**2011-2012 JV Packet**

**•Mars Colonization Affirmative**

**•Mars Colonization Negative**

**•SETI Affirmative**

**•SETI Negative**

**•NASA Tradeoff Disadvantage**

**•NASA Tradeoff Disadvantage Affirmative**

**•Privatization Disadvantage**

**•Privatization Disadvantage Affirmative**

**Resolved: The United States federal government should substantially increase its exploration and/or development of space beyond the Earth’s mesosphere.**

**Mars Colonization Affirmative**

# Mars Colonization Affirmative

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# Explanation

Humans have long been fascinated with the other planets in the Solar System. Hundreds of years ago, we believed that the Earth was the center of the universe. Now we know that all of the planets in our solar system orbit around the sun, not the Earth. Despite the immense amount that we have learned since this time through science, there remains the same interest and fascination with outer space.

This case argues that the United States should attempt to establish a permanent human presence on Mars, like a colony. The case believes that this is a good idea because of the many problems that plague people on Earth. There are nuclear weapons, deadly diseases, and a growing population, all of which have the potential to cause great harm to humans. Following the logic that you shouldn’t put all of your eggs in one basket, the case argues that if we had people on a different planet that we would have an insurance policy in case a disaster happened on Earth.

Finally, this case argues that the technology to reach and set up a place to live on Mars is possible with our current technology. Mars is a very attractive option to attempt to colonize because it is a similar size and has a comparable climate to Earth.

# Glossary

**Key Words**:

**Colonize** – sending settlers to a new area with the aim of gaining control of it.

**Status quo** – The world as it is presently

**De-orbited**- taken out of orbit, allowing an object to crash into Earth

**Wane** – When something, like interest in a subject, decreases

**Frontier** – the outer limit of territory that humanity has colonized. Antarctica is a frontier because no humans live there. So is the moon.

**Extinction** – When no more of a species remain. For example, dinosaurs are extinct

**Epidemics** – a widespread and deadly disease. AIDS is an epidemic.

**confined** – restricted or cramped

regions

**self-sustaining** – something that can function on its own.

**Catastrophe** – an event causing great damage and suffering

**Demise** – Something’s demise is its death.

**Species** – a class of living thing. Humans are a species, just like ants or oak trees

**Extinct** – when a species no longer exists

**Implement** – to put into action

**Intriguing** – interesting

**Reserves** – Something stored for later, perhaps in the event of a tragedy

**Inhabitants** – the organisms that live in a certain area

**Vulnerable** – something that is easily open to harm is vulnerable

**springboard** – a point to begin from, like a launch pad.

**Asteroid** – a rocky body, smaller than a planet, that is flying through space with the potential to hit other planets

Key Phrases:

**Axial tilt –** the amount that a planet “wobbles” back and forth along the imaginary line that it spins around. You may have learned that on the Earth are caused by its axial tilt.

**Inelegant Jargon** – Jargon is special words used by people in a specific area (like debaters and “disad” or “1AC”) that are hard for people to understand. Inelegant jargon are phrases that don’t flow easily.

**Diminishing returns –** The idea that it in any area, it is easier to get the basics down than to master everything. For example, the first time you read a book you will learn a lot because you have never read it before. However, the second time you read it you will learn fewer new things because there is less left that you didn’t already know and only the tricky details remain

**Survival prospects** – the likelihood that humans would survive

**Formulate a strategy** – to come up with a plan of action

**Habitable location for homo sapiens** – a place that humans could live in

**Ecological collapse –** when an environment becomes unlivable for many of its inhabitants. For example, if a fresh water lake became contaminated with salt water, many of the plants and animals would not be able to survive, and the lake would suffer an ecological collapse

**Microbial life** – Bacteria, germs, and other organisms that only can be seen through microscopes

**Scientific facility** – a place where scientific experiments are conducted. Think of a lab.

**Political and social implications –** the effects that something would have on the way people work in government and how they interact with each other in society more generally

**El Dorado** – A mythical city of gold that colonizers of the Americas sought. When El Dorado is used today, it refers to an ideal place with great riches that either does not exist or would be very difficult to attain.

**Acronyms**:

**ISS** - International Space Station

**NASA** – National Aeronautics and Space Administration

# 1AC [1/6]

**Contention 1: Inherency**

**The end of the space shuttle program is a symbol of the end of American interest in space exploration. There are currently no plans to colonize Mars, or any other planet.**

**The Economist, 6/30/2011, “The End of the Space Age,” http://www.economist.com/node/18897425**

The reason for that second objective is also the reason for thinking 2011 might, in the history books of the future, be seen as the year when the space cadets’ dream finally died. It marks the end of America’s space-shuttle programme, whose last mission is planned to launch on July 8th (see [article](http://www.economist.com/node/18895018), [article](http://www.economist.com/node/18895010)). The shuttle was supposed to be a reusable truck that would make the business of putting people into orbit quotidian. Instead, it has been nothing but trouble. Twice, it has killed its crew. If it had been seen as the experimental vehicle it actually is, that would not have been a particular cause for concern; test pilots are killed all the time. But the pretence was maintained that the shuttle was a workaday craft. The technical term used by NASA, “Space Transportation System”, says it all. But the shuttle is now over. The ISS is due to be de-orbited, in the inelegant jargon of the field, in 2020. Once that happens, the game will be up. There is no appetite to return to the moon, let alone push on to Mars, the El Dorado of space exploration. The technology could be there, but the passion has gone—at least in the traditional spacefaring powers, America and Russia.

The space cadets’ other hope, China, might pick up the baton. Certainly it claims it wishes, like President John Kennedy 50 years ago, to send people to the surface of the moon and return them safely to Earth. But the date for doing so seems elastic. There is none of Kennedy’s “by the end of the decade” bravura about the announcements from Beijing. Moreover, even if China succeeds in matching America’s distant triumph, it still faces the question, “what next?” The chances are that the Chinese government, like Richard Nixon’s in 1972, will say “job done” and pull the plug on the whole shebang. With luck, robotic exploration of the solar system will continue. But even there, the risk is of diminishing returns. Every planet has now been visited, and every planet with a solid surface bar Mercury has been landed on. Asteroids, moons and comets have all been added to the stamp album. Unless life turns up on Mars, or somewhere even more unexpected, public interest in the whole thing is likely to wane. And it is the public that pays for it all. The future, then, looks bounded by that new outer limit of planet Earth, the geostationary orbit. Within it, the buzz of activity will continue to grow and fill the vacuum. This part of space will be tamed by humanity, as the species has tamed so many wildernesses in the past. Outside it, though, the vacuum will remain empty. There may be occasional forays, just as men sometimes leave their huddled research bases in Antarctica to scuttle briefly across the ice cap before returning, for warmth, food and company, to base. But humanity’s dreams of a future beyond that final frontier have, largely, faded.

# 1AC [2/6]

**Contention 2: Harms.**

Humans have a limited amount of time left on Earth. Global warming, deadly diseases, and nuclear weapons are just a few of many catastrophes that will eventually endanger all life on Earth.

Michael Huang, writer for The Space Review, 4/11/2005, **“The top three reasons for humans in space,”** [**http://www.thespacereview.com/article/352/1**](http://www.thespacereview.com/article/352/1)

Humankind made it through the 20th century relatively well, but there were close calls: the Cuban Missile Crisis almost began a total war between nuclear-armed superpowers. The 21st century has presented its own distinct challenges. Nuclear and biological weapon technologies are spreading to many nations and groups. Progress in science and technology, while advancing humankind, will also lead to the development of more destructive weapons and possibly other unintended consequences. In addition to these manmade threats, natural threats such as epidemics and impacts from space will continue to be with us. The most valuable part of the universe is life: not only because life is important, but because life appears to be extremely rare. The old saying, “Don’t put all your eggs in one basket”, advises that valuable things should be kept in separate places, in case something bad happens at one of the places. This advice is more familiar to investors in the guise of “diversify your portfolio” and “spread your risk”: one should invest in many different areas in case one area declines disastrously. The same principle applies to the big picture. The most valuable part of the universe is life: not only because life is important, but because life appears to be extremely rare. Life and humankind are presently confined to the Earth (although we have built habitats in Earth orbit and ventured as far as the moon). If we were throughout the solar system, at multiple locations, a disaster at one location would not end everything. If we had the technologies to live in the extreme environments beyond Earth, we would be able to live through the extreme environments of disaster areas and other regions of hardship.

# 1AC [3/6]

**In fact, the likelihood of human extinction due to one of many disasters is likely at least 10% over the next several centuries.**

**Bruce E. Tonn, Department of Political Science, U. Of Tennessee, 09/2009, Department of Political Science, U of Tennessee, “Obligations to Future Generations and Acceptable Risks of Human Extinction,” Futures, 41:7, p. 427-435**

[**http://www.sciencedirect.com/science/article/pii/S0016328709000020**](http://www.sciencedirect.com/science/article/pii/S0016328709000020)

The litany of catastrophe-scale problems facing humanity is long and well known [1]. The set of catastrophic-scale events includes nuclear war, global climate change, massive volcanic eruptions, and collisions with near-earth objects [2]. Humanity is also plagued by myriad lesser risks that, when chained together, could equal or possibly even surpass risks posed by catastrophic events. Imagine the consequences of chaining to together the worst outcomes of terrorism, energy shortages, flu pandemics, HIV/AIDS, air and water pollution, water shortages, soil erosion, species extinction, and forest fire. Indeed, history has witnessed the collapse of many civilizations due to chains of less than catastrophic events, usually anchored by the overutilization of natural resources [3]. Last but not least is the set of potential exotic catastrophic events, which includes out-of-control (grey goo) nanotechnologies [4], the emergence of threatening super computer intelligences [5], bombardment by gamma rays emanating from explosions of super novae [6] and [7] and the creation of earth-destroying tears in the fabric of space–time within new high-energy physics devices [8,9]. Because of the perceived weight of these threats, many knowledgeable people believe that the situation facing humanity is extremely dire [10], so dire that human extinction not only seems quite possible but also very probable. For example, Rees [8] puts the chances of human civilization surviving another 100 years to be just 50–50. Bostrom [9] argues that the imminent chances of human extinction cannot be less than 25%. Leslie [11] estimates a 30% probability of human extinction during next five centuries. The Stern Review conducted for the United Kingdom Treasury assumes probability of human extinction during next century is 10% [[12]](http://www.sciencedirect.com/science/article/pii/S0016328709000020" \l "bbib12)

Plan: The United States federal government should direct the National Aeronautics and Space Administration to develop and implement a strategy to send humans to Mars, in order to establish a permanent human presence in space.

# 1AC [4/6]

**Contention 3: Solvency.**

**Colonizing another planet, specifically Mars, will provide a “life insurance policy” against these disasters on Earth, ensuring that human kind will survive even after one of these catastrophic events.**

**J. Richard Gott, Professor of Astrophysics at Princeton University, 6/17/2009, “A Goal For The Human Spaceflight Program,” http://www.nasa.gov/pdf/368985main\_GottSpaceflightGoal.pdf**

The goal of the human spaceflight program should be to increase the survival prospects of the human race by colonizing space. Self-sustaining colonies in space, which could later plant still other colonies, would provide us with a life insurance policy against any catastrophes which might occur on Earth.

Fossils of extinct species offer ample testimony that such catastrophes do occur. Our species is 200,000 years old; the Neanderthals went extinct after 300,000 years. Of our genus (Homo) and the entire Hominidae family, we are the only species left. Most species leave no descendant species. Improving our survival prospects is something we should be willing to spend large sums of money on— governments make large expenditures on defense for the survival of their citizens.

The Greeks put all their books in the great Alexandrian library. I’m sure they guarded it very well. But eventually it burnt down taking all the books with it. It’s fortunate that some copies of Sophocles’ plays were stored elsewhere, for these are the only ones that we have now (7 out of 120 plays). We should be planting colonies off the Earth now as a life insurance policy against whatever unexpected catastrophes may await us on the Earth. Of course, we should still be doing everything possible to protect our environment and safeguard our prospects on the Earth. But chaos theory tells us that we may well be unable to predict the specific cause of our demise as a species. By definition, whatever causes us to go extinct will be something the likes of which we have not experienced so far. We simply may not be smart enough to know how best to spend our money on Earth to insure the greatest chance of survival here. Spending money planting colonies in space simply gives us more chances--like storing some of Sophocles’ plays away from the Alexandrian library.

If we made colonization our goal, we might formulate a strategy designed to increase the likelihood of achieving it. Having such a goal makes us ask the right questions. Where is the easiest place in space to plant a colony—the place to start? Overall, Mars offers the most habitable location for Homo sapiens in the solar system outside of Earth, as Bruce Murray has noted. Mars has water, reasonable gravity (1/3rd that of the Earth), an atmosphere, and all the chemicals necessary for life. Living underground (like some of our cave dwelling ancestors) would lower radiation risks to acceptable levels. The Moon has no atmosphere, less protection against solar flares and galactic cosmic rays, harsher temperature ranges, lower gravity (1/6th that of the Earth), and no appreciable water. Asteroids are similar. The icy moons of Jupiter and Saturn offer water but are much colder and more distant. Mercury and Venus are too hot, and Jupiter, Saturn, Uranus, and Neptune are inhospitable gas giants. Free floating colonies in space, as proposed by Gerard O’Neill, would need material brought up from planetary or asteroid surfaces. If we want to plant a first permanent colony in space, Mars would seem the logical place to start.

# 1AC [5/6]

**Colonizing Mars is possible – the planet has many characteristics similar to Earth.**

**Fraser Cain, Publisher for Universe Today, 6/8/2008, “Mars Colonizing”,** [**http://www.universetoday.com/14883/mars-colonizing/**](http://www.universetoday.com/14883/mars-colonizing/)

Mars makes an intriguing target for human colonizing. Let’s see what some of the Mars colonizing advantages are: It has a very similar length of day. A Martian day is 24 hours and 39 minutes, so plants and animals might find that familiar. It has an axial tilt very similar to Earth. This gives it familiar seasons to our home planet. It has vast reserves of water in the form of ice. This water would be essential for human travelers to Mars, and could also be used to make rocket fuel and hydrogen for fuel. Robert Zubrin, in his book, “The Case for Mars”, explains how future human colonists might be able to live off the land when traveling to Mars, and eventually colonizing it. Instead of bringing all their supplies from Earth – like the inhabitants of the International Space Station – future colonists would be able to make their own air by splitting water on Mars into oxygen and hydrogen. This Martian water would also be used for drinking, and even rocket fuel. Preliminary experiments have shown that Mars soil could be baked into bricks to create protective structures. Earth plants could even be grown in Martian soil, assuming they get enough sunlight and carbon dioxide. Over time, there may be many mineral deposits that could be discovered on Mars and sent back to Earth for sale. In the far future, there might be a viable economy between Martian colonists and the home planet. Launching precious metals, like platinum, off the surface of Mars would be relatively inexpensive thanks to its lower gravity. And in the far future, Mars colonizing might include terraforming Mars, raising the temperature of the planet to the point that its water melts and vast reserves of gas escape and thicken the atmosphere. One day, there could be real Martians, and they would be us. Here’s a great article written by Nancy Atkinson about the possibility of a one-way, one-person trip to Mars. What about using microbes to help colonize mars. The Mars Society is working to try and colonize Mars. And Red Colony is a great resource of articles about colonizing Mars. Finally, if you’d like to learn more about Mars in general, we have done several podcast episodes about the Red Planet at Astronomy Cast. Episode 52: Mars, and Episode 91: The Search for Water on Mars.

# 1AC [6/6]

**Finally, colonizing mars provides a stepping-stone for looking for life on other planets and for colonizing deeper into the Solar System.**

Drik Schulze-Makuch, Professor at the **School of Earth and Environmental Sciences, Washington State University** and Paul Davies, **Co-Director of the Cosmology Initiative, Arizona State University, October 2010,** “**To Boldly Go: A One-Way Human Mission to Mars**”[**http://journalofcosmology.com/Mars108.html**](http://journalofcosmology.com/Mars108.html)

There are several reasons that motivate the establishment of a permanent Mars colony. We are a vulnerable species living in a part of the galaxy where cosmic events such as major asteroid and comet impacts and supernova explosions pose a significant threat to life on Earth, especially to human life. There are also more immediate threats to our culture, if not our survival as a species. These include global pandemics, nuclear or biological warfare, runaway global warming, sudden ecological collapse and supervolcanoes (Rees 2004). Thus, the colonization of other worlds is a must if the human species is to survive for the long term. The first potential colonization targets would be asteroids, the Moon and Mars. The Moon is the closest object and does provide some shelter (e.g., lava tube caves), but in all other respects falls short compared to the variety of resources available on Mars. The latter is true for asteroids as well. Mars is by far the most promising for sustained colonization and development, because it is similar in many respects to Earth and, crucially, possesses a moderate surface gravity, an atmosphere, abundant water and carbon dioxide, together with a range of essential minerals. Mars is our second closest planetary neighbor (after Venus) and a trip to Mars at the most favorable launch option takes about six months with current chemical rocket technology. In addition to offering humanity a "lifeboat" in the event of a mega-catastrophe, a Mars colony is attractive for other reasons. Astrobiologists agree that there is a fair probability that Mars hosts, or once hosted, microbial life, perhaps deep beneath the surface (Lederberg and Sagan 1962; Levin 2010; Levin and Straat 1977, 1981; McKay and Stoker 1989; McKay et al. 1996; Baker et al. 2005; Schulze-Makuch et al. 2005, 2008, Darling and Schulze-Makuch 2010; Wierzchos et al. 2010; Mahaney and Dohm 2010). A scientific facility on Mars might therefore be a unique opportunity to study an alien life form and a second evolutionary record, and to develop novel biotechnology there from. At the very least, an intensive study of ancient and modern Mars will cast important light on the origin of life on Earth. Mars also conceals a wealth of geological and astronomical data that is almost impossible to access from Earth using robotic probes. A permanent human presence on Mars would open the way to comparative planetology on a scale unimagined by any former generation. In the fullness of time, a Mars base would offer a springboard for human/robotic exploration of the outer solar system and the asteroid belt. Finally, establishing a permanent multicultural and multinational human presence on another world would have major beneficial political and social implications for Earth, and serve as a strong unifying and uplifting theme for all humanity.

# Overview Effect Advantage

**Committing to space colonization enacts an overview effect, inaugurating the spirit of human wholeness and connectedness—this solves for human fragmentation and violent divisiveness.**

**Isaac Asimov, President of the American Humanist Association, Biochemist, and famous author, 2003 “Our Future in the Cosmos – Space,” http://www.wronkiewicz.net/asimov.html**

I have a feeling that if we really expanded into space with all our might and made it a global project, this would be the equivalent of the winning of the West. It’s not just a matter of idealism or preaching brotherhood. If we can build power stations in space that will supply all the energy the world needs, then the rest of the world will want that energy too. The only way that each country will be able to get that energy will be to make sure these stations are maintained. It won’t be easy to build and maintain them; it will be quite expensive and time-consuming. But if the whole world wants energy and if the price is world cooperation, then I think people are going to do it. We already cooperate on things that the whole world needs. International organizations monitor the world’s weather and pollution and deal with things like the oceans and with Antarctica. Perhaps if we see that it is to our advantage to cooperate, then only the real maniacs will avoid cooperating and they will be left out in the cold when the undoubted benefits come in. I think that, although we as nations will retain our suspicions and mutual hatreds, we will find it to our advantage to cooperate in developing space. In doing so, we will be able to adopt a globalist view of our situation. The internal strife between Earthlings, the little quarrels over this or that patch of the Earth, and the magnified memories of past injustices will diminish before the much greater task of developing a new, much larger world**.** I think that the development of space is the great positive project that will force cooperation, a new outlook that may bring peace to the Earth**,** and a kind of federalized world government. In such a government, each region will be concerned with those matters that concern itself alone, but the entire world would act as a unit on matters that affect the entire world. Only in such a way will we be able to survive and to avoid the kind of wars that will either gradually destroy our civilization or develop into a war that will suddenly destroy it. There are so many benefits to be derived from space exploration and exploitation; why not take what seems to me the only chance of escaping what is otherwise the sure destruction of all that humanity has struggled to achieve for 50,000 years? That is one of the reasons, by the way, that I have come from New York to Hampton despite the fact that I have a hatred of traveling and I faced 8 hours on the train with a great deal of fear and trembling. It was not only The College of William and Mary that invited me, but NASA as well, and it is difficult for me to resist NASA, knowing full well that it symbolizes what I believe in too.

# Inherency Extensions

**[\_\_\_\_]**

**[\_\_\_\_]Without a commitment to colonization, human spaceflight will end.**

**Jeff** **Foust,** **editor and publisher for the Space Review, 6/6/2011**, <http://www.thespacereview.com/article/1860/1>

Jeff Greason [president of XCOR Aerospace and a member of 2009’s Augustine Committee], though, is more pessimistic about the future of at least NASA’s human spaceflight program without a firm strategy in place for space settlement. Without that strategy, he said, “we’re going to build a big rocket, and then we’re going to hope a space program shows up to fly it. Any in my opinion, that strategy—the strategy of default—is going to result in the end of the NASA human spaceflight program” when members of Congress question the wisdom of spending several billion dollars a year on that effort and its lack of progress in an era of constricting budgets. “If we haven’t done better in the next ten years than we have in the last ten years, we’re going to lose that fight, and NASA’s human spaceflight activity will end.”

**[\_\_\_\_]**

**[\_\_\_\_] Governments are not investing in human colonization in the status quo.**

**Joe Falconer, Australian editor of TheNextWeb news service, 6/26/2011, “What Would Colonization of the Final Frontier Look Like?”** [**http://thenextweb.com/industry/2011/06/26/what-would-colonization-of-the-final-frontier-look-like/**](http://thenextweb.com/industry/2011/06/26/what-would-colonization-of-the-final-frontier-look-like/)

Space colonization is something that people have dreamed about since the moon landing, and is in fact considered a priority for the future of mankind by leading scientists. Unfortunately, we’ve all but ignored space colonization and the development of its technologies in recent decades, though there have been a myriad of developments that weren’t intended to advance the cause that will do just that. Aerospace advances, submarines that humans can survive in for months at a time autonomously and experiments like the Biodome have all led to uncovering pieces of the puzzle. It’s not a huge surprise that governments and corporations aren’t investing heavily in space colonization itself. We still need to make many, many more of these ancillary but important advances before we’d make any significant progress in the area. And there’s that other issue – that governments and corporations don’t see a need to ramp up the timeline on this. But Stephen Hawking, one of the few physicists whose name regular people actually know, thinks differently. He’s worried that until we disperse, we’re in imminent danger of a catastrophic event destroying human civilization – heck, human life – for good. “One we spread out into space and establish colonies, our future should be safe,” Hawking [once said](http://news.bbc.co.uk/2/hi/uk_news/6158855.stm) to a BBC reporter. There’s much to consider, and the question of where we should colonize isn’t even chief among them yet. Let’s skip the boring stuff for the moment, though, and start there. Where would we colonize?

# Extinction Inevitable – Human Weapons

**[\_\_\_\_]**

**[\_\_\_\_] Nuclear war is inevitable as resources run out.**

**Andrew R. Jones, Assistant Professor of Sociology at California State University, Fresno, 2009, “The Next Mass Extinction: Human Evolution or Human Eradication”, Journal of Cosmology, 2009, Vol 2, pages 316-333.** [**http://journalofcosmology.com/Extinction108.html**](http://journalofcosmology.com/Extinction108.html)

An additional threat manifests in the form of global warfare. As resources become increasingly scarce, and human populations attempt to migrate away from areas desertified or inundated due to climate change, the use of military force to secure liveable space will come into play (Klare, 2001; McKee, 2009). The likelihood of this scenario is predicated on whether international efforts at cooperation in addressing our collective situation succeed or fail (Klare, 2009; Levy & Sidel, 2009). Failure could result in the probable use of nuclear weapons, and chemical and biological agents to eliminate “problem” populations (Homer-Dixon, 2001). Be it the Khmer rouge of Cambodia, Hitler and the Nazis, the Armenian genocide, the purposeful eradication of the "Native Americans" and so on, history is replete with stark evidence of humanity's willingness to exterminate their fellow humans. With nuclear proliferation and the increasing risk that "rogue states" or international terrorists will acquire and unleash weapons of mass destruction, it would be naive to believe that humans will not attempt to exterminate millions of their fellow humans again in the future. Dwindling resources, competition for clean water, gas, oil, and other commodities, may guarantee it.

**[\_\_\_\_] If nature’s threats don’t end life first, human behavior will lead to their own extinction.**

**Anders Sandberg, Jason Matheny, and Milan Cirkovic, James Martin Research Fellow, Future of Humanity Institute, Oxford University; Special Consultant, Center for Biosecurity, U of Pittsburgh Medical Center;, Senior Research Associate, Astronomical Observatory, Belgrade and Asst. Prof of Physics, 9/9/2008, Bulletin of the Atomic Scientists Online**

The risks from anthropogenic hazards appear at present larger than those from natural ones. Although great progress has been made in reducing the number of nuclear weapons in the world, humanity is still threatened by the possibility of a global thermonuclear war and a resulting nuclear winter. We may face even greater risks from emerging technologies. Advances in synthetic biology might make it possible to engineer pathogens capable of extinction-level pandemics. The knowledge, equipment, and materials needed to engineer pathogens are more accessible than those needed to build nuclear weapons. And unlike other weapons, pathogens are self-replicating, allowing a small arsenal to become exponentially destructive. Pathogens have been implicated in the extinctions of many wild species. Although most pandemics "fade out" by reducing the density of susceptible populations, pathogens with wide host ranges in multiple species can reach even isolated individuals. The intentional or unintentional release of engineered pathogens with high transmissibility, latency, and lethality might be capable of causing human extinction. While such an event seems unlikely today, the likelihood may increase as biotechnologies continue to improve at a rate rivaling Moore's Law.

# Extinction Inevitable – Asteroids

**[\_\_\_\_]**

[\_\_\_\_] In fact, the planet is overdue for a major impact.

A. Ghayur , Lecturer at the University Institute of Information Technology, Pakistan, 2007, “Developing a Three Period Strategy to Face a Global Threat: A Preliminary Analysis”<http://www.aero.org/conferences/planetarydefense/2007papers/P5-1--Ghayur--Paper.pdf>

1694 was the year when a man envisioned a bone chilling scenario after witnessing a Near Earth Object (NEO); “What if it would return and hit the Earth?” The man is now a world renowned scientist, Dr. Edmond Halley, and the object now one of the most famous comets, the Halley’s Comet has returned numerous times without any incident. Human civilization has come a long way since the Dark Ages of mid twentieth century, however, it is only now that the mankind is realizing the veracity of the apocalyptic scenario – a heavenly body colliding with earth – the Hellish nightmare which troubled Dr. Halley. Although the chances of Halley’s Comet plummeting into earth are nearly nonexistent, the chances nevertheless of another NEO colliding head on with earth are very much there. The battle-scared face of moon and the numerous impact craters on earth are a living testament to it. But all this evidence proved insufficient to turn any heads until 1994 when Shoemaker-Levy Nine crashed into Jupiter. The earth-sized storms created on Jupiter surface sent alarms through the echelons of bureaucracy and politics and suddenly a nonexistent apocalyptic nightmare had become a very much possible scenario. 1 Today, we are sitting in the midst of ever increasing human population on this planet Earth, which in turn is sitting amidst ever increasing number of identified NEOs. We are already overdue for our next big hit*; last one occurring 65 million years ago at Chixilub.* Any impact of that scale would result in deaths and displacement of billions, if not more. Do we have a global network and an institution to respond timely and effectively?

## [\_\_\_\_] Extinction from asteroids is inevitable without space colonization.

James Oberg**, Space Writer and former Space Flight Engineer. 1999, “Space Power Theory”**

We have the great gift of yet another period when our nation is not threatened; and our world is free from opposing coalitions with great global capabilities. We can use this period to take our nation and our fellow men into the greatest adventure that our species has ever embarked upon. The United States can lead, protect, and help the rest of mankind to move into space. It is particularly fitting that a country comprised of people from all over the globe assumes that role. This is a manifest destiny worthy of dreamers and poets, warriors and conquerors. In his last book, Pale Blue Dot, Carl Sagan presents an emotional argument that our species must venture into the vast realm of space to establish a spacefaring civilization. While acknowledging the very high costs that are involved in manned spaceflight, Sagan states that our very survival as a species depends on colonizing outer space. Astronomers have already identified dozens of asteroids that might someday smash into Earth. Undoubtedly, many more remain undetected. In Sagan’s opinion, the only way to avert inevitable catastrophe is for mankind to establish a permanent human presence in space. He compares humans to the planets that roam the night sky, as he says that humans will too wander through space. We will wander space because we possess a compulsion to explore, and space provides a truly infinite prospect of new directions to explore. Sagan’s vision is part science and part emotion. He hoped that the exploration of space would unify humankind. We propose that mankind follow the United States and our allies into this new sea, set with jeweled stars. If we lead, we can be both strong and caring. If we step back, it may be to the detriment of more than our country.

# Extinction Inevitable – Overpopulation

**[\_\_\_\_]**

**[\_\_\_\_] Overpopulation will eventually render Earth inhabitable.**

**Nawal Mahmood, writer for the tech journal, 6/28/2010,** [**http://thetechjournal.com/science/eminent-scientist-claims-humans-will-be-extinct-in-100-years.xhtml#ixzz1Qt1nhm6n**](http://thetechjournal.com/science/eminent-scientist-claims-humans-will-be-extinct-in-100-years.xhtml#ixzz1Qt1nhm6n)

Eminent biologist Professor Frank Fenner, who helped to eradicate smallpox, recently made the dire prediction that humans will probably be extinct within the next 100 years due to overpopulation, environmental destruction and climate change. Fenner, who is emeritus professor of microbiology at the Australian National University (ANU) in Canberra, said homo sapiens will not be able to survive the population explosion and “unbridled consumption,” and will become extinct, perhaps within a century, along with many other species. United Nations official figures from last year estimate the human population is 6.8 billion, and is predicted to pass seven billion next year. Fenner told *The Australian* he tries not to express his pessimism because people are trying to do something, but keep putting it off. He said he believes the situation is irreversible, and it is too late because the effects we have had on Earth since industrialization (a period now known to scientists unofficially as the Anthropocene) rivals any effects of ice ages or comet impacts.

**[\_\_\_\_] Overpopulation will cause extinction. The population has tripled in the last century.**

**Melinda Ham, Writer for the Sydney Morning Herald, 3/21/2011, “The world keeps on churning; overpopulation – our changing environment Part I”**

Mankind is losing the numbers game, writes Melinda Ham. The population of the world's low-income or developing countries is growing at a faster rate than in the higher-income or "developed" countries. In many cases worldwide, this growth is unsustainable, causing overpopulation and putting immense pressure on economic resources and essential services, resulting in poverty and environmental problems. WHY SO MANY PEOPLE ON THE PLANET? During the 19th and early 20th centuries, the development of modern medicine and the control of infectious diseases decreased death rates around the developed world. After the Second World War, this population growth spread to the developing world, resulting in a global population explosion and urban expansion. The number of people on the planet has tripled in only a century, according to the World Bank report Beyond Economic Growth, published in 2004. This has caused "overpopulation", especially in developing countries, where insufficient economic resources means clean water, food, hospitals, schools and jobs can be scarce. This also causes increased pollution and deforestation. HOW BIG WILL THE POPULATION GET? Many push-and-pull factors affect how much world population will increase. By early next year, the United Nations' Population Fund (UNFPA) estimates the world will have reached 7 billion people and go beyond 9 billion by 2050. Most of this growth will still be in the 49 least-developed countries, even though the number of babies women are having is decreasing markedly. Simultaneously, the population growth also depends on the impact of the HIV/AIDS epidemic. If, for some reason, women in less-developed countries stop using contraception, the world population would increase by nearly twice as much as projected, the World Bank says.

# Answers To: War in Space

**[\_\_\_\_]**

## [\_\_\_\_] Space colonization will eliminate ethnic tensions.

The Columbus Dispatch**, 5/23/**2001

There may come a time when humans will consider space colonization. Initiatives such as the space station and a manned Mars landing could be steppingstones toward pitching a tent on another world. In one unexpected consequence, an international push into space could be the great uniter. The heavens, so immense and enigmatic, could make ethnic and religious groups look beyond their problems with each other. Everyone has a stake in this trip.

**[\_\_\_\_]**

## [\_\_\_\_] Space colonization will end nationalism.

**Frank** White, **space lecturer and writer**, 1990, **The SETI Factor**

Many scholars and scientists see benefits in opening up the “space frontier.” It provides an opportunity to divert nationalistic energies away from war and toward peaceful cooperation ventures; it also offers an expanded range in which to work out new forms of societal and political interaction. In the Overview Effect, I pointed out that space exploration also provides an opportunity for human awareness to evolve and transform itself because it provides us with a new perspective on the earth, the universe, and ourselves. The defining feature of the space development subculture is a refusal to consider the future of humanity as confined to the surface of one planet. While members of the space development community may be concerned about the future of Earth, it is not because they plan to stay here. They see themselves as the leaders in creating a “spacefaring civilization,” and making humanity into a “multi-planet species.”

# Overview Effect Extensions

**[\_\_\_\_]**

**Experiencing the “Overview Effect” solves war as we shift to a more peaceful mindset.**

**Frank White, space writer and lecturer, 1998, “The overview effect: space exploration and human evolution” page 48**

The space frontier has become a symbol of humanity working out its destiny: war or peace, cooperation or competition, love or hate. The Overview Effect says it all: we are one; we are all in this together; war and strife solve nothing.Returning to Earth, the astronaut has many choices regarding transmission of the message, and each per-son uses the experience in terms of his or her own interests and place in society. However, because of the cultural role that they have played, people who have been in space often have creditability un-matched by others**.** Many of our cultures are replete with the stories of angels, messengers, sky-gods who come from above with a better view of what is happening below. Even for those who are not reli-gious, this symbolism of people who go into the regions of God (or the gods) and return must be powerful. And previously pointed out by Loren Acton, the influence of astro-nauts, cosmonauts, and other space travelers back to Earth may be the most important aspect of recent missions. The Space Shuttle Program,regardless of the other benefits it may or may not bring to soci-ety,is consolidating the impact of the effect and the supporting its dissemination to the people on Earth. The ultimate impact could be substantial, Nelson suggested, **if** the superpower leaders would have to ar-range a summit meeting in space in the next century. “It would have a positive effect on their making decisions on war and peace.” Ultimately, the Space Shuttle points to a future when living on the frontier with a new perspective will be normal. As Bonnie Dunbar put it, “With success flights, I have become more at home in Space….. I miss looking down n the Earth and out into the universe.” Her views are echoed by Al Sacco, a recent space flier: “For me, being in orbit was very comforting. In some ways, I was more comfortable in space than on Earth, and I hated to leave that environment.”

# Overview Effect Extensions

**[\_\_\_\_]**

**[\_\_\_\_] Colonizing space will cause the next renaissance and promote universal prosperity and clarity.**

Patrick Collins and Adriano Autino, **Professor of Economics at Azabu University (Japan); President of the Space Renaissance International,** 2008 **“What the Growth of a Space Tourism Industry Could Contribute to Employment, Economic Growth, Environmental Protection, Education, Culture and World Peace”**

Healthy societies can revitalise themselves. An interesting explanation of the potential of space travel and its offshoots to revitalise human civilisation is expressed in the idea that "The Earth is not sick: she's pregnant" [35]. Although this idea may seem strange at first sight, it is a surprisingly useful analogy for understanding humans' current predicament. According to the "Pregnant Earth" analogy, the darkening prospect before humanity is due to humans' terrestrial civilisation being "pregnant"—and indeed dangerously overdue—with an extra-terrestrial offspring. Once humans' space civilisation is safely born, the current stresses on the mother civilisation will be cured, and the new life may eventually even surpass it's parent. This idea not only illuminates many aspects of humans' present problems described above, it also provides detailed directions for how to solve these problems, and explains convincingly how successfully aiding this birth will lead to a far better condition than before the pregnancy. A young couple may be happy in each other's company, but their joy is increased by the birth of children and life with them, from which many new possibilities arise. Likewise, the birth of humans' coming extra-terrestrial civilisation will lead to a wide range of activities outside our planet's precious ecosystem. This evolution will solve not just our material problems, by making the vast resources of near-Earth space accessible, but it will also help to cure the emptiness of so-called "modern" commercial culture -- including the "dumbing down" by monopolistic media, the falling educational standards, passification by television, obesity, ever-growing consumption of alcohol, decline in public morality, pornography, narcotics, falling social capital, rising divorce rates, and youths' lack of challenge and lack of "dreams". It will do this by raising humans' sights to the stars, and showing that the door to them is unlocked, and has been for decades—we have only to make a small effort to push it open forever. In addition, re-opening a true geographical frontier, with all its challenges, will in itself be of inestimable value for the cultural growth of modern civilisation. The widespread sense that we live in a closed world which is getting more and more crowded will be replaced by an open-ended, optimistic vision of an unlimited future. Access to the cornucopia of space resources that await humans' exploitation can clearly make a unique contribution to this. To the extent that leaders of major industries are motivated by ambition in business competition, they will welcome this opportunity to extend their activities to new fields in the far wider arena of space. However, to the extent that they are motivated by the attempt to achieve monopolistic control and profits, they may try to hinder development in space, even at the cost of preventing its wide benefits, since this could be more profitable to them. Implementing the "Pregnant Earth" agenda can prevent this cultural regression and start a true world-wide Renaissance, an unprecedented ﬂowering of civilisation of which human culture has been in need ever since the inspiration of the Italian Renaissance was followed by a decline into progressive materialism and war-mongering [35].

# Solvency Extensions

**[\_\_\_\_]**

**[\_\_\_\_]Space Development requires more funding and new visions.**

**Michael Griffin, Administrator of NASA, seven degrees in the fields of Physics, Electrical Engineering, Aerospace Engineering, 2003: “The Future of Human Space Flight,”** [**http://www.spaceref.com/news/viewsr.html?pid=10683)[KEZIOS**](http://www.spaceref.com/news/viewsr.html?pid=10683)%5bKEZIOS)

The required time to achieve the intermediate milestones is irrevocably tied to funding constraints. If no new funding can be provided, we will spend the next several years - probably a decade - working our way out of the Space Shuttle and International Space Station dilemmas, even proceeding as expeditiously as possible. It will be difficult, likely impossible, to begin development of (for example) heavy lift launch vehicles and space nuclear power systems while restricting NASA to today's budget levels and simultaneously respecting current obligations to ISS. Yet, these technologies and others are crucial to any permanent step beyond LEO. There is a lot of ground to be made up, but with a $5 B annual funding increase for NASA, I believe one could expect to see the first lunar base within a decade. What is needed is a different view of spaceflight in the affairs of men and nations than we have so far seen. Space programs in the United States have so far have been just that - programs. They are justified individually, each on its own merits, and have defined goals, funding, start dates and, it is hoped, completion dates. Space activities so far have been largely episodic, when in fact they need to become, again, a way of life. NASA and the space community generally, whether civil or DoD, receive frequent criticism for the high cost of what we do, the cumbersome pace at which it often seems to proceed, and the not infrequent failures which occur. This may not be entirely unfair; it is my own belief that the nation is entitled to expect a higher standard of performance on space projects than has often been the case in recent years. But we in the space community - the engineers who must execute a multiyear vision one budget year at a time - are, I think, entitled to expect a higher and more consistent standard of commitment by the nation, through its policymakers, to that vision.

[\_\_\_\_] Our only chance of survival is to move into space.

**Niall Firth, writer for The Daily Mail, 8/10/2010, “Human race 'must colonise space or face extinction', warns Stephen Hawking”** [**http://www.dailymail.co.uk/sciencetech/article-1301482/Human-race-colonise-space-face-extinction-warns-Stephen-Hawking.html**](http://www.dailymail.co.uk/sciencetech/article-1301482/Human-race-colonise-space-face-extinction-warns-Stephen-Hawking.html)

‘If we are the only intelligent dead’beings in the galaxy we should make sure we survive and continue.’ But he warned that mankind was entering an increasingly dangerous period. ‘Our population and use of the finite resources of planet Earth are growing exponentially along with our technical ability to change the environment for good and ill,’ said the author of the bestseller, A Brief History of Time. ‘But our genetic code carries selfish and aggressive instincts that were a survival advantage in the past. It will be difficult enough to avoid disaster in the next 100 years let alone the next thousand or a million. 'Our only chance of long-term survival is not to remain on planet Earth but to spread into space. ‘We have made remarkable progress in the last 100 years but if we want to continue beyond the next 100 years our future is in space.’

# Answers To: Can’t Establish a Colony Fast Enough

**[\_\_\_\_]**

**[\_\_\_\_] Space Colonization is possible due to new propulsion technologies.**

**Clara Moskowitz, staff writer for Space.com, 2/1/2010, “NASA’s Far-Out New Plans,” http://www.space.com/7852-nasa-plans.html,**

One of the possible consequences of new commercial space vehicles and new propulsion mechanisms is the chance that human civilians could travel to space in large numbers for the first time. That means that space vacations and moon hotels may not be a mere pipe dream anymore. "I am excited to think that the development of commercial capabilities to send humans into low earth orbit will likely result in so many more earthlings being able to experience the transformative power of spaceflight," Apollo 11 astronaut Buzz Aldrin said in a statement. In his comments, Bolden echoed this sentiment. "Imagine enabling hundreds, even thousands of people to visit or live in low-Earth orbit, while NASA firmly focuses its gaze on the cosmic horizon beyond Earth," he said.

**[\_\_\_\_]**

**[\_\_\_\_] A direct trip to mars would be quick.**

**Robert Zubrin, Aerospace engineer and founder of the Mars Society, 6/24/1996, “The case for Mars,”**

Mars Direct says what it means. The plan discards unnecessary, expensive, and time-consuming detours: no need for assembly of spaceships in low Earth orbit; no need to refuel in space; no need for spaceships hangars at an enlarged Space Station, and no requirement for dawn-out development of lunar bases as a prelude to Mars exploration. Avoiding these detours brings the first landing on Mars perhaps twenty years earlier than would otherwise happen, and avoids the ballooning administrative cost that tend to afflict extended government programs.

# Answer To: Health Risks in Space

**[\_\_\_\_]**

## [\_\_\_\_] Nuclear power creates artificial gravity- avoids adverse effects.

**Space.com, 5/21/2000, http://www.space.com/scienceastronomy/solarsystem/nuclearmars\_000521.html**

One of the great added strengths of the Bimodal Nuclear Thermal Rocket is that it can be used to generate not only thrust, but all the power that a crew needs during interplanetary travel. Once the crew-transfer vehicle escapes from Earth orbit and reaches speed on its trip to Mars, the engines are brought down to an idle. Their heat is routed through a generator to produce power for crew survival, high data-rate communications, and even a refrigerator to keep the liquid hydrogen fuel from boiling off into space. Because liquid hydrogen boils at minus 423 degrees Fahrenheit (minus 217 degrees Celsius), the loss of hydrogen propellant is a serious problem which forces most mission designers to carry a great deal of extra propellant to make up for the loss. With nuclear reactors, though, there is plenty of energy to run a refrigeration system to keep the hydrogen cold. This greatly reduces the total mass of the vehicle. Nuclear reactors even provide enough power to create artificial gravity, a feature that should protect the astronaut crew from the physiological ravages of living in low-gravity conditions for extended periods.

**[\_\_\_\_]**

**[\_\_\_\_[ Radiation doesn’t pose significant risks to Mars cosmonauts, shelter sufficient.**

**Robert Zubrin, Aerospace engineer and founder of the Mars Society, Journal of Cosmology, October-November 2010, Vol 12, 3549-3557. “Human Mars Exploration: The Time Is Now”** [**http://journalofcosmology.com/Mars111.html**](http://journalofcosmology.com/Mars111.html)

It is alleged by some that the radiation doses involved in a Mars mission present insuperable risks, or are not well understood. This is untrue. Solar flare radiation, consisting of protons with energies of about 1 MeV, can be shielded by 12 cm of water or provisions, and there will be enough of such materials on board the ship to build an adequate pantry storm shelter for use in such an event. The residual cosmic ray dose, about 50 Rem for the 2.5 year mission, represents a statistical cancer risk of about 1%, roughly the same as that which would be induced by an average smoking habit over the same period.

# Answers To: Colonization Technologically Impossible

**[\_\_\_\_]**

**[\_\_\_\_] Leading experts in the field conclude that funding a human mission to Mars can establish a human colony using current technology.**

**Jeremy A. Kaplan, Executive Editor of PC Magazine, 12/30/2010 “NASA Scientist Publishes 'Colonizing the Red Planet,' a How-To Guide”, http://www.pcmag.com/author-bio/jeremy-a.-kaplan**

A manned mission to Mars would be the greatest adventure in the history of the human race**.** And one man knows how to make it a reality. In fact, he just wrote the book on it -- literally. Joel Levine, senior research scientist with NASA's Langley Research Center and co-chair of NASA's Human Exploration of Mars Science Analysis Group, just published "The Human Mission to Mars: Colonizing the Red Planet." The book reads like a who's who of Mars mission science, featuring senators, astronauts, astrophysicists, geologists and moreon getting to Mars, studying its atmosphere and climate, the psychological and medical effects on the crew and other details. There's even a section detailing the science of sex on Mars, should NASA attempt to create a permanent colony there. "For the last three years, I've been co-chairing a panel of about 30 U.S. and Canadian scientists, coming up with a blueprint, purely from a scientific perspective, of humanity's role on Mars," Levine told FoxNews.com. He was asked to put together a special edition of the Journal of Cosmology exploring the topic, which was just published as the new book. "The United States of America is the only country that can do this successfully right now," he said. And to remain the technological leader of the world, he argued, we need to do this. And it's quite possible**,** the book notes; after all, a trip to Mars isn't even a lengthy one.

# Answers To: Colonization Technologically Impossible

**[\_\_\_\_]**

**[\_\_\_\_] We can reach mars quickly with current technology.**

**Robert Zubrin, Aerospace engineer and founder of the Mars Society, 5/14/2011, “How We Can Fly to Mars in This Decade—And on the Cheap”, Wall Street Journal**

Nothing in this plan is beyond our current technology, and the costs would not be excessive. Falcon-9 Heavy launches are priced at about $100 million each, and Dragons are cheaper. With this approach, we could send expeditions to Mars at half the cost to launch a Space Shuttle flight. There is no question that this plan involves considerable risk, and a variety of missions, technology developments and testing programs in advance might reduce that risk. But if we try to do even a significant fraction before committing to the mission, we will never get to Mars. Is it responsible to forgo any expenditure that might reduce the risk to the crew? I believe so. The purpose of the space program is to explore space, and its expenditures come at the cost of other national priorities. If we want to reduce risk to human life, there are vastly more effective ways of doing so than by spending $10 billion per year for the next two or three decades on a human spaceflight program mired in low Earth orbit. We could spend the money on childhood vaccinations, fire escape inspections, highway repairs, better body armor for the troops—take your pick. For NASA managers to demand that the mission be delayed for decades while hundreds of billions are spent to marginally reduce the risk to a handful of volunteers, when the same funds spent on other priorities could save the lives of tens of thousands, is narcissistic in the extreme. The Falcon 9 Heavy is scheduled for its first flight in 2013. All of the other hardware elements in this plan could be made ready for flight within the next few years. NASA's astronauts have gone nowhere new since 1972, but these four decades of wasteful stagnation need not continue. If President Obama were to act decisively and embrace this plan, we could have our first team of human explorers on the Red Planet by 2016.

# Answers To: Privatization DA / CP

**[\_\_\_\_]**

**[\_\_\_\_] Governments must pioneer on a mission to mars in order to allow the private sector to follow behind it.**

**Charles Q. Choi, journalist for Astrobiology Magazine, 2/10/2011, “Red Planet for Sale? How Corporate Sponsors Could Send Humans to Mars,” Space.com**

It could be argued that NASA and other government space agencies should spearhead a human mission to Mars instead of corporations because of cost and safety. Astronauts have never set foot on Mars, and like the Apollo missions that sent men to the moon, the mission to Mars would need teams of engineers and other scientists working together over many years, with cost concerns more about staying under a projected budget than earning big profits. Governments also pioneered space travel due to the risky and untested aspects of venturing into such territory. Only after pushing boundaries to make voyages into space safer, more routine and less expensive, could business go where they once feared to tread. "I think it likely most people would find it difficult to conceive there wouldn't be any government involvement in such a mission," said space-law expert Timothy Nelson at New York-based law firm Skadden. "The possession of a rocket alone would probably trip you up on the military regulations that govern the ownership of missile technology in the United States. Not to sound too cynical, but space rockets were built as a byproduct of the arms race." There is no ban on putting ads on the sides of spacecraft or for licensing TV broadcast rights on such missions in the existing law regarding outer space, Nelson added. "The question becomes, economically, whether you can generate enough license fee revenue to pay for what you're trying to do," he said.

# Article: Why Spaceflight Has Ended

**The Economist: *The End of the Space Age: Inner space is useful. Outer space is history*. June 20th, 2011.**

HOW big is the Earth? Any encyclopedia will give you an answer: its equatorial diameter is 12,756km, or, for those who prefer to think that way, 7,926 miles. Ah, but then there is the atmosphere. Should that count? Perhaps the planet’s true diameter is actually nearer 13,000km, including all its air. But even that may no longer be an adequate measure. For the Earth now reaches farther still. The vacuum surrounding it buzzes with artificial satellites, forming a sort of technosphere beyond the atmosphere. Most of these satellites circle only a few hundred kilometres above the planet’s solid surface. Many, though, form a ring like Saturn’s at a distance of 36,000km, the place at which an object takes 24 hours to orbit the Earth and thus hovers continuously over the same point of the planet.

Viewed this way, the Earth is quite a lot larger than the traditional textbook answer. And viewed this way, the Space Age has been a roaring success. Telecommunications, weather forecasting, agriculture, forestry and even the search for minerals have all been revolutionised. So has warfare. No power can any longer mobilise its armed forces in secret. The exact location of every building on the planet can be known. And satellite-based global-positioning systems will guide a smart bomb to that location on demand.

Yet none of this was the Space Age as envisaged by the enthusiastic “space cadets” who got the whole thing going. Though engineers like Wernher von Braun, who built the rockets for both Germany’s second-world-war V2 project and America’s cold-war Apollo project, sold their souls to the military establishment in order to pursue their dreams of space travel by the only means then available, most of them had their eyes on a higher prize. “First Men to a Geostationary Orbit” does not have quite the same ring as “First Men to the Moon”, a book von Braun wrote in 1958. The vision being sold in the 1950s and 1960s, when the early space rockets were flying, was of adventure and exploration. The facts of the American space project and its Soviet counterpart elided seamlessly into the fantasy of “Star Trek” and “2001: A Space Odyssey”. Other planets may or may not have been inhabited by aliens, but they, and even other stars, were there for the taking. That the taking would begin in the lifetimes of people then alive was widely assumed to be true.

No longer. It is quite conceivable that 36,000km will prove the limit of human ambition. It is equally conceivable that the fantasy-made-reality of human space flight will return to fantasy. It is likely that the Space Age is over.

**Bye-bye, sci-fi**

Today’s space cadets will, no doubt, oppose that claim vigorously. They will, in particular, point to the private ventures of people like Elon Musk in America and Sir Richard Branson in Britain, who hope to make human space flight commercially viable. Indeed, the enterprise of such people might do just that. But the market seems small and vulnerable. One part, space tourism, is a luxury service that is, in any case, unlikely to go beyond low-Earth orbit at best (the cost of getting even as far as the moon would reduce the number of potential clients to a handful). The other source of revenue is ferrying astronauts to the benighted International Space Station (ISS), surely the biggest waste of money, at $100 billion and counting, that has ever been built in the name of science.

The reason for that second objective is also the reason for thinking 2011 might, in the history books of t

the future, be seen as the year when the space cadets’ dream finally died. It marks the end of America’s space-shuttle programme, whose last mission is planned to launch on July 8th (see [article](http://www.economist.com/node/18895018), [article](http://www.economist.com/node/18895010)). The shuttle was supposed to be a reusable truck that would make the business of putting people into orbit quotidian. Instead, it has been nothing but trouble. Twice, it has killed its crew. If it had been seen as the experimental vehicle it actually is, that would not have been a particular cause for concern; test pilots are killed all the time. But the pretence was maintained that the shuttle was a workaday craft. The technical term used by NASA, “Space Transportation System”, says it all.

But the shuttle is now over. The ISS is due to be de-orbited, in the inelegant jargon of the field, in 2020. Once that happens, the game will be up. There is no appetite to return to the moon, let alone push on to Mars, El Dorado of space exploration. The technology could be there, but the passion has gone—at least in the traditional spacefaring powers, America and Russia.

The space cadets’ other hope, China, might pick up the baton. Certainly it claims it wishes, like President John Kennedy 50 years ago, to send people to the surface of the moon and return them safely to Earth. But the date for doing so seems elastic. There is none of Kennedy’s “by the end of the decade” bravura about the announcements from Beijing. Moreover, even if China succeeds in matching America’s distant triumph, it still faces the question, “what next?” The chances are that the Chinese government, like Richard Nixon’s in 1972, will say “job done” and pull the plug on the whole shebang.

**No bucks, no Buck Rogers**

With luck, robotic exploration of the solar system will continue. But even there, the risk is of diminishing returns. Every planet has now been visited, and every planet with a solid surface bar Mercury has been landed on. Asteroids, moons and comets have all been added to the stamp album. Unless life turns up on Mars, or somewhere even more unexpected, public interest in the whole thing is likely to wane. And it is the public that pays for it all.

The future, then, looks bounded by that new outer limit of planet Earth, the geostationary orbit. Within it, the buzz of activity will continue to grow and fill the vacuum. This part of space will be tamed by humanity, as the species has tamed so many wildernesses in the past. Outside it, though, the vacuum will remain empty. There may be occasional forays, just as men sometimes leave their huddled research bases in Antarctica to scuttle briefly across the ice cap before returning, for warmth, food and company, to base. But humanity’s dreams of a future beyond that final frontier have, largely, faded.

# Article: Why We Must Return to Space

**J. Richard Gott: *A Goal For the Human Spaceflight Program*. June 17th, 2009.**

The goal of the human spaceflight program should be to increase the survival prospects of the human race by colonizing space. Self-sustaining colonies in space, which could later plant still other colonies, would provide us with a life insurance policy against any catastrophes which might occur on Earth.

Fossils of extinct species offer ample testimony that such catastrophes do occur. Our species is 200,000 years old; the Neanderthals went extinct after 300,000 years. Of our genus (*Homo*) and the entire *Hominidae* family, we are the only species left. Most species leave no descendant species. Improving our survival prospects is something we should be willing to spend large sums of money on - governments make large expenditures on defense for the survival of their citizens.

The Greeks put all their books in the great Alexandrian library. I'm sure they guarded it very well. But eventually it burnt down taking all the books with it. It's fortunate that some copies of Sophocles' plays were stored elsewhere, for these are the only ones that we have now (7 out of 120 plays). We should be planting colonies off the Earth now as a life insurance policy against whatever unexpected catastrophes may await us on the Earth. Of course, we should still be doing everything possible to protect our environment and safeguard our prospects on the Earth. But chaos theory tells us that we may well be unable to predict the specific cause of our demise as a species. By definition, whatever causes us to go extinct will be something the likes of which we have not experienced so far. We simply may not be smart enough to know how best to spend our money on Earth to insure the greatest chance of survival here. Spending money planting colonies in space simply gives us more chances--like storing some of Sophocles' plays away from the Alexandrian library.

If we made colonization our goal, we might formulate a strategy designed to increase the likelihood of achieving it. Having such a goal makes us ask the right questions. Where is the easiest place in space to plant a colony - the place to start? Overall, Mars offers the most habitable location for *Homo sapiens* in the solar system outside of Earth, as Bruce Murray has noted. Mars has water, reasonable gravity (1/3rd that of the Earth), an atmosphere, and all the chemicals necessary for life. Living underground (like some of our cave dwelling ancestors) would lower radiation risks to acceptable levels. The Moon has no atmosphere, less protection against solar flares and galactic cosmic rays, harsher temperature ranges, lower gravity (1/6th that of the Earth), and no appreciable water. Asteroids are similar. The icy moons of Jupiter and Saturn offer water but are much colder and more distant. Mercury and Venus are too hot, and Jupiter, Saturn, Uranus, and Neptune are inhospitable gas giants. Free floating colonies in space, as proposed by Gerard O’Neill, would need material brought up from planetary or asteroid surfaces. If we want to plant a first permanent colony in space, Mars would seem the logical place to start.

If colonization is our goal, rather than bringing astronauts back from Mars, we should leave them there to multiply using indigenous materials. Once we have astronauts safely sitting on the surface of Mars, it makes more sense to send them additional supplies rather than to trade them for an equal number of astronauts sitting on Earth. After all, trips from one planet to another pose an additional risk, and it is on Mars that the astronauts help our survival prospects. We just need a few astronauts who would rather be founders of a Martian civilization than return to ticker tape parades on Earth. We can find such intrepid men and women.

**The real space race is whether we colonize off the planet before the funds for the human**

**spaceflight program end.** Now that the Cold War is over, the driving force that got us to the Moon has ended and the human spaceflight program is in danger of extinction. Expensive technological projects are often abandoned after awhile. The Egyptians built bigger and bigger pyramids for about 50 years and then built smaller and less well made ones before finally quitting entirely. Admiral Cheng Ho sailed a great Chinese fleet all the way to Africa and brought back giraffes to the Chinese court. But then the Chinese government decided to cancel the program. Once lost, opportunities may not come again. The human spaceflight program is only 48 years old. The Copernican Principle tells us that our location is not likely to be special. If our location within the history of human space travel is not special, there is a 50% chance that we are in the last half now and that its future duration is less than 48 years (cf. Gott, 2007). If the human spaceflight program has a much longer future duration than this, then we would be lucky to be living in the first tiny bit of it. Bayesian statistics warn us against accepting hypotheses that imply our observations are lucky. It would be prudent to take the above Copernican estimate seriously since it assumes that we are not particularly lucky or unlucky in our location in time, and a wise policy should aim to protect us even against some bad luck. With such a short past track record of funding, it would be a mistake to count on much longer and better funding in the future. Instead, assuming funding levels in the next 48 years like those we have had in the past 48 years, we should ask ourselves what project we could undertake in the next 48 years that would be of most benefit to our species. Planting a self- supporting colony on Mars would make us a two-planet species. It would change the course of world history. You couldn’t even call it world history any more. It might as much as double our long term survival prospects by giving our species two chances instead of one. Colonies are a great bargain. You just send a few astronauts and they multiply there using indigenous materials. It’s the Martian colonists that would do all the work. They would increase their numbers by having children and grandchildren on Mars while increasing their habitable facilities and biosphere using indigenous materials--with no further help needed from us. If couples had four children, on average, the colony, on its own, might multiply its initial population by a factor of as much as a million in 600 years.

And colonies can plant other colonies. The first words spoken on the Moon were in English, not because England sent astronauts to the Moon but because it planted a colony in North America that did. People on Mars might one day plant colonies elsewhere themselves. If people on Earth were extinguished by some catastrophe, Martian colonists might at some later date send an expedition to repopulate it.

Since the funding window for colonization may be short, we should concentrate on establishing the first self-supporting colony in space as soon as possible. That it be self-supporting is important since this would allow it to continue even if funding for space launches from Earth were discontinued.

If establishing a self-supporting colony is our goal, we could skip going back to the Moon, and concentrate on colonizing Mars. According to calculations by Gerard O’Neill, about 50 tons per person are required for a self-supporting colony in space (including biosphere). One of the three colonization waves that populated North and South America with Native Americans began when perhaps a dozen or so people traveled across a land bridge from Asia about 12,000 years ago. The Aboriginal population of Australia may have started with as few as 30 people who voyaged there by raft some 60,000 years ago. (Genetic diversity of our Mars colony could be increased by bringing frozen sperm and egg cells along.) If we just put up into low Earth orbit as much tonnage in the next 48 years as we have in the last 48 years (in Saturn V and Shuttle launches alone) we could deliver 2,304 tons to the surface of Mars. We would need a heavy lift vehicle like the *Ares V*. Four new *Ares V* rockets could be assembled at a time in the vertical assembly building at Cape Canaveral and be ready for launch in sequence during the launch window which opens up once every 26 months. Even if it took 11 years to develop the *Ares V* rocket, we could still deliver 1,808 tons to the surface of Mars in the next 48 years. With no greater commitment in the next 48 years than we have made in the last 48 years we could plant a colony on Mars. The goal

would then be to make the colony self-supporting as soon as possible.

If we fail to establish a self-supporting colony on Mars while we have the chance, it would be a tragedy. The dimensions of that tragedy might not become apparent to us until such time, perhaps many thousands of years from now, when we would find ourselves trapped on Earth with no viable space program, a low population, and our extinction as a species looming near. Moreover, we might end up spending as much money in real terms on the human spaceflight program in the future as we have in the past and *still* never get to Mars. If that happens, it would be a double tragedy. But if we just continue as we are now, without a clear or urgent purpose, this may well be our future.

We should worry that we will not succeed at colonizing off the Earth. Why? Because we are having this conversation on Earth right now. If the human species stays limited to Earth, you and I are entirely typical. You should worry that we might fail to colonize.

The United States has a particular stake in this. It put Neil Armstrong on the Moon. But the importance of that event is yet to be determined. As Kenneth Gatland said in *The Illustrated Encyclopedia of Space Technology*, in 1989, "It is still too early to assess the full significance of the Apollo Moon landings. Did they represent a blind alley of technological advance never to be repeated, or were they the beginning of a bold new era in which mankind eventually will colonize the solar system." If we stay on Earth, then Neil Armstrong’s flight is just another event in the history of exploration, like Edmund Hillary’s ascent of Mount Everest or Roald Amundsen’s visit to the South Pole. But if Neil Armstrong’s flight is just the first step in our becoming a multiplanet species, then he is an important historical figure like Christopher Columbus - someone who was part of changing the course of human history. Indeed, as Representative Robert Torricelli of New Jersey, speaking in favor of the continuation of the manned spaceflight program, once said, if we quit, then “Neil Armstrong’s giant leap for mankind will turn out to have been a small step after all.”

I do not say establishing a colony on Mars would be easy. Small colonies often fail. In North America, the Jamestown colony failed before the Plymouth colony eventually succeeded. Persistence is valuable. Colonizing Mars is a dangerous enterprise for the astronauts who go, but it is what we should be doing. Astronauts are risking their lives every time they take off; we should give them something to do that is worth risking their lives for.

Because the human spaceflight program is not very old we should be colonizing off the Earth as soon as possible, while we still can. In 1961 President Kennedy said: “We choose to go to the Moon in this decade and do the other things not because they are easy but because they are hard” Many people remember that line. But then he added another less well remembered coda: “Because that challenge is one we are willing to accept and unwilling to postpone.” Space colonization is a challenge we should be willing to accept and unwilling to postpone.

With a great recession upon us it is easy to imagine human settlement of Mars being postponed or taken off the table entirely. On the other hand, President Obama now has an opportunity to set forth a new and inspirational objective for the human spaceflight program, one that could change the course of human history.

# Article: Why a Mars Colony Would Be Possible

Drik Schulze-Makuch: ***To Boldly Go: A One-Way Human Mission to Mars***. **October 2010**

The exploration of Mars has been a priority for the space programs of several nations for decades, yet the prospect of a manned expedition continually recedes in the face of daunting and well-recognized challenges. The long travel time to Mars in zero gravity and high radiation conditions would impose a serious health burden on the astronauts. The costs of developing the launch vehicle and assembling the large amount of equipment needed for the astronauts to survive the journey and their long sojourn on the Martian surface, together with a need to send all the fuel and supplies for a return journey make a manned Mars expedition at least an order of magnitude more expensive than the Apollo program.

In our view, however, many of these human and financial problems would be ameliorated by a one-way mission. It is important to realize that this is not a "suicide mission." The astronauts would go to Mars with the intention of staying for the rest of their lives, as trailblazers of a permanent human Mars colony. They would be resupplied periodically from Earth, and eventually develop some "home grown" industry such as food production and mineral/chemical processing (Zubrin and Baker 1992; Zubrin and Wagner 1997). Their role would be to establish a "base camp" to which more colonists would eventually be sent, and to carry out important scientific and technological projects meanwhile. Of course, the life expectancy of the astronauts would be substantially reduced, but that would also be the case for a return mission. The riskiest part of space exploration is take-off and landing, followed by the exposure to space conditions. Both risk factors would be halved in a one-way mission, and traded for the rigors of life in a cramped and hostile environment away from sophisticated medical equipment. On the financial front, abandoning the need to send the fuel and supplies for the return journey would cut costs dramatically, arguably by about 80 percent. Furthermore, once a Mars base has been established, it would be politically much easier to find the funding for sustaining it over the long term than to mount a hugely expensive return mission.

There are several reasons that motivate the establishment of a permanent Mars colony. We are a vulnerable species living in a part of the galaxy where cosmic events such as major asteroid and comet impacts and supernova explosions pose a significant threat to life on Earth, especially to human life. There are also more immediate threats to our culture, if not our survival as a species. These include global pandemics, nuclear or biological warfare, runaway global warming, sudden ecological collapse and supervolcanoes (Rees 2004). Thus, the colonization of other worlds is a must if the human species is to survive for the long term. The first potential colonization targets would be asteroids, the Moon and Mars. The Moon is the closest object and does provide some shelter (e.g., lava tube caves), but in all other respects falls short compared to the variety of resources available on Mars. The latter is true for asteroids as well. Mars is by far the most promising for sustained colonization and development, because it is similar in many respects to Earth and, crucially, possesses a moderate surface gravity, an atmosphere, abundant water and carbon dioxide, together with a range of essential minerals. Mars is our second closest planetary neighbor (after Venus) and a trip to Mars at the most favorable launch option takes about six months with current chemical rocket technology.

In addition to offering humanity a "lifeboat" in the event of a mega-catastrophe, a Mars colony is attractive for other reasons. Astrobiologists agree that there is a fair probability that Mars hosts, or once hosted, microbial life, perhaps deep beneath the surface (Lederberg and Sagan 1962; Levin 2010; Levin and Straat 1977, 1981; McKay and Stoker 1989; McKay et al. 1996; Baker et al. 2005; Schulze-Makuch

et al. 2005, 2008, Darling and Schulze-Makuch 2010; Wierzchos et al. 2010; Mahaney and Dohm 2010). A scientific facility on Mars might therefore be a unique opportunity to study an alien life form and a second evolutionary record, and to develop novel biotechnology therefrom. At the very least, an intensive study of ancient and modern Mars will cast important light on the origin of life on Earth. Mars also conceals a wealth of geological and astronomical data that is almost impossible to access from Earth using robotic probes. A permanent human presence on Mars would open the way to comparative planetology on a scale unimagined by any former generation. In the fullness of time, a Mars base would offer a springboard for human/robotic exploration of the outer solar system and the asteroid belt. Finally, establishing a permanent multicultural and multinational human presence on another world would have major beneficial political and social implications for Earth, and serve as a strong unifying and uplifting theme for all humanity.

**2. The Concept of a One-Way Mission to Mars**

A human mission to Mars is undoubtedly technologically feasible, but unlikely to lift off in the very near future, because of the enormous financial and political commitments associated with it. As remarked, however, much of the costs and payload of the mission are associated with bringing the astronauts back to Earth. Furthermore, the returning astronauts would have to go through an intense rehabilitation program after being exposed for at least one year to zero gravity and an extended period to reduced gravity on the surface of Mars. Eliminating the need for returning early colonists would cut the costs several fold and at the same time ensure a continuous commitment to the exploration of Mars and space in general.

The first colonists to Mars wouldn’t go in "cold." Robotic probes sent on ahead would establish necessities such as an energy source (such as a small nuclear reactor augmented by solar panels), enough food for two years, the basics for creating home-grown agriculture, one or more rover vehicles and a tool-kit for carrying out essential engineering and maintenance work. In addition, the scientific equipment needed for the colonists to do important research work should be part of the preceding unmanned mission. All this equipment could easily be put into place using current technology before the astronauts set out. The first human contingent would rely heavily on resources that can be produced from Mars such as water, nutrients, and shelter (such as in form of lava tube caves). They also would be continuously resupplied from Earth with necessities that could not be produced from the resources available on Mars. This semi-autonomous phase might last for decades, perhaps even centuries before the size and sophistication of the Mars colony enabled it to be self-sustaining.

The first human contingent would consist of a crew of four, ideally (and if the budget permits) distributed between two two-man space craft to allow for some mission redundancy such as in the Viking mission or for the Mars Exploration Rovers. Also, if any technical malfunction occurs on one space craft, the other craft could come to the rescue. Further, any critical part of equipment after landing would be available in duplicate in case of an emergency.

A one-way human mission to Mars would not be a one-time commitment as was the case with the Apollo program. More than 40 years after the last Apollo mission, no human has set foot on a planetary body beyond Earth. Such a hiatus cannot be afforded if humanity is to commit to a grander vision of space exploration (Davies and Schulze-Makuch 2008; Schulze-Makuch and Irwin 2008). No base on the Moon is needed to launch a one-way human mission to Mars. Given the broad variety of resources

available on Mars, the long-term survival of the first colonists is much more feasible than it would be on the Moon.

While the pragmatic advantages of this approach are clear, we anticipate that some ethical considerations may be raised against it. Some in the space agencies or public might feel that the astronauts are being abandoned on Mars, or sacrificed for the sake of the project. However, the situation these first Martian settlers are in, who would of course be volunteers, would really be little different from the first white settlers of the North American continent, who left Europe with little expectation of return. Explorers such as Columbus, Frobisher, Scott and Amundsen, while not embarking on their voyages with the intention of staying at their destination, nevertheless took huge personal risks to explore new lands, in the knowledge that there was a significant likelihood that they would perish in the attempt. A volunteer signing up for a one-way mission to Mars would do so in the full understanding that he or she would not return to Earth. Nevertheless, informal surveys conducted after lectures and conference presentations on our proposal, have repeatedly shown that many people are willing to volunteer for a one-way mission, both for reasons of scientific curiosity and in a spirit of adventure and human destiny. Others may raise objections based on planetary protection considerations, depending on whether indigenous life exists on Mars or not. However, any Martian biota is almost certainly restricted to microbes that would be adapted to the natural environment of that planet, and would therefore almost certainly not pose a safety concern for the colonists due to their presumably different biochemical make-up (e.g., Houtkooper and Schulze-Makuch 2007). Nevertheless, caution has to be urged since we do not know the biochemistry of the putative Martian biota at this time. Thus, it might be prudent to launch a life detection mission or even a sample return mission prior to a one-way human mission to Mars. On the other hand, if Martian organisms really do pose a hazard to human health, it may be preferable to limit the exposure to the crew of a one-way mission rather than place at risk the entire human population from a botched sample return mission (Rummel et al. 2002).

A much more likely problem is the reverse: that the human habitation would pose a threat to any indigenous Martian micro-organisms, even if all possible precautions would be employed to protect it. Sadly, the battle to protect putative Martian biota from terrestrial organisms has already been compromised by the fact that several unsterilized, or inadequately sterilized, spacecraft have already been sent to Mars. In addition, terrestrial impact ejecta may have conveyed viable Earth microbes to Mars repeatedly over geological time scales (Melosh and Tonks 1993; Davies 1996, 2008; Kirschvink and Weiss 2001). Nor is it clear that terrestrial microbes would be better adapted to life on Mars that they would spread uncontrollably in a way that would completely displace the indigenous organisms. Furthermore, the colonists would likely only affect a small portion of the planet and "nature parks" could be designated with special precautions enforced in respect to human interference. Again, such issues could be addressed by a prior life detection or sample return mission to inform us about any risks to Martian biota and the type of precautions that could be taken to protect it. And while we agree that all reasonable precautions should be taken, we do not think their presence should be an over-riding reason to forever resist sending humans to Mars. Indeed, our presence there would allow us to study indigenous life in detail, further our knowledge about essential characteristics of life, and design methods to actually enhance the prospects of Martian biota (McKay 1982; McKay and Marinova 2001).

**3. First Steps in the Human Colonization of Mars**

The success of the project we are proposing would hinge on the quality of preparation. We envisage

three stages: careful site selection using existing and future probes to gather relevant data, the establishment of an unmanned base with minimum resources necessary for human habitation, and the dispatch of the first astronauts. We shall not dwell here on the astronautics of the mission, as these have been thoroughly discussed elsewhere (e.g., Zubrin and Wagner 1997).

**3.1 Site selection** The final determination of a suitable settlement location would require advance scouting missions that could use geophysical exploration tools like ground penetrating radar to locate subsurface voids from aerial or buoyant platforms. Numerous igneous flow features, including lava tubes (large cave structures formed by rivulets of molten lava) have already been identified on Mars (Boston 2003; Figure 1). Lava tube caves on Mars appear to be much larger than on Earth probably due to the lower gravity on Mars (0.38g compared to 1g on Earth). They are natural caves, and some of them are located at a low elevation in close proximity to the former northern ocean, which means that they could harbor ice deposits inside similar to many ice-containing caves on Earth. Ice caves would go a long way to solving the needs of a settlement for water and oxygen. Mars has a thin but substantial atmosphere mostly consisting of carbon dioxide (95%), but it is approximately 1/100th the density of Earth’s atmosphere, has no ozone shield and no magnetospheric shielding; thus some natural or artificial shielding to protect from ionizing and ultraviolet radiation will be required. Ice caves would also provide shelter from this radiation. After a candidate cave is located, its interior would need to be robotically explored before selecting it for the colony’s first home.

**3.2. Establishing an unmanned base** After a suitable location is identified, preferentially associated with some natural shelter (e.g., lava tube caves as discussed above) and other nearby resources (water, minerals, nutrients), a base should be established using unmanned probes and robots, including small rover vehicles, to prepare for the arrival of the first human contingent. The base would also be equipped to allow for a more thorough investigation of specific localities of interest. The base would not have to be very sophisticated, but could simply consist of a communication relay and a power generator, perhaps together with a remotely operated telescope (Schulze-Makuch and Irwin 2008). The lander craft should be designed to double as a permanent station, in modular form, to allow later expansion following further one-way missions.

**3.3. The first colonists** Crew selection for the initial manned mission would have to take into account several factors. Initially, colonists may be preferred who are beyond their reproductive age, because their life expectancy is likely to be 20 years or less, and secondly, the first settlers will endure some radiation damage to their reproductive organs, both during the trip to Mars and on the Martian surface. One feasible approach for the initial one-way mission would be to send two space probes with two astronauts each. Ideally, one should be a trained physician, and all should have advanced scientific and technical know-how, and show a strong commitment to scientific research and exploration.

Once the humans arrived at the base, their task would be not unlike that of the early settlers in North America – only the underlying technology and utilized tools would be much more sophisticated. Plants could be grown outside of the caves in an enriched soil underneath a robotically constructed dome, thus providing the inhabitants of the outpost with food and an additional supply of oxygen. Microbes could be used to break down and recycle wastes, thus the human base would constitute its own independent biosphere with some additional resources provided by the Martian environment. Certainly, the first colonists would be exposed to multiple challenges, from physical rigor to psychological strains due to isolation and uncertainties. However, the astronauts will have undergone psychological profiling and

training before embarking on the mission, and would remain in constant contact with Earth via normal channels such as email, radio and video links. In the era of modern communications they would in fact feel more connected to home than the early Antarctic explorers (who had no systematic psychological training either). Over time, the human contingent on Mars would slowly increase with follow-up missions. Several cave-centered biospheres would be created, each being in constant communication with other cave-centered biospheres to share experiences on which approaches are working best. At some later time, probably several decades after the first human mission, the colony’s population might have expanded to about 150 individuals, which would constitute a viable gene pool to allow the possibility of a successful long-term reproduction program. New arrivees and possibly the use of genetic engineering would further enhance genetic variety and contribute to the health and longevity of the colonists.

While it would undoubtedly take a tremendous effort over many years to establish multiple settlements on Mars, we see no fundamental reason why this plan is not technologically implementable. Some of the heavy lifting hardware has been developed or is in an advanced stage from the recently cancelled Moon program. Work on the permanent unmanned base could be initiated right away, while the human mission and colonization details could be worked out later. We estimate that a reasonable time line for establishing a permanent unmanned base with robots would be 20 years, with the first human contingent arriving shortly thereafter. The main impediment is the narrow vision and the culture of political caution that now pervades the space programs of most nations.

**4. Conclusions**

Self-preservation considerations in a dangerous universe and the human exploratory spirit compel us to explore space and colonize other planets. Mars is the planet in our solar system, which is reasonably close and provides an abundance of resources and shelter for such a colonization effort. Nevertheless, the first step for the colonization of Mars will be the most difficult. Here, we propose that the most pragmatic approach to achieve this goal is by establishing a small permanent robotic base followed by a series of one-way missions to Mars. The advantages of a one-way human mission are many-fold including a dramatic reduction of costs, the long-term commitment by the space agency, the public, and the crew, and that no rehabilitation program is needed for crew members when remaining on the low-gravity surface of Mars. The challenges are still monumental, though, foremost because political and financial long-term commitments have to be secured.

**Mars Colonization Negative**

# Mars Colonization Negative

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# Glossary

**Accept the inevitability of Earth’s destruction** – To recognize that the Earth will be destroyed and that there is no way to prevent it

**Comparative planetology –** the study of the differences and similarities between planets, including how they evolved

**Galactic ray –** rays that originate in the galaxy, consisting of positively charged protons. They are a form of radiation and can cause harm.

**Wake –** the aftermath or consequences of something

**Prophesy –** messages communicated by a divine source. God communicated prophesies to Moses, for example.

**Prudent –** the timely and responsible course of action

**Species** - a class of living thing. Humans are a species, just like ants or oak trees

**Sustainable –** able to be maintained at a certain rate or level

**Colonialism –** when a country makes it a goal to gain full control over a new territory by sending settlers there.

**Hostilities -** fighting or acts of warfare

**Full spectrum dominance –** attempting to be superior in every form of warfare, whether it is air combat, naval combat, etc.

**Overpopulation –** When an ecosystem cannot support the population that is living in it. Some people think that the Earth is overpopulated with humans, that it cannot continue to support the 6 billion that currently live there.

**Assumption –** an implicit statement that is accepted as true without proof

**Unremittingly –** unrelentingly, uninterrupted and constantly continuing

**Trans-oceanic –** across an ocean

**Neolithic** – A period of ancient human history from approximately 9500 to 6500 BC.

**Quasi religious –** bordering on a religion

**Catastrophe –** A disastrous event causing much disruption or harm to many

**Militarization –** the act of assembling and readying resources for war

**Physiological –** the affects of something on the body

**Psychosocial –** the relationship between aspects of society and their affects on individual behavior

**Interpersonal –** communication between people

**Stressor –** something that causes stress

**Infeasibility –** something that is impossible or not feasible.

# Answers To: Inherency

**[\_\_\_\_]**

**[\_\_\_\_]**

**[\_\_\_\_] Private companies are filling in for the government and will colonize Mars in the status quo.**

**Discovery News, 4/23/2011, “SPACEX AIMS TO PUT MAN ON MARS IN 10-20 YEARS,” http://news.discovery.com/space/spacex-elon-musk-mars-astronauts-20-years-110423.html**

Private US company SpaceX hopes to put an astronaut on Mars within 10 to 20 years, the head of the firm said."We'll probably put a first man in space in about three years," Elon Musk told the Wall Street Journal Saturday. "We're going all the way to Mars, I think... best case 10 years, worst case 15 to 20 years." SpaceX is one of the two leading private space companies in the United States and has won $75 million from the US space agency NASA to help its pursuit of developing a spacecraft to replace the space shuttle.The California-based company last year completed its first successful test of an unmanned space capsule into orbit and back. "Our goal is to facilitate the transfer of people and cargo to other planets, and then it will be up to people if they want to go," said Musk, who also runs the Tesla company which develops electric cars. The US space shuttle program is winding down later this year with final flights of Endeavour set for next week and Atlantis in June, ending an era of American spaceflight that began with the first space shuttle mission in 1981. When the shuttle program ends, the United States hopes private industry will be able to fill the gap by creating the next generation of spacecraft to transport astronauts into space.

# Answers To: Colonization Advantage

**[\_\_\_\_]**

**[\_\_\_\_]**

**[\_\_\_\_] Focusing on going to space means we ignore the problems on Earth. We need to keep focusing on our own planet until technology becomes advanced enough for us to leave.**

Lynda Williams, Professor of Physics at San Francisco State University, 2010, “Irrational Dreams of Space Colonization,” *The Peace Review*; Spring 2010; [**http://www.scientainment.com/lwilliams\_peacereview.pdf**](http://www.scientainment.com/lwilliams_peacereview.pdf)

We have much to determine on planet Earth before we launch willy-nilly into another race into space and a potential environmental disaster and arms race in outer space. If we direct our intellectual and technological resources toward space exploration without consideration of the environmental and political consequences, what is left behind in the wake? The hype surrounding space exploration leaves a dangerous vacuum in the collective consciousness of solving the problems on Earth. If we accept the inevitability of Earth’s destruction and its biosphere, we are left looking toward the heavens for our solutions and resolution. Young scientists, rather than working on serious environmental challenges on Earth, dream of Moon or Martian bases to save humanity, fueling the prophesy of our planetary destruction, rather than working on solutions to solve the problems on Earth. Every space faring entity, be they governmental or corporate, will face the same challenges. Star Trek emboldened us all to dream of space, the final frontier. The reality is that our planet Earth is a perfect spaceship. We travel around our star the sun once every year, and the sun pull us with her gravitational force around the galaxy once every 250 million years through star systems, star clusters and all the possible exosolar planets that may host life or be habitable for us to colonize. The sun will be around for billions of years and we have ample time to explore the stars. It would be wise and prudent for us as a species to focus our intellectual and technological knowledge now into preserving our spaceship for the long voyage through the stars, so that once we have figured out how to make life on Earth work in an environmentally and politically sustainable way, we can then venture off the planet into the final frontier of our dreams.

# Answers To: Colonization Advantage

**[\_\_\_\_]**

**[\_\_\_\_] Extinction claims are way overblown.**

**Gregg Easterbrook, senior editor of the New Republic, 07/2003, “We’re All Gonna Die!”**

If we're talking about doomsday - the end of human civilization - many scenarios simply don't measure up. A single nuclear bomb ignited by terrorists, for example, would be awful beyond words, but life would go on. People and machines might converge in ways that you and I would find ghastly, but from the standpoint of the future, they would probably represent an adaptation. Environmental collapse might make parts of the globe unpleasant, but considering that the biosphere has survived ice ages, it wouldn't be the final curtain. Depression, which has become 10 times more prevalent in Western nations in the postwar era, might grow so widespread that vast numbers of people would refuse to get out of bed, a possibility that Petranek suggested in a doomsday talk at the Technology Entertainment Design conference in 2002. But Marcel Proust, as miserable as he was, wrote Remembrance of Things Past while lying in bed. Of course, some worries are truly worrisome. Nuclear war might extinguish humanity, or at least bring an end to industrial civilization. The fact that tensions among the US, Russia, and China are low right now is no guarantee they'll remain so. Beyond the superpowers, India and Pakistan have demonstrated nuclear capability; North Korea either has or soon will have it; Japan may go nuclear if North Korea does; Iran and other countries could join the club before long. Radiation-spewing bombs raining from the sky would, no doubt, be cataclysmic. If you're in the mood to keep yourself up at night, nuclear war remains a good subject to ponder. But reversal of the planet's magnetic field? At a time of global unease, worst-case scenarios have a certain appeal, not unlike reality TV. And it's only natural to focus on danger; if nature hadn't programmed human beings to be wary, the species might not have gotten this far. But a little perspective is in order. Let's review the various doomsday theories, from least threatening to most. If the end is inevitable, at least there won't be any surprises.

# Answers To: Colonization Advantage

**[\_\_\_\_]**

**[\_\_\_\_] History proves that attempts at colonization lead to wars and other conflicts over new territory. Colonization of space would not be any different.**

Peter Dickens, Professor of Sociology at the University of Brighton, UK, 2010, The Monthly Review Volume 62, Issue 6  “The Humanization of the Cosmos—To What End?” <http://monthlyreview.org/2010/11/01/the-humanization-of-the-cosmos-to-what-end> JS).

But even manufactured risks may be minimal in scope, compared with another risk stemming from cosmic colonization. This is outright war. Armed conflict has long been a common feature of past colonialisms; between colonizing nations as well as between the colonizers and aboriginal peoples. Satellites are already a means by which territories and investments on Earth are monitored and protected by governments operating on behalf of their economic interests. But the prospect of galactic colonialisms raises the distinct possibility of hostilities in space. Galactic wars may therefore be the product of galactic colonialism. Such a scenario was prefigured by the *Star Trek* science fiction television series in which the main role of “The Federation” is the protection of capitalist mining colonies. It is a discomforting fact that both China and the United States are now actively developing their own versions of “full spectrum dominance.” China demonstrated its capabilities in January 2007 by shooting down one of its own defunct satellites. In February 2008, the U.S. Navy demonstrated a similar capability, destroying a faulty U.S. satellite with a sea-based missile. An arms race in outer space has already started.

**[\_\_\_\_]**

**[\_\_\_\_] Humans are safe from extinction precisely because there are so many of them. The species that go extinct are the ones that have sparse and fluctuating populations.**

**Darren Curnoe, Senior Lecturer at the University of New South Whales 6/7/2011, “Climate Change, doomsday and the Inevitable Extinction of Humankind”**

Seen in its broadest context, the history of life on Earth soberly demonstrates that the vast majority of organisms that ever lived, perhaps 99% of them, no longer do. It also shows that mammal species normally last 1-2 million years before extinction inevitably bumps them off. Yet, unlike most mammals, including our dozens of extinct hominin cousins, we have escaped the vulnerabilities of a small and massively fluctuating population. The simple, but profound act, of growing our own food delivered us the food security that ensured most of our children survived and our population grew. In effect, farming gave our species level assurance that the biological isn’t always inevitable. The odds have shifted to such a degree that we may now be, with or without climate change, extinction-proof.

# Answers To: Colonization Advantage

**[\_\_\_\_]**

**[\_\_\_\_] Development of space technology will cause wars to be fought in space.**

Kevin Pollpeter, **China Project Manager for Defense Group Incorporated’s Center for Intelligence Research and Analysis, 6/29/2006, “THE CHINESE VISION OF SPACE MILITARY OPERATIONS”, www.defensegroupinc.com/cira/pdf/doctrinebook\_ch9.pdfSimilar**

The development of space technology will inevitably lead to the militarization of space and space militarization will lead to confrontation in space. As the struggle over air and space control is becoming the new focal point of war, space will become the main battlefield of future wars. According to Chinese writings, recent high-technology local wars are evidence that whoever gains air and space control will seize the initiative. Consequently, air and space control will play an increasingly important role in modern war and dominating space will be the one and only principle of winning future wars. Therefore, air and space control will be the new focal point of struggle in future wars.

**[\_\_\_\_]**

**[\_\_\_\_] We have no obligation to save our species down the line – we should be focusing on our own problems right now.**

**Charles Stross, Journalist and Science Fiction Writer, 6/16/2007, 2007 “The High Frontier-Redux,” http://www.antipope.org/charlie/blog-static/2007/06/the-high-frontier-redux.html)**

I'm going to take it as read that the idea of space colonization isn't unfamiliar; domed cities on Mars, orbiting cylindrical space habitats a la [J. D. Bernal](http://en.wikipedia.org/wiki/J._D._Bernal) or [Gerard K. O'Neill](http://en.wikipedia.org/wiki/O%27Neill_cylinder), that sort of thing. Generation ships that take hundreds of years to ferry colonists out to other star systems where — as we are now discovering — there are profusions of planets to explore. And I don't want to spend much time talking about the unspoken ideological underpinnings of the urge to space colonization, other than to point out that they're there, that the case for space colonization isn't usually presented as an economic enterprise so much as a quasi-religious one. "We can't afford to keep all our eggs in one basket" isn't so much a justification as an appeal to sentimentality, for in the hypothetical case of a planet-trashing catastrophe, we (who currently inhabit the surface of the Earth) are dead anyway. The future extinction of the human species cannot affect you if you are already dead: strictly speaking, it should be of no personal concern.

# Answers To: Humans Will Cause Extinction

**[\_\_\_\_] Earth could easily survive a nuclear war.**

**J. R. Nyquist, staff writer in geopolitics and IR,, 5/20/1999, “Is Nuclear War Survivable?” http://www.wnd.com/index.php?pageId=6341**

I patiently reply to these correspondents that nuclear war would not be the end of the world. I then point to studies showing that "nuclear winter" has no scientific basis, that fallout from a nuclear war would not kill all life on earth. Surprisingly, few of my correspondents are convinced. They prefer apocalyptic myths created by pop scientists, movie producers and journalists. If Dr. Carl Sagan once said "nuclear winter" would follow a nuclear war, then it must be true. If radiation wipes out mankind in a movie, then that's what we can expect in real life.

But Carl Sagan was wrong about nuclear winter. And the movie "On the Beach" misled American filmgoers about the effects of fallout. It is time, once and for all, to lay these myths to rest. Nuclear war would not bring about the end of the world, though it would be horribly destructive. The truth is, many prominent physicists have condemned the nuclear winter hypothesis. Nobel laureate Freeman Dyson once said of nuclear winter research, "It's an absolutely atrocious piece of science, but I quite despair of setting the public record straight."

Professor Michael McElroy, a Harvard physics professor, also criticized the nuclear winter hypothesis. McElroy said that nuclear winter researchers "stacked the deck" in their study, which was titled "Nuclear Winter: Global Consequences of Multiple Nuclear Explosions" (Science, December 1983). Nuclear winter is the theory that the mass use of nuclear weapons would create enough smoke and dust to blot out the sun, causing a catastrophic drop in global temperatures. According to Carl Sagan, in this situation the earth would freeze. No crops could be grown. Humanity would die of cold and starvation. In truth, natural disasters have frequently produced smoke and dust far greater than those expected from a nuclear war. In 1883 Krakatoa exploded with a blast equivalent to 10,000 one-megaton bombs, a detonation greater than the combined nuclear arsenals of planet earth. The Krakatoa explosion had negligible weather effects. Even more disastrous, going back many thousands of years, a meteor struck Quebec with the force of 17.5 million one-megaton bombs, creating a crater 63 kilometers in diameter. But the world did not freeze. Life on earth was not extinguished.

**[\_\_\_\_] Biological superweapons would not cause extinction.**

**Gregg Easterbrook, senior editor of the New Republic, 07/2003, “We’re All Gonna Die!”**

3. Germ warfare! Like chemical agents, biological weapons have never lived up to their billing in popular culture. Consider the 1995 medical thriller Outbreak, in which a highly contagious virus takes out entire towns. The reality is quite different. Weaponized smallpox escaped from a Soviet laboratory in Aralsk, Kazakhstan, in 1971; three people died, no epidemic followed. In 1979, weapons-grade anthrax got out of a Soviet facility in Sverdlovsk (now called Ekaterinburg); 68 died, no epidemic. The loss of life was tragic, but no greater than could have been caused by a single conventional bomb. In 1989, workers at a US government facility near Washington were accidentally exposed to Ebola virus. They walked around the community and hung out with family and friends for several days before the mistake was discovered. No one died. The fact is, evolution has spent millions of years conditioning mammals to resist germs. Consider the Black Plague. It was the worst known pathogen in history, loose in a Middle Ages society of poor public health, awful sanitation, and no antibiotics. Yet it didn't kill off humanity. Most people who were caught in the epidemic survived. Any superbug introduced into today's Western world would encounter top-notch public health, excellent sanitation, and an array of medicines specifically engineered to kill bioagents.

# Answers To: Overpopulation Will Cause Extinction

**[\_\_\_\_]**

### **[\_\_\_\_] Earth is sustainable – we haven’t even come close to exhausting our resources yet.**

**Donald G McNeil, science and technology journalist for the New York Times, 6/15/2008 “Malthus Redux: Is Doomsday Upon Us, Again?”http://www.nytimes.com/2008/06/15/world/americas/15iht-15mcneil.13714561.html,**

The whole world has never come close to outpacing its ability to produce food. Right now, there is enough grain grown on earth to feed 10 billion vegetarians, said Joel Cohen, professor of populations at Rockefeller University and the author of "How Many People Can the Earth Support?" But much of it is being fed to cattle, the SUV's of the protein world, which are in turn guzzled by the world's wealthy. Theoretically, there is enough acreage already planted to keep the planet fed forever, because 10 billion humans is roughly where the United Nations predicts that the world population will plateau in 2060. But success depends on portion control; in the late 1980s, Brown University's World Hunger Program calculated that the world then could sustain 5.5 billion vegetarians, 3.7 billion South Americans or 2.8 billion North Americans, who ate more animal protein than South Americans. Even if fertility rates rose again, many agronomists think the world could easily support 20 billion to 30 billion people. Anyone who has ever flown across the United States can see how that's possible: there's a lot of empty land down there. The world's entire population, with 1,000 square feet of living space each, could fit into Texas. Pile people atop each other like Manhattanites, and they get even more elbow room. Water? When it hits $150 a barrel, it will be worth building pipes from the melting polar icecaps, or desalinating the sea as the Saudis do. The same potential is even more obvious flying around the globe. The slums of Mumbai are vast; but so are the empty arable spaces of Rajasthan. Africa, a huge continent with a mere 770 million people on it, looks practically empty from above. South of the Sahara, the land is rich; south of the Zambezi, the climate is temperate. But it is farmed mostly by people using hoes.

**[\_\_\_\_] Overpopulation will soon cease to be an issue, birth rates are falling.**

**Fred Pearce, environment consultant of New Scientist magazine, 2010 “The Coming Population Crash: And Our Planet's Surprising Future" beacon Press Books: Boston, Massachusetts**

But don't despair. There is something you may not have guessed something that may save us all. The population "bomb" is being defused. Only gradually, because the children of the greatest population explosion in history are still mostly of childbearing age, but it is happening. They may be having seven children in Mali, and six in Afghanistan, but half of the world's women are now having two children or fewer-not just in rich countries, but in Iran and parts of lndia, Burma and Brazil, Vietnam and South Africa. Mothers today have fewer than half as many offspring as their own mothers. This is happening mostly out of choice and not compulsion. Women have always wanted freedom, not domestic drudgery and the childbirth treadmill. And now that most of their babies survive to adulthood, they are grabbing it.

# Answers To: Asteroids Will Cause Extinction

**[\_\_\_\_]**

## [\_\_\_\_] Asteroids won’t cause extinction – none will hit earth and we’d be able to deflect it if they did.

**Robert Roy** Britt**, Live Science, 8/7/**2008**, “Will an Asteroid Hit Earth?” http://www.livescience.com/mysteries/070116\_asteroid\_hit.html**

But no, a continent-destroying asteroid is not likely to hit during your lifetime. Most of 1,100 or so that could do the job have been found. And none are on their way. Okay, there is one mid-sized rock—called Apophis—that has a small chance of striking Earth in 2036 and wreaking some regional havoc. But astronomers are watching it and, if future observations reveal it really could hit us, scientists are confident they can devise a mission to deflect it. And if all else fails, some futurists suggests, humanity could simply set up shop elsewhere.

**[\_\_\_\_] No human has ever died from an asteroid strike. Their impact is too improbable.**

**James Bennett, Professor of Economics at George Mason University, 2010, “*The Doomsday Lobby: Hype and Panic from Sputniks, Martians, and Marauding Meteors*,” p. 157-8**

The matter, or manipulation, of odds in regards to a collision between a space rock and Earth would do Jimmy the Greek proud. As Michael B. Gerrard writes in Risk Analysis in an article assessing the relative allocation of public funds to hazardous waste site cleanup and protection against killer comets and asteroids, “Asteroids and comets are… the ultimate example of a low-probability/high-consequence event: no one in recorded human history is confirmed to have ever died from one.” Gerrard writes that “several billion people” will die as the result of an impact “at some time in the coming half million years,” although that half-million year time-frame is considerably shorter than the generally accepted extinction-event period.66 The expected deaths from a collision with an asteroid of, say, one kilometer or more in diameter are so huge that by jacking up the tiny possibility of such an event even a little bit the annual death rate of this never-before experienced disaster exceeds deaths in plane crashes, earthquakes, and other actual real live dangers. Death rates from outlandish or unusual causes are fairly steady across the years. About 120 Americans die in airplane crashes annually, and about 90 more die of lightning strikes. Perhaps five might die in garage-door opener accidents. The total number of deaths in any given year by asteroid or meteor impact is zero — holding constant since the dawn of recorded time.

# Answers To: Overview Effect Advantage

**[\_\_\_\_]**

**[\_\_\_\_] The overview effect is not supported by any scientifically rigorous evidence.**

**William Sims** Bainbridge**, tenured Professor in the Department of Sociology at the University of Washington,** 2006 **(*Goals In Space: American Values and the Future of Technology***,

Several of the Idealistic goals assert that space travel gives a new perspective to the astronauts who look back at Earth from afar and to those Earth-bound enthusiasts who participate vicariously in voyages beyond our world. From the viewpoint of space, we see ourselves, our nations, and our planet in a new light. In a recent book, Frank White (1987) reports that astronauts commonly experience “the overview effect,” a radical shift in consciousness achieved by seeing the Earth as a unity and from outside the traditional limits of human experience. He documents this thesis with material from a number of interviews, but unfortunately his data collection and theoretical analysis were not conducted in a manner that social scientists would consider systematic. Furthermore, although White considers “consciousness” to be the essential ingredient of any culture, he does not draw upon any of the standard literatureon this conceptually slippery topic. Yet, his hypothesis that from the new world-view offered by space exploration will come a series of new civilizations is a stimulating expression of the basic faith of the Idealistic class.

**[\_\_\_\_]**

**[\_\_\_\_] Virtual reality and other technologies on Earth have the same effect as the Overview effect.**

**Jun Okushi and Dudley-Flores, NASA-trained space architect, codeveloper of the International Space Station; policy analyst and space policy expert, 2007“Space and Perceptions of Space in Spacecraft: An Astrosociological Perspective.”**

Author Frank White has mentioned on the radio that he would like to allow more human beings to experience the “Overview Effect” by creating realistic simulations of space travel that go beyond the visual to include the other senses and perhaps create the feeling of isolation as sensed by space travelers. And, if the ordinary individualin Canada, in Italy, in Mozambique, in the Seychelles, in Tajikistan, in Mongolia, in Papua-New Guinea, and in California or any other locale, in his or her space-like isolation, can look out the window to apprehend the Earth, there will likely swell within his or her heart new feelings and new realizations.Such is a paradigm shift, born of humanity abroad in the Cosmos, even if bound to the Earth**.** This shift can be expected to more tightly integrate humans, their machines, and the experiences of all those on Mother Earth. By engaging the challenges of abyssal distances, the humans of the whole Earth can develop a sense of kinship, that “we are in this together,” a perception never fully developed to date by the global population in its history. And, hopefully, one that will be coming soon.

# Answers To: Overview Effect Advantage

**[\_\_\_\_]**

**[\_\_\_\_] Flying in a plane has the same effect as the overview effect.**

**Frank White, space writer and lecturer, 1998, The Overview Effect: Space Exploration and Human Evolution, Second Edition. USA:AIAA,**

There are ways to experience the Overview Effect without going into outer space**.** Anyone who flies in an airplane and looks out the window has the opportunity to experience a mild version of it. My own effort to confirm the reality of the Overview Effect had its origins in a cross-country flight in the late 1970s. As the plane flew north of Washington, D.C., I found myself looking down at the Capitol and Washington Monument. From 30,000 feet, they looked like little toys sparkling in the sunshine. From that altitude, all ofWashington looked small and insignificant. However, I knew that people down there were making life and death decisions on my behalf and taking themselves very seriously as they did so. From high in the jet stream, it seemed absurd that they could have an impact on my life. It was like ants making laws for humans. On the other hand, I knew that it was all a matter of perspective. When the plane landed, everyone on it would act just like the people over whom we flew. This line of thought led to a simple but important realization: mental processes and views of life cannot be separated from physical location.Our "world view" as a conceptual framework depends quite literally on our view of the world from a physical place in the universe. Later, as the plane flew over the deserts and mountains of the western states, the flood of insights continued. I could look down on the network of roads below and actually "see the future." I knew that the car on Route 110 would soon meet up with that other car on Route 37, although the two drivers were not yet aware of it. If they were about to have an accident, I'd see it, but they wouldn't. From the airplane, the message that scientists, philosophers, spiritual teachers, and systems theorists have been trying to tell us for centuries was obvious: everything is interconnected and interrelated, each part a subsystem of a larger whole system. Finally, after I spent several hours looking out at the Earth's surface, all the insights linked into a single gestalt. I expressed it as the following: People living in space settlements will always have an overview! They will be able to see how everything is related, that what appears to be "the world" to people on Earth is merely a small planet in space, and what appears to be "the present" is merely a limited viewpoint to one looking from a higher level. People who live in space will take for granted philosophical insights that have taken those on Earth thousands of years to formulate, They will start at a place we have labored to attain over several millennia.

# Answers To: Solvency

**[\_\_\_\_] We would be better off creating a safe haven on Earth than trying to colonize Mars. We are much closer to creating an underground facility on Earth that would be able to survive a nuclear war or other catastrophic event than we are to colonizing another planet. The sooner we have a haven, the better, because it will allow us to ensure survival in the case of one of the disasters the affirmative mentions.**

**[\_\_\_\_] Another planet would be a poor life insurance policy. We could not get people to Mars fast enough if extinction were to occur on Earth.**

**Donald Rapp, Professor of Engineering at the University of California, Berkeley, 2008,**

**“Human Missions to Mars: Enabling Technologies for Exploring the Red Planet,” P. 11**

In regard to the broader, visionary viewpoint expressed in DRM-1, the drive toward a sustained human presence beyond Earth appears to be premature by a few hundred years. Certainly, the presence of a handful of humans on Mars will not relieve the Earth of any of its pressures due to overpopulation, pollution, or resource depletion. Comparative planetology is a worthwhile goal but it is not clear that a human presence is needed to accomplish this. Surely, there are plenty of opportunities for international cooperation without sending humans into Mars? The conclusion that the investment required to send humans to Mars is “modest” is derived by comparing with larger societal expenditures. But when compared with traditional expenditures for space, it is huge. On the other hand, there may be merit in the claims that the new technologies or the new uses of existing technologies will not only benefit humans exploring Mars but will also enhance the lives of people on Earth, and the boldness and grandeur of Mars exploration “will motivate our youth, will drive technical education goals, and will excite the people and nations of the world.” Here it all boils down to the benefit/cost ratio, which seems likely to be low.

# Answers To: Solvency

**[\_\_\_\_]**

**[\_\_\_\_] There are immense health risks to traveling in outer space include muscle degeneration and cosmic radiation.**

**Besty Querna, writer for National Geographic, 05/18/2001, “Health Risks Pose Hurdle for Travel to Mars”** [**http://news.nationalgeographic.com/news/pf/26132202.html**](http://news.nationalgeographic.com/news/pf/26132202.html)

Humans may soon be on their way to Mars. But human safety is paramount in space missions. Depending on its orbit, Mars can be 500 times farther from Earth than the moon. Traveling such a long distance poses health problems never faced before. Being weightless for the entire mission would cause degeneration of muscles, bones, and the heart. And without a vigorous exercise program, an astronaut would likely experience heart problems because his or her heart would become too weak to pump blood upon returning to Earth and its gravitation. Another issue that must be addressed is the huge amount of radiation exposure that occurs outside the atmosphere. Gary Marin, director for advanced programs at the U.S. National Aeronautics and Space Administration (NASA), said, "Being away from Earth for three years would mean that every cell of your body would be transversed by a galactic ray, and we just don't know what that would do to people." Chemically propelled engines, which are currently used for space flights, would not be able to carry enough fuel for the spacecraft to turn around and return to Earth if a problem such as trauma or serious illness occurred on board.

[\_\_\_\_] We do not have the technology to travel to another planet in the status quo. Many would die in the attempt

Donald F. Robertson, Aperospace industry journalist, 3/6/2006, “Space Exploration,” Space News, http://www.space.com/spacenews/archive06/RobertsonOpEd\_030606.html

Two largely unquestioned assumptions long ago took root within the space community. As we prepare to voyage back to Earth's Moon and on to Mars, it is time to question them both. The first assumption is that exploring the Moon, Mars, or any part of the solar system, can be accomplishedin a generation or two and with limited loss of life. The second is that we can use robots to successfully understand another world. Both assumptions are almost certainly wrong, yet many important elements of our civil space program are based on one or both of them being correct. To paraphrase Douglas Adams, even within the space community most people don't have a clue how "mind-bogglingly big space really is." Most of the major worlds in the solar system have surface areas at least as large as terrestrial continents -- a few are much larger -- and every oneof them is unremittingly hostile to human life**.** Learning to travel confidently through former President John F. Kennedy's "this new ocean" will be difficult, expensive, time-consuming and dangerous. Mr. Kennedy's rhetoric was more accurate than he probably knew. The only remotely comparable task humanity has faced was learning to travel across our world's oceans. We take trans-oceanic travel for granted, but getting from Neolithic boats to modern freighters cost humanity well over 10,000 years of hard work and uncounted lives. Even today, hundreds of people die in shipping accidents every year. We and our woefully inadequate chemical rockets are like Stone Age tribesfolk preparing to cast off in canoes, reaching for barely visible islands over a freezing, storm-tossed, North Atlantic.

# Answers To: Solvency

**[\_\_\_\_]**

[\_\_\_\_] The extended time in space will give the crew cabin fever – they won’t be able to handle the pressure.

Kira Bacal, Assistant Professor of Medicine at Ohio University, 1/2/2009, **“Sex in space taken seriously,” http://philosophyofscienceportal.blogspot.com/2009/01/sex-in-space-taken-seriously.html) hss**

The psychosocial implications of in-flight sex and reproduction are at least as problematic as the related physiological challenges. For the foreseeable future, space crews will be relatively small in number. If pairing off occurs within the crew, it can have serious ramifications on the crew's working relationships, and therefore, on mission success and crew operations.[4,11,14,15] Former astronaut Norman Thaggard commented, "[Issues associated with romantic relationships are] just one more problem that can potentially cause the whole thing to come apart."[4]

As we have seen in recent years, even professional astronauts on active flight status can develop serious mental health issues related to interpersonal relationships,[2,16] and the extreme, prolonged stressors of the long-duration spaceflight environment will only make such situations worse.[4] Previous long-duration missions have demonstrated that minor nuisances can lead to huge conflicts, and the addition of sexual tension will create even more challenges for the crew.[17] The limited social networks can lead to problems, such as privacy issues, the odd man out, and triangles.[15] Break-ups, which must be considered an inevitable corollary to romantic pairings, can further contribute to widespread inter-personal conflicts.[11,17] Behavioral health has long been recognized as a major challenge to long-duration spaceflight.[17-20] An International Space Station astronaut Dan Bursch commented, "Most of the challenges are more mental and psychological." In this, he echoed the earlier sentiments of cosmonaut Valerie Ryumin, "All one needs to effect a murder is lock two men into a cabin, 18 ft by 20 ft, and keep them there for two months.[17]" How much more challenging will it be to maintain crew performance and healthy interpersonal relationships when the group becomes coeducational, semi-permanent, and sexually involved?

# Answers To: Solvency

**[\_\_\_\_]**

**[\_\_\_\_] We don’t have the technology for humans to return from Mars. We would be sending them on a suicide mission.**

Lynda Williams. Professor of Physics at San Francisco State University, 2010, “Irrational Dreams of Space Colonization,” *The Peace Review*; Spring 2010; [**http://www.scientainment.com/lwilliams\_peacereview.pdf**](http://www.scientainment.com/lwilliams_peacereview.pdf)

Moon base is envisioned as serving as a launch pad for Martian expeditions, so the infeasibility of a lunar base may prohibit trips to Mars, unless they are launched directly from Earth. Mars is, in its closest approach, 36 million miles from Earth and would require a nine-month journey with astronauts exposed to deadly solar cosmic rays. Providing sufficient shielding would require a spacecraft that weighs so much it becomes prohibitive to carry enough fuel for a roundtrip. Either the astronauts get exposed to lethal doses on a roundtrip, or they make a safe one-way journey and never return. Either way, no one can survive a trip to Mars and whether or not people are willing to make that sacrifice for the sake of scientific exploration, human missions to Mars do not guarantee the survival of the species, but rather, only the death of any member who attempts the journey.

# Article: Why We Should Not Seek to Colonize Mars

**Lynda Williams: *Irrational Dreams of Space Colonization*. Spring, 2010.**

Since Sputnik was launched over 50 years ago and the first human walked on the moon 12 years later, we have associated the exploration and colonization of space, specifically the Moon and Mars, as a necessary pursuit to guarantee our survival as a species, and to satisfy an evolutionary drive to explore and inhabit worlds beyond our own. Space enthusiasts claim that it is our manifest destiny, an expression of the human spirit, to explore and colonize the solar system. World-renowned scientists such as Stephen Hawking have made calls to colonize the Moon and Mars in order to preserve the species due to the inevitability of certain future doom on Earth by environmental destruction, plague or warfare. Commercial space developers promise private trips to space and beyond, infusing dreams of space wanderlust and enthusiasm for space travel in citizens who could never even afford such expensive and lofty excursions. Corporate space interests promise the certainty of achieving these goals along with new technological advances and resource riches from space exploration that will rival those gained from the Apollo moon missions. This article will examine the validity of these threats and promises, and their environmental and ethical consequences to life on Earth.

**The Destruction of Earth Threat**

According to scientific theory, the destruction of Earth is a certainty. About five billion years from now, when our sun exhausts its nuclear fuel, it will expand in size and envelope the inner planets, including the Earth, and burn them into oblivion. So yes, we are doomed, but we have 5 billion years, plus or minus a few hund red million, to plan our extraterrestrial escape. The need to colonize the Moon or Mars to guarantee our survival based on this fact is not pressing. There are also real risks due to collisions with asteroids and comets, though none are of immediate threat and do not necessitate extraterrestrial colonization. There are many Earth-based technological strategies that can be developed in time to mediate such astronomical threats such as gravitational tugboats that drag the objects out of range. The solar system could also potentially be exposed to galactic sources of high-energy gamma ray bursts that could fry all life on Earth, but any Moon or Mars base would face a similar fate. Thus, Moon or Mars human based colonies would not protect us from any of these astronomical threats in the near future.

**The Destruction of Earth’s Biosphere**

Life on Earth is more urgently threatened by the destruction of the biosphere and its life sustaining habitat due environmental catastrophes such as climate change, ocean acidification, disruption of the food chain, bio-warfare, nuclear war, nuclear winter, and myriads of other man-made doomsday prophesies. If we accept these threats as inevitabilities on par with real astronomical dangers and divert our natural, intellectual, political and technological resources from solving these problems into escaping them, will we playing into a self- fulfilling prophesy of our own planetary doom? Seeking space based solutions to our Earthly problems may indeed exacerbate the planetary threats weface. This is the core of the ethical dilemma posed by space colonization: should we put our recourses and bets on developing human colonies on other worlds to survive natural and man-made catastrophes or should we focus all of our energies on solving the problems that create these threats on Earth?

**Human Life on The Moon and Mars**

What do the prospects of colonies or bases on the Moon and Mars offer? Both the Moon and Mars host

extreme environments that are uninhabitable to humans without very sophisticated technological life supporting systems beyond any that are feasible now or will be available in the near future. Both bodies are subjected to deadly levels of solar radiation and are void of atmospheres that could sustain oxygen-based life forms such as humans. Terra- forming either body is not feasible with current technologies or within any reasonable time frames so any colony or base would be restricted to living in space capsules or trailer park like structures which could not support a sufficient number of humans to perpetuate and sustain the species in any long term manner.

Although evidence of water has been discovered on both bodies, it exists in a form that is trapped in minerals, which would require huge amounts of energy to access. Water can be converted into fuel either as hydrogen or oxygen, which would eliminate the need to transport vast amounts of fuel from Earth. However, according to Britain's leading spaceflight expert, Professor Colin Pillinger, "You would need to heat up a lot of lunar soil to 200C to get yourself a glass of water." The promise of helium as an energy source on the moon to is mostly hype. Helium-3 could be used in the production of nuclear fusion energy, a process we have yet to prove viable or efficient on Earth. Mining helium would require digging dozens of meters into the lunar surface and processing hundreds of thousands of tons of soil to produce 1 ton of helium-3. (25 tons of helium-3 is required to power the US for 1 year.) Fusion also requires the very rare element tritium, which does not exist naturally on the Moon, Mars or on Earth in abundances needed to facilitate nuclear fusion energy production. There are no current means for generating the energy on the Moon to extract the helium-3 to produce the promised endless source of energy from helium-3 on the Moon. Similar energy problems exist for using solar power on the Moon, which has the additional problem of being sunlit two weeks a month and dark for the other two weeks.

A Moon base is envisioned as serving as a launch pad for Martian expeditions, so the infeasibility of a lunar base may prohibit trips to Mars, unless they are launched directly from Earth. Mars is, in its closest approach, 36 million miles from Earth and would require a nine- month journey with astronauts exposed to deadly solar cosmic rays. Providing sufficient shielding would require a spacecraft that weighs so much it becomes prohibitive to carry enough fuel for a roundtrip. Either the astronauts get exposed to lethal doses on a roundtrip, or they make a safe one-way journey and never return. Either way, no one can survive a trip to Mars and whether or not people are willing to make that sacrifice for the sake of scientific exploration, human missions to Mars do not guarantee the survival of the species, but rather, only the death of any member who attempts the journey.

**Space Law and Space Ethics**

The technological hurdles prohibiting practical space colonization of the Moon and Mars in the near future are stratospherically high. The environmental and political consequences of pursuing these lofty dreams are even higher. There are no international laws governing the Moon or the protection of the space environment. The Moon Treaty, created in 1979 by the United Nations, declares that the Moon shall be developed to benefit all nations and that no military bases could be placed on the moon or on any celestial body, and bans altering the environment of celestial bodies. To date, no space faring nation has ratified this treaty, meaning, the moon, and all celestial bodies, including Mars and asteroids are up for the taking. If a nation did place a military base on the moon, they could potentially control all launches from Earth. The Moon is the ultimate military high ground. How should we, as a species, control the exploration, exploitation and control of the Moon and other celestial bodies if we can not even agree on a legal regime to protect and share its resources?

Since the space race began 50 years ago with the launch of Sputnik, the space environment around Earth

has become overcrowded with satellites and space debris, so much so, that circumterrestrial space has become a dangerous place with an increasing risk of collision and destruction. Thousands of pieces of space junk created from launches orbit the Earth in the same orbit as satellites, putting them at risk of collision. Every time a rocket is launched, debris from the rocket stages are put into orbital space. In 2009 there was a disastrous collision between an Iridium satellite and a piece of space junk that destroyed the satellite. In 2007 China blew up one of its defunct satellites to demonstrate its antiballistic missile capabilities, increasing the debris field by 15%. There are no international laws prohibiting anti-satellite actions. Every year, since the mid 1980s, a treaty has been introduced into the UN for a Prevention of an Arms Race in Outer Space (PAROS), with all parties including Russia and China voting for it except for the US. How can we hope to pursue a peaceful and environmentally sound route of space exploration without international laws in place that protect space and Earth environments and guarantee that the space race to the moon and beyond does not foster a war over space resources? Indeed, if the space debris problem continues to grow unfettered or if there is war in space, space will become too trashed for launches to take place without risk of destruction.

The private development of space is growing at a flurried rate. Competitions such as the X-Prize for companies to reach orbit and the Google Prize to land a robot on the Moon has launched space wanderlust in citizens throughout the country who dream of traveling to space. The reality is that there are few protections for the environment and the passengers of these flights of fancy. The FAA, which regulates space launches, is under a Congressional mandate to foster the industry. It is difficult if not impossible to have objective regulation of an industry when it enjoys government incentives to profit.

We have much to determine on planet Earth before we launch willy nilly into another race into space and a potential environmental disaster and arms race in outer space.

**Spaceship Earth**

If we direct our intellectual and technological resources toward space exploration without consideration of the environmental and political consequences, what is left behind in the wake? The hype surrounding space exploration leaves a dangerous vacuum in the collective consciousness of solving the problems on Earth. If we accept the inevitability of Earth’s destruction and its biosphere, we are left looking toward the heavens for our solutions and resolution. Young scientists, rather than working on serious environmental challenges on Earth, dream of Moon or Martian bases to save humanity, fueling the prophesy of our planetary destruction, rather than working on solutions to solve the problems on Earth.

Every space faring entity, be they governmental or corporate, face the same challenges. Star Trek emboldened us all to dream of space, the final frontier. The reality is that our planet Earth is a perfect spaceship. We travel around our star the sun once every year, and the sun pull us with her gravitational force around the galaxy once every 250 million years through star systems, star clusters and all the possible exosolar planets that may host life or be habitable for us to colonize. The sun will be around for billions of years and we have ample time to explore the stars. It woukd be wise and prudent for us as a species to focus our intellectual and technological knowledge now into preserving our spaceship for the long voyage through the stars, so that once we have figured out how to make life on Earth work in an environmentally and politically sustainable way, we can then venture off the planet into the final frontier of our dreams.

# Article: Space Travel Has Many Health Risks

**National Geographic Magazine: *Health Risks Pose Hurdle for Mission to Mars.* May, 18th, 2001.**

Humans may soon be on their way to Mars. But human safety is paramount in space missions.

Depending on its orbit, Mars can be 500 times farther from Earth than the moon. Traveling such a long distance poses health problems never faced before.

Being weightless for the entire mission would cause degeneration of muscles, bones, and the heart. And without a vigorous exercise program, an astronaut would likely experience heart problems because his or her heart would become too weak to pump blood upon returning to Earth and its gravitation.

Another issue that must be addressed is the huge amount of radiation exposure that occurs outside the atmosphere. Gary Marin, director for advanced programs at the U.S. National Aeronautics and Space Administration (NASA), said, "Being away from Earth for three years would mean that every cell of your body would be transversed by a galactic ray, and we just don't know what that would do to people."

Chemically propelled engines, which are currently used for space flights, would not be able to carry enough fuel for the spacecraft to turn around and return to Earth if a problem such as trauma or serious illness occurred on board.

NASA is now looking into ways to deal with some of the physical risks. But psychological problems are harder to solve with technology.

Astronauts would be confined in the spacecraft for most of the mission. As Richard Berendzen, a scientist at American University, observed, "Five or six of your closest friends in a room the size of your living room for three years, that's a tough thing to do."

Scientists have discovered evidence that water may have existed on Mars, and may still be present under the surface. The availability of water is crucial to a mission to Mars because it might help provide the basic elements people need to remain on the planet for an extended period.

"That water is very important to us," said Berendzen speaking on *National Geographic Today.* "Not only to drill down and drink, but to pump up, break the H2O apart, use the oxygen to breath and the hydrogen for fuel."

The possibility that there is water on Mars suggests that even more intriguing findings may lie ahead. The presence of water is an indication of energy sources, and very likely organic matter.

Berendzen said that if evidence of past forms of life were found, "It would probably be the most stunning discovery in the history of humankind."

While going to Mars would clearly offer a minefield of discoveries, carrying out such a mission at this time has too high a risk for the people who would make such a journey. As research continues, however, the dream of a trip to Mars will inevitably become a reality.

**SETI Affirmative**

# SETI Affirmative

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# Explanation

Are we alone in the universe? This affirmative is designed to answer that exact question. Until recently, there were programs in the status quo funded by the government that used radio telescopes located on the Earth to listen for signals emitted by possible alien cultures. Recently however, due to the economic recession, the government has cancelled the funding for the Allen Telescope Array, the first set of radio telescopes created entirely for the purpose of searching for alien life. The ATA has been put into hibernation because of the funding cut and no other sources of funding seem apparent.

This affirmative has two advantages. The first argues that not only does alien life exist, but it is likely to be biologically similar to ours, allowing for the possibility of communication. Ecology suggests that any civilization that would be able to survive long enough to broadcast a signal into space has likely evolved to be peaceful and altruistic. If we made contact with aliens, the end result would likely be an exchange of technology, where we would inherit the benefit of centuries of research that would likely revolutionize our society and help solve the problems of overpopulation and environmental degradation.

However, even if we were unable to make contact, continuing search for extraterrestrial life forces us to re-evaluate how we look at humanity. Acknowledging that we may not be alone in the universe makes it more likely that we will begin to see ourselves less as members of a specific country or nation but instead citizens of earth. This broad and inclusive view of humanity as a whole will allow for greater cooperation on important issues and lessen the likelihood of conflict.

Finally, the affirmative argues that searching for life with radio telescopes is the most effective means of trying to contact extraterrestrials. Radio telescopes can search a much broader area at any given time, which is important to maximize the possibility that we will find pick up a foreign signal.

# Glossary

**Radio telescope** – a telescope that searches for radio waves, as opposed to traditional telescope that look at visible light

**Galaxy –** the system of millions of stars that contains the solar system

**Quanta –** a small amount of energy

**Cosmos** – the universe

**Moore’s law** – the idea that technology doubles in power every two years

**Space debris / junk** – small pieces of debris such as rock moving very quickly that pose a danger to orbiting satellites

**Astrobiology** – study of life in space

**Cooperative –** working with others to achieve a goal

**Extant** – currently existing

**Sustainable** – Something that is sustainable can continue to exist without external inputs.

**Ecosystem** – a large biological community of many organisms. An ocean is an ecosystem, for example

**Degraded** – to degrade something is to lower its quality

**Pioneer –** Someone who is among the first to settle a new area

**Dehumanizing** – degrading people and thinking less of them to the point where they no longer seem human.

**Publichealth** – The health of an entire country or nation. Factors that determine public health include amount of exercise, occurrence of disease, life expectancy, etc.

**Tangible** – Something concrete. A tangible benefit is usually material, such as money or resources

**Forlorn** – lonely, abandoned

**Species** - a class of living thing. Humans are a species, just like ants or oak trees

**Ideological** – a person who is ideological will adhere to the position she already believes in very strongly and is often unwilling to consider alternate points of view

**Transcend** – overcome or surpass a particular obstacle or standard

**Conceits** – excessive pride in oneself

**Flourish** – to grow or develop in a healthy or vigorous way

**Foibles** – a minor weakness

**Scarcity** – a small or inadequate amount

**Surveillance** – continual observing and watching a particular object

**Extremists –** people that hold extreme or fanatical political or religious views

**Financial crisis** – an economic crisis caused by banks or other large financial institutions in a country

**Academia** – another word for the world of universities and professors, as opposed to the world of business or government

**Sophisticated** – very complex

**Encephelization** – referring to an animal’s large brain in relation to its size

**Omniscient** – all knowing

**Propagate** – reproduce and spread

**ATA –** Allen Telescope Array

**ET -** Extraterrestrial

**ETI –** Extraterrestrial intelligence

**AF –** Air Force **SSN –** Space Surveillance Network

**AFSPC –** Air Force Space Command

**ASAT –** Anti Satellit

# 1AC [1/6]

**Contention 1: Inherency**

**The federal government has cut the funding of the Allen Telescope Array, a cluster of radio telescopes attempting to find life in other parts of the galaxy. This has caused the operation to shut down.**

**Associated Press, 4/27/2011, “Shrinking Funds Pull Plug on Alien Search Devices,” http://www.foxnews.com/scitech/2011/04/27/shrinking-funds-pull-plug-alien-search-devices/**

In the mountains of Northern California, a field of radio dishes that look like giant dinner plates waited for years for the first call from intelligent life among the stars. But they're not listening anymore. Cash-strapped governments, it seems, can no longer pay the interstellar phone bill. Astronomers at the SETI Institute said a steep drop in state and federal funds has forced the shutdown of the Allen Telescope Array, a powerful tool in the search for extraterrestrial intelligence, an effort scientists refer to as SETI. "There's plenty of cosmic real estate that looks promising," Seth Shostak, senior astronomer at the institute, said Tuesday. "We've lost the instrument that's best for zeroing in on these better targets." The shutdown came just as researchers were preparing to point the radio dishes at a batch of new planets. About 50 or 60 of those planets appear to be about the right distance from stars to have temperatures that could make them habitable, Shostak said. The 42 radio dishes had scanned deep space since 2007 for signals from alien civilizations while also conducting research into the structure and origin of the universe. SETI Institute chief executive Tom Pierson said in an email to donors recently that the University of California, Berkeley, has run out of money for day-to-day operation of the dishes. "Unfortunately, today's government budgetary environment is very difficult, and new solutions must be found," Pierson wrote. The $50 million array was built by SETI and UC Berkeley with the help of a $30 million donation from Microsoft Corp. co-founder Paul Allen. Operating the dishes cost about $1.5 million a year, mostly to pay for the staff of eight to 10 researchers and technicians to operate the facility. An additional $1 million a year was needed to collect and sift the data from the dishes. The Paul G. Allen Family Foundation, the billionaire's philanthropic venture, had no immediate plans to provide more funding to the facility, said David Postman, a foundation spokesman. The institute, however, was hopeful the U.S. Air Force might find the dishes useful as part of its mission to track space debris and provide funding to keep the equipment operating. The SETI Institute was founded in 1984 and has received funding from NASA, the National Science Foundation and several other federal programs and private foundations. Other projects that will continue include the development of software and tools to be used in the search for extraterrestrial life.

# 1AC [2/6]

**Contention 2: Harms**

**We could discover proof of alien life in the next 25 years. The Drake Equation proves that the universe is too massive for humans to be alone.**

**Clara Moskowitz, Space.com senior staff writer, 8/16/2010, “Proof of Aliens Could Come Within 25 Years, Scientist Says,” http://www.msnbc.msn.com/id/38727371/ns/technology\_and\_science-space/t/chances-well-find-et-are-pretty-good/**

SANTA CLARA, Calif. ? Proof of extraterrestrial intelligence could come within 25 years, an astronomer who works on the search said Sunday. "I actually think the chances that we'll find ET are pretty good," said Seth Shostak, senior astronomer at the Search for Extraterrestrial Intelligence Institute in Mountain View, Calif., here at the SETI con convention. "Young people in the audience, I think there's a really good chance you're going to see this happen." Shostak bases this estimation on the Drake Equation, a formula conceived by SETI pioneer Frank Drake to calculate the number (N) of alien civilizations with whom we might be able to communicate. That equation takes into account a variety of factors, including the rate of star formation in the galaxy, the fraction of stars that have planets, the fraction of planets that are habitable, the percent of those that actually develop life, the percent of those that develop intelligent life, the fraction of civilizations that have a technology that can broadcast their presence into space, and the length of time those signals would be broadcasted. Reliable figures for many of those factors are not known, but some of the leaders in the field of SETI have put together their best guesses. Late great astronomer Carl Sagan, another SETI pioneer, estimated that the Drake Equation amounted to N = 1 million. Scientist and science fiction writer Isaac Asimov calculated 670,000. Drake himself estimates a more conservative 10,000. But even if that lower value turns out to be correct, at the rate they're going, it wouldn't take scientists too long to discover an alien signal**,** Shostak said. "This range, from Sagan's million down to 10,000 ? that's the range of estimates from people who have started and worked on SETI," said Shostak. "These people may know what they're talking about. If they do, then the point is we trip across somebody in the next several dozen or two dozen years." The SETI quest is set to take a leap forward when the Allen Telescope Array, a network of radio dishes under construction in northern California, is fully operational. By 2015, the array should be able to scan hundreds of thousands of stars for signs of extraterrestrial intelligence, Shostak said. But while humans might be able to discover an alien signal within that timeframe, interpreting what ET is trying to tell us could take much, much longer. Shostak admitted such a task would be very difficult. An alien civilization may be as technologically advanced compared to us as Homo sapiens are to our hominid relatives Neanderthals. "We could give our digital television signals to the Neanderthals, and they’ll never figure it out. And they're not stupid," he said. Yet simply having proof that we are not alone in the universe would likely be a world-changing achievement, Shostak added.

# 1AC [3/6]

**Furthermore, Aliens would not be hostile to humans. In order to survive to the point where they could make contact with us, they must be peaceful beings.**

**Seth Bauman et al 10, Phd Candidate in Geography at Penn State University, Acta Astronautica Volume 68, Issues 11-12, June-July 2011, Pages 2114-2129, “Would contact with extraterrestrials benefit or harm humanity? A scenario analysis”**

We do not know if ETI would be cooperative, but we have several reasons to suspect that they would be.Noncooperation can be a risky and harmful strategy, and noncooperative civilizations may tend to have shorter lifetimes as their noncooperation eventually leads to their demise. For this reason, a long-lived civilization that explores the galaxy may have transcended any aggressive patterns out of the need to maintain long-term survival [36] and [46]. It is also possible that intelligent civilizations may inevitably develop cooperative tendencies as part of their evolutionary process [44] and [47]. However, there are also reasons to suspect that evolution would proceed along different, less desirable trajectories [48]. Another reason to suspect that ETI would be cooperative follows fromthe Sustainability Solution to the Fermi paradox. A corollary of the Sustainability Solution is that extant ETI civilizations in the galaxy may be less prone to violence and destruction in the event of contact. This corollary follows from the tendencies of sustainable human populations. On Earth, **s**ustainable human populations tend to be more protective of their ecosystems. This protectiveness can be for either of two reasons. First, humans can protect ecosystems for their own benefit. This protection is known as conservationism and involves humans placing intrinsic value on themselves. Second, humans can protect ecosystems for the ecosystems’ benefit. This protection is known as preservationism and involves humans placing intrinsic value on the ecosystems. (See [49] for a similar approach to environmental ethics in the context of terraforming Mars.) In either case, human populations that follow a sustainable mode of development are less likely to expand for lack of resources, although they may choose to explore out of sheer curiosity. ETI populations may be similar in this regard [50]. Thus, if exponential growth is in fact unsustainable on the galactic scale as Haqq-Misra and Baum [19] suggest, then we are much more likely to encounter a long-lived ETI civilization that follows a sustainable development pattern. Such a civilization may have no need to consume Earth systems (or humans) because they will have already found a way to effectively manage their resources over long timescales. Therefore, the possible unsustainability of long-term rapid expansion decreases the probability that ETI will destroy us. However, there is a scenario in which sustainable ETI would destroy us—specifically if the ETI is expanding at the maximum rate possible given its sustainability constraints. This “maximally expansive” scenario is one of the “harmful to humanity” scenarios discussed below.

# 1AC [4/6]

**The application of Alien technology has the potential to solve resource crises and poverty.**

**Steven M. Greer, M.D., member of Alpha Omega Alpha medical honor society, director of CSETI, 8/30/95, http://www.cseti.org/position/greer/national.htm**

Putting this debate aside for now, let us contemplate a "downloading" of these advanced extraterrestrial technologies in a setting of international stability and peace. These technologies are not polluting fossil fuels or radioactive nuclear power, but are completely revolutionary energy systems which are non-linear, zero-point type technologies. That is, there is a background source of limitless energy which is omni- present in the universe, even in deep space, and these devices "tap into" this energy. The result is vast amounts of energy generated, and, in defiance of the "law of thermodynamics", more energy is obtained than is put into the system.

Without going into a long discussion of propulsion systems which propel vehicles at beyond the speed of light (allegedly impossible according to 20th century physics) or of "bending" space-time, or of negating the effects of gravity and mass inertia, or of non-linear communications systems which interface directly with mind or thought, or a myriad other considerations related to advanced ET technology, let us simply state that these technologies are many quanta ahead of current technology on earth.

What are the implications of such technologies being applied around the world?

- The environment, which is being degraded at an alarming rate primarily due to the burning of fossil fuels and the relative scarcity of energy, would be greatly assisted, if not saved, by the widespread application of such technology. For the most part, the earth is still in the 1800s as far as energy generation, transportation and related technologies are concerned. The internal combustion engine reigns supreme, as does gas, oil and coal as sources of energy. Aside from being the chief sources of pollution of the air and water, their relative scarcity results in a further cost- and efficiency-related inability to "scrub" other sources of pollution from waterways, chemical processing, manufacturing and the like. Such inefficiencies, scarcity and intrinsically polluting qualities of the current world energy system are literally killing the earth. The application of advanced ET energy systems would completely reverse this situation.

- When it takes only minutes - instead of 12-14 hours - to go from Asia to New York, the world will truly be a global village. Indeed, the need for vast, inefficient and dehumanizing metropolises will no longer exist, since both communications and transportation will allow small towns and villages to have access to each other instantly. This will result in a transformation in the nature and function of society unequaled in recorded history.

- The relative scarcity of energy, and hence of resources generally, has resulted in a vast inequality among the poor and rich nations of the world. The application of these ET technologies will alter this situation radically, and eventually abundance and an economic equilibrium will emerge. This will alter the world socio-economic situation and mitigate the economic pressures and inequalities which create so much strife and conflict in the world. With zero-point and related technologies in every village and every home, the consciousness of scarcity and a "zero sum game" will give way to one of abundance. And with this, the human race will be freed from the oppressive mentality of material acquisitions and survival to a larger vision of developing the full potential of each human.

- Public health and medical advances will result both directly and indirectly from these new technologies. For example, imagine a world where abundance of clean water and energy removes the specter of famine and disease from the entire earth

# 1AC [5/6]

**Thus my partner and I propose the following plan:**

**The United States federal government should fully fund the Allen Telescope Array.**

**Contention 3: Solvency**

**The rapid advance of radar technology means that the ATA will be able to find life in the next few decades.**

**Alok Jha, Science Correspondent for the Guardian Newspaper, 4/26/2011 “Alien finding institute Seti runs out of cash to operate telescope,” The Guardian, accessed 5-17-11, http://www.guardian.co.uk/science/2011/apr/26/alien-institute-seti-cash-telescope**

The ATA is the Seti Institute's biggest facility by far, and its only dedicated one. Its shutdown means astronomers will need to rely on data collected during downtime from other telescopes around the world and this will reduce its chances of finding that elusive alien signal. Shostak said the future of the ATA had to be decided sooner rather than later, as there was only enough money to keep it in hibernation mode for a few months. Until the funding crisis can be solved, the institute said it would continue its work on developing equipment and software that supports the overall search for alien signals. This includes an increased focus on involving citizens in its work: astronomers have already developed the successful Seti@Home project, a programme that uses the downtime on people's home computers to sort through the masses of data collected by the institute's experiments. The next step is SetiQuest.Org, an application that allows "citizen scientist volunteers to look for patterns in data from the ATA that might be missed by current algorithms, and help us explore frequency bands that are so full of signals that our detectors get confused", said Pierson. Given the improvements in radar technology, Shostak said it would be a shame to stop searching now for signals from ET. "If this experiment is going to work, it's going to work in a few dozen years, simply on the basis of the rapid improvement of the technology afforded by Moore's Law. The equipment keeps getting faster and faster, so I think success is not very far off if you keep doing this."

# 1AC [6/6]

**The strategy of the Allen Telescope Array solves best. We should use radio signals to cast a wide net and search the most stars.**

**Nathan Cohen and Robert Hohlfeld, professors at Boston University in telecommunications and computational science, 2001, “Smarter SETI Strategy” http://www.skyandtelescope.com/resources/seti/3304536.html?page=1&c=y**

They are not. Recent work confirms long-standing suspicions that star-by-star targeting should be abandoned in favor of scanning the richest star fields to encompass very large numbers of stars, even if most of them are very far away. To see why, we flash back 30 years to when Frank Drake did the basic mathematics that still governs the field. He showed that finding an ET signal is similar to certain problems in surveying natural radio sources. Some sources are intrinsically strong; a greater number are intrinsically weak. The steepness of the ratio between them determines which category will dominate our sky. For example, many of the first sources found by early, primitive radio telescopes are at extreme, cosmological distances. This is because inherently strong radio sources (such as quasars and radio galaxies) are powerful enough to more than make up for their scarcity compared to the abundant weak sources(such as the coronas of stars). Similarly, it was clear that if even just a few rare, very distant alien radio beacons are very powerful, they will dominate the detectable population in our sky, and a wide-sky survey will succeed first. If, on the other hand, ET transmitters are common and all of them are relatively weak and similar to each other, a star-by-star targeted survey starting nearby will work best. Recently we revisited this 30-year-old problem with the advantage of more sophisticated mathematical models (and computers capable of running them!) covering all reasonable scenarios. The outcome is clear, surprising, and overwhelming. Unless ETs truly infest the stars like flies (very unlikely), the first signals we detect will come from the very rare, very powerful transmitters very far away. The 1971 model, which lent too much weight to nearby stars, turns out to be a naive case, the best that could be calculated at the time. In practical terms, this means that SETI searchers should use their limited resources to scan great numbers of stars first and worry about sensitivity per star second. Given real radio telescopes under the real sky, the best use of SETI time actually turns out to be a "hybrid," semi-targeted strategy: one that targets the richest star fields. These might include selected parts of the Milky Way's plane, certain star clusters, and even nearby galaxies. The idea is to fill the radio telescope's beam (listening area) with many stars, then dwell on this spot long enough to build up sensitivity**.** With, say, just 100 carefully selected patches of sky on the list, millions of Milky Way stars and many billions in other galaxies can be scrutinized in significant depth. It makes no sense to dwell on nearby stars one by one if they have sparse backgrounds. We need to look deep and long and bet on the numbers. Thus it was heartening to hear SETI Institute chair Frank Drake say that such thinking should carry the day and that the strategy for the ATA should emphasize searches near the galactic plane.

# Extraterrestrial Perspective Advantage

**[\_\_\_\_] The search for extraterrestrial life itself means that humanity will recognize its place in the universe and become less hostile toward one another.**

**Allen Tough, Professor Emeritus at the University of Toronto, 1998, “Positive consequences of SETI before detection,” Acta Astronautica Volume 42, Issues 10-12, May-June 1998, Pages 745-748]**

Cosmic evolution over billions of years has led to our present period, which is characterized by diverse life on Earth and probably throughout the universe. Eric Chaisson calls this period “the Life Era”[2]and Steven Dick calls this view “the biological universe”[3]. The SETI enterprise makes the likelihood of intelligent life throughout the galaxy feel more tangible and real**.** Instead of just talking or writing about the possibility, someone is actually doing something about it. As a result, humanity is gradually shifting toward a fresh image of who we are as a species. Increasingly we see ourselves as one of the abundantly diverse intelligent species that have arisen in the universe. That is how we fit into the universe. We feel part of the cosmic family; we feel a bond or kinship with others. We are one of the species that have developed a civilization marked by curiosity, inquiry, knowledge, meaning and purpose. We are not alone in the universe. Although we are unique, we may be one of billions of civilizations in the universe (just as each person and each snowflake is unique, but is also one of billions). As they learn about cosmic evolution and SETI activities, more and more people are developing a deeper sense of themselves as citizens of the universe—as part of intelligent life and evolving culture throughout the cosmos. We begin to move from forlorn isolation to a “feeling of genuine biological and spiritual unity with the universe” and that universe feels “friendlier”[4]. We begin to see ourselves within a galactic frame of reference. To use Michael Michaud’s words, we are about to “leave the era of Earth history, and enter an era of cosmic history**”[**5]. More recently he noted that “many of us are involved in SETI because we hope that detection, and even the search itself, will introduce a new and positive factor in human affairs. We are involved because SETI defines us as a species with shared interests. We are involved because SETI forces humanity to think big”[6]. According to Frank White, SETI may be, at its deepest levels**,** an effort to achieve a new kind of connection with the universe—to regain an integration or connectedness that has been shattered by standing apart from the cosmos and examining it as something that is not alive, not intelligent, and separate from ourselves[7].

**[\_\_\_\_] Even if we don’t actually find extraterrestrials, acknowledging that they could exist will allow us to be more cooperative with one another.**

**Ben Finney, Professor of Anthropology at the University of Hawaii, 1990 “The Impact of Contact,” Acta Astronautica, Volume 21, Issue 2, accessed 5-19-11, p.**

First, even in if we did not make contact, we might well benefit from an extraterrestrial perspective. The recent stimulus investigations about such extraterrestrial phenomena as cometary showers have had on thinking about the evolution of life on Earth provides a mode[14]. Just thinking about how other intelligent civilizations might develop, and about how we might relate to such civilizations, could stimulate us to take a detached and non ideological perspective on our own global civilization and its problems. It is often said that those first photos of earth taken from space made us fully realize the significance and value of our ecosphere. A view from an extraterrestrial civilization, even an imaginary one, might help us to transcend our cultural conceits and political divisions and think constructively about our own global civilization.

# Extraterrestrial Perspective Advantage

**[\_\_\_\_] This new global perspective would help solve the problems of warfare and environmental degradation.**

**Allen Tough, Professor Emeritus at the University of Toronto, 1998, “Positive consequences of SETI before detection,” Acta Astronautica Volume 42, Issues 10-12, May-June 1998, Pages 745-748]**

Photographs of the whole earth from the early space missions gave us a fresh perspective. A more recent photograph from even further away in our solar system gives us the sense of being a small fragile planet--a pale blue dot surrounded by space [9]. SETI provides a third fresh perspective by encouraging us to think about how extraterrestrials might perceive us**.** As we view ourselves through the ``eyes'' of distant extraterrestrials, this fresh perspective leads in turn to a fresh way of looking at our society's values, goals, priorities and foibles. Three aspects of SETI stimulate this fresh perspective by encouraging us to put ourselves ``in the shoes'' of remote extraterrestrials. (a) In order to choose search strategies, scientists must first think through the likely characteristics of whoever is out there, and their likely behaviour toward all other civilizations--in particular toward us since they may somehow be aware of our existence or even have some information about us. (b) During the past few years, at astronautics and SETI meetings, some attention has focused on what we should do about sending a reply after we detect a signal. Such thinking inevitably requires attention to how ``they'' might react to various sorts of replies that we might send. (c) In general, the whole SETI enterprise stimulates a wide variety of people to begin thinking more seriously about who might be out there and how they might view our society. By thinking about how a remote civilization might view us, we gain a fresh perspective on our own civilization. Various specific implications may occur to us. We may wonder why our society places such emphasis on differences among people when, compared with any extraterrestrial species, we are all quite similar and should feel deeply connected. We may see more sharply the importance of such priorities as ensuring our long-term survival and flourishing, caring about future generations, accumulating significant knowledge, protecting that knowledge from potential catastrophes, developing a set of universal goals and laws that might apply throughout the galaxy**,** and reducing our worst foibles and errors (warfare, population growth, environmental degradation). Surely extraterrestrials would wonder why we have not shifted our attention, resources, and efforts towards these key priorities.

# Space Debris Advantage

**[\_\_\_\_] The ATA would also be used to help the air force track space debris – small particles that are extremely dangerous to orbiting satellites.**

**Tom Pierson, CEO of the SETI institute, 4/22/2011, “Status of the Allen Telescope Array” http://archive.seti.org/pdfs/ATA-hibernation.pdf**

As a significant supporter of the Allen Telescope Array (ATA), you are already familiar with its unique capabilities. Not only does the Array enable our SETI search, but it also has been used to make considerable strides in radio astronomy and, most recently, in the development of the ability to detect space debris. With leadership funding by Paul Allen and the significant contributions by you and many others, the array has achieved much. Perhaps most important, the ATA is the world’s best instrument to search for possible signals from the thousands of planets being identified by NASA’s *Kepler Mission*.

However, the ATA faces some serious challenges. I am writing to personally alert you to them. We wanted you to hear this directly from us, rather than learn about it in the news or by other means. Effective this week, the ATA has been placed into hibernation due to funding shortfalls for operations of the Hat Creek Radio Observatory (HCRO) where the ATA is located. As a long time participant in supporting our work, you know that the Array is a partnership between the SETI Institute and the Radio Astronomy Lab of the University of California, Berkeley (UCB). Consistent with the original partnership understandings, the SETI Institute raised the funds to construct the Array, while the operations of the Observatory have been the responsibility of UCB. The UC Berkeley Radio Astronomy Lab has operated the Hat Creek Observatory for more than five decades, hosting several generations of radio astronomy instruments, the most recent being the ATA. Historically, the costs of HCRO operations were supported from two primary sources: 1) major “*University Radio Observatory”* grants from the National Science Foundation, and 2) supplemental budgetary support from the State of California via Berkeley’s Radio Astronomy Lab. Unfortunately, today’s government budgetary environment is very difficult, and new solutions must be found. NSF University Radio Observatory funding for HCRO has been reduced to approximately one-tenth of its former level. This is compounded by growing State of California budget shortfalls that have severely reduced the amount of state funds available to the Radio Astronomy Lab. Combined, these factors have resulted in the current decision by UCB to reduce operations of the Hat Creek site to a hibernation mode, pending future funding or some alternative solution. Hibernation means that, starting this week, the equipment is unavailable for normal observations and is being maintained in a safe state by a significantly reduced staff.

More than two years ago, seeing the early effects of these funding difficulties, the SETI Institute began an effort to replace the lost funds by seeking a partnership with the United States Air Force to conduct experiments to see how the ATA could serve as a collaborating sensor to the USAF space surveillance network, helping track space debris. This effort is ongoing and showing much promise, but near term funding has been delayed due to the same, highly publicized large scale federal budget problems we all read about in the news.

# Space Debris Advantage

[\_\_\_\_] The radio monitoring of the ATA is well suited to monitoring debris. It would also track debris during the day, which would not detract from its mission to seek out ETs.

The SETI Institute, 5/19/2009 “AFSPC explores Allen Telescope Array for Space Surveillance,” http://www.seti.org/afspc

The unique design of the Allen Telescope Array (ATA) is intriguing to the Air Force because it provides a similar sensitivity to a very large dish antenna, but at a cheaper cost for the same collecting area. This is known as a Large-Number Small-Diameter concept, and fits well with the Air Force’s goal of conducting its mission in a fiscally responsible manner. The AF working with the ATA may be a natural win-win relationship. Specifically, the AF requires additional sensors to observe orbiting objects during the daytime, because many of its Electric-Optical (EO) sensors are affected by light pollution during the day, which limits the observations that can be conducted at that time. The ATA's primary missions, searching for extraterrestrial life and scientific research, are most often conducted at night, because this gives them the best pointing stability and avoids decrease in the strength of narrow band signals due to scattering by the solar wind. Operating the ATA during the daylight hours for the AF allows the array to be more fully utilized while not detracting from its scientific and SETI goals, and may provide the AF with vital daytime observations. To be utilized as a viable long-term sensor for the SSN, the ATA has to demonstrate many characteristics besides accurately being able to observe orbiting satellites. Its data have to be consistent, timely, precise, sensitive, and have a throughput that makes it worth the cost of a long-term investment by the Air Force. If these factors demonstrate themselves, the ATA may be integrated into the SSN to help to ensure the safety of flight of objects in space.

**[\_\_\_\_] Tracking space debris is critical to protecting our satellites, which perform a variety of essential economic functions.**

**Megan Ansdell, Consultant at Booz Allen Hamilton for Space Policy, Former Graduate Student Intern at NASA, 2010 “Active Space Debris Removal: Needs, Implications, and Recommendations for Today’s Geopolitical Environment,”** [**www.princeton.edu/jpia/past-issues-1/2010/Space-Debris-Removal.pdf**](http://www.princeton.edu/jpia/past-issues-1/2010/Space-Debris-Removal.pdf)

There are currently hundreds of millions of space debris fragments orbiting the Earth at speeds of up to several kilometers per second. Although the majority of these fragments result from the space activities of only three countries—China, Russia, and the United States—the indiscriminate nature of orbital mechanics means that they pose a continuous threat to all assets in Earth’s orbit. There are now roughly 300,000 pieces of space debris large enough to completely destroy operating satellites upon impact (Wright 2007, 36; Johnson 2009a, 1). It is likely that space debris will become a significant problem within the next several decades. Predictive studies show that if humans do not take action to control the space debris population, an increasing number of unintentional collisions between orbiting objects will lead to the runaway growth of space debris in Earth’s orbit (Liou and Johnson 2006). This uncontrolled growth of space debris threatens the ability of satellites to deliver the services humanity has come to rely on in its day-to-day activities. For example, Global Positioning System (GPS) precision timing and navigation signals are a significant component of the modern global economy; a GPS failure could disrupt emergency response services, cripple global banking systems, and interrupt electric power grids (Logsdon 2001).

# Space Debris Advantage

**[\_\_\_\_] Another major economic shock would lead to war.**

**Walter Russell Mead, the Henry A. Kissinger Senior Fellow in U.S. Foreign Policy at the Council on Foreign Relations, 2/4/2009, “Only Makes You Stronger,” The New Republic,** h**ttp://www.tnr.com/politics/story.html?id=571cbbb9-2887-4d81-8542-92e83915f5f8&p=2**

So far, such half-hearted experiments not only have failed to work; they have left the societies that have tried them in a progressively worse position, farther behind the front-runners as time goes by. Argentina has lost ground to Chile; Russian development has fallen farther behind that of the Baltic states and Central Europe. Frequently, the crisis has weakened the power of the merchants, industrialists, financiers, and professionals who want to develop a liberal capitalist society integrated into the world. Crisis can also strengthen the hand of religious extremists, populist radicals, or authoritarian traditionalists who are determined to resist liberal capitalist society for a variety of reasons. Meanwhile, the companies and banks based in these societies are often less established and more vulnerable to the consequences of a financial crisis than more established firms in wealthier societies. As a result, developing countries and countries where capitalism has relatively recent and shallow roots tend to suffer greater economic and political damage when crisis strikes--as, inevitably, it does. And, consequently, financial crises often reinforce rather than challenge the global distribution of power and wealth. This may be happening yet again. None of which means that we can just sit back and enjoy the recession. History may suggest that financial crises actually help capitalist great powers maintain their leads--but it has other, less reassuring messages as well. If financial crises have been a normal part of life during the 300-year rise of the liberal capitalist system under the Anglophone powers, so has war. The wars of the League of Augsburg and the Spanish Succession; the Seven Years War; the American Revolution; the Napoleonic Wars; the two World Wars; the cold war**:** The list of wars is almost as long as the list of financial crises**.** Bad economic times can breed wars**.** Europe was a pretty peaceful place in 1928, but the Depression poisoned German public opinion and helped bring Adolf Hitler to power. If the current crisis turns into a depression, what rough beasts might start slouching toward Moscow, Karachi, Beijing, or New Delhi to be born? The United States may not, yet, decline, but, if we can't get the world economy back on track, we may still have to fight.

# Inherency Extensions

**[\_\_\_\_]**

[\_\_\_\_] The Allen Telescope search for extra – terrestrial intelligence has been taken off line die to funding shortfalls.

Lisa Krieger, Reporter for the San Jose Mercury News 4/25/2011 **“SETI Institute to shut down alien-seeking radio dishes”**

If E.T. phones Earth, he'll get a "disconnect" signal. Lacking the money to pay its operating expenses, Mountain View's SETI Institute has pulled the plug on the renowned Allen Telescope Array, a field of radio dishes that scan the skies for signals from extraterrestrial civilizations. In an April 22 letter to donors, SETI Institute CEO Tom Pierson said that last week the array was put into "hibernation," safe but nonfunctioning, because of inadequate government support. The timing couldn't be worse, say SETI scientists. After millenniums of musings, this spring astronomers announced that 1,235 new possible planets had been observed by Kepler, a telescope on a space satellite. They predict that dozens of these planets will be Earth-sized -- and some will be in the "habitable zone," where the temperatures are just right for liquid water, a prerequisite of life as we know it. "There is a huge irony," said SETI Director Jill Tarter, "that a time when we discover so many planets to look at, we don't have the operating funds to listen." SETI senior astronomer Seth Shostak compared the project's suspension to "the Niña, Pinta and Santa Maria being put into dry dock. "... This is about exploration, and we want to keep the thing operational. It's no good to have it sit idle. "We have the radio antennae up, but we can't run them without operating funds," he added. "Honestly, if everybody contributed just 3 extra cents on their 1040 tax forms, we could find out if we have cosmic company." The SETI Institute's mission is to explore the origin, nature and prevalence of life in the universe. This is a profound search, it believes, because it explains our place among the stars. The program, located on U.S. Forest Service land near Mount Lassen, uses telescopes to listen for anything out of the ordinary -- a numerical sequence of "beeps," say, or crackly dialogue from an alien version of a disembodied "Charlie" talking to his "Angels." The entire program was set up to prove what once seemed unthinkable: In the universe, we are not alone.

# Alien Contact Extensions – Aliens Exist

**[\_\_\_\_] A consensus of astrobiologists believes that alien life similar to ours exists.**

Mark Kauffman, Astrobiology Correspondent, 6/11/2011, **“It’s Alive Out There!” Saint Paul Pioneer Press**

This hidden-in-plain-sight campaign is the renewed scientific push to find signs of life, or of past life, beyond the confines of our planet. The umbrella science that organizes the effort is called astrobiology, and the field is making surprising and compelling progress. It still may well be years before science finds anything that is clearly extraterrestrial life, but scientists are more convinced than ever of the existence of alien life, and they have the newly sophisticated (and still quickly evolving) tools and knowledge to actually find it. The scientific breakthroughs of the field reflect its breadth: Astrobiology takes in fields ranging from microbiology to chemistry, astronomy and planetary science to cosmology. From the world of microbiology, for instance, scientists have learned that microbial life is far more tenacious than ever imagined, and able to survive deep underground, in glaciers, alongside hydrothermal vents, and even floating in the atmosphere. From astrochemistry we have learned that all of the elements and molecules needed for life as we know it - hydrogen, oxygen, nitrogen, water, and complex carbons - are present throughout the universe. These non-living building blocks need planets to land on where they can possibly interact in ways that can lead to biology and life, and now we know that such planets (or exoplanets, as they're called) are common. More than 500 have been positively identified in the past 15 years, 1,200 new candidate planets were discovered by NASA's Kepler mission this year, and astronomers now are convinced there are billions, and maybe hundreds of billions, of exoplanets in the Milky Way and beyond. What's more, techniques for finding exoplanets have evolved to the point that several groups have claimed to have located "Goldilocks" planets - those orbiting their suns at a distance where water won't always be either boiling or freezing.

**[\_\_\_\_] Like physics, the principles of biology are universal. Life exists outside the solar system.**

David Shwartzman, professor of biology at Howard University, 5/21/2010, **“SETI Redux: Joining The Galactic Club,” *Astrobiology Magazine***

The first explanation is contrary to the subtext of astrobiology, the belief in quasi-deterministic astrophysical, planetary and biologic evolution. This view of life's inevitability in the cosmos is a view (or, shall I admit, a prejudice) I heartedly endorse. Most scientists active in the astrobiological research program would support an optimistic estimate of all the probabilities leading up to multicellular life on an Earth-like planet around a Sun-like star. I happen to be an optimist on this issue too. I have argued that encephalization - larger brain mass in comparison to body mass - and the potential for technical civilizations are not very rare results of self-organizing biospheres on Earth-like planets around Sun-like stars. Biotically-mediated climatic cooling creates the opportunity for big-brained multicellular organisms, such as the warm-blooded animals we observe on our planet. Note that several such animals have now been shown to pass the "mirror test" for self-consciousness: the great apes, elephants, dolphins and magpies, and the list is growing. But some, like my occasional collaborator Charley Lineweaver, an astrophysicist at Australian National University, are deep pessimists regarding the chances for other technical civilizations to emerge in the galaxy. He has argued, "humans and dolphins have 3.5 billion years of shared common ancestry. For 98 percent of our history, humans and dolphins were the same. The genes needed to develop those big brains had been fine-tuned over billions of years of evolution and were already in place." Lineweaver says that if advanced civilizations do emerge elsewhere in the galaxy, we can't expect they'll have human-like intelligence. This deserves an essay in itself. But if the pessimists concede just one of the millions if not billions of Earth-like planets is the platform for just one technical civilization that matures to a planetary stage, advancing beyond our present primitive self-destructive stage, just one advanced civilization with the curiosity to spread through the galaxy, at sub-light speeds with Bracewell probes to explore and document an Encyclopedia Galactica, then what should we expect?

# Alien Contact Extensions – Alien Contact Good

**[\_\_\_\_]**

**[\_\_\_\_] Alien societies will be far more advanced than ours and share their technology, allowing us to thrive and benefit from their research**

**Matt Smith, writer for the San Francisco Weekly, 4/1/1998, “Heavenly Secrets,” SF Weekly**

If the musings of the more enthusiastic scientists who conduct the Search for Extra Terrestrial Intelligence are any guide, once we know we have company in the universe, astonishing advances will occur. Then, because the civilization communicating with Earth will most certainly be thousands of years more advanced than our own, we will instantly become privy to the wisdom of the ages. That civilization will have learned how to cure disease, outlive nuclear weapons, and solve the countless other quandaries haunting our species, so life expectancy on Earth will skyrocket. Earthlings will wire into an intergalactic Internet, through which far-flung civilizations communicate across time and space. As earthlings are freed from planetary tethers, eons of alien science will make us immortal, omniscient, and transcendentally wise.

**[\_\_\_\_]**

**[\_\_\_\_] There’s no reason for aliens to be aggressive or try to exploit us – it’s not practical to travel so far for the resources Earth has.**

**Jeff Foust, Space Review Editor**, **8/23/2010, “SETI at 50,” Space Review, http://thespacereview.com/article/1686/1**

Others, though, noted that we have been broadcasting, as radio broadcasts and other emissions that have “leaked” out from Earth over the decades that could be easily detected by an extraterrestrial civilization. “This horse has left the barn,” Shostak said. “Any society that could possibly be a threat to us can easily know that we’re here.” Shostak and others also took issue with the claim that such civilizations, alerted to our presence, would go after us for our resources. “To me it is almost inconceivable that there is a material resource worth traveling light-years to collect,” said science fiction writer Robert J. Sawyer. “The energy required to collect it will almost always be more expensive than the cost of making it at home.” An advanced civilization would likely have to get any warlike instincts under control if it is to survive, added social scientist Douglas Vakoch. And even if they didn’t, “can they do us any harm at interstellar distances?”

# Extraterrestrial Perspective Extensions

**[\_\_\_\_]**

**[\_\_\_\_] Even insignificant contact with extraterrestrial life will revolutionize humanity**

**Allen Tough, Professor Emeritus at the University of Toronto, 2000**, “**When SETI Succeeds: The Impact of High-Information Contact”, http://ieti.org/tough/books/succeeds/sectII.pdf**

Post-contact society is likely to affect our views of ourselves in at least three ways. First, it will speed awareness that we are part of the biological universe (Dick, 1996). Contact, even under minimum detection scenarios, is likely to accelerate our views of our selves as a part of a larger, interstellar humanity,” to extend the terminology of Olaf Stapleton’s “ interplanetary man” (Dick, this volum ) . Many other factors—such as our progress in spacefaring—will contribute to our consciousness of the cosmos. Second, knowledge of relationships among extraterrestrial subpopulations could help us gain insight into intergroup relations on Earth. We may learn, for example, from how ETI societies treat different societies as well as their own subpopulations. This discovery could cause us to reﬂect on how we ourselves treat people from different cultures and subcultures. By seeing how ETI manages diversity, we may learn new models for group relations on Earth. Almost a century of work in psychology and sociology shows that other people’s treatment of us shapes our views of ourselves. People who are treated as competent and worthwhile individuals tend to develop high self-conﬁdence and perform well. Selfconﬁdence and success tend to feed upon each other and generate an upward spiral of events. People who are treated as inferior and incompetent lose self-conﬁdence and motivation, and perform poorly. Low self-conﬁdence and poor performance also feed on each other, in this case creating a downward spiral.

**[\_\_\_\_]**

**[\_\_\_\_] Whether or not we find life, SETI will help answer questions about our place in the universe.**

David L. Chandler, science writer for the Boston Globe, 6/25/1984, **“ASTRONOMY; LISTENING TO THE STARS GETS RESPECT,” Boston Globe**

But for the most part, the scientists gathered here were not interested in such practical spinoffs from their work. "I wouldn't want to justify it on those grounds," Morrison said. The justification the SETI scientists prefer seems to be more philosophical than practical. Michael Papagiannis, BU astronomy professor, president of the IAU's SETI commission and organizer of the symposium, summed it up thus: "We stand at a historic threshold. We have the chance to open the windows of our tiny planet. We can now seek experimentally the answers to ancient and fundamental questions." Morrison adds that one of the benefits of SETI research is that it causes us to take a "broad look at our own history." Sagan says that "provided we play the game, we win whether we find extraterrestrial intelligence or not. Suppose we do a comprehensive search and find nothing. Is this a failure? I don't think so." Whether we find signals or not, he says, it will teach us valuable lessons about our place in the universe.

# Space Debris Extensions – ATA Helps Tracking

[\_\_\_\_]

**[\_\_\_\_] The ATA can track debris in daylight, something that current technology cannot.**

THE SETI Institute, 5/19/2009 “AFSPC explores Allen Telescope Array for Space Surveillance,” http://www.seti.org/afspc

Future tasks for the ATA will include demonstrating the capability to track objects besides GPS. Additionally, tasks such as tracking objects during the daylight hours, or with the sun or moon in field of view, will further demonstrate the capabilities of the ATA as a sensor for the SSN. These demonstrations are important because many of the current sensors have difficulty with light-pollution, which hampers observations. If the ATA can demonstrate its capability to precisely locate satellites in all orbits, during day or night, it increases it significance as a SSN sensor, and increases the overall safety of space.

[\_\_\_\_] The ATA could be used by the Air Force Space Command to improve space safety.

THE SETI Institute, 5/19/2009 “AFSPC explores Allen Telescope Array for Space Surveillance,” <http://www.seti.org/afspc>

AFSPC is one of a few organizations responsible for obtaining and maintaining the awareness needed for successful and safe space operations. The command develops, maintains and shares a comprehensive and accurate catalog of orbiting space objects, while constantly seeking methods to improve their Space Surveillance Network (SSN), a global network of radar and optical sensors that detect and track orbiting space objects. AF Space Command is exploring opportunities in academia and the commercial sector that could provide suitable cost-effective means for augmenting the Space Command's Space Surveillance mission. The Allen Telescope Array (ATA), located at the Hat Creek Radio Observatory, 290 miles northeast of San Francisco, California is a tool with strong potential for use by AFSPC in support of the Department of Defense’s Space Surveillance mission**.** The ATA is a radio interferometer that is dedicated to cutting-edge astronomical research. This array of antennas is optimized to receive and process a very wide portion of the radio spectrum and can stare at many areas of the sky at once. AFSPC, through the Space Innovation and Development Center (SIDC), is currently researching the possible use of the ATA to augment the already extensive sensors of the Space Surveillance Network, potentially leveraging the array to help increase space situational awareness. Initial demonstrations show promise for the ATA to track transmitting satellites in Low Earth Orbit, Medium Earth Orbit and, most promising, in Geosynchronous Orbit (GEO), which is home to the most costly, highly-utilized, and vital satellites that orbit the earth.A collision and subsequent debris field in GEO could permanently remove the GEO belt from worldwide use. AFSPC is working with the SETI Institute, and its partner, the Radio Astronomy Laboratory at the University of California, Berkeley. These partners currently operate the ATA. The effort is to demonstrate the array’s capability of accurately surveying the GEO belt by demonstrating the array’s capability of precisely locating objects in that area, in an effort to avoid a devastating collision in GEO. The ATA may prove to be a viable and sensitive SSN sensor, capable of all-weather, day and night operations, and will hopefully lead to improved space safety.

# Space Debris Extensions – Plan Mitigates Debris

**[\_\_\_\_]**

**[\_\_\_\_] A tracking system is key to alleviate space debris.**

**Sarah D. Dahl, Major, United States Air Force, 04/2009, “ Is it time for space debris removal?”**

With all the increased activities in space, it has become critical that debris is detected and tracked to protect the spacecraft. Depending on the altitude and radar cross-section of the debris, our detection and tracking capabilities are limited to the LEO and GEO orbits (with GEO being the most challenging due to the altitude), which isn’t necessarily bad given that these are the most congested orbits. Debris is tracked using a combination of optical telescopes (most effective for objects in GEO) and radar (most effective for objects in LEO). Currently, an international space surveillance system does not exist. However, several countries have established their own systems to track objects, and in some cases have been willing to share the data. The countries most involved with tracking are the United States, United Kingdom, Germany, and France. The U.S. Space Surveillance Network (SSN) is the leading mechanism 8 for tracking debris and maintaining a catalogue of its location (which is critical information to satellite operators to provide early warning to conduct collision avoidance maneuvers or launch notifications). This system consists of around 30 radar and optical sensors, located at 16 sites around the world. 30 It is capable of reliably tracking objects that are ten centimeters or larger (currently tracking over 17,300 objects of this size). 31 “About seven percent are operational satellites, 15 percent are rocket bodies, and about 78 percent are fragmentation and inactive satellites.” 32 However, there are over 300,000 objects between one and 10 cm in size, and billions more even smaller (especially in LEO). 33 Debris this small can only be observed using such systems as the Haystack Radar, which is a 37-meter telescope that can detect objects in LEO down to 5-mm in size if in the radar’s line of sight. 34 To put all this into perspective, we currently track about 17,300 objects the size of a grapefruit or larger (10-cm), but can only observe anything smaller at a specific place and time at best. To complicate matters, the reliability of these systems is dependent on the space environment. Solar flares can cause these systems to lose objects for days. This can be concerning when planning launches and forecasting where the debris will be with respect to the launch trajectory. Given the increasing amount of debris (and debris creating activities such as ASAT tests), it is even more critical that our detection and tracking capabilities become more accurate, reliable and able to track debris less than 10 cm. Additionally, an international tracking system should be established and funded among all space-faring nations to share the burden of developing this capability.

# Space Debris Extensions – Debris Impacts

**[\_\_\_\_]**

**[\_\_\_\_] Top experts confirm the military would collapse without satellites**

**Kevin Johnson and John G. Hudson, Lieutennant and project supervisor at the Global Innovation and Strategy Center (GISC) Internship program, Fall 2007, “Eliminating Space Debris – Applied Technology and Policy Perscriptions”** [**http://www.slideshare.net/stephaniclark/giscinternpaperspacedebriselimination**](http://www.slideshare.net/stephaniclark/giscinternpaperspacedebriselimination)

General Kevin P. Chilton, Commander of United States Strategic Command, recently wrote: “Military and civilian entities are heavily reliant on services that satellites provide, and space operations are so pervasive that it is impossible to imagine the U.S. functioning without them.”4 During Operation Desert Storm, commercial satellites provided 45% of all communications between the theater and the continental United States.5 Today, according to General Chilton, “We rely on satellites to verify treaty compliance, monitor threats and provide advance warning of missile attacks. It's important to remember that every soldier, sailor, Marine and airman in Iraq and Afghanistan relies on space technology for crucial advantages in the field.”6

**[\_\_\_\_]**

**[\_\_\_\_] Satellites collisions would cause economic panic.**

**Space Daily, 8/31/2009, “Space Debris – Problem Solved,”** [**http://www.spacedaily.com/reports/Space\_Debris\_Problem\_Solved\_999.html**](http://www.spacedaily.com/reports/Space_Debris_Problem_Solved_999.html)

Upper stages must vent tanks to rid them of residual propellant that might later result in explosions. Many satellites are maneuvered to avoid close-conjunction events. JSpOC is beefing up its satellite and debris tracking capabilities. National and international working groups are meeting regularly to assess the threat and to recommend actions for all space-faring nations. The world is just one major satellite collision event away from panic. Instances of close conjunction events in highly congested orbital bands have increased dramatically in the past few years. In fact, the frequency of close encounters between active satellites and large debris objects within the Iridium constellation has reached a frighteningly high level. Odds are that there will be another Iridium/Cosmos type of event in the near future. Should such an event occur, several bad things will happen to many satellite operators. If another Iridium satellite is involved the company would be forced to replace the lost satellite. The frequency of close encounters in orbits near that of Iridium's constellation would suddenly increase to levels that would cause several operators to reassess the viability of existing space applications. Satellite insurance providers might be forced to raise premiums on in-orbit performance to record high levels. Future launch plans for almost all low orbit satellites may be curtailed. Space-based services to the world would diminish over time. The economic impact is not even calculable. This is scary!

# Solvency Extensions – ATA Leads to Contact

[\_\_\_\_]

[\_\_\_\_] Fully functioning telescope array means that alien contact could happen in the next 25 years.

**United Press International, source for science news, 8/16/2010, “Scientist: SETi success within 25 years?”**

The search for extraterrestrial intelligence could yield proof of its existence with 25 years, a U.S. scientist involved in the quest says. Speaking at the SETI Con convention in Santa Clara, Calif., Seth Shostak -- senior astronomer at the Search for Extraterrestrial Intelligence Institute in Mountain View, Calif. -- said, "I actually think the chances that we'll find ET are pretty good," SPACE.COM reported Monday. "Young people in the audience, I think there's a really good chance you're going to see this happen," he said. The SETI search will take a giant step forward when the Allen Telescope Array, a network of radio dishes under construction in northern California, is fully operational, Shostak said. By 2015, the array should be able to scan hundreds of thousands of stars for signs of extraterrestrial intelligence, he said. Detecting an alien signal within 25 years is one thing, but figuring out the message could take much longer, Shostak said. An alien civilization would likely be as technologically advanced compared to us as Homo sapiens are to our hominid relatives Neanderthals, he said. "We could give our digital television signals to the Neanderthals, and they'll never figure it out. And they're not stupid," he said.

**[\_\_\_\_]**

[\_\_\_\_] The ATA means that we will encounter alien communications soon.

Michael Shermer, Columnist for Scientific American, 06/2011, Scientific American, Volume 304, Issue 6, p86-89, EBSCO, “The Myth of the Evil Aliens”

With the Allen Telescope Array run by the SETI Institute in northern California, the time is coming when we will encounter an extraterrestrial intelligence (ETI). Contact will probably come sooner rather than later because of Moore's Law (proposed by Intel's co-founder Gordon E. Moore), which posits a doubling of computing power every one to two years. It turns out that this exponential growth curve applies to most technologies, including the search for ETI (SETI): according to astronomer and SETI founder Frank Drake, our searches today are 100 trillion times more powerful than 50 years ago, with no end to the improvements in sight. If E.T. is out there, we will make contact. What will happen when we do, and how should we respond?

# Solvency Extensions – Radio Searching Best

**[\_\_\_\_]**

[\_\_\_\_] Radio experiments are better than observational experiments because they have a lower energy cost.

Seth Shostak, **senior astronomer at the SETI institute**, 04/2001, Vol. 101, Issue 4, Sky & Telescope, EBSCO, “The Future of SETI”

Radio works. And 30 years ago, researchers were convinced it works best -- better than light, for instance. The argument was twofold. Microwaves handily penetrate interstellar dust, whereas visible light is blocked. But a subtler point is that radio requires less energy per bit of information, which ought to make it the communication medium of choice for any alien engineers. In the radio regime, the minimum background noise you'll encounter is the faint**,** 2.7 degrees Kelvin afterglow of the Big Bang. In the microwave part of the spectrum this means you typically need to receive just 50 photons per bit to stand out from the noise**.** No problem. But at higher, optical frequencies, a photon is more energetic and expensive. Even a single infrared photon packs 5,000 times more punch than the group of 50 necessary to send one bit at microwave frequencies. So higher frequencies mean higher energy costs.

**[\_\_\_\_]**

[\_\_\_\_] Radio searching is the best method, the improving technology means it will be successful.

Seth Shostak, **senior astronomer at the SETI institute**, 04/2001, Vol. 101, Issue 4, Sky & Telescope, EBSCO, “The Future of SETI”

Radio SETI may no longer be the only game in town, but it's still the game to which most researchers belly up. That's because the odds of a jackpot, though quite unknown, are unquestionably getting better all the time -- because the instruments are growing more capable by leaps and bounds. The ideal SETI radio telescope can only be imagined. It would monitor every point on the sky, in every radio channel from one end of the microwave window to the other (about 1,000 to 11,000 megahertz), all the time -- a true Omnidirectional Search System, or OSS. Unfortunately, this ideal is a very long way off. But it'sno longer impossible to work toward. The STWG team considered what it would take to build a reasonable interim OSS. They were seduced by the thought of a telescope able to find powerful but intermittent signals, the kind that none of the current large SETI experiments has a hope of detecting.

# Solvency Extensions – Can Identify Alien Signals

**[\_\_\_\_]**

[\_\_\_\_] SETI scientists have the tools to distinguish alien transmissions from noise.

Tim Folger, Editor at Discover, 01/2011, Scientific American, Volume 304, Issue 1, p40-45,

EBSCO, “Contact the Day After”

SETI SCIENTISTS THINK they know, in broad terms, what an ET signal will look like. To stand out as obviously artificial against a background of natural cosmic radio emissions, the signal would have to be narrow, with a lot of energy packed into a few frequencies. Natural phenomena, such as pulsars and interstellar gases, spew out radio emissions at many different frequencies. If an observatory ever receives a narrowband signal coming from an astronomical distance, the source would almost certainly be from an artificial source.

**[\_\_\_\_]**

**[\_\_\_\_] Our own history proves that there are plenty of reasons for aliens to broadcast a signal.**

Gregory Benford and James Benford, astrophysicist in the department of Physics and Astronomy at UC Irvine and expert in high powered microwaves, 04/2011**, “Smart SETI,” Analog Science Fiction & Fact, 131:4, p.33,**

What could motivate a Beacon builder? Here we can only reason from our own historical experience. Other possible high intelligences on Earth (whales, dolphins, chimpanzees) do not have significant tool use, so they do not build lasting monuments. Sending messages over millennia or more connects with our own cultures. Human history suggests (Benford G., 1999) that there are two major categories of long-term messages that finite, mortal beings send across vast time scales: • Kilroy Was Here: These can be signatures verging on graffiti. Names chiseled into walls have survived from ancient times. More recently, we sent compact disks on interplanetary probes, often bearing people’s names and short messages that can endure for millennia. • High Church These are designed for durability, to convey the culture’s highest achievements. The essential message is this was the best we did; remember it. A society that is stable over thousands of years may invest resources in either of these paths. The human prospect has advanced enormously in only a few centuries; the lifespan in the advanced societies has risen by 50% in each of the last two centuries. Living longer, we contemplate longer legacies. Time capsules and ever-proliferating 5 monuments testify to our urge to leave behind tributes or works in concrete ways (sometimes literally). The urge to propagate culture quite probably will be a universal aspect of intelligent, technological, mortal species (Minsky, 1985). Thinking broadly, high-power transmitters might be built for wide variety of goals other than two-way communication driven by curiosity. For example: • The Funeral Pyre: A civilization near the end of its life announces its existence.

# Answers To: Privatization DA / CP

**[\_\_\_\_]**

**[\_\_\_\_] Government action is key to coordinate SETI, otherwise we will not have a unified response when we actually make contact with aliens.**

**Martin Dominik and John C. Zarnecki, Royal Society University Research Fellow at the School of Physics and Astronomy at the University of St Andrews, Arthur Clarke Professor of Space Science at Open University, 2011, consequences for science and society and The detection of extra-terrestrial life, Philosophical Transactions of the Royal Society,**

While scientists are obliged to assess benefits and risks that relate to their research, the political responsibility for decisions arising following the detection of extra-terrestrial life cannotand should not rest with them. Any such decision will require a broad societal dialogue and a proper political mandate. If extraterrestrial life happens to be detected, a coordinated respons**e** that takes into account all the related sensitivities should already be in place. In 1989, the International Academy of Astronautics (IAA) approved a SETI post-detection protocol [51], which was developed by one of its committees. Despite the fact that it has subsequently been endorsed by the International Institute of Space Law (IISL), the Committee on Space Research (COSPAR) of the International Council for Science (ICSU), the International Astronomical Union (IAU) and the International Union of Radio Science (URSI), the procedures laid out in that document are not legally enforceable. If it remains a voluntary code of practice, it will probably be ignored in the event to which it should apply. Will a suitable process based on expert advice from proper and responsible scientists arise at all, or will interests of power and opportunism more probably set the scene (cf. [52])? A lack of coordination can be avoided by creating an overarching framework in a truly global effort governed by an international politically legitimated body. The United Nations fora constitute a ready-made mechanism for coordination. Member States of the Committee on the Peaceful Uses of Outer Space (COPUOS) will need to place ‘supra-Earth affairs’ on the agenda in order to take it further to the General Assembly, with the goal of establishing structures similar to those created for dealing with threats arising from potentially impacting near-Earth objects [53].

# Article: The Allen Telescope Array

**The Guradian: *Alien Finding Institute SETI Runs Out of Cash to Operate Telescope*. April 26th, 2011.**

It is the scientific institute made famous in Carl Sagan's novel Contact, the organisation for which the main character, Ellie Arroway – played by Jodie Foster in the 1997 film version – worked day and night looking for signs of intelligent life in outer [space](http://www.guardian.co.uk/science/space).

In real life, the Seti Institute has spent five decades hunting the skies for radio signals from deep space, possible communications which may indicate we are not alone in the universe. Now it has fallen prey to a very earthly problem: it has run out of cash. The institute's chief executive, Tom Pierson, has announced that there are "serious challenges" in finding operating funds and that from this week the organisation's brand new $50m (£30m) telescope array will be placed into hibernation. "This means that the equipment is unavailable for normal observations and is being maintained in a safe state by a significantly reduced staff," he said in a letter to private donors to the institute.

The problems revolve around the operation of the Allen Telescope Array (ATA), a set of radio dishes dedicated to looking for alien signals. Though it was paid for by the Seti Institute, the array, at the Hat Creek Radio Observatory, 300 miles north-east of San Francisco, is managed and operated by the radio [astronomy](http://www.guardian.co.uk/science/astronomy) lab of the University of California, Berkeley.

According to Seti senior astronomer Seth Shostak, the facility needs about $2m-$3m a year to function and to keep the scientific research programmes going. The scientists need an additional $5m to fund a two-year project to listen for possible radio signals coming from the Earth-like exoplanets found by Nasa's Kepler satellite. Launched in 2009, it has already identified more than 1,000 candidate planets, which the Seti Institute wants to use to narrow its search.

The money needed to operate the observatory has until now come from a mixture of private donations, the US National Science Foundation (NSF) and the state government of California. "As it happens, Berkeley's budget is way down – the state of California is in terrible financial circumstances because of the economic downturn," Shostak said. "Consequently, they don't have the money to keep the doors open and pay the electric bills and pay the staff at the antenna. And we don't either, because we run our Seti projects mostly based on private donations, and those are down as well." Funding from the NSF has also been cut, to about a tenth of its former level.

Paul Davies, an astrophysicist at Arizona State University, said the ATA facility was "the gold standard for Seti observations and acts as an emblem for the entire worldwide research effort. It would be an utter tragedy if a unique research programme is abandoned for the cost of a few miles of motorway". He added: "Our society squanders vast sums on trivia and entertainment, yet cannot find some small change to address the burning issue of whether we are alone in the universe."

There is some hope of raising funds by working with the US air force on future projects, according to Pierson, with one idea being to use the ATA in collaboration with the USAF's space surveillance network to track debris in space, which can damage satellites and space vehicles. But this is also uncertain, given impending cuts in federal funding for the military.

"The other possibility is that private donations could bring the telescope back to life and keep it working," said Shostak. In the past, science fiction author Arthur C. Clarke and Silicon Valley

entrepreneurs Bill Hewlett and David Packard had helped fund Seti, he said, and "if Richard Branson or somebody … wanted to help us out now, they can get in touch".

The ATA is the Seti Institute's biggest facility by far, and its only dedicated one. Its shutdown means astronomers will need to rely on data collected during downtime from other telescopes around the world and this will reduce its chances of finding that elusive alien signal.

Shostak said the future of the ATA had to be decided sooner rather than later, as there was only enough money to keep it in hibernation mode for a few months.

Until the funding crisis can be solved, the institute said it would continue its work on developing equipment and software that supports the overall search for alien signals.

This includes an increased focus on involving citizens in its work: astronomers have already developed the successful Seti@Home project, a programme that uses the downtime on people's home computers to sort through the masses of data collected by the institute's experiments.

The next step is SetiQuest.Org, an application that allows "citizen scientist volunteers to look for patterns in data from the ATA that might be missed by current algorithms, and help us explore frequency bands that are so full of signals that our detectors get confused", said Pierson.

Given the improvements in radar technology, Shostak said it would be a shame to stop searching now for signals from ET. "If this experiment is going to work, it's going to work in a few dozen years, simply on the basis of the rapid improvement of the technology afforded by Moore's Law. The equipment keeps getting faster and faster, so I think success is not very far off if you keep doing this."

He added: "In the grand scheme of things, this is not a whole lot of money and, clearly, Seti is an uncertain proposition. But Seti has a long lever-arm because, clearly, if we were to find a signal showing there was intelligent life, that would be an extraordinarily interesting thing. Not only for us but for every generation that follows us."

**Seti history**

Seti, the Search for Extraterrestrial Intelligence, was conceived in 1960 by astronomer Frank Drake. He pointed the Green Bank radio telescope in West Virginia towards the star Tau Ceti and began looking for anomalous radio signals that might have been sent by intelligent life. Eventually, the Seti Institute was set up in California and began to use the downtime on radar telescopes around the world to scour for signals.

Most recently, the search has been helped by building a dedicated set of antennae, the $50m Allen Telescope Array, 300 miles north-east of San Francisco. Part-funded by Microsoft co-founder Paul Allen, the array has 42 radio dishes, each 6m in diameter, and is the first step in an ambitious plan to build up to 350 antennae to look for radio signals day and night.

# Article: Overview of SETI’s History

**The Space Review: *SETI at 50*. August 23rd, 2010**

Fifty years ago this spring, a young astronomer turned a West Virginia radio telescope towards a pair of nearby stars and listened. That in and of itself was hardly unusual, but the reason for these particular observations was: that astronomer, Frank Drake, was listening for signals from those stars that might be artificial in origin, evidence of an extraterrestrial civilization. And almost immediately he found something.

As it turned out, what Drake detected that night *was* artificial, but merely terrestrial: a military radar jammer of some kind, most likely. In the intervening 50 years, the Search for Extraterrestrial Intelligence (SETI) has continued without finding definitive evidence of such broadcasting civilizations. SETI itself has persisted despite, for most of its history, lacking an official government imprimatur and funding, and while being consigned by many scientists to the fringes of respectability, just a step or two from those who claim to have evidence of UFOs.

SETI researchers and their supporters, though, have managed to carry on despite the institutional obstacles and lack of success. Earlier this month several hundred people, from scientists to enthusiasts, came to Santa Clara, California, for the first [SETICon](http://www.seticon.com/), a weekend conference organized by the SETI Institute to honor SETI’s 50th anniversary, as well as the 80th birthday of Drake and the institute’s own 25th anniversary. The conference—which had more of the flavor of a science fiction “con” than a traditional scientific conference—was an opportunity to reflect on SETI’s past while also chart a course for future efforts to answer that fundamental question: are we alone?

**SETI’s humble origins**

That initial SETI survey 50 years ago, called Project Ozma, took place at a time when mainstream science had turned away from the idea of life in space. “In the 1950s it was considered a very dangerous thing for a scientist to embark on anything to do with life in space,” Drake recalled in one session. “It was considered a flaky subject that only people who couldn’t do legitimate science might do.”

Drake said he got support for carrying out Project Ozma from the director of the new National Radio Astronomy Observatory (NRAO), the eminent astronomer Otto Struve, who was one of the few scientists of the era not disinclined to the subject of extraterrestrial life. “It so happened that Struve himself was very interested in life in space,” Drake said. “He didn’t have to defend himself against the taboo; he was too great a man.”

Drake said he approached Struve, noting that larger radio telescopes and advances in detector technology allowed them to detect signals from nearby stars of comparable strength of what Earth was transmitting. Struve was interested, and allowed the project to proceed on two conditions: that it not cost a lot, and that it would have utility for ordinary radio astronomy. Drake complied by developing a detector that operated at the 21-centimeter line of hydrogen, which had considerable scientific applications, and cost $2,000, “not an amount that would offend anybody.”

The first two stars targeted by the project were Tau Ceti and Epsilon Eridani. Tau Ceti didn’t yield anything, but when then turned to Epsilon Eridani, “within a minute we suddenly heard out of the loudspeaker this huge sound, one that we had never heard before.” Drake said it was a pulsing sound, repeating at about ten times a second. “Was it that easy?” he wondered about detecting was appeared to be an artificial signal on almost their first try. The signal went away, though, before they could complete

tests to see if the signal was, in fact, coming from that star.

Drake said they tried to keep the detection quiet until they could do follow up observations, but word nonetheless leaked out. “Sure enough, by the next morning the phone was ringing off the hook,” he said. Eventually, he said, the signal came back. This time it was detected by both the main radio telescope and a separate omnidirectional telescope, which meant that it was terrestrial in origin, not a signal from a civilization on Epsilon Eridani. “We never really knew what the source of this was,” he said, although it did have the characteristics of a military radar jammer.

**Are we searching the right way?**

In the 50 years since Project Ozma, the vast majority of SETI searchers have focused on radio transmissions. The technology and the telescopes have improved, but other than a small amount of work in optical SETI—looking for laser pulses deliberately transmitted towards us—SETI continues to remain focused on radio wavelengths. But is this the best approach?

A lot of approaches have been suggested over the years, from gravity waves to neutrinos, said Seth Shostak, senior astronomer at the SETI Institute. Many, though, appear infeasible or too expensive from an energy standpoint to be worthwhile. There are, though, other, simpler searches that are possible: one possibility he suggested was looking for stars with an excess of infrared emission—evidence, perhaps, of waste heat from astroengineering projects.

An analogous approach suggested by Drake is to look for stars with spectral lines created by compounds that don’t exist in nature. One example he suggested was chlorofluorocarbons, as they are artificially produced and create strong spectral lines even in trace amounts. It was something that even our civilization could do relatively easily: 100 tons of Freon dumped into the Sun would be enough to create discernable spectral lines, Drake estimated. (“Of course, the EPA would be climbing the walls,” he joked.)

That “one-bit” signal wouldn’t at first seem particularly useful, given the ability to encode much more information into a radio signal, but Shostak said it would serve as something of a beacon. “The assumption is that there’s something more interesting to be found now that you’re going to be spending a lot of time looking at that spot in the sky,” he said.

And, while a half-century of radio searches have turned up empty, there’s a lot more that can be wrung out of the radio part of the electromagnetic spectrum. That’s the direction the SETI Institute is going with its Allen Telescope Array, an array of 42 small dishes (eventually planned to go to 350) located in northern California. “It’s really turning this into a computational problem,” said Greg Papadopoulos, former CTO of Sun Microsystems and a member of the institute’s board of trustees. “Let’s look for progressively more complex signals.”

**SETI goes open source**

The challenge with increasingly complex SETI search techniques is that the resources and expertise of the SETI community is fairly limited. “The number of people in the world actively involved in SETI could fit into a phone booth,” said Jill Tarter, director of the Center for SETI Research at the SETI Institute.

Without access to additional funding, Tarter and others are turning to another approach to increase the

size and expertise of the field: the open source model best known for developing the Linux operating system and thousands of other applications widely used today. At SETICon Tarter announced a new project, called [setiQuest](http://www.setiquest.org/), designed to open up the code and algorithms used by SETI to the public, in the hopes that people will use and build upon them, providing a new source of innovation for SETI efforts.

The setiQuest effort will be providing access to existing code and algorithms (posted on [GitHub](http://github.com/), a site that hosts a wide range of open source coding projects), cloud computing resources for developing new algorithms, and even raw data sets. The hope is to attract both people interested in SETI as well as those who may not be interested in the concept but are looking for specific routines, such as in digital signal processing, who would use the SETI code in their own projects, make improvements, and submit that changed code for potential use in SETI projects.

The project is just getting started, and Tarter and others said they are still trying to determine the best way to run this effort. (A closed-door meeting during SETICon was devoted to working on issues of governance and organization for setiQuest.) She and others are looking to other open source software projects for lessons and best practices; one topic of discussion is whether the project needs a single overarching leader, or “benevolent despot”, such as Linux had in its early development with its founder, Linus Torvalds, personally accepting or rejecting additions to the code developed by others.

SetiQuest is following a similar path as another project, [SETI@home](http://setiathome.ssl.berkeley.edu/), which starting in 1999 has allowed the public to get involved by helping process data sets for SETI projects. However, Tarter and others emphasized that setiQuest would be more participatory that SETI@home, which is primarily a distributed computing project. SETI@home, she said, was “fantastic”, but “that’s not an arena that you can actually change. We want to set up a community where your creativity can in fact lead to capabilities.”

“SETI@home uses your resources to do computing,” said Avinash Agrawal, director of innovation at the SETI Institute. “We are giving you resources to allow us to extend what we do.”

**Should we talk back?**

Another topic of discussion and debate revolves around what is often called “active SETI”: deliberately sending out transmissions to other stars to let any civilizations there that might be listening of our existence. Earlier this year in a Discovery Channel documentary Stephen Hawking [warned that such communication was ill-advised](http://www.timesonline.co.uk/tol/news/science/space/article7107207.ece), fearing the worst of any direct contact with an alien civilization that might arise if we let them know we exist: “If aliens ever visit us, I think the outcome would be much as when Christopher Columbus first landed in America, which didn’t turn out very well for the Native Americans.”

John Billingham, a retired NASA scientist who led SETI programs there in the early 1990s, endorsed Hawking’s caution about broadcasting our presence. “No one can say that there’s no risk to transmitting,” he said in a statement read at the conference. He endorsed the concept of a global conference to discuss the merits and concerns of such transmissions, perhaps leading to a treaty to determine who should transmit such messages and their contents.

Others, though, noted that we have been broadcasting, as radio broadcasts and other emissions that have “leaked” out from Earth over the decades that could be easily detected by an extraterrestrial civilization. “This horse has left the barn,” Shostak said. “Any society that could possibly be a threat to us can easily

know that we’re here.”

Shostak and others also took issue with the claim that such civilizations, alerted to our presence, would go after us for our resources. “To me it is almost inconceivable that there is a material resource worth traveling light-years to collect,” said science fiction writer Robert J. Sawyer. “The energy required to collect it will almost always be more expensive than the cost of making it at home.”

An advanced civilization would likely have to get any warlike instincts under control if it is to survive, added social scientist Douglas Vakoch. And even if they didn’t, “can they do us any harm at interstellar distances?”

**So where are they?**

The fact remains, though, that 50 years of SETI searches have failed to turn up any evidence yet that there are other civilizations out there—at least any we can detect with our current technologies and methodologies. Does that mean that there’s no one out there at all, no one out there bothering to communicate, or that we haven’t given the search enough time yet?

Most at SETICon gravitated towards the last explanation. “We still have only scratched the surface of a multidimensional search space of SETI,” Billingham said in his statement. Any dismissal of SETI as a failure “reflects the lack of understanding of the magnitude of the search,” added Vakoch. “It’s very plausible that it may take decades for traditional passive SETI searches to succeed.”

Others, though, argued that other civilizations simply might not be interested in communicating with others. “Is in fact the most dangerous thing to the long-term survival of a race individuality?” asked Sawyer. Civilizations that do survive may need to sacrifice individuality in order to avoid threats to their survival like terrorism, and are thus less interested in communicating with others. “This notion that we need someone to talk to may very well be an adolescent notion.”

Drake, the father of modern SETI, remains positive about not just the prospects of finding a signal from another civilization but the impact it will have on our own. “The impact of this will be great for every person on Earth in the long run,” he said. Any civilization we detect, he argued, will likely be far more advanced than our own, and thus we would have much to learn from them; he described the “wonderful turmoil” of information that could come from such a signal.

“I’m always an optimist,” Drake said. Optimism—and persistence—may be the critical elements of the next 50 years of SETI.

**SETI Negative**

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# SETI Negative

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# Glossary

**Linguistic –** relating to language

**Ubiquitous –** universal, everywhere, permeating

**Sanguine –** cheerfully optimistic

**Immodest –** lacking humility

**Premature –** occurring or done before the proper time; too early

**Fathom** – difficulty in understanding a problem or idea

**Alruistic –** showing unselfish concern for the welfare of others

**Astronomer –** a scientist who studies celestial bodies such as planets, asteroids, and stars

**Extra-terrestrial –** Something that originates from outside the Earth

**Telescope** – an instrument designed to make distant objects appear nearer

**Cryptographers –** someone with expertise in solving codes and decryption

**UFOlogists –** term used to describe those that collect, interpret, and believe accounts that extraterrestrials exist, frequently believing in a conspiracies involving government cover up of aliens on Earth

**Tragedy of the commons –** the idea that a good that can be freely accessed by all is likely to be used up or degraded because no individual has an incentive to take care of it.

**Geostiationary objects –** objects that orbit the Earth and rotate at the same speed that the Earth does, so from Earth, the object appears not to move

**White noise –** random and meaningless static picked up by a receiver

**SETI –** Search for Extraterrestrial Intelligence

**GEO –** Geostationary Orbit

**METI –** Messaging to Extraterrestrial Intelligence

# Answers to: Inherency

**[\_\_\_\_]**

**[\_\_\_\_]**

[\_\_\_\_] SETI will continue even without proper funding. There is plenty of data to analyze even without continuing to search.

**Australian Broadcasting Company, 4/27/2011, “SETI will survive cuts says astronomer” , http://www.abc.net.au/science/articles/2011/04/27/3201466.htm , Lexis 4-27-2011 MLF 6-24-11**

A top astronomer searching for extra-terrestrial intelligence is optimistic SETI will survive, despite its main telescope being shut down. The University of California Berkeley's Allen Telescope Array (ATA) has been placed in hibernation due to funding cuts, according to an announcement on the SETI Institute's website. The SETI (Search for Extraterrestrial Intelligence) Institute, a private organisation, built the radio telescope array at the UC Berkeley observatory site at Hat Creek. SETI operates the array in partnership with the university, and the project relies on ongoing federal and state government funding. Dr Seth Shostak, SETI senior astronomer, says that funding cuts have hit radio astronomy particularly hard, and that the SETI project is a part of the radio astronomy research being done at the UC Berkeley observatory site. "It's certainly not the end of SETI," says Shostak, "but it is an unfortunate development because while our telescope is on hold, we're not moving forward with it unless we can find some money to operate it." Shostak says it costs around US$2.5 million per annum to maintain the telescope. "For basic research, that's not a terribly expensive project," says Shostak. He says he hasn't thrown in the towel just yet. "The first thing we're going to do is try and find that money and reinstate the telescope, get it out of park and into gear. That would be the best solution because this is the best instrument for checking out some of the planets that are being found by NASA's Kepler telescope that are reckoned to be somewhat similar to Earth, planets that might be cousins of our own and might have life." "Clearly you want to know if they have intelligent life and the best instrument to answer that question would be the Allen Telescope Array," he says. Shostak says that there are still some smaller scale SETI experiments going on in different countries, searching for radio waves and laser light pulses from far off places in the universe. In the meantime, he says, there is plenty of work to be done analysing the data the ATA has already gathered. "We're proceeding with our plans to make some of the data collected by this telescope available to the public [via our] SETI Quest program, and anyone can get involved in looking at these data on the web." "The long term outlook is either get this telescope going again or think of other experiments that can take advantage of the equipment that we do have," Shostak says.

# Answers to: Inherency

**[\_\_\_\_]**

[\_\_\_\_] SETI will look to small private donations to continue operating.

Dylan Darling, journalist for the Redding Record, 5/27/2011, **“SETI scours Earth for cash; donations sought to restart deep space search,” *Redding Magazine*,**

Since mid-April, the Allen Telescope Array, a collection of radio dishes about 75 miles east of Redding, has been in hibernation after the state and federal government steeply cut funding. To bring the array back online, the Search for Extraterrestrial Intelligence (SETI) Institute is trying to find $2.5 million a year in support, said Tom Pierson, CEO for the nonprofit organization in Mountain View. "We are basically trying to tap our donor base," he said. So far SETI has about $100,000 for the array, but it's about to launch a new fundraising program called SETI Stars in the next two weeks to a month, Pierson said. While he was tight with details, Pierson said the new program will feature social networking designed by Silicon Valley entrepreneurs. He said the idea is to have donors have a sense of personal participation and feedback. SETI already has "tens of thousands" of supporters and more than 110,000 followers on Twitter, Pierson said.

**[\_\_\_\_]**

SETI will continue by using the equipment of others.

Seth Shostak, senior astronomer at the SETI institute, 6/21/2011, In an interview with **Rachel Saslow - Interviewer, Staff Writer for the Washington Post, “Q-and-A with 'alien hunter' Seth Shostak,”**

What happens now? If the Allen Telescope Array can't be brought back, and I think it can, then we go to Plan B, which is unclear but likely is to use other people's equipment. Do you still feel confident that you'll have success by 2025? The prediction is based on the fact that SETI keeps getting faster because the equipment gets better. If this experiment is going to succeed, then it's going to succeed during a generation, not hundreds of years. It's either going to work rather quickly or there's something wrong with the idea.

# Answers to: Alien Contact Advantage

**[\_\_\_\_]**

**[\_\_\_\_]**

[\_\_\_\_] Even if we found ETs, we would not be able to communicate with them because our backgrounds would be so different.

**Albert Harrison and Steven Dick, Professor of Social Psychology at the University of California, Davis, and Chief Historian of NASA, 2000, “When SETI Succeeds: The Impact of High-Information Contact”, www.futurefoundation.org/documents/hum\_pro\_wrk1.pdf**

Or, we could discover an alien probe or artifact that we could not understand. Maybe we will intercept a communication that has high information content but that is indecipherable to us. Given that our two civilizations may be separated by millions of years of evolution, translation and interpretation could be very difficult. Perhaps whole careers and institutes will be devoted to these processes, but with very little progress and very little impact on our descendants’ daily lives. How well could we communicate with humanity of the year 3000, much less with even more advanced beings from entirely different genetic and cultural backgrounds? There may be ethical as well as linguistic barriers to communication. Among the many reasons listed for our current “absence of evidence” are that ETI civilizations consider it unethical to alter the course of a developing civilization, or consider it desirable to preserve some civilizations for future study (Ball, 1973). Our ability to learn from ETI may depend on their perception of our readiness to acquire advanced information or to meet entrance-level requirements for the Galactic Club. We must be prepared for the possibility that we are not considered worth talking to, or that we will receive limited information that does not put the continuity of our physical, scientific, and moral evolution at risk.

# Answers To: Alien Contact Advantage

**[\_\_\_\_]**

**[\_\_\_\_] We are alone in the universe. Earth is a unique location that allowed the stability necessary for life to develop.**

**Robin McKie, Science Editor for the Observer, 7/16/2000, “There's life out there ... but not as we dreamt it,” http://www.guardian.co.uk/science/2000/jul/16/spaceexploration.theobserver**

WE ARE alone. Mankind may be the sole intelligent occupier of the entire galaxy, according to a growing number of scientists involved in the Search for Extraterrestrial Intelligence (Seti). After decades of employing radio telescopes in vain bids to hear E.T. phoning home, and after studying patterns of evolution on Earth, they believe that complex, brainy extraterrestrials must be rare, if not non-existent. Life may be ubiquitous, they admit, but only on our planet did it evolve into beings capable of rational thought, sophisticated behaviour and powerful civilisations. On other worlds, it has remained rooted at the level of amoebas, microbes, and primitive pond life.

All aliens are scum, in other words an observation with crucial implications. As UK astronomer Ian Crawford points out in the latest issue of Scientific American, we may be 'the most advanced life-forms in the galaxy'.

'We used to think that once life emerged on a planet, intelligent beings would inevitably appear,' added Dr Ian Morison, director of Seti research at Britain's Jodrell Bank radio telescope. 'Now, it seems we only evolved thanks to an extraordinary series of fortuitous events.'

The first and most important of these lucky breaks concerns location, as astronomers Peter Ward and Donald Brownlee recently revealed in Rare Earth: Why Complex Life is Uncommon in the Universe (Copernicus). Earth far from being an average world in an unimportant part of the cosmos turns out to be prime galactic real estate.

First, our sun is a highly stable star and is unaffected by wild fluctuations in output of its radiation. Such afflictions emanate from many other stars and would destroy evolving advanced life-forms, allowing only bacteria-like entities to flourish. In addition, ours is a safe suburban part of the galaxy, the astronomical equivalent of Cheltenham. By contrast, in more crowded, 'down-town' galactic neighbourhoods, in stellar Sauchiehall Streets of the universe, jostling stars are likely to have continually dislodged the swathes of comets believed to hover at the edges of most solar systems. These comets would then have crashed into each star's family of planets with devastating consequences for their evolving life-forms. In addition, Earth has a planetary big brother, Jupiter, which sweeps up those few dangerous comets that do make it through to the solar system's inner regions, while our world is further blessed in having a relatively large moon which helped stabilise Earth's rotation, preventing wild swings in our seasons and climate.

# Answers To: Alien Contact Advantage

**[\_\_\_\_]**

**[\_\_\_] The affirmative is naïve - advanced aliens would enslave and eat us just the way that we have done to less developed societies.**

**Jared Diamond, Professor of Geography and Physiology at UCLA, 12/05/1999, http://www.nytimes.com/1999/12/05/magazine/to-whom-it-may-concern.html**

The remaining potential calamity is the one from outer space -- and I'm not talking about asteroids. The existence of so many billions of stars, and the recent discoveries of planets around some of those stars close enough for us to scrutinize with telescopes, make it probable that, somewhere, there are planets supporting intelligent beings capable of space travel. Some scientists have already sent radio signals or space probes to tell those beings about us and our location, so as to open a dialogue; a few others are now continuing those efforts. What will happen if they succeed, and if as a result some intelligent extraterrestrials come to visit us? The astronomers and others hope that the extraterrestrials, delighted to discover fellow intelligent beings, will sit down for a friendly chat. Perhaps the astronomers are right; that's the best-case scenario. A less pleasant prospect is that the extraterrestrials might behave the way we intelligent beings have behaved whenever we have discovered other previously unknown intelligent beings on earth, like unfamiliar humans or chimpanzees and gorillas. Just as we did to those beings, the extraterrestrials might proceed to kill, infect, dissect, conquer, displace or enslave us, stuff us as specimens for their museums or pickle our skulls and use us for medical research. My own view is that those astronomers now preparing again to beam radio signals out to hoped-for extraterrestrials are naive, even dangerous. And so, the Times Capsule might be opened by aliens who have conquered us. As they read our histories of what we did to one another and to apes, the thing that will most impress them about the capsule is the incredible stupidity of our refusal to learn from our own deeds.

# Answers To: Alien Contact Advantage

**[\_\_\_\_]**

[\_\_\_\_] There will be no social impact to alien contact. It will only affect academics and elites.

**Albert Harrison and Steven Dick, Professor of Social Psychology at the University of California, Davis, and Chief Historian of NASA, 2000, “When SETI Succeeds: The Impact of High-Information Contact”, www.futurefoundation.org/documents/hum\_pro\_wrk1.pdf**

Short-term effects of contact will be measured in days, weeks, and months. Long-term effects will be measured in decades, centuries, and perhaps millennia. Short-term effects will be evident in sharp and intense focus in the media, organizations scrambling to redefine themselves and cope with a new reality, and collective behavior. Long-term effects could permeate all aspects of our culture and its institutions. Yet we should not take “an assumption of maximum impact” (White, 1990) for granted, because major scientific discoveries have not necessarily impacted average people who are grappling with the problems of everyday life. It may be that the only people who are really interested are academics and the intellectual descendants of those who are now involved in SETI. If contact is delayed for centuries, it will impact people who may be very different from us. Recent years have seen enormous changes in philosophy, science, and popular beliefs. Certainly, we expect that, compared to people who believed that the Sun circles the Earth, who never heard of evolution, and who never read science fiction, the people of today would respond very differently to ETI. Similarly, the people of tomorrow may have values, interests, and technologies that differ substantially from our own and for this reason react to ETI in ways that we cannot imagine.

**[\_\_\_\_]**

[\_\_\_\_] Even if we made contact the cultural impact would be limited. We would know so little about them that it wouldn’t be revolutionary.

Tim Folger, Editor at Discover, 01/2011, Scientific American, Volume 304, Issue 1, p40-45, EBSCO, “Contact the Day After”

TAKING INTO ACCOUNT political debates and the time needed to build a telescope sensitive enough to analyze the signal, years would pass before astronomers or cryptographers could begin to attempt to decipher a message from the stars. So whereas that first contact with another intelligence would in itself be one of the most important scientific discoveries of all time, the lack of any further knowledge about the nature of that alien intelligence would limit the immediate cultural impact**.** The story of the discovery would monopolize headlines for a while, but our collective attention span would inevitably move on while scientists sought to translate the message.

# Answers To: Extraterrestrial Perspective Advantage

**[\_\_\_\_]**

**[\_\_\_\_] Even if the ATA makes contact it would have no effect. Contact would likely just be in the form of simple radio communication, which would underwhelm a society that has been hearing fantastic myths about aliens from fake scientists.**

Lawrence Squeri, professor of history at East Stroudsburg University, 2004

**“When ET Calls: SETI Is Ready,” Journal of Popular Culture, 37:3, p. 478, February**

SETI scientists have demanded hard evidence of alien visitations. According to Albert Harrison, a psychologist at the University of California at Davis, who has written extensively on SETI, there must be "(a) skepticism, verification, peer review, and the scientific method, (b) strict safeguards against hoaxes, self-delusion, and erroneous data, and (c) protocols to avoid premature and immodest claims." This scientific rigor may give academic respectability to SETI but is simply ignored by much of the public. Like all elites with professional credentials, SETI has to suffer the existence of self-styled experts. Ufologists who write and lecture on alleged human contacts with extraterrestrials have captivated much of the public. These ufologists do not write and speak with the precision of the scientific community; they do not use its specialized jargon, nor do they have the facility with mathematical formulae-and they do not care. By insisting that extraterrestrials have visited the Earth, they proclaim a greater insight into the cosmos than SETI, whose admission of not having contacted extraterrestrials can be seen as an admission of failure. In our nonjudgmental, postmodern culture, ufologists even manage to share the spotlight with SETI. Popular documentaries on television pay attention to alleged government cover-ups of flying saucer crashes, autopsies of alien visitors, abductions into spaceships, and other strange tales.

# Answers To: Extraterrestrial Perspective Advantage

**[\_\_\_\_]**

[\_\_\_\_] Discovery of extraterrestrials would not lead to peaceful cooperation among humans – instead it would cause painful culture shock as we realized we were inferior.

Lawrence Squeri, professor of history at East Stroudsburg University, 2004

**“When ET Calls: SETI Is Ready,” Journal of Popular Culture, 37:3, p. 478, February**

SETI activists assume that extraterrestrials have the best of human traits, especially altruism, and have outgrown the negatives. The reality may not be so sanguine. Creatures that have evolved in different physical contexts may have different body chemistries and modes of thinking. Contact with these creatures may not be pleasant. How will humanity react if extraterrestrials inform us that their religion mandates the eating of first-born children? Even a gentle extraterrestrial culture may cause problems. Earth's history shows that technologically superior people can inflict enormous culture shock on backward societies. Contact between the West and non-Western peoples have resulted in loss of confidence, enervation, and cultural despair. Will the knowledge that human science and medical knowledge are clearly inferior to ET's make us feel that our culture is also inferior? Will humans split between those who wish to adopt "alien" ways and those who believe in traditional culture? The different forms of stress that contact can precipitate are endless.

# Answers To: Space Debris Advantage

**[\_\_\_\_]**

**[\_\_\_\_]**

**[\_\_\_\_] The Space Debris problem can only be solved by removing them, something that international governments are unwilling to do.**

**Megan Ansdell, Consultant at Booz Allen Hamilton for Space Policy, Former Graduate Student Intern at NASA, 2010 “Active Space Debris Removal: Needs, Implications, and Recommendations for Today’s Geopolitical Environment,”** [**www.princeton.edu/jpia/past-issues-1/2010/Space-Debris-Removal.pdf**](http://www.princeton.edu/jpia/past-issues-1/2010/Space-Debris-Removal.pdf)

The biggest challenge, however, will be simply starting the process of active debris removal. Despite growing consensus within the space debris community that active removal will be needed over the next several decades, the fact that space activities continue today without significant interference causes the larger global community to not see space debris as an issue. Moreover, space suffers from the “tragedy of the commons,” a phenomenon that refers to the overexploitation of a shared resource when there is no clear ownership over it. This, in addition to the abovementioned challenges facing debris removal systems, means that the natural tendency of those in power will likely be to do nothing until they absolutely must. This is reminiscent of responses to climate change, where the failure of governments to take responsibility for their past actions and act preemptively is compromising the larger global good. Policy makers must therefore take necessary actions, as recommended in next section of this paper, to prevent what is now happening on Earth from also occurring in space.

# Answers To: Space Debris Advantage

**[\_\_\_\_]**

**[\_\_\_\_] Our space satellites are resilient. Others would fill in if debris impacted one.**

**David Perera, Special Contributor to Government Computer News, 2/22/2008, “'Space Pearl Harbor' overstated,”**

[**http://www.gcn.com/online/vol1\_no1/45866-1.html?topic=geospatial#**](http://www.gcn.com/online/vol1_no1/45866-1.html?topic=geospatial)

However, even if the United States should find itself fighting an enemy with the will and capacity to destroy U.S. satellites, high-bandwidth communications would continue to operate, Mosher said. 'The key here is not to protect satellites. The key is to protect the function,' he added. That could be accomplished many ways, including ensuring that satellite systems are robust enough to survive the loss of some of their units. A prime example is the Global Positioning System, which consists of at least 24 satellites in medium Earth orbit. 'It would take a whole lot to significantly degrade GPS,' Mosher said. 'You'd have to shoot a lot of satellites.' Increased use of transoceanic fiber-optic cables could also make the military less dependent on satellites. Such cabling has already proven to be reliable and has done a great deal to reduce satellite use in the private sector, Mosher said. In any event, if a satellite-shooting war occurs, air vehicles with sensors and routers located lower in the atmosphere than satellites would already be active. 'That just makes sense in regional warfare anyway,' he said. A shot-down satellite would be a loss because alternatives would not perfectly compensate for the missing capacity, 'but it's not the end of the world,' Mosher said.

**[\_\_\_\_]**

**[\_\_\_\_] Some space debris is too small to be tracked with current technology.**

**Megan Ansdell, Consultant at Booz Allen Hamilton for Space Policy, Former Graduate Student Intern at NASA, 2010 “Active Space Debris Removal: Needs, Implications, and Recommendations for Today’s Geopolitical Environment,”** [**www.princeton.edu/jpia/past-issues-1/2010/Space-Debris-Removal.pdf**](http://www.princeton.edu/jpia/past-issues-1/2010/Space-Debris-Removal.pdf)

The most dangerous pieces of space debris are those ranging in diameter from one to ten centimeters, of which there are roughly 300,000 in orbit. These are large enough to cause serious damage, yet current sensor networks cannot track them and there is no practical method for shielding spacecraft against them. Consequently, this class of orbital debris poses an invisible threat to operating satellites (Wright 2007, 36). Debris larger than ten centimeters, of which there are roughly 19,000 in orbit, can also incapacitate satellites but they are large enough to be tracked and thus potentially avoided. Debris smaller than one centimeter, in contrast, cannot be tracked or avoided, but can be protected against by using relatively simple shielding (Wright 2007, 36).

# Answers To: Space Debris Advantage

**[\_\_\_\_]**

**[\_\_\_\_] Scientists are already working on techniques to deal with space debris.**

**Asian News International 4/28/2011, “Technique to trace space junk with help of stars developed”**

Washington, May 27 (ANI): A team of researchers have developed a method to track the movement of geostationary objects using the position of the stars, which could help to monitor space debris. The technique of researchers from the Royal Institute and Observatory of the Navy (ROA) in Cadiz (Spain) can be used with small telescopes and in places that are not very dark. Objects or satellites in geostationary orbit (GEO) can always be found above the same point on the Equator, meaning that they appear immobile when observed from Earth. By night, the stars appear to move around them, a feature that scientists have taken advantage of for decades in order to work out the orbit of these objects, using images captured by telescopes, as long as these images contain stars to act as a reference point. "Against this backdrop, we developed optical techniques to precisely observe and position GEO satellites using small and cheap telescopes, and which could be used in places that are not particularly dark, such as cities", Francisco Javier Montojo, a member of the ROA and lead author of the study, told SINC. The method can be used for directly detecting and monitoring passive objects, such as the space junk in the geostationary ring, where nearly all communications satellites are located. At low orbits (up to around 10,000 km) these remains can be tracked by radar, but above this level the optical technique is more suitable. The team has created software that can precisely locate the centre of the traces or lines that stars leave in images (due to photograph time exposure). The study is detailed in the journal Advances in Space Research.

# Answers To: Solvency

**[\_\_\_\_]**

**[\_\_\_\_]**

[\_\_\_\_] The Antennas on the ATA are not big enough to decipher any alien transmission.

Tim Folger, Editor at Discover, 01/2011, Scientific American, Volume 304, Issue 1, p40-45, EBSCO, “Contact the Day After”

Even if the signal is confirmed as an authentic transmission from an extraterrestrial civilization, it is unlikely that astronomers would be able to extract any information from it for many years. SETI's instruments are designed to search for steady, periodic narrowband radio pulses--carrier waves powerful enough to be detectable across many light-years. The pulse itself would yield no information, other than its artificial nature. Any message content would likely be in the form of changes in amplitude or frequency buried within the pulse. Even a large radio telescope would need to repeatedly scan a small patch of sky to build up the signal pulse above background radio noise. In doing so, it would average out modulations on finer time-scales that might contain a message. Resolving the message would require an antenna far more powerful than Earth's largest, the 305-meter dish at Arecibo, Puerto Rico. "You would need something on the order of 10,000 times bigger than Arecibo," Shostak says. Rather than a single enormous dish, such a telescope would probably consist of many smaller antennas spread across a large area and linked electronically. Constructing such an instrument would require international collaboration and funding, with no guarantee that the message--if the signal contained one--could ever be deciphered. "That's not something you'd do overnight," Shostak observes. "That's a big project. I think we would do it, because--gosh darn it--we would want to know what they're saying."

# Answers To: Solvency

**[\_\_\_\_]**

**[\_\_\_\_] The ATA will not be able to filter human transmissions from Earth from alien ones.**

**Bob Hirshon, Senior Project Director, Media Programs American Association for the Advancement of Science, 6/20/2011 “SETI at Home Upgrade” http://www.sciencenetlinks.com/sci\_update.php?DocID=342**

So SETI, the Search for Extraterrestrial Intelligence, isn't looking for alien spaceships. Instead, it's looking for radio waves that might be being sent, probably unintentionally, by other civilizations. (Our own radio and television signals, which leak from Earth and drift across the universe, have already passed by thousands of stars; if there are any alien civilizations in those neighborhoods, they could theoretically be watching early Earthling TV shows like I Love Lucy.) SETI looks specifically for something called “narrow band transmissions,” which as far as we know can be produced only by artificial equipment. No matter where you are in the universe, these transmissions will be most efficient at broadcasting signals that can be received at the other end. So SETI believes that even extraterrestrials who are very different from us will probably make use of these radio waves for communication, if they have the intelligence and technology to do so. However, it's very hard to look for these narrow band transmissions, because we produce so many of them here on Earth. Sifting out all that noise, along with natural radio waves that bounce around in space, is a task that the world's biggest supercomputers couldn't manage.

[\_\_\_\_]

**[\_\_\_\_] There’s no chance of a conversation between Earth and the ETs, we would have to wait thousands of years for a simple reply.**

**Roger Highfield, Editor of New Scientist, 10/5/2005, The Daily Telegraph, “’The greatest discovery of all time’ The chances are there’s life out there, but any message could be thousands of years old and indecipherable. Roger Highfield reports,”**

There is, of course, a chance, that an incoming message may be sent in response to messages extraterrestrials have already received from Earth. Some of our radio and television from the Thirties and Forties is just now reaching some of the nearer stars. What would aliens make of news of Neville Chamberlain's return from his Munich meeting with Adolf Hitler? The problem is, however, that these signals have only travelled around 80 light years, too little for even the most optimistic SETI sage to raise the chance of meeting up with another civilisation. We may have to wait millennia for a reply, and Prof Davies speculates that it would probably come from an "information processor" that will blur the distinctions we make today between living organisms and artificial non-living machines.

# Answers To: Solvency

**[\_\_\_\_]**

**[\_\_\_\_] Our technology is too primitive to pick up alien forms of communication.**

**Casey Kazan, writer for The Telegraph, 5/11/2011, “Earth's Technology May be Too Primitive to Detect Advanced ET Life” pg online @ [http://www.dailygalaxy.com/my\_weblog/2011/05/earths-technologies-may-be-too-primitive-to-detect-advanced-et-life.html**

Some of the world's leading astronomers -- including Great Britain's astronomer royal, Sir Martin Rees -- believe aliens, rather than using different radio waves or visible light to signal, may be using an entirely different communication medium such as ghostly neutrinos or with gravitational waves (ripples in the fabric of space-time) or using communication mechanisms we cannot begin to fathom. “The fact that we have not yet found the slightest evidence for life -- much less intelligence -- beyond this Earth," said Arthur C. Clarke, "does not surprise or disappoint me in the least. Our technology must still be laughably primitive, we may be like jungle savages listening for the throbbing of tom-toms while the ether around them carries more words per second than they could utter in a lifetime." Lord Rees, a leading cosmologist and astrophysicist who is the president of Britain’s Royal Society and astronomer to the Queen of England believes the existence of extraterrestrial life may be beyond human understanding. “They could be staring us in the face and we just don’t recognize them. The problem is that we’re looking for something very much like us, assuming that they at least have something like the same mathematics and technology." “I suspect there could be life and intelligence out there in forms we can’t conceive. Just as a chimpanzee can’t understand quantum theory, it could be there as aspects of reality that are beyond the capacity of our brains.” Frank Drake, the founder of SETI and Drake's Equation, believes that satellite TV and the “digital revolution” is making humanity invisible to aliens by cutting the transmission of TV and radio signals into space. The earth is currently surrounded by a 50 light year-wide “shell” of radiation from analogue TV, radio and radar transmissions. According to Drake, digital TV signals would look like white noise to a race of observing aliens.

# Answers To: Solvency

**[\_\_\_\_]**

**[\_\_\_\_] Just like on Earth, economics dictates that Aliens probably aren’t broadcasting their signal because it is expensive with a very low probability of payoff. The plan’s inherency proves this because the government is cutting SETI’s funding.**

**Gregory Benford, James Benford and Dominic Benford , Physics and Astronomy Department, University of California Irvine, Irvine, California, Employee at Microwave Sciences, Inc., Employee at the Observational Cosmology Lab, NASA Goddard Space Flight Center, Greenbelt, Maryland, 5/12/2010, “Smart SETI,” Analog Science Fiction & Fact, 131:4, p.33, April, http://www.liebertonline.com/doi/abs/10.1089/ast.2009.0394**

Traditional SETI research takes the point of view of receivers, not transmitters. This neglects the implications for what signals should look like in general, and especially the high emitting costs, which a receiver does not pay. 6 We shall assume, like conventional SETI, that microwaves are simpler for planetary societies, since they can easily outshine their star in microwaves. Microwaves are probably better for Beacons (Tarter, 2001). Whatever the life form, evolution will select for economy of resources. This is an established principle in evolutionary theory (Williams, 1966). Further, Minsky (1985) argues that a general feature of intelligence is that it will select for economy of effort, whatever the life form. Tullock (1994) argues that social specie evolve to an equilibrium in which each species unconsciously carries out “environmental coordination” which can follow rules like those of a market, especially among plants. He gives many such examples. Economics will matter. A SETI broadcaster will face competing claims on resources. Some will come from direct economic competition. Standing outside this, SETI beaming will be essentially altruistic, since replies will take centuries if not millennia, or else are not even an issue. SETI need not tax an advanced society’s resources. The power demands in our companion paper are for average powers ≦GW, far less than the 17 TW now produced globally (Hoffert et al., 2002) But even altruistic Beacon builders will have to contend with other competing altruistic causes, just as humans do (Lemarchand and Lomberg, 1996). They will confront arguments that the response time for SETI is millennia, and that anyway, advanced societies leak plenty of microwaves etc. into deep space already. We take up these issues below. It seems clear that for a Beacon builder, only by minimizing cost/benefit will their effort succeed. This is parsimony, meaning ‘less is better’ a concept of frugality, economy. Philosophers use this term for Occam’s Razor, but here we mean the press of economic demands in any society that contemplates long term projects like SETI. On Earth, advocates of METI (Messaging to Extraterrestrial Intelligence) will also face economic constraints (Benford et al., 2010).

# Article: Aliens Don’t Exist

**The Guardian: *There’s Life Out There… but not as we dreamt it.* July 16th, 2000.**

We are alone. Mankind may be the sole intelligent occupier of the entire galaxy, according to a growing number of scientists involved in the Search for Extraterrestrial Intelligence (Seti).

After decades of employing radio telescopes in vain bids to hear E.T. phoning home, and after studying patterns of evolution on Earth, they believe that complex, brainy extraterrestrials must be rare, if not non-existent.

Life may be ubiquitous, they admit, but only on our planet did it evolve into beings capable of rational thought, sophisticated behaviour and powerful civilisations. On other worlds, it has remained rooted at the level of amoebas, microbes, and primitive pond life.

All aliens are scum, in other words - an observation with crucial implications. As UK astronomer Ian Crawford points out in the latest issue of Scientific American , we may be 'the most advanced life-forms in the galaxy'.

'We used to think that once life emerged on a planet, intelligent beings would inevitably appear,' added Dr Ian Morison, director of Seti research at Britain's Jodrell Bank radio telescope. 'Now, it seems we only evolved thanks to an extraordinary series of fortuitous events.'

The first and most important of these lucky breaks concerns location, as astronomers Peter Ward and Donald Brownlee recently revealed in Rare Earth: Why Complex Life is Uncommon in the Universe (Copernicus). Earth - far from being an average world in an unimportant part of the cosmos - turns out to be prime galactic real estate.

First, our sun is a highly stable star and is unaffected by wild fluctuations in output of its radiation. Such afflictions emanate from many other stars and would destroy evolving advanced life-forms, allowing only bacteria-like entities to flourish.

In addition, ours is a safe suburban part of the galaxy, the astronomical equivalent of Cheltenham. By contrast, in more crowded, 'down-town' galactic neighbourhoods, in stellar Sauchiehall Streets of the universe, jostling stars are likely to have continually dislodged the swathes of comets believed to hover at the edges of most solar systems. These comets would then have crashed into each star's family of planets - with devastating consequences for their evolving life-forms.

In addition, Earth has a planetary big brother, Jupiter, which sweeps up those few dangerous comets that do make it through to the solar system's inner regions, while our world is further blessed in having a relatively large moon which helped stabilise Earth's rotation, preventing wild swings in our seasons and climate.

All these improbable conditions, in combination, provided the stability that allowed four-billion-year-old primitive slime to evolve - about 250,000 years ago - into the only intelligent creatures known to science, ourselves. Humanity may therefore be viewed as the outcome of the biggest accumulator bet in the universe. As Professor Brownlee, of Washington University, Seattle, puts it: 'Earth is a charmed place. We know of no other body that is even remotely like it.'

The idea that Earth is special runs counter to the entrenched astronomical assumption that our planet is not even mildly important. It also reverses a trend that was begun in the Sixties by astronomers, including Carl Sagan, who argued that ET civilisations must be two-a-penny, and that there should be thousands, possibly millions, in our galaxy.

For the past 30 years, astronomers have tried to pick up radio signals from these alien worlds - either from their TV broadcasts, or from radio beacons deliberately sent into space. But scientists have detected nothing but hiss and static.

The Astronomer Royal, Sir Martin Rees, believes the jury is still out on ETs. 'We still have only searched a relatively small part of our galaxy. There is still plenty of time and space to find extraterrestrial intelligences. In any case, intelligent beings may simply not want to talk to us, or have any way of knowing about us. For example, they could be dolphin-like beings having a calm time, thinking deep thoughts on an aquatic world.'

Or as the Open University astronomer Professor Colin Pillinger - designer of the British Beagle 2 probe scheduled to land and seek life on Mars in 2003 - points out: 'We may simply not realise that aliens are trying to contact us now. When astronomers first detected regular pulses that were emanating from rotating neutron stars, they thought they were listening to little green men. For all we know, we could be listening to alien messages, thinking they are bursts of radiation being produced by stars or galaxies.'

Nevertheless, the sceptics insist we should have seen some sign of alien life by now. Even if only a few extraterrestrials achieved complex, intelligent status, their existence should have become apparent, they argue. Armed with only relatively crude interstellar rocket drives, aliens should have been able to 'colonise the entire galaxy on a cosmically short timescale,' states Crawford in Scientific American .

One answer, according to evolutionist Stephen Jay Gould, has chilling implications. 'Perhaps any society that could build a technology for such interplanetary travel must first pass through a period of potential destruction where technological capacity outstrips social or moral restraint. Perhaps, no, or very few, societies can ever emerge intact from such a crucial episode.'

# Article: Problems With Alein Communication

**The Daily Galazy: *Today’s Technology May be Too Primitive to Detect Advanced ET Life*. 5/11/2011**

Some of the world's leading astronomers -- including Great Britain's astronomer royal, Sir Martin Rees -- believe aliens, rather than using different radio waves or visible light to signal, may be using an entirely different communication medium such as ghostly neutrinos or with gravitational waves (ripples in the fabric of space-time) or using communication mechanisms we cannot begin to fathom.

“The fact that we have not yet found the slightest evidence for life -- much less intelligence -- beyond this Earth," said Arthur C. Clarke, "does not surprise or disappoint me in the least. Our technology must still be laughably primitive, we may be like jungle savages listening for the throbbing of tom-toms while the ether around them carries more words per second than they could utter in a lifetime."

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“They could be staring us in the face and we just don’t recognize them. The problem is that we’re looking for something very much like us, assuming that they at least have something like the same mathematics and technology."

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Frank Drake, the founder of SETI and Drake's Equation, believes that satellite TV and the “digital revolution” is making humanity invisible to aliens by cutting the transmission of TV and radio signals into space. The earth is currently surrounded by a 50 light year-wide “shell” of radiation from analogue TV, radio and radar transmissions. According to Drake, digital TV signals would look like white noise to a race of observing aliens.

Although the signals have spread far enough to reach many nearby star systems, they are rapidly vanishing in the wake of digital technology, said Drake. In the 1960s, Drake spearheaded the conversion of the Arecibo Observatory to a radio astronomy center. As a researcher, Drake was involved in the early work on pulsars. Drake also designed the Pioneer plaque with Carl Sagan in 1972, the first physical message sent into space. The plaque was designed to be understandable by extraterrestrials should they encounter it.

Milan Cirkovic of the Astronomical Observatory in Belgrade, points out that the median age of terrestrial planets in the Milky Way is about 1.8 gigayears (one billion years) greater than the age of the Earth and the Solar System, which means that the median age of technological civilizations should be greater than the age of human civilization by the same amount. The vastness of this interval indicates that one or more processes must suppress observability of extraterrestrial communities.

  Since at this point, there is no direct and/or widely apparent evidence that extraterrestrial life exists, it likely means one of the following:

We are (A) the first intelligent beings ever to become capable of making our presence known, and leaving our planet. At this point, there are no other life forms out there as advanced as us. Or perhaps extraterrestrial life does exists, but for some reason extraterrestrial life is so very rare and so very far away we’ll never make contact anyway -- making extraterrestrial life nonexistent in a practical sense at least.

Or is it (B) that many advanced civilizations have existed before us, but without exception, they have for some unknown reason, existed and/or expanded in such a way that they are completely undetectable by our instruments.

Or is it (C) There have been others, but they have all run into some sort of “cosmic roadblock” that eventually destroys them, or at least prevents their expansion beyond a small area.

Since Earth’s placement in space and time appears to be unremarkably random, proposition “A” seems fairly unlikely. Assuming humans evolved like other forms of life into our present state due to natural selection, then there's really nothing all that mystical, special or remarkable about our development as a species either. Due to the sheer numbers, there are almost certainly other planets capable of supporting at least some form of life. If that is so, then for Earthlings to be the very first species ever to make a noticeable mark on the Universe, from a statistical perspective, is incredibly unlikely.

For proposition “B” to be correct would defy all logic. If potentially thousands, or even millions of advanced extraterrestrial civilizations exist in the known Universe, then why would all of them, without exception, choose to expand or exist in such a way that they are completely undetectable? It’s conceivable that some might, or perhaps even the majority, but for all of them to be completely undetectable civilizations does not seem likely either.   Proposition C in some ways, appears to be more likely than A or B. If “survival of the fittest” follows similar pathways on other worlds, then our own “civilized” nature could be somewhat typical of extraterrestrial civilizations that have, or do, exist. Somehow, we all get to the point where we end up killing ourselves in a natural course of technological development and thereby self-inflict our own “cosmic roadblock”.

**NASA Tradeoff Disadvantage**

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# NASA Tradeoff Disadvantage

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# Explanation

This disadvantage forces the affirmative to consider the potential costs of their plan. As you have no doubt realized, there are many ways to improve the world, but almost all of them are costly. Humanity, and especially the United States government, has a very limited amount of resources that it can use in order to solve problems. Every year, NASA is assigned as set budget by Congress to conduct all of its operations. This year, NASA received 18.7 billion dollars that it could choose to spend how it liked. Predictably, NASA had many more possible projects than it had money for, so it was forced to choose some over others.

The uniqueness evidence indicates that a shift is occurring in NASA right now. At the request of President Obama, the agency is beginning to focus less on exploring space, especially with human astronauts, and beginning to allocate more money towards studying the Earth itself. Specifically, it is planning to fund experiments and satellites that would allow it to more effectively track carbon dioxide and climate change, which many scientists think is important to eventually solving the problem.

The plan forces a tradeoff. NASA’s budget doesn’t get any bigger as a result of the plan, so in order to do the plan, NASA has to choose something to cut. The evidence indicates that NASA sees a choice between space-focused programs and ones that focus on Earth. Because the plan is focused on space exploration, money will likely come from the budget for Earth sciences.

The impact to this is that NASA will not be able to effectively monitor climate change, which may mean that we feel more of the negative effects of global warming in the future.

# Glossary

**CO2** – Carbon Dioxide. Carbon Dioxide is the result of many human activities, such as driving a car or burning oil to heat a house. Carbon dioxide is frequently mentioned as one of the gasses that is contributing to the global warming problem.

**Greenhouse gasses** – Gasses believed to be responsible for climate change. While C02 is the most well known, water vapor, methane, nitrus oxide, and ozone, also function as greenhouse gasses. They get their name because they prevent energy from the Sun from escaping back into space once it reaches the Earth, much the same way that a glass greenhouse traps energy inside it to keep plants warm.

**Fossil fuel** – Fuels created by the slow decomposition of dead organisms. They are mostly made of carbon. Examples of fossil fuels include coal, oil, and natural gas.

**Emissions** – the product or discharge of something. When someone refers to emissions, they refer to greenhouse gasses entering the atmosphere.

**Climate change** – Refers to the phenomenon that the Earth’s climate and mean temperature are changing over time. It has been well documented that in the last half century that the average temperature of the Earth has increased. Many believe this increase is a result of human activity and releasing many greenhouse gasses into the atmosphere.

**Heliophysics** – A branch of space science that explores the interactions between radiation given off by the sun and the atmospheres of planets. The study of solar flares is done under heliophysics.

**Monies** – money set aside for a specific purpose

**Global Precipitation Mission** – An attempt by NASA to continually measure the Earth’s atmospheric moisture.

**Toil -** Work extremely hard or incessantly.

**Robust** - Strong and healthy; vigorous

**Passé** - No longer fashionable; out of date

**Flora and fauna** – Plants and Wildlife

**Correlated** – Two things are correlated if they have a mutual relationship or connection.

**Post facto** – After the fact

**Budget –** An allocation of money for a specific goal.

**R&D** – Research and Development

**OCO –** Orbiting Carbon Observatory, a NASA satellite mission intended to provide global space-based observations of atmospheric carbon dioxide.

**NASA –** National Aeronautics and Space Administration

**NOAA –** National Oceanic and Atmospheric Administration

**GRACE –** Gravity Recovery and Climate Experiment, a satellite system run by NASA that makes detailed measurements of the Earth’s gravity field.

# Budget Tradeoff 1NC [1/2]

**A. Uniqueness. NASA is shifting its priorities. While its budget will not increase, it will spend more money focusing on the observation of Earth and not the exploration of space.**

Spaceref.com, 6/8/2011, “**NASA Spending Shift to Benefit Centers Focused on Science & Technology”, 6/8/11, http://www.spaceref.com/news/viewpr.html?pid=33782**

Euroconsult, the leading international consulting and analyst firm specializing in the space sector, along with the consulting firm Omnis, today announced the findings of a study today foreseeing a significant shift in NASA spending toward [Earth](http://www.spaceref.com/news/viewpr.html?pid=33782) science and R&D programs and away from legacy spaceflight activities. According to the report "NASA Spending Outlook: Trends to 2016," [NASA's](http://www.spaceref.com/news/viewpr.html?pid=33782) budget, which will remain flat at around $18.7 billion for the next five years, will also be characterized by significant shifts from space operations to technology development and science. With the shift in [budget](http://www.spaceref.com/news/viewpr.html?pid=33782) authority, NASA Centers focused on Earth observation, space [technology](http://www.spaceref.com/news/viewpr.html?pid=33782), and aeronautics will see increases in funding, while those involved in human spaceflight will see major funding reductions. Indeed, the termination of the Space Shuttle program will lead to a budget cut over $1 billion for Space Operations, resulting in a 21% budget cut for the Johnson Space Center. Overall, the agency's budget for R&D will account for about 50% of all NASA spending.

**B. Link. A push for space exploration as a result of the plan causes cuts in the budgets of Earth science programs.**

**Brian Stempeck, Environment and Energy Daily Senior Reporter, 4/29/2005, “Climate Change:****NASA space missions may undermine climate studies,” April 29, Environment and Energy Daily,**

A member of the National Academy of Sciences' National Research Council told a House panel yesterday that the White House's push for further space exploration missions is coming at the expense of earth research programs, including a key effort on climate change science. Berrien Moore, a professor at the University of New Hampshire and a co-chair with the National Research Council, told assembled House Science Committee members yesterday about the findings NRC has uncovered so far as it prepares a final report on federal earth science research due out in late 2006. "Recent changes in federal support for Earth observation programs are alarming," NRC scientists concluded in their interim report . "Opportunities to discover new knowledge about Earth are diminished as mission after mission is cancelled, descoped or delayed because of budget cutbacks." NASA's decision to shift its priorities toward space exploration is putting current earth research programs "at risk of collapse," Moore said. And presidential initiatives such as the Climate Change Research Initiative and the subsequent Climate Change Science Program are some of the most at-risk programs, he said.

# Budget Tradeoff 1NC [2/2]

**C. Impact. NASA’s new focus on Earth science is key to monitoring and solving global warming.**

**James A. Lewis et. al, , senior fellow and director of the Technology and Public Policy Program at CSIS Sarah O. Ladislaw, senior fellow in the Energy and National Security Program at CSIS, June 2010, “ Earth Observation for Climate Change,”** [**http://csis.org/files/publication/100608\_Lewis\_EarthObservation\_WEB.pdf**](http://csis.org/files/publication/100608_Lewis_EarthObservation_WEB.pdf)

For most of the last decade, NASA was unable to replace its climate-monitoring satellites. Replacing these satellites is crucial to avoid a drastic decline in collecting the most valuable information for monitoring climate change. The Obam**a** administration has proposed a budget for NASA’s Earth science programs of $2.4 billion in new funding over the next five years, an increase of more than 60 percent. The new funding, which requires congressional approval, will help replace OCO and allow NASAto replace the twin GRACEsatellites that make detailed measurements of Earth’s gravity field that can provide important climate data. The request for NOAA’s budget for climate-related activities has been increased as well. NOAA will be spending $2.2 billion to maintain and further develop satellites and to support climate research; $435 million has been requested to support the U.S. Global Change Research Program, with $77 million in new increases for core climate services and observations. Spending on space has always been a question of priorities. Until recently, those priorities were frozen in time, reflecting political needs that were decades out of date. Our national priorities have changed. A new priority, reflecting the new challenges to our security and national interest, involves monitoring and understanding climate change. Debate over climate change is fierce and there are many skeptics, but the signs of major changes are undeniable. Warnings of catastrophe are likely overblown, but we do not fully understand the implications of climate change or the utility of various measures to mitigate it. Climate change is occurring, and it creates new risks.In this context,the recent decision to scale back spending on human space flight and increase spending on Earth observation is a better match for national priorities and interests. It updates a space policy that has been badly out of date for years. Observation of climate change began more than a century ago with simple measurements of the Earth’s average temperature. These were interesting, but inadequate. The breakthrough in understanding climate change came with Earth observation satellites. Satellites provide global awareness in ways that other technologies cannot match. The monitoring needed for a serious effort requires observations that can only be done from space.

**D. Unchecked, global warming will cause extinction.**

**Oliver Tickell, environmental researcher, 8/11/2008,** [**http://www.guardian.co.uk/commentisfree/2008/aug/11/climatechange**](http://www.guardian.co.uk/commentisfree/2008/aug/11/climatechange)

We need to get prepared for four degrees of global warming, Bob Watson told the Guardian last week. At first sight this looks like wise counsel from the climate science adviser to Defra. But the idea that we could adapt to a 4c rise is absurd and dangerous. Global warming on this scale would be a catastrophe that would mean, in the immortal words that Chief Seattle probably never spoke, "the end of living and the beginning of survival" for humankind. Or perhaps the beginning of our extinction. The collapse of the polar ice caps would become inevitable, bringing long-term sea level rises of 70-80 metres. All the world's coastal plains would be lost, complete with ports, cities, transport and industrial infrastructure, and much of the world's most productive farmland. The world's geography would be transformed much as it was at the end of the last ice age, when sea levels rose by about 120 metres to create the Channel, the North Sea and Cardigan Bay out of dry land. Weather would become extreme and unpredictable, with more frequent and severe droughts, floods and hurricanes. The Earth's carrying capacity would be hugely reduced. Billions would undoubtedly die.

# Overview

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2.

3.

# Uniqueness – NASA Focusing on Earth Science

**[\_\_\_\_]**

**[\_\_\_\_] NASA’s most recent budget substantially increased funds allocated for Earth Science.**

**Keith Cowing, writer at astrobiology.com, 2/1/2011, “The Obama Space Vision for NASA: Massive Paradigm Shifts Ahead,” http://www.astrobiology.com/news/viewnews.html?id=1372**

Over the past decade, NASA's focus on Earth Science has faltered as it has across the Federal government. This will be rectified with a hefty budget that will increase the enacted FY 2010 budget by $382 million and then go on to add an additional $1.8 billion between FY 2011 and 2014. In addition to re-flying the Orbiting Carbon Observatory, NASA will seek to accelerate the development of new satellites to observe Earth as well as support the existing flotilla of Earth observation spacecraft. Planetary science will see much less of an increase than other parts of NASA. Its budget will ramp up from $1.486 billion in FY 2001 to $1.650 billion in FY 2015. Astrophysics will go from $1.076 billion in FY 2011 to $1.132 billion in FY 2015, and Heliophysics will go from $542 million in FY 2011 to $751 million in FY 2015. Some of the notable increases in space and planetary science, albeit small, include adding $16 million per year for the next 5 years to Near Earth Object (NEO) detection, restarting Plutonium-238 production with the Department of Energy for radioisotope thermoelectric generator (RTG) construction, plans for a 2011 launch of Mars Science Laboratory, bringing the Mars 2016 mission into formulation, funding of James Webb Space Telescope at a 70% confidence level for a 2014 launch, and initiation of Solar Probe "Plus" mission.

[\_\_\_\_] Obama cut the Constellation program in order to orient NASA towards climate science

Chloe Albanesius, **editor at PCMagazine online, “Obama Budget Cuts Moon Program, Boosts R&D”, 2/1/10, http://www.pcmag.com/article2/0,2817,2358658,00.asp**

Among the programs on the chopping block are NASA's Constellation Systems Program, an effort to put astronauts back on the Moon by 2020. The $3.466 billion program, which started in 2005, is woefully behind schedule, and a review conducted in May 2009 found that the program probably won't put anyone on the Moon until well into the 2030's. Instead, the White House would increase NASA's overall budget in order to focus on climate science, green aviation, science education, and other priorities. It would also encourage NASA to leverage advanced technology, international partnerships, and commercial capabilities in its quest to return to the Moon. Also getting the proposed axe is the $12 million EP-X manned surveillance program and a $9 million revamped command and control center, both within the Department of Defense, as well as a $73 million infrared missile warning satellite program.

# Uniqueness – NASA Focusing on Earth Science

**[\_\_\_\_]**

**[\_\_\_\_] Obama’s new budget strongly stresses Earth science and global warming research.**

**Phil Plait, writer for the Discovery Magazine, 2/1/2010, “President Obama’s NASA budget unveiled”. http://blogs.discovermagazine.com/badastronomy/2010/02/01/president-obamas-nasa-budget-unveiled/**

As promised, today President Obama released his planet NASA budget for the year. Not too surprisingly, it’s pretty much as the rumors indicated. There’s a lot to say here, and I have a lot on my mind, so please hear me out. The good news for sure is an increase of $6 billion over the next five years. It stresses new technology and innovation (to the tune of over $1.5 billion), which is also good. A lot of NASA’s successes have been from pushing the limits on what can be done. It also stresses Earth science, which isn’t surprising at all; Obama appears to understand the importance of our environmental impact, including global warming. So that’s still good news. The very *very* good news is that half that money — *half*, folks, 3.2 billion dollars — is going to science. Yeehaw! The release specifically notes telescopes and missions to the Moon and planets. That, my friends, sounds fantastic.

**[\_\_\_\_] NASA is shifting priorities away from the shuttle towards Earth science.**

**Space Travel.com, 6/8/2011 “NASA Spending Shift to Benefit Centers Focused on Science and Technology,” http://www.space-travel.com/reports/NASA\_Spending\_Shift\_to\_Benefit\_Centers\_Focused\_on\_Science\_and\_Technology\_999.html**

"Budget allocation across Centers will vary greatly," said Steve Bochinger, President of Euroconsult North America. "As NASA shifts priorities for human spaceflight from Shuttle operations to Human Exploration Capabilities and commercial spaceflight, the budget will be redirected to a range of technology development programs. Likewise, as NASA shifts its science mission focus away from space science to Earth science, the science budget will be redistributed among centers." This shift in NASA's priorities will also affect the agency's contract spending. As large legacy programs end, new research and development programs will be initiated. This turnover of programs should provide many new contracting opportunities over the next five years, especially at Research Centers. The Euroconsult/Omnis report details these changes. "The uniqueness of this report is that it brings together in one picture NASA's budget, spending and contracting, providing insights into opportunities created by the new NASA direction," said Bretton Alexander, Senior Consultant for Omnis. Some of the findings include: Following an 11% increase in 2011, the Science Mission Directorate budget will remain at the $5 billion level through 2016. This increase, however, is entirely within the Earth science theme, reflecting the Administration's priority on climate change research. Goddard Space Flight Center and Langley Research Center, which manage and implement Earth science projects, will thus benefit from this increase as will contractors who develop Earth observation spacecraft and instruments.

# Link - Space Exploration Trades off With Earth Science

### **[\_\_\_\_]**

### **[\_\_\_\_] Experiences from the Bush administration prove that space exploration directly trades off with NASA’s focus on Earth.**

**Andrew Lawler, senior writer with Science Magazine, and freelance writer for Smithsonian, National Geographic, Discover, March 2004 “ Scientists Fear Collateral Damage From NASA's Revised Vision,” Science 26 March 2004: Vol. 303**

NASA currently spends nearly $4 billion on space science, with another $1.5 billion for earth science and $965 million for biological and physical research. Bush's January call forrobotic and humanexploration of the moon and Mars would mean new monies fortheMarsrobotic effort,a new line of lunar orbiters and landers costing $1.3 billion through 2009, and more biological research on the space station tailored to the needs of future astronauts (see table). Under the new plan, space science budgets would grow from $3.9 billion this year to $5.5 billion by 2009. A host of projects not directly related to such exploration, however**,** face significant changes. The Laser Interferometer Space Antenna, for example, would be launched in 2012, a year later than planned, and Constellation-X, also slated for launch after 2010, would face a 2-year delay. NASA is halting preliminary work on a series of probes named after Einstein and designed to examine mysteries such as dark energy. In earth science, the Global Precipitation Mission would be delayed 2 years, a probe to measure ocean winds would be postponed indefinitely, and a series of small earth science platforms would be put on hold for a year. “This is a massive shift in direction,” said Yale University astronomer Meg Urry. “It is a little disorienting.” She and several board members called these and other changes “collateral damage” from the new exploration plan. “We're ending up with a very narrowly focused science program,” complained James Burch, vice president of the Southwest Research Institute in San Antonio, Texas, and a former NASA space physicist.

# Link - Space Exploration Trades off With Earth Science

**[\_\_\_\_]**

### **[\_\_\_\_] Earth science and space missions will tradeoff**, **they are seen as zero-sum in the budget**

**Jeff Foust, editor and publisher of The Space Review and has written for Astronomy Now and The New Atlantis, 2/9/2011 “Human spaceflight versus Earth sciences?”**

**http://www.spacepolitics.com/2011/02/09/human-spaceflight-versus-earth-sciences/]**

A letter signed by several members of Congress is the latest evidence that a new battle line is forming over NASA funding**:** humanspaceflight versus Earth sciences. In a letter to House Appropriations committee chairman Rep. Hal Rogers and CJS subcommittee chairman Frank Wolf, six Republican members of Congress asked the appropriators to prioritize NASA funding on what they consider to be the agency’s primary mission, human spaceflight. To do that, they argue that funding for NASA’s climate change research be redirected to human spaceflight accounts. “With your help, we can reorient NASA’s mission back toward human spaceflight by reducing funding for climate change research and reallocating those funds to NASA’s human spaceflight accounts, all while moving overall discretionary spending towards FY2008 levels,” the letter’s authors—Reps. Bill Posey (R-FL), Pete Olson (R-TX), Rob Bishop (R-UT), Jason Chaffetz (R-UT), Sandy Adams (R-FL), and Mo Brooks (R-AL)—argue.

### **[\_\_\_\_] A shift towards space exploration will cause budget cuts in Earth science.**

**Brian Berger, Space.com Staff Writer, 5/02/2005, “ NASA's Exploration Focus Blamed for Earth Science Cuts,”** [**http://www.space.com/1028-nasa-exploration-focus-blamed-earth-science-cuts.html**](http://www.space.com/1028-nasa-exploration-focus-blamed-earth-science-cuts.html)

WASHINGTON -- House Science Committee Chairman Sherwood Boehlert (R-N.Y.) expressed alarm over recent budget cuts and delays in NASA's Earth science program that a recent National Research Council report attributed to the U.S. space agency's shift in focus toward lunar and Mars exploration. "This report has to be a red flag for all of us," Boehlert said during an April 26 hearing examining how Earth science programs fare in NASA's 2006 budget request. "We need to stop, examine what's happening, and make sure that the fiscal 2006 budget for NASA - whatever its top-level number - includes adequate funding to keep Earth science moving forward for the foreseeable future." NASA merged its Earth science and space science programs into a single organization, the Science Mission Directorate, in 2004 and no longer maintains separate budgets for the two activities. But according to a House Science Committee analysis of NASA's budget request, of the $5.47 billion included for the Science Mission Directorate, only $1.36 billion would be spent on Earth science activities, a drop of 8 percent below the 2005 level and 12 percent less than the 2004 level. Earth science spending would continue to decline in 2007, NASA projections show, even as overall science funding would grow by $500 million. The National Research Council report, written by an expert panel and released the day of the hearing, says the budget trend for Earth science already is translating into program delays and cancellations. The report, "Earth Science Applications from Space: Urgent Needs and Opportunities to Serve the Nation," points out that NASA has "canceled, descoped, or delayed at least six planned missions" and has nothing in the pipeline to replace the fleet of Earth Observing System satellites the agency has spent more than a decade putting on orbit. "At NASA, the vitality of Earth science and application programs has been placed at substantial risk by a rapidly shrinking budget that no longer supports already-approved missions and programs of high scientific and societal relevance," the report states. "Opportunities to discover new knowledge about Earth are diminished as mission after mission is canceled, descoped, or delayed because of budget cutbacks, which appear to be largely the result of new obligations to support flight programs that are part of the Administration's vision for space exploration."

# Specific Link – Colonization Affirmative

**[\_\_\_\_]**

[\_\_\_\_] A Mars mission would deplete intellectual resources for a decade and hurt studying climate change on Earth.

J. Scott Christianson, writer at the Columbia Daily Tribune, 3/11/2011**, “We can’t afford manned mission to Mars”, http://thefreerangetechnologist.com/2011/03/manned-mission-to-mars/**

A manned mission to Mars will tie up most of NASA’s intellectual resources for a decade or more as they toil on an incredibly expensive project whose success and scientific value is uncertain. The American public should have a better chance of receiving a decent return on its investment in NASA. Perhaps the most compelling argument for not proceeding with a manned mission to Mars is NASA’s great success with unmanned missions to Mars and other planets. These “smaller, cheaper, faster” space probes have been extremely useful and cost-effective and have proved themselves capable of performing real science or, at the very least, capable of being the on-the-ground technicians for scientists safely located on Earth. A better use of NASA’s budget for exploration and planetary science would be to fund several smaller unmanned missions to explore Mars and other planets, thus spreading out both the risks and the rewards. While some of these are bound to fail, most of these little probes would be successful, and several would be successful beyond their original design. The Spirit and Opportunity probes continue to operate on Mars some five years past their original mission of 90 days. Even Voyager 1, launched in 1977, is still operating some 30 years later. Investing in several smaller missions with clear scientific goals offers much more reward for the risk. If NASA is to receive more appropriations, it should be for investigating problems here on Earth. Studying climate change is an unprecedented opportunity to learn about a sophisticated planetary processes happening right here, right now. Moreover, we need NASA to not just document the effects of global warming and other environmental problems but provide us with possible solutions and new technologies addressing these challenges. Solving the problem of global warming would be a greater step for mankind than any trip to space and is much more deserving of public investments. Landing humans on Mars and bringing them back safely would be a great technological feat and no doubt resplendent with numerous spinoff technologies, but it is not one of the major technical problems currently facing the human race. A manned mission to Mars will happen someday, but we should concentrate our scientific resources on figuring out how to leave future generations with a habitable Earth and leave it to them to discover how to make it to Mars.

**[\_\_\_\_] Missions to Mars drain funding allocated to answer science questions.**

Frank Gaglioti, high school science teacher and contributing journalist, 5/20/2006, **“Cuts to NASA Budget Gut Space Research http://www.wsws.org/articles/2006/may2006/nasa-m20.shtml**

In a far-reaching reorientation of its programs, the US National Aeronautic and Space Administration (NASA) budget has effectively capped science spending for the five-year period from 2007 to 2011. Programs designed to investigate more fundamental scientific questions about the character of the solar system and the universe are being sacrificed to enable NASA to carry out President George Bush’s grandiose scheme to establish a permanent settlement on the moon in preparation for a manned mission to Mars. NASA’s announcement in February was part of Bush’s budget cuts to federal science spending by 1 percent to $59.8 billion. The changes to NASA’s program are mirrored in the overall science budget, which is focussed more narrowly on projects with commercial payoffs or to strengthen the US military. Bush’s “American Competitive Initiative,” which is aimed at bolstering US corporate interests at the expense of their rivals, will consume $5.9 billion. Presidential science adviser John Marburger bluntly declared: “The point is, we’re prioritising.”

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# Specific Link – Constellation Affirmative

**[\_\_\_\_]**

**[\_\_\_\_] Climate science would be cut to build the replacement to the space shuttle.**

Agence France-Presse, French news agency 3/6/2011, “**NASA reels from climate science setbacks”, http://www.spacemart.com/reports/NASA\_reels\_from\_climate\_science\_setbacks\_999.html**

But some Republicans, who hold a majority in the House of Representatives, want to see NASA give up climate science so it can focus on returning astronauts to space once the 30-year-old shuttle program ends later this year. "NASA's primary purpose is human space exploration and directing NASA funds to study [global warming](http://www.spacemart.com/reports/NASA_reels_from_climate_science_setbacks_999.html) undermines our ability to maintain our competitive edge in human space flight," said Republican Congressman Bill Posey last month. Earth science has been a distinct mission of NASA ever since Congress formed the agency with the 1958 Space Act, setting its first objective as "the expansion of human knowledge of the earth and of phenomena in the atmosphere and space." Further revisions of the Space Act in 1976 gave NASA "authority to carry out stratospheric ozone research," and a 1984 change broadened NASA's earth science authority from the stratosphere to "the expansion of human knowledge of the Earth." But budget squeezes have crippled NASA's efforts since the 1990s, when NASA first set out to create a global Earth observing system and budget deficits forced engineers to scale back to one third of their original plan, according to Wielicki. "What we have now are pieces of that system that have lived well beyond their design life," he said. "Space missions are expensive by nature, risky by nature, and our nation has decided not to spend the kind of resources it would take for a more robust set of climate research observations."

**[\_\_\_\_] Returning to the moon will cause funds to be taken from science.**

Stefanie Olsen, staff writer at CNET, 2/6/2006, **“NASA budget emphasizes space exploration”, 2/6/6,** [**http://news.cnet.com/NASA-budget-emphasizes-space-exploration/2100-11397\_3-6035753.html#ixzz1PsWvN4gW**](http://news.cnet.com/NASA-budget-emphasizes-space-exploration/2100-11397_3-6035753.html#ixzz1PsWvN4gW)

Science will play a diminishing role at NASA as the space agency emphasizes lunar exploration in the next five years, according to a new governmental budget. NASA Administrator Michael Griffin, who was appointed to the office by the Bush administration only 10 months ago, announced a $16.8 billion budget request for NASA on Monday, per recommendations from President Bush. The budget, outlined in a press briefing here at NASA Ames Research Center, is a 3.2 percent rise over expected 2006 spending. It comprised about 0.7 percent of the federal budget. "This is a modest investment to extend the frontiers of space exploration, scientific discovery and aeronautics research," Griffin said. NASA's spending, Griffin said, will concentrate on implementing Bush's Vision for Space Exploration, a plan the president announced roughly two years ago to launch human missions to the moon. Science, such as studying the solar system or the origin of the universe, will [play a lesser role at NASA organizations](http://news.cnet.com/Research-money-crunch-in-the-U.S./2100-1008_3-5938451.html), resulting in cutbacks to divisions like astrobiology studies and life sciences at Ames Research Center. Ames' life sciences budget was cut by roughly 80 percent in November 2005, resulting in the loss of 100 contractor jobs.

# Specific Link – SETI Affirmative

**[\_\_\_\_]**

**[\_\_\_\_] SETI is extremely expensive and would strain NASA’s budget.**

**D. Vogt, writer and historical researcher, and manager of the Canadian History channel on Helium, 6/14/2010,** [**http://www.helium.com/items/1861053-stephen-hawking-opposes-seti**](http://www.helium.com/items/1861053-stephen-hawking-opposes-seti)

Most critics of the Search for Extraterrestrial Intelligence (SETI) suggest merely that it is a well-intentioned but foolish waste of money, chasing after radio signals sent by "little green men" while substantive research projects with tangible results go unfunded. However, some, like well-known Cambridge physicist [Stephen Hawking](http://astronomy.helium.com/topic/6956-stephen-hawking), go further: not only is SETI expensive, if done right, but it's also a bad idea because we really don't know who (if anyone) is listening. Usually, it is assumed that the worst-case scenario for SETI is that the money and time invested simply goes to waste. Not so, says Hawking: how are we sure that the aliens are really people we'd want to meet?

# Specific Link – Asteroids Affirmative

### **[\_\_\_\_] Surveys to find asteroids are funded by taking money from other programs.**

**National Academies, independent research organizations comprised of some of the premier scientists of the US, 2009, “Near-Earth Object Surveys and Hazard Mitigation Strategies:**

**Interim Report” http://www.nap.edu/catalog.php?record\_id=12738**

Currently, the U.S. government spends a relatively small amount of money funding a search and survey program to discover and track near-Earth objects, and virtually no money on studying methods of mitigating the hazards posed by such objects.3 Although Congress has mandated that NASA conduct this survey program and has established goals for the program, neither Congress nor the administration has sought to fund it with new appropriations. As a result, NASA has supported this activity by taking funds from other programs, while still leaving a substantial gap between the goals established by Congress and the funds needed to achieve them.

### **[\_\_\_\_] Because Congress is unwilling to allocate new funding to asteroid detection, NASA has been forced to fund the program by cutting other areas.**

**Cary Johnston, associate writer for Ars Technica, 08/2009, “ NASA asteroid-tracking program stalled due to lack of funds,” 8/2009,** [**http://arstechnica.com/science/news/2009/08/nasa-asteroid-tracking-program-stalled-due-to-lack-of-funds.ars**](http://arstechnica.com/science/news/2009/08/nasa-asteroid-tracking-program-stalled-due-to-lack-of-funds.ars)

The risk of an asteroid rending civilization into bits is a favorite scenario in disaster movies, but it has been none too popular with the United States government. Eleven years ago**,** Congress tasked NASA with detecting, tracking, and classifying large asteroids and comets **t**hat pose a threat to Earth; these are generically termed near earth objects, or NEOs. Since then, save for a small grant, NASA has funded the project on its own. Now Congress has created new goals for the program and requested that they be achieved by 2020. The National Research Committee has put out an interim report on the NEO project, and it indicates that very little progress has been made since 2005, primarily due to a lack of funding. Congress kicked off the NEO-tracking project in 1998, requiring that NASA's equipment be able to locate and identify at least 90 percent of all NEOs one kilometer in diameter or larger. Congress selected this size as the lower bound because it is the smallest size that might be globally catastrophic if it ran into Earth. To guarantee a catastrophe, an asteroid would have to be even larger, perhaps 1.5 to 2 kilometers. On impact, an asteroid of this size would create a fireball the size of a continent and a crater fifteen times the asteroid's diameter; if it hits the ocean, there would be an enormous tsunami. Congress awarded NASA a $1.6 million grant in 1999 toput towards the NEO discovery program. Unfortunately, this was the only funding Congress gave to NASA to pursue this goal; nonetheless, NASA continued the project on its own, and has since successfully achieved the objective of a 90 percent track rate for 1km NEOs. The problem now, the NRC report asserts, is that we shouldn't be satisfied with this. What NASA has accomplished so far will largely enable us to at least attempt to prevent any impacts that would ultimately cause the majority of humans that survive the initial blow to die of starvation. However, asteroids smaller than 1km in diameter are not sufficiently less disastrous than their larger counterparts that we can happily ignore them. For example, the NRC report states that the body that caused the 1908 Tunguska explosion and destroyed 2,000 square kilometers of Siberian forest was only 30-40 meters in diameter. This realization is what led Congress to change its mind and decide that NASA should track even smaller asteroids. The new goal: track 90 percent of NEOs 140 meters or larger in diameter by 2020. The NRC report primarily takes issue with the lack of action on this goal from anyone involved: Congress has not volunteered funding for their mandate, and NASA has not allotted any of their budget toit**,** either. The equipment currently in use to track NEOs can easily see the 1km monsters, but it's not sensitive enough to track the 140m asteroids. As a result, if a Tunguska-sized body were headed for Earth today, its arrival would probably be a complete surprise.

# Impact – Earth Science Solves Global Warming

**[\_\_\_\_]**

**[\_\_\_\_] Satellite data from NASA is essential to measuring emissions to stop global warming.**

**James Lewis et. al, senior fellow and director of the Technology and Public Policy Program at CSIS Sarah O. Ladislaw, senior fellow in the Energy and National Security Program at CSIS, June 2010, “ Earth Observation for Climate Change,”** [**http://csis.org/files/publication/100608\_Lewis\_EarthObservation\_WEB.pdf**](http://csis.org/files/publication/100608_Lewis_EarthObservation_WEB.pdf)

This is a question of priorities. Manned flight should remain a priority, but not the first priority. Earth observation data is critical to understanding the causes and effects of climate change and quantifying changing conditions in the environment. The paucity of satellites actually designed and in orbit to measure climate change is disturbing. The United States does not have a robust climate-monitoring infrastructure. In fact, the current infrastructure is in decline. Until that decline is reversed and an adequate space infrastructure put in place, building and launching satellites specifically designed for monitoring climate change should be the first priority for civil space spending. Manned spaceflight provides prestige, but Earth observation is crucial for security and economic well-being**.** The United States should continue to fund as a priority a more robust and adequate space infrastructure to measure climate change, building and orbiting satellites specifically designed to carry advanced sensors for such monitoring. Satellites provide globally consistent observations and the means to make simultaneous observations of diverse measurements that are essential for climate studies. They supply high-accuracy global observations of the atmosphere, ocean, and land surface that cannot be acquired by any other method. Satellite instruments supply accurate measurements on a near-daily basis for long periods and across broad geographic regions. They can reveal global patterns that ground or air sensors would be unable to detect—as in the case of data from NASA satellites that showed us the amount of pollution arriving in North America from Asia as equal to 15 percent of local emissions of the United States and Canada. This sort of data is crucial to effective management of emissions—the United States, for example, could put in place regulations to decrease emissions and find them neutralized by pollution from other regions. 15 Satellites allow us to monitor the pattern of ice-sheet thickening and thinning. While Arctic ice once increased a few centimeters every year, it now melts at a rate of more than one meter annually. This knowledge would not exist without satellite laser altimetry from NASA’s ICESat satellite.

# Impacts – Earth Science Solves Global Warming

**[\_\_\_\_]**

**[\_\_\_\_] NASA satellites focused on global warming are key to help predict global warming and natural disasters.**

**Larry West, Environmental journalist, finalist for the Pulitzer prize, 3/5/2006,** “**Budget Cuts and Mismanagement Place Environmental Satellites at Risk”**

Budget cuts and cost overruns are threatening the current integrity and future existence of a network of U.S. environmental satellites that help scientists forecast hurricanes, droughts and floods, and predict global warming, according to a news story by the Associated Press. "The system of environmental satellites is at risk of collapse," said Richard A. Anthes, president of the University Corporation for Atmospheric Research and chairman of a National Academy of Sciences committee that advises the federal government on developing and operating environmental satellites, in an interview with the Associated Press. "Every year that goes by without the system being addressed is a problem." Satellites Give Warning Before Disasters Strike Scientists say that neglecting the environmental satellites orbiting the Earth could have severe human consequences. If the environmental satellites aren’t there to provide up-to-date information about approaching natural disasters and threats from other severe climate and weather conditions, then scientists will be unable to warn the people most likely to be harmed and the public safety officials who must try to protect them. Yet, at a time when the United States is still recovering from the worst hurricane season on record, when Africa and South America are experiencing devastating droughts, and when regions worldwide are feeling the first effects of global warming, NASA is managing its budget as though extreme weather and natural disasters were passé.

**[\_\_\_\_] Environmental satellites provide critical data on global warming.**

**Larry West, Environmental journalist, finalist for the Pulitzer prize, 3/5/2006,** “**Budget Cuts and Mismanagement Place Environmental Satellites at Risk”**

In an effort to save money, NASA has canceled plans for at least three earth-observing satellites, and cost overruns have delayed a new generation of weather satellites until 2010 or 2012. The Government Accounting Office has called the entire U.S. environmental satellite effort “a program in crisis.” Balancing Budgets and Priorities NASA Administrator Michael Griffin has the difficult job of trying to stretch his shrinking budget to cover the cost of operating the space shuttle and the space station as well as space exploration and programs such as the environmental satellites. NASA’s proposed budget for 2007 includes $6.2 billion for space shuttle and space station operations, and $4 billion for planning future missions to the moon and Mars, but only $2.2 billion for satellites that help scientists observe the Earth and the sun. "We simply cannot afford all of the missions that our scientific constituencies would like us to sponsor," Griffin told members of Congress when he testified before the House Science Committee on Feb. 16, 2006. Perhaps not, but it seems as though humanity’s critical need for the information that environmental satellites provide should place them higher on NASA’s list of priorities.

# Impact – Warming Causes Extinction

**[\_\_\_\_]**

**[\_\_\_\_] Global warming causes extinction.**

**Bill Henderson, district environmental administrator for the Florida DOT, 8/19/2006, “Runaway Global Warming Denial.” Countercurrents.org August 19,.** [**http://www.countercurrents.org/cc-henderson190806.htm**](https://webmail.whitman.edu/horde/services/go.php?url=http%3A%2F%2Fwww.countercurrents.org%2Fcc-henderson190806.htm)

The scientific debate about human induced global warming is over but policy makers - let alone the happily shopping general public - still seem to not understand the scope of the impending tragedy. Global warming isn't just warmer temperatures, heat waves, melting ice and threatened polar bears. Scientific understanding increasingly points to runaway global warming leading to human extinction. If impossibly Draconian security measures are not immediately put in place to keep further emissions of greenhouse gases out of the atmosphere we are looking at the death of billions, the end of civilization as we know it and in all probability the end of man's several million year old existence, along with the extinction of most flora and fauna beloved to man in the world we share.

**[\_\_\_\_]**

**[\_\_\_\_] Global warming will cause civilization to collapse**

**Lester R. Brown, founder of the Worldwatch Institute and the Earth Policy Institute, 2008 “Plan B 3.0: Mobilizing to Save Civilization,”**

Beyond what is already happening, the world faces a risk that some of the feedback mechanisms will begin to kick in, further accelerating the warming process. Scientists who once thought that the Arctic Ocean could be free of ice during the summer by 2100 now see it occurring by 2030. Even this could turn out to be a conservative estimate.78 This is of particular concern to scientists because of the albedo effect, where the replacement of highly reflective sea ice with darker open water greatly increases heat absorbed from sunlight. This, of course, has the potential to further accelerate the melting of the Greenland ice sheet. A second feedback loop of concern is the melting of permafrost. This would release billions of tons of carbon, some as methane, a potent greenhouse gas with a global warming effect per ton 25 times that of carbon dioxide.79 The risk facing humanity is that climate change could spiral out of control and it will no longer be possible to arrest trends such as ice melting and rising sea level. At this point, the future of civilization would be at risk. This combination of melting glaciers, rising seas, and their effects on food security and low-lying coastal cities could overwhelm the capacity of governments to cope. Today it is largely weak states that begin to deteriorate under the pressures of mounting environmental stresses. But the changes just described could overwhelm even the strongest of states. Civilization itself could begin to unravel under these extreme stresses.

# Impact – Warming is Man Made

## [\_\_\_\_]

**[\_\_\_\_] Warming is caused by humans – the variation of temperature increase is much higher than normal.**

## Stephanie B. Oshita, Assistant Professor of Environmental Science and Management at the University of San Francisco, 2007, “The Scientific and International Context for Climate Change Initiatives” 42 U.S.F.L. Rev. 1 Summer

Even if we recognize that the globe is warming, how do we know that humans are causing the phenomenon? Through a combination of measurements and models, we can discern the human "fingerprint" on the climate system in a number of ways. n27 First, the observed warming goes well beyond natural variation. Paleoclimatology - the sleuthing for indicators of past temperatures in ice cores and coral reefs - indicates that current levels of CO2 in the atmosphere far exceeded the natural range of the last 650,000 years. n28 We know that the atmospheric concentrations of CO2 and temperature are strongly correlated, explaining why temperatures levels are higher than ever before. n29 Second, the rapid increase in levels of CO2 in the atmosphere coincides with the onslaught of the industrial revolution and the release of CO2 from fossil fuels, along with dramatic changes in land use by humans. n30 Third, models of the climate system with and without human emissions show that natural variation alone cannot obtain observed [\*7] changes. n31 Natural fluctuations in the Earth's orbit, natural variation in solar activity, and other non-human phenomena cannot account for the rapid rise in atmospheric greenhouse gases and average temperature over the past century. Human activity does explain the observed changes

**[\_\_\_\_] The increase of carbon dioxide in the atmosphere is very predictable, and it has increased dramatically in the last 50 years due to human activity.**

## Lester E. Brown, Director and Founder of the Global Institute of Environment in the U.S. and President and Senior Researcher at the Earth Policy Institute, 2008 [Lester E., “Plan B 3.0: Mobilizing to Save Civilzation”

Scientists at the Goddard Institute for Space Studies of the National Aeronautics and Space Administration (NASA) gath­er data from a global network of some 800 climate-monitoring stations to measure changes in the earth's average temperature. Their direct measurements go back to 1880.6 Since 1970, the earth's average temperature has risen by 0.6 degrees Celsius, or 1 degree Fahrenheit. Meteorologists note that the 23 warmest years on record have come since 1980. And the seven warmest years since recordkeeping began in 1880 have come in the last nine years. Four of these-2002, 2003, 2005, and 2006-were years in which major food-producing regions saw their crops wither in the face of record temperatures. The amount of carbon dioxide (C02) in the atmosphere has risen substantially since the start of the Industrial Revolution, growing from 277 parts per million (ppm) to 384 ppm in 2007. The annual rise in the atmospheric *C02* level, one of the world's most predictable environmental trends, is the result of the annu­al discharge into the atmosphere of 7.5 billion tons of carbon from burning fossil fuels and 1.5 billion tons from deforesta­tion. The current annual rise is nearly four times what it was in the 1950s, largely because of increased emissions from burning fossil fuels. As more C02 accumulates in the atmosphere, tem­peratures go up.

# Impact – Warming Not Inevitable

**[\_\_\_\_]**

**[\_\_\_\_] Warming is not inevitable. Many of the predicted consequences can still be avoided.**

## James E Hansen, NASA Goddard Institute for Space Studies and Adjunct Professor in the Department of Earth and Environmental Sciences at Columbia University, 6/25/2007, “How Can We Avert Dangerous Climate Change?” Delivered to the Select Committee on Energy Independence and Global Warming, United States House of Representatives, http://arxiv.org/pdf/0706.3720

We have solved or are solving those pollution problems, at least in developed countries. But we did not address them until they hit us with full force. That approach, to wait and see and fix the problems post facto, unfortunately, will not work in the case of global climate change. On the contrary, the inertia of the climate system, the fact that much of the climate change due to gases already in the air is still ‘in the pipeline’, and the time required for economically-sensible phase-out of existing technologies together have a profound implication. They imply that ignoring the climate problem at this time, for even another decade, would serve to lock infuture catastrophic climatic change and impacts that will unfold during the remainder of this century and beyond (references A and B). Yet this is not a reason for gloom and doom. On the contrary, there are many bright sides to the conclusion that the ‘dangerous’ level of CO2 is no more than 450 ppm, and likely much less than that. It means that we, humanity, are forced to find a way to limit atmospheric CO2 more stringently than has generally been assumed. In so doing, many consequences of high CO2 that were considered inevitable can be avoided. We will be able to avoid acidification of the ocean with its destruction of coral reefs and other ocean life, retain Arctic ice, limit species extinctions, prevent the U.S. West from become intolerably hot, and avoid other undesirable consequences of large global warming. It is becoming clear that we must make a choice. We can resolve to move rapidly to the next phase of the industrial revolution, and in so doing help restore wonders of the natural world, of creation, while maintaining and expanding benefits of advanced technology. Or we can continue to ignore the problem, creating a different planet, with eventual chaos for much of humanity as well as the other creatures on the planet.

# Article: The State of NASA’s Budget

**Space Reference: *NASA Spending Shift to Benefit Centers Focused on Science & Technology*. June 8th, 2011.**

Washington DC, June 7, 2011 - Euroconsult, the leading international consulting and analyst firm specializing in the space sector, along with the consulting firm Omnis, today announced the findings of a study today foreseeing a significant shift in NASA spending toward Earth science and R&D programs and away from legacy spaceflight activities.

According to the report "NASA Spending Outlook: Trends to 2016," NASA's budget, which will remain flat at around $18.7 billion for the next five years, will also be characterized by significant shifts from space operations to technology development and science.

With the shift in budget authority, NASA Centers focused on Earth observation, space technology, and aeronautics will see increases in funding, while those involved in human spaceflight will see major funding reductions. Indeed, the termination of the Space Shuttle program will lead to a budget cut over $1 billion for Space Operations, resulting in a 21% budget cut for the Johnson Space Center. Overall, the agency's budget for R&D will account for about 50% of all NASA spending.

"Budget allocation across Centers will vary greatly," said Steve Bochinger, President of Euroconsult North America. "As NASA shifts priorities for human spaceflight from Shuttle operations to Human Exploration Capabilities and commercial spaceflight, the budget will be redirected to a range of technology development programs. Likewise, as NASA shifts its science mission focus away from space science to Earth science, the science budget will be redistributed among centers."

This shift in NASA's priorities will also affect the agency's contract spending. As large legacy programs end, new research and development programs will be initiated. This turnover of programs should provide many new contracting opportunities over the next five years, especially at Research Centers. The Euroconsult/Omnis report details these changes.

"The uniqueness of this report is that it brings together in one picture NASA's budget, spending and contracting, providing insights into opportunities created by the new NASA direction," said Bretton Alexander, Senior Consultant for Omnis.

Some of the findings include: Following an 11% increase in 2011, the Science Mission Directorate budget will remain at the $5 billion level through 2016. This increase, however, is entirely within the Earth science theme, reflecting the Administration's priority on climate change research. Goddard Space Flight Center and Langley Research Center, which manage and Implement Earth science projects, will thus benefit from this increase as will contractors who develop Earth observation spacecraft and instruments.

- Spending in the Exploration Systems Mission Directorate has been impacted by the cancellation of Constellation and repositioning of exploration policy. But it will hold steady at around $3.9 billion between 2011 and 2016, funds will shift away from human exploration activities at the Johnson Space Center in Texas and the Marshall Space Flight Center in Alabama. The Kennedy Space Center in Florida will escape some of the pain of reduced funding with the development of the new Commercial

Crew Development program. However, much of the work will be done by companies spread around the United States, rather than those based at Kennedy, creating an opportunity for new contractors.

- The newly created Space Technology Directorate, is set to receive an average of $1 billion annually between 2012 and 2016. The programs here are designed to revitalize the agency's ability to develop revolutionary technologies and innovations for exploration and robotic spaceflight This substantial budget will benefit Langley, Glenn and Ames Research Centers, which in the past supported research and test programs in aeronautics, science and human spaceflight missions.

- NASA's restructuring of the Aeronautics Research Mission Directorate (ARMD) will be focused on long-term investment in fundamental aeronautics and development of technologies required for the Next Generation Air Transportation System (NextGen). Funding for the 2011-2016 period is expected to increase to a total of $570 million per year. With these shifts in funding and priorities, NASA's business practices will also adapt. The Euroconsult/Omnis report analyzes how NASA's shift from cost-plus contracting, currently used in many legacy programs, to fixed-price contracts will impact various programs throughout the agency. The new Commercial Crew Development program undertaken as a public-privatepartnership with the industry typifies the agency's new contract practices.

# Article: Space Science, Earth Science and Politics

**Space politics: *Human Spaceflight versus Earth Sciences?* February 9th, 2011.**

A letter signed by several members of Congress is the latest evidence that a new battle line is forming over NASA funding: human spaceflight versus Earth sciences. In [a letter to House Appropriations committee chairman Rep. Hal Rogers and CJS subcommittee chairman Frank Wolf](http://posey.house.gov/UploadedFiles/NASAAppropsLetter-Feb2011.pdf), six Republican members of Congress asked the appropriators to prioritize NASA funding on what they consider to be the agency’s primary mission, human spaceflight. To do that, they argue that funding for NASA’s climate change research be redirected to human spaceflight accounts. “With your help, we can reorient NASA’s mission back toward human spaceflight by reducing funding for climate change research and reallocating those funds to NASA’s human spaceflight accounts, all while moving overall discretionary spending towards FY2008 levels,” the letter’s authors—Reps. Bill Posey (R-FL), Pete Olson (R-TX), Rob Bishop (R-UT), Jason Chaffetz (R-UT), Sandy Adams (R-FL), and Mo Brooks (R-AL)—argue.

There are a number of issues with the letter. They claim that NASA spent “over a billion dollars” on “studying global warming/climate change” in FY2010. The agency got about $1.4 billion for all Earth sciences research in FY10, [according to agency budget documents](http://www.nasa.gov/pdf/432577main_Earth_Science_R1.pdf). There’s no breakout for how much of that went specifically to climate change research, though. The letter also claims that the “lion share” of NASA’s share of stimulus funding went to climate change studies. In fact, only about a third of the agency’s stimulus funding, $325 million, [went to Earth sciences programs](http://www.recovery.gov/Transparency/agency/reporting/agency_reporting5program.aspx?agency_code=80&progplanid=7540), to accelerate development of Earth science spacecraft. Human spaceflight got even more: [$400 million](http://www.recovery.gov/Transparency/agency/reporting/agency_reporting5program.aspx?agency_code=80&progplanid=7541), including $50 million for the CCDev program. And their claim that NASA’s core mission is human spaceflight is not supported by other documents, ranging from the [National Aeronautics and Space Act](http://www.nasa.gov/offices/ogc/about/space_act1.html) from 1958 to the latest [NASA authorization act](http://legislative.nasa.gov/PL%20111-267.pdf), which declared that NASA “is and should remain a multi-mission agency with a balanced and robust set of core missions in science, aeronautics, and human space flight and exploration” and that “NASA plays a critical role through its ability to provide data on solar output, sea level rise, atmospheric and ocean temperature, ozone depletion, air pollution, and observation of human and environment relationships”.

A bigger issue, though, is that this letter may be indicative of a bigger battle some in Congress want to wage between human spaceflight and Earth science. Some members have openly expressed their skepticism about the validity of climate change research, questioning either the existence of global warming or the role of human activities in causing climate change. The letter to appropriators makes no judgment on the quality of validity of such research, only NASA’s role in supporting it, but some might see that unspoken argument there. For example, one of the letter’s signers, Rep. Brooks, said last week in regards to NASA funding that [there would be “hearings soon on global warming” by the House science committee](http://blog.al.com/breaking/2011/02/congress_will_cut_defense_cong.html) without going into more details. An attack on Earth sciences funding to support human spaceflight could create or reinvigorate opponents of human spaceflight programs, reminiscent of previous debates between human spaceflight and robotic space exploration advocates—a battle that the agency presumably would want to avoid.

**NASA Tradeoff Disadvantage Affirmative**

# NASA Tradeoff DA Affirmative

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# Glossary

**Mars Science Laboratory** – A NASA mission to land a rover named curiosity of the Martian surface. The object of the mission is to determine whether Mars could have once supported microbial life, and determine its habitability for humans.

**Cape Canaveral** – An area of Florida east of Orlando that is home to the Kennedy Space Center and the location of the launches of many spacecraft.

**Irradience** – describing an object that is shining brightly

**Imperative** - An essential or urgent thing

**Inception** - The establishment or starting point of something; the beginning

**Pension** - A regular payment made by the government to people of or above the official retirement age

**Animosity** – strong hostility

**Decadal** – With respect to decades.

**Appropriator** – Someone who allocates resources among difference causes.

**ISS** – International Space Station

**NASA** – National Aeronautics and Space Administration

**NOAA** – National Oceanic and Atmospheric Administration

**GISS** – Goddard Institute for Space Studies

**FY** – Fiscal Year. A fiscal year is a year for tax or accounting purposes. It is still 365 days long, but it often does not start and end on January 1st.

**JPL** – Jet Propulsion Laboratory

**OCO** – Orbiting Carbon Observatory

**IPCC** – United Nations Intergovernmental Panel on Climate Change

# Uniqueness – NASA Overbudget now

**[\_\_\_\_] The Mars Science Laboratory is already overbudget, which makes a trade off with Earth science inevitable.**

**Amy Svitak, senior writer for space.com, 1/28/2011, “NASA’s Overbudget Mars Rover in Need of Another Cash Infusion,”** [**http://www.spacenews.com/civil/110128-mars-rover-need-cash.html**](http://www.spacenews.com/civil/110128-mars-rover-need-cash.html)**,**

NASA’s Mars Science Laboratory (MSL) mission needs an $82 million cash infusion to maintain its late November launch date after development of the $2.47 billion rover exhausted program funding reserves last year, according to agency officials. Jim Green, director of NASA’s Planetary Sciences Division in the U.S. space agency’s Science Mission Directorate here, attributed the 3 percent cost increase to problems developing the truck-sized rover’s mobility systems, avionics, radar and drill, as well as delays in completing the rover’s Sample Analysis at Mars instrument suite, which is designed to sniff the surrounding air for carbon-containing compounds. “Our problem right now is MSL,” Green told members of the NASA Advisory Council’s planetary sciences subcommittee during a public meeting here Jan. 26. “It has virtually no unencumbered reserves left.” With MSL slated for delivery to Florida’s Cape Canaveral Air Force Station in June, Green said it is imperative that the program’s funding reserves be restored in order to gird against any further development or test problems that could cause the rover to miss an unforgiving three-week launch window that opens Nov. 25. MSL’s price tag has grown by more than $660 million since 2008, according to a February 2010 audit by the U.S. Government Accountability Office, which attributed much of the increase to a 68 percent rise in hardware development costs since the program’s 2003 inception. Although NASA had planned to launch MSL in 2009, technical setbacks forced the agency to postpone the mission two years, the minimal delay for any Mars-bound craft missing its launch window.

[\_\_\_\_] NASA’s pension obligations to shuttle workers mean that it will have to take funds from other areas.

**New York Times, 6/15/2011, “Shuttle’s End Leaves NASA a Pension Bill” http://www.nytimes.com/2011/06/15/business/15nasa.html?\_r=2**

The pension fund now has about half the amount needed. The president’s budget proposal for the 2012 fiscal year requests $547.9 million for NASA to provide the rest. That is nearly 3 percent of the agency’s total budget and just about what the Science Mission Directorate at NASA spent last year on all grants and subsidies to study climate change, planetary systems and the origins of life in the universe. “We know that it’s NASA’s obligation to fund this, and NASA will do so,” said a spokesman for the space agency, Michael Curie. Other federal agencies have made promises to pay contractors’ annual pension costs — the Energy Department, for example, for companies that run nuclear sites — and some government auditors have been warning for years that investment oversight was lacking and that the potential costs had been underestimated. This appears to be the first time, though, that a company’s main contract has expired and an agency has had to bear the cost of terminating its plans. Although NASA was reimbursing the contractor for the annual pension contributions, it had no say over how the money was invested. United Space Alliance put most of the money into stocks. The backstop will be unusually costly because of market conditions. While United Space Alliance has made its required contributions every year, the fund lost nearly $200 million in the market turmoil of 2008 and 2009. When interest rates are very low, as they have been, the cost of the promises rises rapidly as well, creating a bigger shortfall. The cash infusion is also being readied at a time when some members of Congress are demanding cuts in spending and threatening to block anything that could be construed as a taxpayer bailout. “It’s unfortunate that it’s coming in this fiscal environment,” said Bill Hill, NASA assistant associate administrator for the space shuttle. He said that he hoped Congress would appropriate the money before the fiscal year ended on Sept. 30. If not, he said, NASA will have to divert funds from space-related activities.

# Uniqueness – Earth Science Not Funded Now

**[\_\_\_\_]**

**[\_\_\_\_] Despite increasing funds for Earth science Obama is cutting research for global warming.**

**Turner Brinton, Space News Writer, 3/7/2011, “NASA Cuts 2 Earth Science Missions on White House Order”, March 7th 2011 http://www.space.com/11050-white-house-nasa-earth-science-cuts.html**

Even though NASA’s Earth science budget is slated to rise next year, the U.S. space agency has been ordered by the White House to shelve a pair of big-ticket climate change missions that just last year were planned for launch by 2017. With U.S. President Barack Obama under pressure to rein in federal spending, the White House eliminated funding for the Climate Absolute Radiance and Refractivity Observatory (CLARREO) and Deformation, Ecosystem Structure and Dynamics of Ice (DESDynI) missions, Steve Volz, associate director for flight programs at NASA’s Earth Science Division, said in a Feb. 24 interview. The cuts came before the failed launch of the Glory satellite Friday (March 4), NASA's latest Earth-observing mission to study Earth's atmosphere, due to a rocket malfunctions. So the White House orders are unrelated to NASA's loss of the Glory satellite. The multiyear budget plan NASA sent Congress a year ago called for spending $1.2 billion between 2012 and 2015 to develop CLARREO and DESDynI, two of the four top-tier missions recommended by the National Research Council’s 2007 Earth Science decadal survey. But the White House Office of Management and Budget specifically removed these funds from the agency’s 2012 budget request, Volz said in an interview. “Removal of these missions was not what we desired and not what the administration desired, but it was a clear recognition and acknowledgement of the budget issues we face as a nation,” Volz said. “It’s cleaner to be allowed to delete the scope that goes along with the dollars than to have to figure out how to do more with less.” The other two top-tier Earth science missions — Soil Moisture Active-Passive and ICESat-2 — remain budgeted for launch in 2014 and 2016, respectively.

[\_\_\_\_] Current budget levels are just projections that mean nothing. Hostility to global warming by Republicans means that Earth science will be cut.

**Eli Kintisch, writer at Science Insider, 3/8/2011 http://news.sciencemag.org/scienceinsider/2011/03/nasa-satellite-crash-complicates.html**

The desired launch dates presume that Congress will approve the president's request to grow the agency's budget for Earth science in the next 4 years—from $1.8 billion to $2.3 billion by 2015. That may be wrong. Given the budget pressure, the $1.9 billion that President Barack Obama requested for the 2012 fiscal year "is the high point," speculates NASA earth science budget expert Art Charo of the National Academies' National Research Council. In particular, the House of Representatives has already approved cutting NASA's budget for the rest of 2011 by $600 million. Senate Democrats have said they want to cut it by $200 million. Neither has yet specified how the cut should be distributed across the agency's $18.7 billion budget. But in recent years, the earth science budget has gotten its lunch eaten by the manned spaceflight program. Given the animosity in the House toward anything that has the word "climate" in its name, it's hard to see any change in that dynamic. The crash of OCO in 2009 has already led to some brutal triage. To set up OCO-II, NASA was forced to cut other missions. In the 2012 budget rollout last month, for example, NASA announced it wished to curtail plans to launch CLARREO—a four-satellite constellation to measure tiny fluctuations in reflected energy from Earth, and DESDynI, a $1.6 billion mission to scan ice.

# Uniqueness – Earth Science Not Funded Now

**[\_\_\_\_] NASA’s Earth science budget is slated to lose 1.7 billion dollars this year.**

**Turner Brinton, Space News Writer, 3/7/2011, “NASA Cuts 2 Earth Science Missions on White House Order”, March 7th 2011 http://www.space.com/11050-white-house-nasa-earth-science-cuts.html**

While NASA’s Earth Science Division fared better in the president’s 2012 budget proposal than other parts of the agency, the division stands to receive some $1.7 billion less between 2010 and 2015 than forecast just last year. That spending plan, which called for giving Earth science a growing share of a NASA budget expected to surpass $20 billion within four years, included enough funding to build and launch all four top-tier decadal survey missions by the end of 2017. The NASA budget plan unveiled Feb. 14 puts last year’s growth plans on hold. The agency’s overall spending would be frozen at $18.7 billion, and Earth science, after receiving a $400 million boost for 2012, would remain flat at $1.8 billion through at least 2016. Adding to NASA’s budget woes, the president’s 2011 budget was never enacted, leaving the agency and the rest of the federal government funded at typically lower 2010 levels under stopgap spending measures, the latest of which expires March 4.

[\_\_\_\_] Obama recently cancelled two climate change satellites to save money, leaving NASA’s Earth science program crippled.

**Seth Borenstein, National Science writer for The Associated Press, 3/4/2011, “Lost satellite deals heavy blow to climate research”, http://www.msnbc.msn.com/id/41895904/ns/technology\_and\_science-space/t/lost-satellite-deals-heavy-blow-climate-research/**

NASA's environmental division is getting used to failure, cuts and criticism. In 2007, a National Academy of Sciences panel said that research and purchasing for NASA Earth sciences had decreased 30 percent in six years and that the climate-monitoring system was at "risk of collapse." Just last month, the Obama administration canceled two major satellite proposals to save money. Also, the Republican-controlled House has sliced $600 million from NASA in its continuing spending bill, and some GOP members do not believe the evidence of manmade global warming. Thirteen NASA Earth-observing satellites remain up there, and nearly all of them are in their sunset years. "Many of the key observations for climate studies are simply not being made," Harvard Earth sciences professor James Anderson said. "This is the nadir of climate studies since I've been working in this area for 40 years." Scientists are trying to move climate change forecasts from ones that are heavily based on computer models to those that rely on more detailed, real-time satellite-based observations like those that Glory was supposed to make. The satellite's failure makes that harder. Ruth DeFries, the Columbia University professor who co-chaired the 2007 National Academy of Sciences panel, said in an e-mail that this matters for everyone on Earth. "The nation's weakening Earth-observing system is dimming the headlights needed to guide society in managing our planet in light of climate change and other myriad ways that humans are affecting the land, atmosphere and oceans," DeFries wrote. NASA Earth Sciences chief Michael Freilich said it is not that bad. "We must not lose sight of the fact that we in NASA are flying 13 research missions right now, which are providing the fuel for advancing a lot of our Earth science," Freilich told The Associated Press. He said airplane missions, current satellites and future ones can pick up much of the slack for what Glory was going to do. However, Freilich, at a budget briefing a year ago, described the Earth-watching satellites as "all old," adding that 12 of the 13 "are well beyond their design lifetimes." "We're losing the ability to monitor really key aspects of the climate problem from space," said Jonathan Overpeck, a climate scientist at the University of Arizona. "Just about every climate scientist in the worldhas got to be sad right now."

# No Link – Tradeoff Happens Between Agencies

**[\_\_\_\_]**

[\_\_\_\_] New NASA projects take funding from other agencies. Funding will not be taken from within NASA’s budget itself.

**Jeffrey Mervis, deputy news editor, Science Magazine, 2/5/2010, http://www.wbur.org/npr/123410020/president-obamas-science-spending**

But more broadly, Congress isn't going to go for all of these things. Congress, as you'll talk about later with NASA, is not going to be happy with that reallocation and savings. And the reason that's important to the rest of the science budget is because NASA is funded by the same committee that funds the National Science Foundation, the Environmental Protection Agency, the Department of Commerce, which has NOAA and NIST. And so if they have a fixed amount of money, the more they give to one agency, the less there is for everybody else. So sometimes Congress makes decisions not because they're opposed to research, but because they have other higher priorities.

**[\_\_\_\_] Congress is considering taking funds from other agencies to fund NASA, which proves there would be no tradeoff.**

**Amy Svitak, Senior writer for space.com, 3/29/2011, “NASA’s Budget Could Get Infusion From Other U.S. Departments,” http://www.space.com/11247-nasa-budget-funding-commerce-justice-departments.html**

Congressional appropriators could tap the funding accounts of the U.S. departments of Commerce and Justice to help cover what some see as a $1 billion shortfall in NASA’s $18.7 billion spending plan for 2012, which allocates less money for a heavy-lift rocket and crew capsule than Congress directed last year. “There’s over a billion-dollar difference between the budget request and the authorized levels in [20]12 for the launch system and the crew vehicle, and now that falls squarely back on the shoulders of [the appropriations committees] to try and figure out where to come up with that money,” said a panelist at a March 23 breakfast on Capitol Hill. Sponsored by Women in Aerospace (WIA), the breakfast was held under the Chatham House Rule, an 84-year-old protocol fashioned by the London-based nonprofit think-tank to promote frank discussion through anonymity. [What Obama and Congress Should Do for Spaceflight] The panelist, one of six whose names and job titles were circulated by WIA prior to the meeting, said funding requested in NASA’s 2012 spending plan does not square with levels Congress set in the NASA Authorization Act of 2010 that U.S. President Barack Obama signed into law in October. Specifically, the request called for spending $1.2 billion less than the $4 billion Congress authorized for the heavy-lift launch vehicle and crew capsule in 2012. At the same time, the request includes $350 million more than the $500 million Congress authorized to nurture development of commercial vehicles to deliver cargo and crews to the International Space Station after the space shuttle retires later this year. Consequently, the panelist said, it is now up to congressional appropriators “to find a billion dollars in other places in NASA to pay for those activities or to decide to make those tradeoffs and take that money out of the departments of Commerce or Justice or the other agencies that are funded in the same bill as NASA.” NASA’s annual appropriation is part of a broader spending package totaling nearly $65 billion that funds the U.S. Commerce and Justice departments, the National Science Foundation, the National Institute of Standards and Technology and related agencies.

# No Link – Budget Flexibility now

**[\_\_\_\_]**

### **[\_\_\_\_] The retirement of the shuttle means there is a lot of extra money in NASA’s budget to be spent**.

**Clara Moskowitz, Senior Writer for Space.com, 4/15/2011 “NASA's 2011 Budget Should Allow Flexibility Despite Cuts,” Space.com, http://www.space.com/11411-nasa-2011-budget-cuts-constellation-funding.html**

The new budget at least frees NASA from a stifling provision under its 2010 budget that prevented it from cutting funding to the moon-bound Constellation program. Yet that program was canceled by President Barack Obama in early 2010, and NASA has been targeting new goals ever since. Now the space agency will finally be free to stop spending money on canceled Constellation projects. "The elimination of the Constellation provision will free up resources otherwise committed," Handberg said, saving NASA some of the money that it loses in the reduction of its annual budget. NASA leaders expressed gratitude that the agency can now move forward fully toward its new direction. "This bill lifts funding restrictions that limited our flexibility to carry out our shared vision for the future," NASA administrator Charles Bolden said in a statement. "With this funding, we will continue to aggressively develop a new heavy lift rocket, multipurpose crew vehicle and commercial capability to transport our astronauts and their supplies on American-made and launched spacecraft."

### **[\_\_\_\_] The end of Constellation frees up money and creates new budget flexibility.**

**The Economist 6/30/2011 “The space shuttle Into the sunset”** [**http://www.economist.com/node/18895018**](http://www.economist.com/node/18895018)

So, although the shuttle—which has been the icon of America’s space effort for a generation—will be missed, harder heads will be glad to see the decks cleared. Last year Barack Obama outlined his plans for the future of America’s space programme. Its most striking feature is to delegate the humdrum task of ferrying people and equipment to low-Earth orbit to the private sector. Rocketry is a mature technology, and NASA has always relied on using contractors to build its rockets and spacecraft. In future, private firms will run the missions as well. Later this year two spacecraft, one which has been designed by Orbital Sciences, a Virginia-based firm, and another by SpaceX, a Californian company run by Elon Musk, an internet entrepreneur, will make cargo runs to the ISS. The hope is that such craft will soon be able to carry humans too, and at a far lower cost than NASA’s efforts. Liberated from the burden of having to service the ISS (which Mr Obama wants to keep until 2020, six years longer than originally planned), NASA will be free to concentrate on loftier goals. In 2010, when Mr Obama outlined his ideas, he spoke, somewhat vaguely, of a manned trip to a near-Earth asteroid, to be followed at some unspecified date in the 2030s by the ultimate space-cadet dream—a manned mission to Mars. To that end, NASA will spend billions of dollars developing new engines, propellants, life-support systems and the like. Even the shuttle will live on, in some sense, since the Space Launch System—the unromantic name of the beefy rocket needed to loft astronauts and cargoes into high orbits or farther into the solar system—will be built partly from recycled shuttle parts in an effort to save money and use familiar technology. And spending will be managed through fixed-price contracts instead of the “cost-plus” deals that helped to inflate the price of the shuttle.

# Link Turn – Spending Increases the Budget

**[\_\_\_\_]**

**[\_\_\_\_] Allocating funds for one part of NASA has a snowball effect and results in Congress increasing the agency’s budget overall.**

**Geoffrey Landis, NASA scientist in planetary exploration and interstellar propulsion, 1995, “ Footsteps to Mars: An incremental approach to Mars exploration,” Journal of the British Interplanetary Society, Vol. 48, pp. 367-342 (1995); http://www.geoffreylandis.com/Footsteps.pdf**

Recently there has been an alarming tendency in the scientific and space advocacy communities for advocates to attack one project, in the belief that if that project could be canceled, the money saved would be used for their own, more desirable projects. This is false. Quoting from senate staffer Steve Palmer [17]: “What space station and ASRM [advanced solid rocket motor] add up to is a drop in the bucket. If Congress cuts out both space station and ASRM, will the money be used for other programs of interest to the space industry? The short answer is no**”.** Arguments to cancel space projects are eagerly picked up in Congress, by people who have agendas and pet projects that have nothing to do with space. Further, attacking space projects has the result of making enemies out of allies. When we attack someone else’s project, we can count on having them attack ours**.** The result is that the arguments against both projects will be remembered by a money-starved Congress**.** It is not true that manned missions eclipse funds for unmanned science missions. In fact, there is an excellent case to be made for precisely the opposite correlation**:** the presence of large mannedmissions increases the funding and opportunities for unmanned science missions. Historically, the science budget of NASA has been a roughly constant fraction of the total budget**;** any major new initiative which increases the overall space budget is likely to increase the funding for science**.** If Mars advocates adopt the approach of pushing our initiatives by tearing down other space programs, the likely result is that nothing, neither Mars nor other programs, will be accomplished.

# No Impact – NASA Program Unnecessary

**[\_\_\_\_]**

**[\_\_\_\_] NASA research on global warming is only a small part of total federal spending on climate change. Even if it were lost NASA was doing redundant research.**

**Anthony Watts, meteorologist with the seal of approval from the American Meteorological Society, 2/9/2011, “NASA Climate Programs Being Eyed for Budget Axe”** [**http://wattsupwiththat.com/2011/02/09/nasa-climate-programs-being-eyed-for-the-budget-axe/**](http://wattsupwiththat.com/2011/02/09/nasa-climate-programs-being-eyed-for-the-budget-axe/)

NASA spent over a billion dollars last year on climate change studies…which would you rather have? Pronouncements about death trains, expert testimony for climate vandals, failed predictions, failed models, and a questionable GISTEMP dataset, or a continued manned spaceflight program? From my perspective, NASA GISS is a duplication of climate services already covered by NOAA/NCDC, and all we seem to get from it is climate activism of the chief scientist, a coffee table book by his assistant, and a snarky condescending blog called RealClimate that one private citizen and some volunteers are currently beating the pants off of in public outreach. Further, the government spent over $8.7 billion across 16 Agencies and Departments throughout the federal government on these efforts in FY 2010 alone. Inside NASA, we have duplication of climate services not only at GISS in NYC, Goddard Spaceflight in Greenbelt, MD, but also at JPL Pasadena. There’s been all sorts of domestic military base closures in the recent years to save money, and NASA Goddard and GISS re-purposed itself after the Apollo program ended and their mission did too. It’s time to close this duplication of services dinosaur, it will be missed far less than a TV comedy series by the American public.  If you feel the same way, tell your representatives.

**[\_\_\_\_] Other countries are filling in by gathering climate change data.**

**Tariq Malik, Senior Editor for space.com, 2/21/2009, “NASA Climate Satellite Crashes in Ocean After Launch Failure”, http://www.space.com/3355-nasa-climate-satellite-crashes-ocean-launch-failure.html**

The loss of NASA’s OCO spacecraft is a blow to global climate research after eight years of development to ready the satellite for launch. Researchers hoped the spacecraft would provide definitive answers to questions surrounding Earth’s natural carbon dioxide cycle, as well as how the planet processes the 8 billion tons of greenhouse gas produced by the burning of fossil fuels and other human endeavors each year. “OCO was to make some important measurements of the carbon cycle,” said Michael Freilich, director of NASA’s Earth Science Division. “What we’re going to do is take a good, solid and thoughtful look at how best to advance earth system science in general, and with a focus on the carbon cycle, given all the assets that we have available now and into the near future.” Climate scientists expected OCO to take the lead in an international collection of weather-monitoring spacecraft known as the A-Train, which fly in a train-like progression over Earth with the goal of building a three-dimensional picture of the planet’s weather and climate change, as well as understanding human contributions to the greenhouse effect and global warming. Japan’s recently launched Ibuki climate-studying spacecraft, as well as other satellites already in orbit, may be able to compensate for the lack of OCO. While there is hope to be able to pick up where the OCO’s loss left off, much work lies ahead before NASA officials can, “decide how it is best scientifically, and for the nation, to move forward,” Freilich said.

# No Impact – Warming Not Caused by Humans

**[\_\_\_\_]**

[\_\_\_\_]Warming is natural – studies of Mars prove this.

**Kate Ravilious, writer for National Geographic 2/28/2007, “ Mars Melt Hints at Solar, Not Human, Cause for Warming, Scientist Says,”** [**http://news.nationalgeographic.com/news/2007/02/070228-mars-warming.html**](http://news.nationalgeographic.com/news/2007/02/070228-mars-warming.html)**,**

Simultaneous warming on Earth and Mars suggests that our planet's recent climate changes have a natural—and not a human-induced—cause, according to one scientist's controversial theory. Earth is currently experiencing rapid warming, which the vast majority of climate scientists says is due to humans pumping huge amounts of greenhouse gases into the atmosphere. Mars, too, appears to be enjoying more mild and balmy temperatures. In 2005 data from NASA's Mars Global Surveyor and Odyssey missions revealed that the carbon dioxide "ice caps" near Mars's south pole had been diminishing for three summers in a row. Habibullo Abdussamatov, head of space research at St. Petersburg's Pulkovo Astronomical Observatory in Russia, says the Mars data is evidence that the current global warming on Earth is being caused by changes in the sun. "The long-term increase in solar irradiance is heating both Earth and Mars," he said. Solar Cycles Abdussamatov believes that changes in the sun's heat output can account for almost all the climate changes we see on both planets. Mars and Earth, for instance, have experienced periodic ice ages throughout their histories. "Man-made greenhouse warming has made a small contribution to the warming seen on Earth in recent years, but it cannot compete with the increase in solar irradiance," Abdussamatov said. By studying fluctuations in the warmth of the sun, Abdussamatov believes he can see a pattern that fits with the ups and downs in climate we see on Earth and Mars.

**[\_\_\_\_]**

[\_\_\_\_] Warming is natural- satellites prove.

**Roy Spencer, U.S. Science Team Leader for the National Aeronautic and Space Administration’s collection of satellite temperature data, 10/9/2008, “ NASA’s Spencer Tells Congress Global Warming Is Not a Crisis”**

Despite decades of persistent uncertainty over how sensitive the climate system is to increasing concentrations of carbon dioxide from the burning of fossil fuels, we now have new satellite evidence which strongly suggests that the climate system is much less sensitive than is claimed by the U.N.’s Intergovernmental Panel on Climate Change (IPCC). Another way of saying this is that the real climate system appears to be dominated by “negative feedbacks”—instead of the “positive feedbacks” which are displayed by all 20 computerized climate models utilized by the IPCC. (Feedback parameters larger than 3.3 Watts per square meter per degree Kelvin (Wm-2K-1) indicate negative feedback, while feedback parameters smaller than 3.3 indicate positive feedback.) If true, an insensitive climate system would mean that we have little to worry about in the way of manmade global warming and associated climate change. And, as we will see, it would also mean that the warming we have experienced in the last 100 years is mostly natural. Of course, if climate change is mostly natural then it is largely out of our control, and is likely to end—if it has not ended already, since satellite-measured global temperatures have not warmed for at least seven years now.

# No Impact – Warming Inevitable

**[\_\_\_\_]**

**[\_\_\_\_] Even if we stop greenhouse gas emissions, warming is inevitable.**

**Robert Longley, government official that has worked with the EPA, 2008, “ Global Warming Inevitable This Century, NSF Study Finds” http://usgovinfo.about.com/od/technologyandresearch/a/climatetochange.htm**

Despite efforts to reduce greenhouse gas emissions, global warming and a greater increase in sea level are inevitable during this century, according to a new study performed by a team of climate modelers at the National Center for Atmospheric Research (NCAR) in Boulder, Colo. Indeed, say the researchers, whose work was funded by the National Science Foundation (NSF), globally averaged surface air temperatures would still rise one degree Fahrenheit (about a half degree Celsius) by the year 2100, even if no more greenhouse gases were added to the atmosphere. And the resulting transfer of heat into the oceans would cause global sea levels to rise another 4 inches (11 centimeters) from thermal expansion alone. The team's findings are published in this week's issue of the journal "Science." “This study is another in a series that employs increasingly sophisticated simulation techniques to understand the complex interactions of the Earth,” says Cliff Jacobs of NSF’s atmospheric sciences division. “These studies often yield results that are not revealed by simpler approaches and highlight unintended consequences of external factors interacting with Earth’s natural systems.”

**[\_\_\_\_]**

**[\_\_\_\_] Even if we stopped emitting completely we couldn’t reverse current levels.**

**The Times News, Gary Yohe, Wesleyan University, Richard Richels, Electric Power Research Institute and Richard Tol, Economic and Social Research Institute, 5/23/2008, “ Copenhagen Consensus: global warming,”**

There is unequivocal evidence that humans are changing the planet’s climate. We are already committed to average temperature increases of about 0.6°C, even without further rises in atmospheric carbon dioxide concentration. The world has focused on mitigation — reducing carbon emissions — a close look at the costs and benefits suggests that relying on this alone is a poor approach. Option One: Continuing focus on mitigation Even if mitigation — economic measures like taxes or trading systems — succeeded in capping emissions at 2010 levels, then the world would pump out 55 billion tonnes of carbon emissions in 2100, instead of 67 billion tonnes. It is a difference of 18 per cent: the benefits would remain smaller than 0.5 per cent of the world’s GDP for more than 200 years. These benefits simply are not large enough to make the investment worthwhile.

**Privatization Disadvantage**

# Privatization Disadvantage

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# Explanation

This disadvantage explores the domestic consequences of a new initiative by the government to explore space. Since President Kennedy issued his infamous challenge to America in 1961 to place a man on the moon by the end of the decade, space exploration has largely been accomplished by the public sector, that is, conducted by the government. The Apollo program, the Space Shuttle, and all NASA operations are completely funded by Congress and are ultimately accountable to the President.

Recently however, there has been a movement towards the privatization of space exploration. What this means is that private companies independent of the government would begin to take over the business of going to space, and the government and NASA would rely on them for their needs. Many of these companies have existed for many years, like Boeing, while others like SpaceX have come into being recently. During the Apollo program, NASA engineers would design rockets and space probes and then pay one of these companies to build them.

Recently, Obama’s vision for space exploration cancelled the Constellation program and allocated funds to incentivize the private sector to fill in the lost capabilities. Obama’s plan pushes a vision of space exploration whereby NASA would no longer be designing the rockets going into space – they would instead be more like passengers. The government would function as a customer to a business just like you or me do (if you had the money, likely millions of dollars, you too could ride to space if these companies are successful).

The disadvantage argues that new NASA programs hinder the development of these private space companies. If NASA takes over a function, then investors perceive that that service is already being provided and will not set up their own companies to provide it. Ultimately, private companies will be more effective than the government at space exploration, so NASA should allow them to continue to develop.

# Glossary

**Private sector** – the private sector collectively refers to companies that are owned by individuals, as opposed to the government. In the context of space exploration, NASA would be a “public” organization since it is a part of the government, whereas someone like Boeing or Lockheed Martin would be considered a part of the private sector.

**SpaceX** – a private company attempting space exploration. It created the Falcon 1 and Falcon 9 rockets and the Dragon spacecraft. In 2010, SpaceX became the first privately funded company to successfully launch, orbit, and recover a spacecraft.

**Outsourcing** – to outsource is to contract out a practice an organization used to perform itself to another organization. You may have heard some electronics companies have outsourced tech support to foreign countries. In the context of the disadvantage, outsourcing is similar to privatization, and refers to NASA allowing the private sector to take over functions it traditionally performed itself.

**Low earth orbit** – the area from 100 miles to 1240 miles above the Earth’s surface. With the exception of the Apollo missions, every spacecraft has been launched into low earth orbit.

**Ansari X Prize** - A Competition launched by private donors and supported by NASA that awarded 10 million dollars to the first company that could send a reusable manned rocket into space twice within two weeks. The object of the prize was to promote commercial development of space.

**Crowding Out –** When a government prevents private business activity because it already provides the service.

**Entrepreneur** - A person who organizes and operates a business or businesses, taking on financial risk to do so

**Investor** - someone who lends money to a company on the promise of repayment with interest later on.

**Behest** - A person's orders or command

**Frenetic** - Fast and energetic in a rather wild and uncontrolled way

**Hypersonic** – Faster than 5 times the speed of sound

# Privatization DA 1NC [1/2]

**A. Uniqueness. Space exploration is being taken over by the private sector in the status quo due to policies of the Obama administration.**

**Jeffrey Kluger, senior time write for TIME magazine, 12/17/2010, “Astronatus Inc.: The Private Sector Muscles Out NASA,” http://www.time.com/time/health/article/0,8599,2037089,00.html**

If old NASA hands winced at this kind of giddy talk, they kept it to themselves — and wisely so. In the face of contracting federal budgets and an expanding private sector, the space agency of the golden years is being blown up and rethought — transformed from a government operation into a public-private partnership that, so its advocates say, will replace the politics, stodginess and glacial pace of Washington with the speed, nimbleness and accountability of the marketplace. That door had been creaking open for a while, but the Obama Administration — facing towering debts and a nation in no mood to spend big on an indulgence like space — has kicked it wide, and Musk is not the only one rushing through. The Orbital Sciences Corporation of Dulles, Va., is vying with SpaceX for government recognition and government contracts. So too are traditional aerospace giants like Lockheed and Boeing, whose rockets are not currently intended to carry astronauts but, they insist, could be redesigned to be safe for humans in short order and at a reasonable price.

**B. Government space programs prevent solutions by the commercial sector and hurt privatization more broadly.**

David Matsen, CEO of Masten Space Systems, Inc, and named person of the year by Aviation Week in 2010, 6/29/2004, “Public Goods, Bads and NASA,” http://distributedrepublic.net/archives/2004/06/29/public-goods-bads-and-nasa

Over the past 30 years or so NASA, the Air Force, and both of their prime contractors have been the only organizations doing any serious space work. But the idea that government must do this and is more capable is not a correct understanding of how it really is. The existence and inefficiencies of government space programs has hindered the market development of private space industry. NASA is to the entrepreneurial space community a public bad. Until very recently, when I or any of my friends or associates talked to investors about funding a space program we would get laughed at, nevermind that there is lots of solid market research indicating far better returns than most other technologies. We called it the giggle factor. We had to carefully hone our presentations to minimize this. And even then we would more often hear "what - you intend to compete against NASA?" or "Only governments can do space it's too difficult and too expensive." Followed by laughing. At us. If they were in a good mood. Government programs to provide some good do it badly, and in addition discourage private solutions from coming to market.

# Privatization DA 1NC [2/2]

## C. Impact—Privatization of space is key to the US economy. **A strong private space industry is key to the economy and innovation.**

**E.C. Aldridge, Chairman of the President’s Commission on Implementation of United States Space Exploration Policy, 2004 “A Journey to Inspire, Innovate, and Discover”, pg. 32, http://www.nasa.gov/pdf/60736main\_M2M\_report\_small.pdf**

Although many companies exist and more are emerging in the field of space, an increase in both the number and variety of such businesses would vastly increase the processes and materials available for space exploration. The private sector will continue to push the envelope to succeed competitively in the space field. It is the stated policy of the act creating and enabling NASA that it encourage and nurture private sector space. The Commission heard testimony on both positive incentives and potential bottlenecks encountered by the private sector as they attempt to exploit these commercial opportunities. A space industry capable of contributing to economic growth, producing new products through the creation of new knowledge and leading the world in invention and innovation, will be a national treasure. Such an industry will rely upon proven players with aerospace capabilities, but increasingly should encourage entrepreneurial activity.

## D. US economic leadership solves great power wars.

**Zalmay Khalilzad, former US ambassador to the United Nations, 2/8/2011 National Review, “The Economy and National Security.” February 8, 2011. Online. Accessed May 4, 2011 at http://www.nationalreview.com /articles/259024/economy-and-national-security-zalmay-khalilzad?page=1**

Today, economic and fiscal trends pose the most severe long-term threat to the United States’ position as global leader. While the United States suffers from fiscal imbalances and low economic growth, the economies of rival powers are developing rapidly. The continuation of these two trends could lead to a shift from American primacy toward a multi-polar global system, leading in turn to increased geopolitical rivalry and even war among the great powers.

# Overview

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# Uniqueness – Privatization Occuring Now

**[\_\_\_\_]**

**[\_\_\_\_] Private industry will eclipse NASA as the leader in space in the next 10 years**

**Evan Ackerman, staff writer for DVICE, 4/25/2011, "Will humans make it to the moon and Mars in 10 years? ", http://dvice.com/archives/2011/04/will-humans-mak.php**

Private industry is rapidly catching up to NASA. In the next ten years especially, the space agency seems likely to get eclipsed after the impending retirement of the space shuttle. SpaceX might have the credentials to back up its space exploration plans, which would put humans on Mars in a decade if everything goes well. That's a big if, though, since SpaceX still has a lot of work to do to get its Falcon heavy-lift rocket operational by 2012. Is a 10 year timetable — especially one that includes Mars —; reasonable? SpaceX founder Elon Musk even puts the worst case at "15 to 20 years." When considering investing in an outpost on the moon at all, there are so many variables: whether we want it to be manned by humans (as opposed to robots and the like) or whether NASA is even the best fit for the job. Don't get me wrong, I'm a big supporter of NASA and I think there's a lot of important lunar research that still needs to be done. At the same time, however, I think that the amount of additional infrastructure required to support humans would be hard to justify considering the capabilities of autonomous or teleoperated systems. And it seems that NASA itself is starting to focus more on outsourcing spaceflight (and space exploration) to private industry, which often exhibits the same levels of creativity and technical expertise without the bureaucratic baggage and budget constraints.

**[\_\_\_\_]**

**[\_\_\_\_] NASA is in transition to allow the private sector to lead space exploration**

**Jeffrey Kluger, senior time write for TIME magazine, 12/17/2010, “Astronatus Inc.: The Private Sector Muscles Out NASA,” http://www.time.com/time/health/article/0,8599,2037089,00.html**

The Obama Administration turbo-charged things this year when it officially directed NASA to scrap its part of that work and concentrate exclusively on space science and eventual manned flights to asteroids or beyond. The private sector alone will tend to near-Earth orbit. SpaceX and Orbital Sciences had already made enough progress to secure conditional contracts with NASA to service the space station, but SpaceX was clearly the greater of those two equals, with successful orbital missions in 2008 and June 2010. Last week's mission blew those other two away because it included a working prototype and successful return of the *Dragon* space capsule, making SpaceX the first private company to achieve such a feat.[(See pictures of five nations' space programs.)](http://www.time.com/time/photogallery/0,29307,1737868_1584492,00.html) "It's a historical truth that government goes into those areas in which there is no private-sector profit motive, and the private sector follows behind," says Phil McAlister, acting director of NASA's Commercial Space Flight Development team. "We think the time is right to transition that part to the private sector."

# Uniqueness – Privatization Occuring Now

**[\_\_\_\_] Private companies are leading the way with new innovations in space.**

**The Economist, 9/10/2009, “Flying High,” http://www.economist.com/node/14401165**

At the behest of the president, NASA has been undergoing an independent review of its human-spaceflight plans. On September 8th the review committee delivered a summary report. That the agency does not have enough money to return to the moon is no surprise. What is more surprising is that the Augustine report (named after the committee’s chairman, Norman Augustine) argues that NASA should stop travelling to the International Space Station in particular and to “low Earth orbit” in general. It should let the private sector do that instead, and focus its own efforts on more distant and difficult tasks. Five years ago the idea that the private sector might have been capable of transporting cargo and people reliably into low Earth orbit was viewed as crazy. Much has happened since, and two things in particular. One was that Virgin Galactic, an upstart British firm, said it would develop a space-tourism business based around a craft that had cost only $25m to build. The other was that an equally upstart American entrepreneur called Elon Musk, flush from his sale of PayPal, created a company called SpaceX (whose Falcon rocket is pictured above, dropping its first stage on its way into orbit). He said he wanted to make it cheaper to launch people into space and wanted, ultimately, to send a mission to Mars—but that he would start by launching satellites. It would be an understatement to say that both ventures were treated with scepticism. But they have now come far enough to be able to thumb their noses at the cynics. On September 3rd SpaceX signed a contract worth $50m with ORBCOMM, a satellite-communications firm. The deal is to launch 18 satellites for ORBCOMM’s network. Meanwhile, at the end of July, Aabar Investments, a sovereign-wealth fund based in Abu Dhabi, bought a 32% stake in Virgin Galactic for $280m. Aabar was not just interested in space tourism. It was also keen on a proposal to use Virgin’s White Knight launch system to put satellites into low Earth orbit. Will Whitehorn, Virgin Galactic’s president, said that one of the things which attracted Aabar was the fact that White Knight (an aircraft which lifts to high altitude a rocket that can then take either passengers or satellites onwards into space) could be flown from Abu Dhabi.

**[\_\_\_\_]**

**[\_\_\_\_] Space exploration will be led by businesses soon.**

**Patrice Sarath, staff writer for bizmology, a subsidiary of Hoover’s business research company, , 2/25/ 2011. “Space, Inc: as the shuttle program lands for good, private companies step in.”** <http://www.bizmology.com/2011/02/25/space-inc-as-the-shuttle-program-lands-for-good-private-companies-step-in/>

It’s not just the plot of a science fiction novel, either. Humans are a resource-hungry species. With the right infrastructure, from rockets to shuttles to space stations, to automated mining equipment to space elevators (my personal favorite in the pie-in-the-sky space exploration Olympics), it is possible that the exploration of space will become the business of space in a fairly short time. It’s interesting to compare the development of space flight with the development of manned flight. It’s only now that the private sector has stepped in, after the government has stepped back, whereas the Wright Brothers and their intrepid ilk led the way in their rickety airplanes. At a recent discussion of space flight at ConDFW, a science fiction convention, several experts in the space industry said that is exactly what space flight needs now to carry it forward: the barnstormers and the space tourists to put it within reach.

# Links – NASA Crowds Out Private Sector

**[\_\_\_\_]**

**[\_\_\_\_] NASA’s presence in an activity in space hinders private companies from going into the same area because of NASA’s regulations.**

**Blake Powers, Director of Outreach for NASA’s Space Product Development Program, 8/24/2003 “A Time for Everything,”** [**http://laughingwolf.net/archives/000400.html**](http://laughingwolf.net/archives/000400.html)

At the same time, NASA has not exactly been a friend to commercial space enterprises. This is particularly true for efforts to develop alternative manned space access. NASA has a great deal invested in being the only way to get people into space, from hardware and infrastructure to an internal culture that claims that only career NASA civil servants can be called astronauts. All those others who fly, or meet the international guidelines for being called such, cannot be called such in any NASA publication. NASA has for years tried to block the development of manned commercial access. Just take a look at the regulatory environment for such and NASA’s role in it. NASA has bitterly resisted any suggestion that any other launch service be used, unless it was completely under their control. There are many other examples, for those who care to go do the homework and look them up. It’s official support of commercial activities has been limited. Despite various actions by Congress and its own charter, the agency has not been supportive of commercial research and development. Just go take a look at the history of the Space Product Development Program, which has managed to do some very important and good things with industry, for a good example. Take a good look at the so-called commercialization efforts of Dan Tam, or the idea that Headquarters had that companies would pay for large portions of the ISS without being able to display logos or use their sponsorship in advertising. Those ideas were patently ridiculous, obvious to anyone who had any real-world experience, and beloved by top NASA management who should have known better.

**[\_\_\_\_]**

# Links – NASA Crowds Out Private Sector

**[\_\_\_\_] NASA space programs discourage innovation by drawing talented engineers away from the private sector.**

**Declan McCullagh, chief political correspondent for CNET, 10/3/2007, “Do we need NASA?” CNET News, http://news.cnet.com/Do-we-need-NASA/2009-11397\_3-6211308.html**

The difference? Critics say it's the National Aeronautics and Space Administration. Aviation's youth and adolescence were marked by entrepreneurs and frenetic commercial activity: Lindbergh's trans-Atlantic prize money was put up by a New York hotel owner, and revenue from the airlines funded the development of the famous DC-3. The federal government aided aviation by paying private pilots to deliver air mail. Space, by contrast, until recently has remained the domain of NASA. Burt Rutan, the aerospace engineer famous for building a suborbital rocket plane that won the Ansari X Prize, believes NASA is crowding out private efforts. "Taxpayer-funded NASA should only fund research and not development," Rutan said during a recent panel discussion at the California Institute of Technology. "When you spend hundreds of billions of dollars to build a manned spacecraft, you're...dumbing down a generation of new, young engineers (by saying), 'No, you can't take new approaches, you have to use this old technology.'"

**[\_\_\_\_]**

[\_\_\_\_] NASA’s bureaucracy and regulations have a crowd out effect with the private sector, making commercial investment impossible.

Joe Pappalardo, writer for Popular Mechanics, 6/04/2009, “Private Space to the Government”

The future of space could soon belong to private companies—the soon-to-be retired space shuttle is being replaced by private launchers, space tourists are snapping pictures from the International Space Station, global positioning systems are ubiquitous, and entrepreneurs are building suborbital craft destined for use by paying customers. But the mood at the Space Business Forum, an annual gathering of investors and space geeks held in New York City, was impatience to get the feds out of the way so the private sector can attract investments and grow quicker. "I'd say the role of government [in the space industry] is too high," says Heidi Wood, the senior equity analyst for aerospace for Morgan Stanley. "There are far too many hands on it." Complaints start with a familiar mantra of the stifling nature of bureaucracy and regulation. High on the list of irritants is the Federal Communications Commission, which must license the use of bandwidth and approve the orbital slot of any satellite being launched. This oversight prevents satellite collisions and overlapping signal interruptions, but the auction and approval process can be slow, and firms loathe delaying the construction of satellites until the government hoops are cleared. These add to financial risks, in turn driving away much-needed investor cash; companies with long startup times and no guaranteed return are not appealing to investors. "The markets don't want to hear about negative cash flow right now," says Andrew Africk, senior partner with the private equity firm Apollo Management LP.

# Links – NASA Crowds Out Private Sector

**[\_\_\_\_] As long as NASA is the leader in human space efforts we will not make advances towards commercial uses of space.**

**Edward L. Hudgins, director of The Objectivist Center, is the editor of the Cato Institute book, Space: The Free-Market Frontier, 1998 “Time to Privatize NASA”** [**http://www.cato.org/pub\_display.php?pub\_id=5960**](http://www.cato.org/pub_display.php?pub_id=5960)

The government has had many opportunities to turn over civilian space activities to the private sector. In the 1970s, American Rocket Co. was one of the private enterprises that wanted to sell launch services to NASA and private businesses. But NASA was moving from science to freight hauling, and planned to monopolize government payloads on the shuttle and subsidize launches of private cargo as well. The agency thus turned down American Rocket. In the late 1980s, Space Industries of Houston offered, for no more than $750 million, to launch a ministation that could carry government and other payloads at least a decade before NASA's station went into operation. (NASA's station currently comes with a price tag of nearly $100 billion for development, construction and operations.) NASA, not wishing to create its own competition, declined Space Industries' offer. In 1987 and 1988, a Commerce Department-led interagency working group considered the feasibility of offering a one-time prize and a promise of rent to any firm or consortium that could deliver a permanent manned moon base. When asked whether such a base were realistic, private-sector representatives answered yes -- but only if NASA wasn't involved. That plan was quickly scuttled. Each shuttle carries a 17-story external fuel tank 98 percent of the distance into orbit before dropping it into the ocean; NASA could easily -- and with little additional cost -- have promoted private space enterprise by putting those fuel tanks into orbit. With nearly 90 shuttle flights to date, platforms -- with a total of 27 acres of interior space -- could be in orbit today. These could be homesteaded by the private sector for hospitals to study a weightless Mr. Glenn or for any other use one could dream of. But then a $100 billion government station would be unnecessary. As long as NASA dominates civilian space efforts, little progress will be made toward inexpensive manned space travel. The lesson of Mr. Glenn's second flight is that space enthusiasts ignore economics at their peril.

# Impact – Economic Growth

**[\_\_\_\_]**

**[\_\_\_\_] Privatization of space will spur an economic renaissance in the US.**

**Steve Nelson, Daily Caller staff writer, 2/8/2011. “Fiscal Conservatives call for increased privatization of space” http://dailycaller.com/2011/02/08/fiscal-conservatives-call-for-increased-privatization-of-space/**

Tuesday morning the Competitive Space Task Force, a self-described group of fiscal conservatives and free-market leaders, hosted a press conference to encourage increased privatization of the space industry. Members of the task force issued several recommendations to Congress, including finding an American replacement to the Space Shuttle (so to minimize the costly expenditures on use of Russian spacecraft) and encouraging more private investment in the development of manned spacecraft. Former Republican Rep. Robert S. Walker of Pennsylvania said, “If we really want to ‘win the future’, we cannot abandon our commitment to space exploration and human spaceflight. The fastest path to space is not through Moscow, but through the American entrepreneur.” Task Force chairman Rand Simberg, of the Competitive Enterprise Institute, said, “By opening space up to the American people and their enterprises, NASA can ignite an economic, technological, and innovation renaissance, and the United States will regain its rightful place as the world leader in space.”

**[\_\_\_\_]**

**[\_\_\_\_] Allowing for commercialization of space will create jobs and add to the economy.**

**Environment News Service, 6/28/2010, “Obama's New Space Policy Peaceful But Guarded,” http://www.ens-newswire.com/ens/jun2010/2010-06-28-02.html**

"In addition," he said, "we will expand our partnerships with private industry, allowing commercial companies to take a larger role in the exploration of space while NASA pursues those activities the agency is uniquely qualified to do." "This policy will enable a vibrant, job-creating, transportation system for taking humans to and from low-Earth orbit, which should significantly contribute to the national economy, benefit all of our nation's citizens, and enable exploration beyond low-Earth orbit," Bolden said. "This policy promises to transform human spaceflight for future generations. "If there's one really broad theme it is international cooperation, which is woven throughout the new policy and it's our sort of foundational emphasis for achieving all of our goals in space," Barry Pavel, senior director for defense policy and strategy for the National Security Council, told reporters.

# Impact – Leadership

**[\_\_\_\_] Privatization of space is absolutely necessary to maintain space leadership.**

**Douglas Messier, founder of Earth and Space Foundation, International Space University graduate, masters in public policy and science and technology from George Washington University29, 11/29/2011. “Witt: Privatization “Absolutely Required” to Progress in Space” http://www.parabolicarc.com/2010/11/29/witt-privatization-absolutely-required-progress-space/**

The Obama administration, Congress, NASA and the private sector are finally voyaging toward a market-based space industry. Admittedly, the new policy’s vision is not bold enough nor its exploration schedule aggressive enough, but it does – as the Great One advised – “skate to where the puck is going, not to where it’s been.” It dismantles a cost-plus quagmire that has left Americans traveling in space far less often, far less safely, at far greater expense and, most ironically, not so very far at all. Much must be done to maintain U.S. space leadership, but privatization is absolutely required. In a world of declining revenues and budget-crushing entitlements, NASA as a sleepy jobs program for aging engineers is unsustainable. We understand that putting all our eggs into a newly woven basket of private space firms is taking a risk. However, risk-taking has defined America’s space accomplishments. President Obama took a risk when he chose to fight the vested interests for this private-sector solution, and it would be mad to imagine a Republican-led House opposing it. Yet, in a “through the looking glass” moment, some GOP members are resuscitating socialized space as a high-tech pork delivery vehicle for loyal Southern states.

[\_\_\_\_]

[\_\_\_\_] Privatization is key to overall space leadership because it will allow us to outperform other governments.

**David Gomez, writer for TG daily, 7/5/2011, ” Russia has the edge in the space race now”** [**http://www.tgdaily.com/opinion-features/57034-russia-has-the-edge-in-the-space-race-now**](http://www.tgdaily.com/opinion-features/57034-russia-has-the-edge-in-the-space-race-now)

I think that the space race is extremely important for all of mankind, but when the wealthiest country in the world is cutting most of its budget for their space program I’d say that’s a very telling event. Economic problems and budget problems are causing our status in the world to fall, and they need to be taken seriously. If the U.S. ever wants to be a world leader in the space race, which I hope we do, then it will need to come from a different system. If we are ever going to get serious about a space program again, then this time it needs to be directed by the private sector. The huge budget that NASA used to have is unjustifiable with the economic problems we are facing, but that doesn’t mean we have to give up on getting to colonize the stars. We can still have the best space program in the world; we just shouldn’t expect the taxpayers to fund it. We also shouldn’t let politicians be the ones who control it anymore. They’re the reason why the program lost its edge in the first place. A private sector directed space program needs to happen in some way, shape, or form. It’s too important to humanity’s future to not pursue. Our private sector space program could easily beat any other country’s government controlled space program. The only problem is getting it started. Does anyone want to put in a call to Richard Branson or some other eccentric billionaire?

# Impact – Turns Case

**[\_\_\_\_]**

**[\_\_\_\_] Privatization frees NASA from menial functions which allows it to focus its funding on crucial science including asteroids and global warming.**

**Joseph N. Pelton, Research Professor with the Institute for Applied Space Research -- George Washington University, 05/2010 “A new space vision for NASA - And for space entrepreneurs too?” Space Policy 26 (2010) p. 78-80**

With much less invested in a questionable Project Constellation enterprise we can do much more in space astronomy. We can invest more wisely in space science to learn more about the Sun, the Earth and threats from Near Earth Objects. David Thompson, Chairman and CEO of Orbital Sciences said the following in a speech that endorsed the new commercial thrust of the NASA space policies on Nine February 2010: “Let us, the commercial space industry, develop the space taxis we need to get our Astronauts into orbit and to ferry those wanting to go into space to get to where they want to go. We are in danger of falling behind in many critical areas of space unless we shift our priorities”[10]. With a change in priorities we can deploy far more spacecraft needed to address the problems of climate change via betterEarth observation systems. We can fund competitions and challenges to spur space entrepreneurs to find cheaper and better ways to send people into space. We can also spur the development of solar power satellites to get clean energy from the sun with greater efficiency. We can deal more effectively with finding and coping with “killer” asteroids and near earth objects. We may even find truly new and visionary ways to get people into space with a minimum of pollution and promote the development of cleaner and faster hypersonic transport to cope with future transportation needs. The real key is to unlock the potential of commercial space initiatives while giving a very middle-aged NASA a new lease on life. Here are just some of the possibilities that are on the horizon of a revitalized commercial space industry.

## [\_\_\_\_] The disadvantage turns the case: increased privatization of space allows NASA to be freed up to do deep space operations and better research.

**Seth Borenstein and Alicia Chang, staff writers for the Huffington Post, 1/31/2010, “NASA To Outsource Space Travel To Private Companies As Part Of Obama's Budget Proposal,” http://www.huffingtonpost.com/2010/01/31/nasa-to-outsource-space-t\_n\_443549.html**

Getting to space is about to be outsourced. The Obama administration on Monday will propose in its new budget spending billions of dollars to encourage private companies to build, launch and operate spacecraft for NASA and others. Uncle Sam would buy its astronauts a ride into space just like hopping in a taxi. The idea is that getting astronauts into orbit, which NASA has been doing for 49 years, is getting to be so old hat that someone other than the government can do it. It's no longer really the Right Stuff. Going private would free the space agency to do other things, such as explore beyond Earth's orbit, do more research and study the Earth with better satellites. And it would spur a new generation of private companies – even some with Internet roots – to innovate.

# Impact – Turns Case

**[\_\_\_\_]**

**[\_\_\_\_] Privatization of space allows for a substantial reduction in launch costs and more space exploration overall.**

**Jessica Berman, Writer for Voice of America News, 4/27/2011, “US Space Program Goes Commercial,” http://www.voanews.com/english/news/science-technology/US-Space-Program-Goes-Commercial-120822324.html**

President Barack Obama is asking Congress to approve $850 million to aid the development of private rockets to service the orbiting scientific outpost. NASA administrator Charles Bolden says the budget will support a public-private partnership in space. "We must have safe, reliable and affordable access to it for our astronauts and their supporting equipment. That's why this budget boosts funding for our partnership with the commercial space industry," Bolden said. The private sector's role in unmanned space operations - such as the manufacture of satellites and robotic spacecraft -- is nothing new. So says former NASA executive Alan Stern, now with the Southwest Research Institute, which offers technical assistance to the aerospace industry. Stern says the private sector is promising to conduct space missions for a fraction of what they have traditionally cost NASA. For example, SpaceX says it can reduce the cost of a launch, depending upon the rocket, to between $50 million and $100 million compared to the $1.5 billion price tag for each space shuttle mission. Stern says this savings of dimes on the dollar benefits the private sector as well as the public. "That's a huge reduction in cost that's going to allow us to have multiple space lines, and to be able to afford that and to be able to do more things in space than we could in the past," Stern said. Last year, SpaceX became the first commercial aerospace company to successfully launch, place into orbit and retrieve a spacecraft -- the Falcon 9, carrying an unmanned capsule called the Dragon. The Dragon is being built as part of NASA's $1.6 billion deal with SpaceX. Company founder and CEO Elon Musk says the space agency has been pressing it to complete testing of the capsule, so it can go to the space station on a resupply mission at the end of this year. However, news reports have quoted a top official in Russia's manned space program as saying Russia will not allow the SpaceX rocket to dock with the space station until more extensive safety testing has been completed. Safety is a big concern for the private rocket builders, too. Alan Stern says the companies are not cutting corners to keep costs down or to meet tight deadlines. He says they have a lot to lose if there are accidents. "If the rockets fail or the capsules have problems, that's going to affect their future business pretty strongly; in fact it could put them out of business. And that's a very strong motivation for any private concern," Stern said.

# Article: NASA and the Privatization of Space

**Time Magazine: *Astronauts Inc.: The Private Sector Muscles Out NASA.* December 17th, 2010.**

NASA has never been an exclamation-point outfit. The folks who work there may do extraordinary things, but they tend to talk about them in the dry and uninflected tones of the engineers they are.

So it was something of a departure last week when, after an unmanned version of what may well be the next spacecraft that will carry American astronauts into orbit took off from Cape Canaveral and returned home safely, the first official dispatch read simply: "SPLASHDOWN!!!" Unfamiliar too was how the announcement was made: it was a tweet.

That tonal change was by no means the most important thing that made the launch of the fancifully named *Falcon 9* booster and *Dragon* space capsule different from all the granddaddy Saturns and Titans that have gone before it. Far more significant was that this ship was privately designed and privately built, the brainchild of the California-based rocketry start-up SpaceX, owned and operated by engineer Elon Musk, who also created PayPal.

"It's actually almost too good," the never reticent Musk said of his accomplishment at his postflight press conference. "There's a natural reaction that sort of blows my mind, and it's hard to be articulate with a blown mind."

If old NASA hands winced at this kind of giddy talk, they kept it to themselves — and wisely so. In the face of contracting federal budgets and an expanding private sector, the space agency of the golden years is being blown up and rethought — transformed from a government operation into a public-private partnership that, so its advocates say, will replace the politics, stodginess and glacial pace of Washington with the speed, nimbleness and accountability of the marketplace.

That door had been creaking open for a while, but the Obama Administration — facing towering debts and a nation in no mood to spend big on an indulgence like space — has kicked it wide, and Musk is not the only one rushing through. The Orbital Sciences Corporation of Dulles, Va., is vying with SpaceX for government recognition and government contracts. So too are traditional aerospace giants like Lockheed and Boeing, whose rockets are not currently intended to carry astronauts but, they insist, could be redesigned to be safe for humans in short order and at a reasonable price.

Such competitive churn is exactly what the private sector likes to see. But detractors worry that it's exactly the wrong way to take people into orbit, much less to the moon and beyond. Manned spaceflight is a uniquely risky, uniquely pricey, uniquely time-consuming enterprise that does not respond well to the pressures of the business cycle. Go too fast and people die (think the Apollo 1 fire), but go too slow and investors gripe. Best to take your time, keep the investors out of the loop and avoid the periodic tableaus of the flag-draped coffins and grieving families.

"Every time we f\_\_\_ up," says Mike Griffin, NASA administrator from 2005 to 2009, "it's because something that we didn't think mattered turns out to matter. Who knew that a briefcase-size piece of foam could bring down an orbiter? The stuff that kills us isn't going to be the thing we think will hurt us."

But even old-school rocketeers — including Griffin himself — recognize the current reality, which is that without the private sector, America may simply not have the wallet to put human beings into space for a very long time. Giving private companies skin in the game may be an inevitable step if we don't want to become an earthbound nation, but what worries detractors is whether it's a prudent one.

The privatization of at least some of the manned space program has been inevitable for a while — particularly since 2003, when the loss of the shuttle *Columbia* made it clear that the entire aging shuttle fleet was becoming too risky to fly. NASA had made only the sketchiest plans for a shuttle replacement, so in 2006, Griffin created an office called Commercial Orbital Transportation Services (COTS) within the agency to draw private companies into the business of helping to deliver cargo and crew to the International Space Station, even as NASA developed its own Earth-orbital rockets too.

The Obama Administration turbo-charged things this year when it officially directed NASA to scrap its part of that work and concentrate exclusively on space science and eventual manned flights to asteroids or beyond. The private sector alone will tend to near-Earth orbit. SpaceX and Orbital Sciences had already made enough progress to secure conditional contracts with NASA to service the space station, but SpaceX was clearly the greater of those two equals, with successful orbital missions in 2008 and June 2010. Last week's mission blew those other two away because it included a working prototype and successful return of the *Dragon* space capsule, making SpaceX the first private company to achieve such a feat.

"It's a historical truth that government goes into those areas in which there is no private-sector profit motive, and the private sector follows behind," says Phil McAlister, acting director of NASA's Commercial Space Flight Development team. "We think the time is right to transition that part to the private sector."

Such transitions are usually slow, but Musk, a space newbie, sees no reason to wait. His press conference was equal parts Q&A and touchdown dance — and that raised eyebrows. "People sometimes assume that to take a cargo spacecraft and put a crew into it requires this enormous amount of magical pixie dust or something," he said. "This is not the case. If there had been people sitting in the *Dragon* capsule today, they would have had a very nice ride."

Well, no. For one thing, there are no seats. For another thing, the life-support system is not remotely human-rated yet. Those are more than details. Every bit of additional hardware adds weight and complexity and the possibility of a breakdown — and if that breakdown occurs in the network of tubes and tanks and fuel cells that feed air and power and water to the crew, the mortal consequences can be immediate (think Apollo 13).

Musk is right that it's not pixie dust that makes a spacecraft suitable for what the space community sometimes calls "payloads with a pulse"; it's rigorous testing and retesting of multiply redundant systems, until you've reduced the risk of failure to a statistical rounding error. When Musk spoke equally glibly about scrapping the *Dragon*'s parachute-based re-entry system and instead using a motor and legs as the lunar landers did — something no manned craft has ever achieved on Earth — he caused more murmuring still.

The established space companies are being no less flip in their belief that they can leap quickly into the manned-space pool. There is a lot that goes into human-rating a rocket that was built to launch only

satellites, not the least being redesigning it so it can fly on a shallower trajectory that reduces the g-forces to a level a human body can tolerate and retrofitting the booster with both hardware and software to make an abort possible. Astronauts speak of so-called black zones during a powered ascent — points at which speed or angle of flight rule out any safe abort, regardless of what onboard equipment you have. Unmanned ships have plenty of black zones since there's nothing on board that can die if the vehicle blows up. Astronauts want no black zones at all, and recent years have witnessed an unseemly tableau of manufacturers and astronauts sitting at conference tables haggling over just how long a black zone would be considered acceptable. Would you tolerate 10 seconds in which there'd be no saving you if something were to break down? How about a minute? How about two?

"What you get is an alternative discussion led by people who stand to make a profit," says Griffin. "Lockheed and Boeing say NASA's goals are too strict. Well, that's fine — up until the first accident, when people say, 'Where were NASA's standards?' "

Among the leading companies, it's Orbital Sciences that, at the moment at least, seems to be threading the needle most carefully — if least showily. With former shuttle astronaut Frank Culbertson heading up its human-spaceflight-activities group, it is concentrating on developing a cargo vehicle for the space station as well as a new launch site at NASA's Wallops Island facility in Virginia, with no talk at present of trying to fly crew.

NASA, while ceding some of its turf to the private sector, is both immovable and believable when it says it won't let safety suffer. Any private craft approved to approach anywhere near the space station — much less carry crew — will be subjected to the same rigorous flight-readiness requirements the agency's own spacecraft are. In the meantime, U.S. cargo and astronauts can always get to and from orbit if seats are bought aboard Russian Soyuz ships. The Soyuz already makes regular runs to the space station and will become America's sole means of transport after the last space-shuttle mission is flown next year.

The hope both inside and outside NASA is that we won't be thumbing rides for too long — but that we'll suffer that indignity for as long as we have to and vet any new ship fully and well before we commit lives to it. Musk may have been right last week when he was asked about people who resist the inevitable move to privatization. "They'll be fighting on the wrong side of yesterday's war," he said.

But as Musk himself knows, wars have casualties. There were 14 of them in the shuttle program and three in Apollo, and that was with some of the best safety protocols imaginable. NASA does things the old way, but until a new way proves itself — which it eventually will — it's still the best way we have.

**Privatization Disadvantage Affirmative**

# Privatization DA Affirmative

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# Glossary

**Private sector** – the private sector collectively refers to companies that are owned by individuals, as opposed to the government. In the context of space exploration, NASA would be a “public” organization since it is a part of the government, whereas someone like Boeing or Lockheed Martin would be considered a part of the private sector.

**Free Enterprise** – Synonym for Private sector

**Commercial Sector** – Synonym for Private Sector

**Commercialization** – Synonym for Privatization

**Space Junk** – Also known as space debris, it is the collection of objects in orbit around Earth that were created by humans but no longer serve any useful purpose. Many worry that accumulation of Space Junk will pose a hazard to future space flight. Because there is no friction or air resistance in space, the debris moves very fast and functions like a small bullet, potentially ripping holes

**Demand Pull –** The process of creating a market by creating a demand for it. You are creating demand pull for a company if you consistently demand something that you cannot buy in the status quo. Government operations in space create a demand pull for private companies if the government is unwilling to use its own means of space transportation

**Chapter 11** – A company in Chapter 11 is bankrupt.

**Assumption** – a foundation of an argument accepted to be true without proof

# Uniqueness – Private Sector Doesn’t Exist

**[\_\_\_\_]**

**[\_\_\_\_] A commercial space sector does not exist yet**

**William Harwood, writer for cnet news, 2/1/2010, “Obama ends moon program, endorses private spaceflight,” http://news.cnet.com/8301-19514\_3-10445227-239.html**

As for commercial flights to and from the International Space Station, NASA Deputy Administrator Lori Garver said she hoped a new private-sector launch system, possibly including modified versions of technology developed for the canceled moon program, could be available by around 2016 if not earlier. "We will try to accelerate and use the great minds of industry to get a competition going, and I'm sure they'll want to beat that," she said. Former NASA Administrator Mike Griffin, chief architect of the now-canceled moon program, told CBS News the shift to commercial space operations was a profound mistake. "I'm one of the biggest proponents of commercial spaceflight that there is, but it doesn't yet exist," he said. "I would like an enlightened government policy to help bring it about, but I don't believe you get there by destroying all your government capability so there's no option but for the government to do whatever necessary to get the 'commercial operators' to succeed. That's not the way to do it.

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**[\_\_\_\_] The private sector is not ready to take over from NASA**

David Freedman, science and tech journalist for 30 years, December 2010, Scientific American December 2010, Vol 303, Issue 6

What, then, could the Obama administration have been thinking when it announced this past February that NASA should essentially get out of the manned-spaceship business and turn it over to private industry? Under the plan, NASA will write off most of the $9 billion invested so far in Constellation, the program to develop a replacement vehicle for the **space** shuttle capable of ferrying astronauts and supplies to the **space** station and, eventually, to the moon. Instead the agency will provide seed money to start-ups such as SpaceX, then agree to buy tickets to the **space** station on their rockets. It is a naive and reckless plan, a chorus of voices charged. Among the loudest was that of former astronaut and **space** icon Neil Armstrong, who was quick to scoff at the notion that the private sector is ready to take over from NASA. "It will require many years and substantial investment to reach the necessary level of safety and reliability," he stated. Leaving orbital ferrying in the hands of private companies, Armstrong and others insisted, would at best be setting the clock back on manned **space** exploration. And were private enterprise to drop the ball, perhaps even catastrophically, as many believe it would, the entire grand enterprise of sending people into **space** might come to a long-term or even permanent halt. Once NASA's massive manned-spaceflight machine is dismantled, rebuilding it might take far more time and money than anyone would want to spend. Yet despite these concerns, Congress reluctantly agreed to the plan this fall.

# Uniqueness – Private Sector Doesn’t Exist

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**[\_\_\_\_] The private sector is not ready now because it has not received enough government incentives**

**Gregg Easterbrook, senior editor of the New Republic, 4/15/2010, “Get over the moon. We need NASA to save the Earth”**

Obama’s plan to encourage free-enterprise rocketry sounds great, but is extremely unrealistic. Only one company, Sea Launch, has ever succeeded in placing a large, privately funded rocket into orbit, and right now Sea Launch is in Chapter 11. The capital requirement for reaching space is very high, the customer base modest. (Here are details about Sea Launch and private rocketry The White House would provide $6 billion over five years to encourage development of private rockets, but this is a drop in the bucket. The new Boeing 787 and its engines cost about $13 billion to develop, and the 787, while beautiful, is just an airplane. A new “human-rated” — multiple redundant systems — rocket capable of carrying significant payloads to orbit could easily require $25 billion or more for development. No private company will be able to raise such a sum without a long-term guaranteed NASA contract, at which point you might as well just have NASA develop the next rocket. (Private flight to orbit will happen someday, but absent a major breakthrough, perhaps not for decades. The winged “spaceship” being developed by Richard Branson is not a spaceship; it will fly higher than conventional aircraft, but not reach orbit.)

# Link Turn – Government Action Spurs the Private Sector

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**[\_\_\_\_] Government action is needed for a private sector. The government must create a demand for companies to fulfill**

**Christopher Chyba, Professor of Astrophysics and International Affairs at Princeton, 5/18/2011, Senate Committee on Commerce, Science and Transportation, Subcommittee on Science and Space. “Sen. Bill Nelson Holds a Hearing on Contributions of Space to National Imperatives”**

What we have to do instead I think is twofold. We have to develop a kind of infrastructure or even you might even call it an ecosystem in low Earth orbit that has a variety of ways of encouraging the advance of human space flight and cost cutting in human space flight. And that includes this robust - encouraging this robust commercial sector. But in order to do that the government is going to have to provide demand pull; all right? It's going to have to provide the station as a destination. Not for make-work, but for important experiments and developments that will further enable human space flight. And also, let's hope - let's hope - this remains to be demonstrated, but let's hope there will turn out to be a commercial market, both with respect to suborbital flights and perhaps also with an additional private station-like inflatable entity that people want to go to. That remains to be seen. But I think that the government demand-pull alone is probably sufficient to get that ball rolling. But simultaneously, because the commercial sector independently is not there yet, we have to have the heavy launch vehicle capability that's going to allow us to move out beyond low Earth orbit**.** So I favor, I absolutely support, the authorization bill's approach to this. This is not - flexible path is not a mission to nowhere. It's a mission to expand human civilization into our solar system, the most ambitious possible space objective. But it tries to do it in a way that I think has the hope of being sustainable, of actually providing us with that future.

**[\_\_\_\_] The government must lead the way and demonstrate necessary technologies in order to promote true privatization**

**Mike Wall, SPACE.com Senior Writer, 10/30/2010, “Want to Mine the Solar System? Start With the Moon”, http://www.space.com/9430-solar-system-start-moon.html**

However, government leadership and [investment](http://www.space.com/9430-solar-system-start-moon.html) will likely be needed to get these businesses off the ground, several panelists said. Some people in the aerospace industry are skeptical about the feasibility of extraterrestrial mining operations, Spudis said. To get them onboard, government should demonstrate the necessary technologies and know-how. "Let the government lead the way, and let the private sector follow," Spudis said. Government could also prime the pump for private industry, some panelists said, spurring demand for rocket fuel sold from orbiting filling stations. "An appropriate government investment can catalyze it," Greason said. "Government shows the initial demand and the private sector figures out how to provide the supply." The panel agreed about the transformative potential of extraterrestrial resource extraction.

# Link Turn – Government Action Spurs the Private Sector

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**[\_\_\_\_] Private industry can’t go it alone, it needs support form the government**

**Vinita Singla, Reporter for the new York Post, 7/8/2011, “NASA Takes a New Route in Space Leadership”, CNBC.com, 8 Jul 2011, http://www.cnbc.com/id/43470129, CGW**

Again, critics disagree. "In order to retain our capabilities we need both commercial and federally-led efforts," says Dr. Mark Lewis, a professor at the University of Maryland and former chief scientist of the U.S. Air Force. “Private industry can't go it alone. It would be like expecting private industry to develop a private fighter jet on its own. It's too expensive and would require too much speculative investment.” Space is certainly a modern growth industry, but it is a very broad one, which complicates the discussion of the space race. The global space sector grew for the fifth straight year in 2010, up 7.7 percent to $276.52 billion, based on the Space Foundation's annual study. The industry is expected to grow 5 percent annually until 2020, according to the UK Space Agency. The bulk of that money is from the private sector and for commercial purposes. For every orbital launch in 2010, there were 13 active satellites, a growing number of them dedicated to serving the broadband internet connectivity — hardly a great technological leap into the unknown. Total government spending is only a quarter of the money involved.

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**[\_\_\_\_] The funding needed to develop space exploration technology means that the government must be involved**

**Jeff Foust, Program Manager at the Futron Corporation and the editor and publisher of The Space Review, 7/26/2010, “Recasting the Debate about commercial crew”, The Space Review, July 26 2010. http://www.thespacereview.com/article/1671/1,**

However, the magnitude of the funding needed to develop commercial orbital crewed spacecraft—hundreds of millions to perhaps billions of dollars—suggests that the government may be the only source of funding to support near-term development of such systems. Mcalister, who last year supported the Augustine Committee, noted that at the time a number of companies pitched commercial crew systems to the committee. “Consistently, everyone said that without any government support, there was really no viable way for them to get a return on their investment,” he said. That conclusion was echoed last week by Boeing officials in Farnborough in discussions of funding development of the CST-100. “The money that NASA has proposed being invested allows us to close the business case,” said John Elbon, manager of Boeing’s commercial crew program. “It would be very difficult for us to make a decision to move out if there is no decision in Congress to support commercial crew.”

# No Impact – Privatization Won’t Achieve Goals

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**[\_\_\_\_] The private sector looks to the government for direction. Alone, it will not innovate.**

**David M. Livingston, business consultant, financial advisor, and strategic planner, 8/10/2000, “From Earth to Mars: A Cooperative Plan,”** [**http://www.spacefuture.com/archive/from\_earth\_to\_mars\_a\_cooperative\_plan.shtml**](http://www.spacefuture.com/archive/from_earth_to_mars_a_cooperative_plan.shtml)

Regarding the private sector, some of the same components are missing, such as leadership, education, commitment, and acceptance. Unfortunately, the private sector has been conditioned to believe that our space program is the proper function of government. This is to be expected since the commercial space industry of today, while highly profitable and successful, was initiated by government policy and acts of Congress. In addition, space commercialization developed on a dual track with the military's usage of space and communication satellites, even to the extent of using military rockets for all commercial satellite launches. The private sector simply is not prepared to lead the way with something as unique, costly, risky, and new as putting humans on Mars. It still looks to the public sector for leadership, support, and encouragement. Thus, there is no private-sector leadership that can do what public sector leadership has the opportunity to do. While the opportunity does exist for developing private-sector leadership in this field, it is not within the culture of the private sector at this time to do so. This fact needs to change before the private sector can help lead the way to putting people on Mars.

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[\_\_\_\_] Private companies will only look to make money, they will not create useful technologies

Lane Wallace, **author who has written several books for NASA,** 7/8/2011 **“*As the Shuttle Mission Ends, Analyzing the Cost of Exploration*”, The Atlantic, http://www.theatlantic.com/technology/archive/2011/07/as-the-shuttle-mission-ends-analyzing-the-cost-of-exploration/241586/,**

But exploration of the cosmos -- even through robotic eyes -- still takes an enormous amount of commitment and investment. Which is to say ... money. Federal, government money. Why government money? For the very same reason national laboratories, NASA, and its predecessor, the National Advisory Committee on Aeronautics, were formed in the first place. Private industry has no incentive to invest in endeavors where either: a) the result is greater scientific knowledge or understanding, but nothing that has any hope of a fiscal return on investment, or b) cutting-edge technology whose development is so nascent that its incorporation into commercial products is simply too risky to attempt.

# No Impact – Privatization Won’t Work

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**[\_\_\_\_] The private sector will be unable to comply with NASA safety standards and not develop**

**Alan Boyle, Science editor for MSNBC, 1/28/2011, “New spaceships should be safer than the space shuttle”,** [**http://www.msnbc.msn.com/id/41279893/ns/technology\_and\_science-space/t/new-spaceships-should-be-safer-space-shuttle/**](http://www.msnbc.msn.com/id/41279893/ns/technology_and_science-space/t/new-spaceships-should-be-safer-space-shuttle/)

NASA eventually hopes to use commercial craft to ferry astronauts back and forth to the space station as well. But the job won't be easy. In a set of draft requirements issued last month, NASA said it expected commercial companies to measure up to the same risk standards the space agency expected for itself: a 1-in-1,000 chance that the crew would be lost during a journey to and from the space station. "These are quite demanding and rigorous standards," Logsdon said. Some space veterans think the commercial companies can't do it. Apollo 17 commander Gene Cernan — who was the last man to walk on the moon back in 1972 — complained to Congress last year that the new players in spaceflight "do not yet know what they don't know, and that can lead to dangerous and costly consequences." In addition to the dollars-and-cents issue, the commercial companies are wary of being too hamstrung by hundreds of pages of written requirements. Former space shuttle program director Wayne Hale, who retired from NASA last year, warned that excessive red tape could lead to a "train wreck" for the space agency's commercialization effort.

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**[\_\_\_\_] Space research is too expensive to be successful and will not attract business**

**John McGowan, contractor at NASA Ames Research Center, 6/8/2009**

**Space Review, “Can the private sector make a breakthrough in space access?”, 6/8/09, http://www.thespacereview.com/article/1388/1**

Modern “professional” research has not overcome the need for large amounts of trial and error to achieve major breakthroughs or significant inventions and discoveries. Indeed, the number of actual breakthroughs may have declined with increased funding and professionalization, at least in part because the per-trial cost has risen relative to funding. (See “Cheap access to space: lessons from past breakthroughs”, The Space Review, May 11, 2009) In space, a full launch attempt costs on the order of $50–100 million, depending on the vehicle, meaning that $1 billion can fund only 10–20 trials, a small number relative to the hundreds or thousands usually involved in a major breakthrough. There has been minimal progress in power and propulsion in aviation and rocketry since about 1970. Even five years is an extremely long time by the standards of modern business, especially the high technology companies often looked to as examples of how to achieve cheap access to space. Venture capitalists, for example, typically invest in projects with an expected return (an initial public offering, merger, or other so-called “exit strategy”) within three to five years. During the Internet bubble, some venture capitalists appeared to have invested in a large number of dot-coms with very short turnarounds, little more than put up a web site and go public in a few months or years.

# Impact Turn – Leadership

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**[\_\_\_\_] Privatization will undermine leadership because it will have no clear goal to implement**

**David Wu, Democratic Member of the U.S. House of Representatives from Oregon, 4/15/2010**, “**Debate: Obama's Space Privatization Plan Is a Costly Mistake,” http://www.aolnews.com/2010/04/15/debate-obamas-space-privatization-plan-is-a-costly-mistake/**

President Barack Obama is in Florida today to argue his case for privatizing the human spaceflight program. It will be a tough sell. The president's vision for privatizing American space exploration may sound appealing initially, but it rests on flawed assumptions and could result in the United States surrendering our lead in space exploration to our international competitors, including China and Russia. The president has proposed a radical restructuring of U.S. space policy, which includes the termination of the next phase of the human spaceflight program, known as the Constellation program. The Constellation program is the architecture developed to deliver American astronauts to the International Space Station -- and later to the moon and other destinations in our solar system -- following the retirement of the space shuttle program, which is on pace to fly its last mission late this year or early next year. In place of Constellation, the Obama administration supports the development of commercial capabilities for delivering Americans to the space station and beyond. This may sound good rhetorically, but it fails to meet the standards of sound space policy. The president's plan to privatize space exploration rests on ill-defined objectives and unsubstantiated assumptions. For instance, the administration has not adequately explained where the space program's shifted trajectory will lead our nation and cannot explain how its plan affects our nation's previously established goals of returning humans to the moon by 2020 and some day sending astronauts to Mars and beyond. Without clearly defined goals, including specific destinations and timelines for reaching them, how can we ensure that taxpayers are receiving an adequate return on their investments in space exploration? It is simply unwise to carry out such a dramatic shift in how our nation conducts space exploration without a clear objective in mind

**[\_\_\_\_] Privatization will mean that space ceases to inspire leadership by the US**

**David Wu, Democratic Member of the U.S. House of Representatives from Oregon, 4/15/2010**, “**Debate: Obama's Space Privatization Plan Is a Costly Mistake,” http://www.aolnews.com/2010/04/15/debate-obamas-space-privatization-plan-is-a-costly-mistake/**

The Constellation program is not perfect. But putting all of our eggs in a private-sector basket is simply too risky a gamble. If the president's plan is implemented, we would be jeopardizing our nation's lead in space exploration, and we would be jeopardizing our children's future. The space program encourages us to reach for the stars in both our dreams and our actions. It helps drive innovation, and it challenges us to find creative solutions to technological challenges. Moreover, it inspires America's next generation of scientists and engineers to pursue their passions -- something we must have if our nation is to compete in the 21st century global economy. The president's plan to privatize our spaceflight program will hinder our nation's ability to remain at the forefront of human achievement for generations to come. We must reconsider.

# Impact Turn – Leadership

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**[\_\_\_\_] US leadership prevents nuclear war**

**Zalmay Khalilzad, Defense Analyst at RAND, 1995 “Losing the Moment? The United States and the World After the Cold War” The Washington Quarterly, RETHINKING GRAND STRATEGY; Vol. 18, No. 2; Pg. 84**

Under the third option, the United States would seek to retain global leadership and to preclude the rise of a global rival or a return to multipolarity for the indefinite future. On balance, this is the best long-term guiding principle and vision. Such a vision is desirable not as an end in itself, but because a world in which the United States exercises leadership would have tremendous advantages. First, the global environment would be more open and more receptive to American values -- democracy, free markets, and the rule of law. Second, such a world would have a better chance of dealing cooperatively with the world's major problems, such as nuclear proliferation, threats of regional hegemony by renegade states, and low-level conflicts. Finally, U.S. leadership would help preclude the rise of another hostile global rival, enabling the United States and the world to avoid another global cold or hot war and all the attendant dangers, including a global nuclear exchange. U.S. leadership would therefore be more conducive to global stability than a bipolar or a multipolar balance of power system.

# Impact Turn – Space Debris

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**[\_\_\_\_] The privatization of space will cause increased space debris to the point where space can no longer be used**

**Bruce Gagnon, coordinator of the Global Network Against Weapons & Nuclear Power in Space, 6/23/2003, “Space Privatization: A road to conflict?” http://www.space4peace.org/articles/road\_to\_conflict.htm**

The news brings us the story of "space pioneers" launching privately funded craft into the heavens.  A special prize is offered to the first private aerospace corporation who can successfully take a pilot and a "space tourist" into orbit. Is this "privatization" of space a good thing?  Is there any reason to be concerned about the trend?  Are there any serious questions that should be raised at this historic moment? Three major issues come immediately to mind concerning space privatization.  Space as an environment, space law, and profit in space. We've all probably heard about the growing problem of space junk where over 100,000 bits of debris are now tracked on the radar screens at NORAD in Colorado as they orbit the earth at 18,000 m.p.h.  Several space shuttles have been nicked by bits of debris in the past resulting in cracked windshields.  The International Space Station (ISS) recently was moved to a higher orbit because space junk was coming dangerously close.  Some space writers have predicted that the ISS will one day be destroyed by debris. As we see a flurry of launches by private space corporations the chances of accidents, and thus more debris, becomes a serious reality to consider.  Very soon we will reach the point of no return, where space pollution will be so great that an orbiting minefield will have been created that hinders all access to space.  The time as certainly come for a global discussion about how we treat the sensitive environment called space before it is too late.

**[\_\_\_\_] Space junk threatens satellites that perform many crucial economic functions**

**Megan Ansdell, Consultant at Booz Allen Hamilton for Space Policy, Former Graduate Student Intern at NASA, 2010 “Active Space Debris Removal: Needs, Implications, and Recommendations for Today’s Geopolitical Environment,”** [**www.princeton.edu/jpia/past-issues-1/2010/Space-Debris-Removal.pdf**](http://www.princeton.edu/jpia/past-issues-1/2010/Space-Debris-Removal.pdf)

There are currently hundreds of millions of space debris fragments orbiting the Earth at speeds of up to several kilometers per second. Although the majority of these fragments result from the space activities of only three countries—China, Russia, and the United States—the indiscriminate nature of orbital mechanics means that they pose a continuous threat to all assets in Earth’s orbit. There are now roughly 300,000 pieces of space debris large enough to completely destroy operating satellites upon impact (Wright 2007, 36; Johnson 2009a, 1). It is likely that space debris will become a significant problem within the next several decades. Predictive studies show that if humans do not take action to control the space debris population, an increasing number of unintentional collisions between orbiting objects will lead to the runaway growth of space debris in Earth’s orbit (Liou and Johnson 2006). This uncontrolled growth of space debris threatens the ability of satellites to deliver the services humanity has come to rely on in its day-to-day activities. For example, Global Positioning System (GPS) precision timing and navigation signals are a significant component of the modern global economy; a GPS failure could disrupt emergency response services, cripple global banking systems, and interrupt electric power grids (Logsdon 2001).