# Space Colonization Good/Bad

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# \*\*\*Space Colonization Good

## Laundry List 1/2

### It’s space or extinction from disease, space objects or nuclear war

Huang 5

[Michael Huang, “Spaceflight or Extinction”, cites Carl Sagan who was a professor of astronomy and space sciences at Cornell University, cites J. Richard Gott III who is a professor of astrophysical sciences at Princeton University, cites Martin Rees who is a professor of cosmology and astrophysics and Master of Trinity College at the University of Cambridge. http://www.spaext.com/]

[If there are civilizations elsewhere in the universe,] Their eventual choice, as ours, is spaceflight or extinction. Carl Sagan ...the only factor that appears to have improved a family of organisms’ chance of survival was widespread geographic colonization at the time of the event. The Columbia Encyclopedia The goal of the human spaceflight program should be to increase our survival prospects by colonizing space. J. Richard Gott The aim of astronautics is “to extend life to there”, to establish habitats beyond Earth. This should be achieved not only for its intrinsic value, but to ensure the safety of the human species through a critical stage of its development. A civilization restricted to the surface of a single planet has inevitable threats to its long-term existence. Natural threats such as epidemics and impacts from space objects, and man-made threats such as nuclear and biological war, will be joined by new threats from emerging sciences and technologies. If we have self-sufficient human settlements throughout the solar system, and access to life support technology on Earth, humankind would have a secure future. A global catastrophe, although terrible, would not end the human species and the potential of a universe filled with intelligent life. We have a choice between two possible futures: spaceflight or extinction. To do nothing is a choice for the second future. The aim of this web site is to contribute towards the first. The theme of this book is that humanity is more at risk than at any earlier phase in its history. The wider cosmos has a potential future that could even be infinite. But will these vast expanses of time be filled with life, or as empty as the Earth’s first sterile seas? The choice may depend on us, this century.

### Extinction from multiple threats is inevitable absent space colonization

Britt ’01

[Robert Roy Britt, senior science writer, “The Top 3 Reasons to Colonize Space”, October 8, http://www.space.com/missionlaunches/colonize\_why\_011008-3.html]

It's no secret. Sooner or later, Earth's bell will be rung. A giant asteroid or comet will slam into the planet, as has happened many times before, and a deadly dark cloud will envelop the globe, killing much of whatever might have survived the initial impact. "We live on a small planet covered with the bones of extinct species, proving that such catastrophes do occur routinely," says J. Richard Gott, III, a professor of astrophysics at Princeton and author of "Time Travel in Einstein's Universe." Gott cites the presumably hardy Tyrannosaurus rex, which lasted a mere 2.5 million years and was the victim of an asteroid attack, as an example of what can happen if you don't plan ahead. But space rocks may not be the only threat. Epidemics, climatological or ecological catastrophes or even man-made disasters could do our species in, Gott says. And so, he argues, we need a life insurance policy to guarantee the survival of the human race. "Spreading out into space gives us more chances," he says. And the time is now: History instructs that technological hay should be made while the economic sun shines. "There is a danger we will end the human space program at some point, leaving us stranded on the Earth," Gott warns. "History shows that expensive technological projects are often abandoned after awhile. For example, the Ancient Egyptians quit building pyramids. So we should be colonizing space now while we have the chance."

Laundry List 2/2

### Nuclear war, terrorism, disease, biological warfare, and asteroids make space colonization the only way for humans to survive

Engdahl, ‘07

[Sylvia Engdahl, science teacher and space advocate, “Space and Human Survival: My Views on the Importance of Colonizing Space,” 10-07, www.sylviaengdahl.com/space/survival.htm]

A more urgent cause for concern is the need not to “put all our eggs in one basket,” in case the worst happens and we blow up our own planet, or make it uninhabitable by means of nuclear disaster or perhaps biological warfare. We would all like to believe this won’t happen, yet some people are seriously afraid that it will—it’s hardly an irrational fear. Peace with Russia may have drawn attention from it, yet there are other potential troublemakers, even terrorists; the nuclear peril is not mere history. Furthermore, there is the small but all-too-real possibility that Earth might be struck by an asteroid. We all hope and believe our homes won’t burn down, and yet we buy fire insurance. Does not our species as a whole need an insurance policy? Even Carl Sagan, a long-time opponent of using manned spacecraft where robots can serve, came out in support of space colonization near the end of his life, for this reason; see his book Pale Blue Dot. And in an interview with Britain’s newspaper Daily Telegraph, eminent cosmologist Stephen Hawking said, “I don’t think that the human race will survive the next thousand years unless we spread into space. There are too many accidents that can befall life on a single planet.” Hawking is more worried about the possibility of our creating a virus that destroys us than about nuclear disaster. However, he said, “I’m an optimist. We will reach out to the stars.”

### Space colonization is key to protect humans from super volcanoes, asteroid collisions, and solar activities

Young ’03

[John W. Young, former astronaut and associate technical director of NASA Johnson Space Center, "The BIG Picture: Ways to Mitigate or Prevent Very Bad Planet Earth Events," http:Ilspace.balettie.comNoung.html]

Conclusion: The human race is at total war. Our enemy is ignorance, pure and simple. The last 25 years of NASA's Solar System exploration including Earth is telling us what we need to do to preserve our species. This new knowledge is useless unless we act on it. Large volcanoes on Earth, giant impacts on Earth, or unreliable solar activity cannot be ignored. Historical statistics show that these events are likely in our lifetimes or the lifetimes of our children and grandchildren. Knowing what we know now, we are being irresponsible in our failure to make the scientific and technical progress we will need for protecting our newly discovered severely threatened and probably endangered species -- us. NASA is not about the 'Adventure of Human Space Exploration,' we are in the deadly serious business of saving the species. All Human Exploration’s, bottom line is about preserving our species over the long haul.

## Extinction 1/2

### Space colonization is key to the future of humans

Foust, 2006

[Jeff Foust, aerospace analyst, editor and publisher of The Space Review, Ph.D in planetary science, The Space Review, “New Strategies for Exploration and Settlement,” http://www.thespacereview.com/article/1860/1, June 6]

Spudis took issue with those who he believes have conflated exploration with science. “I think we’ve come in the last century to misunderstand the original meaning of exploration,” he said. Exploration enables science, he said, by making discoveries scientists then attempt to explain, but exploration is more than just science. “Fundamentally exploration is more important than science because it is broader and richer than science,” he said. “It includes both asset protection and wealth generation.” That approach to exploration, he argued, should be applied to future human space exploration. The “ultimate rationale” for human spaceflight is the survival of the species, he said, noting the record of asteroid and comet impacts and the likelihood that eventually another large body will collide with the Earth, with devastating consequences for life on the planet. “If you want humanity to survive, you’re going to have to create multiple reservoirs of human culture,” he said, “and the way to do that is to expand human civilization off the planet.” Not surprisingly, Spudis believes the place to begin to do that is the Moon. “We’re going to the Moon to learn the skills to live and work productively on another world,” he said. Those skills, he added, can be grouped into three categories: development of a transportation system, the ability to safely live on another world, and developing resources that can be exported for profit—or, as Spudis put it, “arrive, survive, and thrive.”

### The only way to prevent extinction from scientific accidents is space colonization

Highfield ’01

[Roger Highfield, Science Editor, “Colonies in space may be only hope, says Hawking”, 10/16, http://research.lifeboat.com/hawking.htm]

THE human race is likely to be wiped out by a doomsday virus before the Millennium is out, unless we set up colonies in space, Prof Stephen Hawking warns today. In an interview with The Telegraph, Prof Hawking, the world's best known cosmologist, says that biology, rather than physics, presents the biggest challenge to human survival. "Although September 11 was horrible, it didn't threaten the survival of the human race, like nuclear weapons do," said the Cambridge University scientist. "In the long term, I am more worried about biology. Nuclear weapons need large facilities, but genetic engineering can be done in a small lab. You can't regulate every lab in the world. The danger is that either by accident or design, we create a virus that destroys us. "I don't think the human race will survive the next thousand years, unless we spread into space. There are too many accidents that can befall life on a single planet. But I'm an optimist. We will reach out to the stars." Current theories suggest that space travel will be tedious, using spaceships travelling slower than light. But Prof Hawking, Lucasian professor of mathematics at Cambridge, says that a warp drive, of the kind seen in Star Trek, cannot be ruled out. This method of space exploration and colonisation, apparently the stuff of science fiction, could be one possible escape from the human predicament.

Extinction 2/2

### Colonization is the only way for humans to survive

Baum 10

[Seth D. Baum, Ph.D in Geography from Pennsylvania State University and M.S. in Electrical Engineering from Northeastern University and scholar at Columbia University's Center for Research on Environmental Decisions, “Cost–Benefit Analysis Of Space Exploration: Some Ethical Considerations”, Space Policy Volume 25, Issue 2, May, pg 75-80, http://www.sciencedirect.com/science/article/pii/S0265964609000198]

Another non-market benefit of space exploration is reduction in the risk of the extinction of humanity and other Earth-originating life. Without space colonization, the survival of humanity and other Earth-originating life will become extremely difficult – perhaps impossible – over the very long term. This is because the Sun, like all stars, changes in its composition and radiative output over time. The Sun is gradually converting hydrogen into helium, thereby getting warmer. In some 500 million to one billion years, this warming is projected to render Earth uninhabitable to life as we know it [25] and [26]. Humanity, if it still exists on Earth then, could conceivably have developed technology to survive on Earth despite these radical conditions. Such technology may descend from present proposals to “geoengineer” the planet in response to anthropogenic climate change [27] and [28].2 However, later – around seven billion years later – the Sun will lose mass that spreads into Earth's orbit, causing Earth to slow, be pulled into the Sun, and evaporate. The only way life could survive on Earth would be if, by sheer coincidence (the odds are on the order of one in 105 to one in 106 [29]), the planet happened to be pulled out of the Solar System by a star system that was passing by. This process might enable life to survive on Earth much longer, although the chances of this are quite remote. While space colonization would provide a hedge against these very long-term astronomical threats, it would also provide a hedge against the more immediate threats that face humanity and other species. Such threats include nuclear warfare, pandemics, anthropogenic climate change, and disruptive technology [30]. Because these threats would generally only affect life on Earth and not life elsewhere, self-sufficient space colonies would survive these catastrophes, enabling life to persist in the universe. For this reason, space colonization has been advocated as a means of ensuring long-term human survival [32] and [33]. Space exploration projects can help increase the probability of long-term human survival in other ways as well: technology developed for space exploration is central to proposals to avoid threats from large comet and asteroid impacts [34] and [35]. However, given the goal of increasing the probability of long-term human survival by a certain amount, there may be more cost-effective options than space colonization (with costs defined in terms of money, effort, or related measures). More cost-effective options may include isolated refuges on Earth to help humans survive a catastrophe [36] and materials to assist survivors, such as a how-to manual for civilization [37] or a seed bank [38]. Further analysis is necessary to determine the most cost-effective means of increasing the probability of long-term human survival.

## Asteroids

### Extinction from asteroid collision is inevitable absent space colonization

Oberg 99

[James Oberg, Space Writer and former Space Flight Engineer. Space Power Theory, http://www.jamesoberg.com/books/spt/new-CHAPTERSw\_figs.pdf]

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.

## Economy

### Space exploration is vital to sustaining economic growth and preventing collapse of the biosphere

Howerton 96

[B. Alexander Howerton, business editor of Countdown, a bimonthly newsletter that follows space-related activities around the world, “Why bother about space?” The Futurist, Vol. 30, January-February 1996]

The best method for creating these conditions is an ever-growing economy. We are currently witnessing the damaging effects of stagnant or recessed economies around the globe. People who feel that they have lost their opportunities for advancement or who feel that others are taking those opportunities from them are much easier to persuade to hate, kill, or go to war. Therefore, many governments consider it imperative to keep their economy growing at almost any cost. The opening of eastern Europe and the ongoing development of the Third World make it appear as if there is much more room for growth in the global economy, but ultimately the earth is a closed system with finite resources. If we try to keep our economy growing forever based on the finite resources of the earth, we will one day run out. We must keep the economy growing, because the population of the planet is experiencing an exponential increase. Most attempts to curb population growth have been unsuccessful, yet it has been discovered that the best method of population control is a high standard of living. And that is achieved through an ever-expanding economy. The only way to keep the economy expanding infinitely is to expand our resource base infinitely. The universe is a big place. Human ingenuity is such that we will find innumerable ways to economically prosper in space. The list of known methods already includes solar power satellites, lunar helium-3 production, asteroid mining, hydroponic agriculture, and tourism, just to name a few. We need only a few visionaries to realize the magnitude of the carrot of space development in front of them and the stick of global depression behind them to jump-start the space economy. The explosion of new industries and jobs created in their wake will dwarf any economic expansion that has heretofore occurred in human history. Poverty would diminish worldwide as the growing labor requirements of the new space industries put more and more people to work. Moreover, as we progress into space, new opportunities will be developed, further compounding the positive economic effects. We will have escaped the trap of a closed, cyclical economy; the riches of the solar system will lie before us. A second argument--and one of the most compelling--for developing space lies in the necessity of protecting our home planet. Humans are beginning to exert great pressure on the ecosystems of Mother Earth. Even conservative population estimates predict 10 billion people by 2050--nearly twice as many as we have now--with no indication of the growth rate slowing. Industry has developed to a point where we can wield amazing power and accomplish great feats. It all occurs, however, within the earth's biosphere, so any waste products stay right here, creeping into our food chain and atmosphere. Conservation is a noble cause, but it is ultimately a losing proposition. The best we can hope for is to slow down the rate of pollution and depletion of natural resources. We merely delay the inevitable day of our own destruction. Science has devised possible solutions to our problems. Less-polluting energy sources, electric cars, and alternative urban designs, to name just a few, hold the promise of improving our lives and chances of survival. Yet, we have invested so much in our current way of doing things, both financially and psychically, that our present systems stringently resist change. As we develop a space-based economy, we will have the opportunity to develop new systems and technologies, and these new discoveries and inventions will filter down to Earth, improving everyone's standard of living.

### Economic Decline causes nuclear war – multiple scenarios

Cusick ‘9

[James Cusick, Sunday Herald (Scotland) 3.18.09 http://www.sundayherald.com/oped/opinion/display.var.2495478.0.dont\_bank\_on\_financial\_trouble\_being\_resolved\_without\_conflict.php]

I'm not saying that America is about to declare war on China, or that Germany is going to invade France. But there are profound economic stresses in central Europe that could rapidly turn into conflict in the bankrupt Baltic states, Hungary, Ukraine. And if the Great Recession, as the IMF's Dominique Strauss-Kahn called it last week, turns into a Great Depression, with a prolonged collapse in international trade and financial flows, then we could see countries like Pakistan disintegrate into nuclear anarchy and war with neighbouring India, which will itself be experiencing widespread social unrest. Collapsing China could see civil war too; Japan will likely re-arm; Russia will seek to expand its sphere of economic interests. Need I to go on?

## Environment

### Space production is key to environmental protection - solves pollution and provides energy

Asimov ’03

[Isaac Asimov, author, former president of the American Humanist Association, and biochemist, Speech at Rutgers University, "Our Future in the Cosmos-Space," http:/lwww.wronkiewicz.net~asimov.html]

Another kind of structure in outer space is factories. There is no reason why a good proportion of our industrial factories couldn't be placed into orbit. Space has very unusual properties that may be helpful to us. It has unlimited vacuum, zero gravity, the possibility of high and low temperatures, and hard radiation. There are a great many things we can do in space that we can do only with difficulty, if at all, on Earth. Most important of all, when we have a factory in space, any unavoidable pollution that it produces can be discharged into space. Space is huge compared to the surface of the Earth. Some people argue that to earlier generations the ocean seemed huge and capable of absorbing any amount of pollution. But now we are in danger of poison in the entire atmosphere. Some people argue that in the future we may be so casual about reasoning pollutants into space that we may gradually poison all the space around ourselves. However, that won't happen, for not only is space literally millions of times more voluminous than the biosphere and not occupied by trillions of living things, but it is also true that nothing we release into space is going to stay there because of something called the solar wind. The Sun emits speeding particles in every direction; it has been doing this as long as it has been in existence and will continue to do this for billions of years. This solar wind will push the pollutants out beyond the orbit of Mars, beyond the asteroids and into the outer solar system, where there is a trillion times more room than in the Earth's neighborhood. The solar wind has a natural ventilating effect. This is important because it means that perhaps Earth can get rid of its dark satanic mills (to quote William Blake, who wrote in the first decades of the 19th century) without abandoning industrialization. People who view industrialization as a source of the Earth's troubles, its pollution, and the desecration of its surface, can only advocate that we give it up. This is something that we can't do; we have the tiger by the tail. We have 4.5 billion people on Earth. We can't support that many unless we're industrialized and technologically advanced. So, the idea is not to get rid of industrialization but to move it somewhere else. If we can move it a few thousand miles into space, we still have it, but not on Earth. Earth can then become a world of parks, farms, and wilderness without giving up the benefits of industrialization.

### Extinction

Diner ’94

[David Diner, Major in US Army, Winter, “THE ARMY AND THE ENDANGERED SPECIES ACT: WHO'S ENDANGERING WHOM?” Lexis]

Biologically diverse ecosystems are characterized by a large number of specialist species, filling narrow ecological niches. These ecosystems inherently are more stable than less diverse systems. "The more complex the ecosystem, the more successfully it can resist a stress. . . . [l]ike a net, in which each knot is connected to others by several strands, such a fabric can resist collapse better than a simple, unbranched circle of threads -- which if cut anywhere breaks down as a whole." [**79**](http://www.lexis.com/research/retrieve?_m=2c2079b6a9753fd72b599ac94393715a&csvc=bl&cform=bool&_fmtstr=FULL&docnum=1&_startdoc=1&wchp=dGLzVlz-zSkAA&_md5=5d418220b8f79eb99eb7ad7f7b46acfc#n79) By causing widespread extinctions, humans have artificially simplified many ecosystems. As biologic simplicity increases, so does the risk of ecosystem failure. The spreading Sahara Desert in Africa, and the dustbowl conditions of the 1930s in the United States are relatively mild examples of what might be expected if this trend continues. Theoretically, each new animal or plant extinction, with all its dimly perceived and intertwined affects, could cause total ecosystem collapse and human extinction. Each new extinction increases the risk of disaster. Like a mechanic removing, one by one, the rivets from an aircraft's wings, [**80**](http://www.lexis.com/research/retrieve?_m=2c2079b6a9753fd72b599ac94393715a&csvc=bl&cform=bool&_fmtstr=FULL&docnum=1&_startdoc=1&wchp=dGLzVlz-zSkAA&_md5=5d418220b8f79eb99eb7ad7f7b46acfc#n80) mankind may be edging closer to the abyss.

## Resources

### Extinction from resource depletion is inevitable absent space colonization

Tumlinson ’03

[Richard Tumlinson, President of Space Research Foundation, “Future of NASA”, FDCH, Oct 29, lexis]

Our first possible choice, and the one lots of folks sometimes seem to believe is inevitable, is the worst. It's what might happen if we keep on rolling along and do nothing about conserving our natural resources or accessing new. The characterization we see in popular culture and films such as the Matrix, the Terminator series, and other dark dystopian images. It is an apocalyptic vision, the result of a time when all the world's cultures rush to create consumer societies such as those in Europe, Japan and the USA. Eventually our excesses exceed our limits and we end up with a polluted and stripped world whose environment collapses, bringing down whole societies, leading to war, famine, the end of global culture, and the dawn of a new dark age. Our second choice is to attempt to sustain the human race on this one world through rationing of resources - at the cost of personal freedom - as we anesthetize ourselves with virtual realities and sensory distortions. . . Under the heavy hand of global Big Brother, our lives, actions, and even our very thoughts will be monitored and controlled. Imagination and innovation will be seen as threats to order and safety. Risk will be avoided at all cost. Perhaps we will eventually become so physically and intellectually passive that we finally load ourselves into banks of virtual electronic realities and pass the eons in a bliss of pretend adventures and paradises uncounted, until some global catastrophe such as an asteroid strike sends us into oblivion. Or there's the third choice, opening the High Frontier of space and breaking out into the galaxy. Celebrating the spirit of exploration and individuality, we begin to truly explore and open the space around us to human settlement. Turning debates between free enterprise technologists and protectors of the Earth on their heads, we unleash the power of human imagination to create ways to harvest the resources of space, not only saving this precious planet, but also blazing a path to the stars. This is a tomorrow where life is exciting, new possibilities open up each day, and humanity spreads outwards, as the harbinger of life to worlds now dead. This future is characterized by new ideas and cultures spreading every where, the entire human race engaged in spreading life to the stars and a future that is ever expanding and hopeful. Opening the space frontier will also change what it means to be an American. The effect of the space frontier on America will be profound. Our pioneering past will at last have a direct link to our future. Our heritage will be connected with our tomorrow in a visible and exciting way. The paths blazed by Daniel Boone, Davy Crockett and Lewis and Clark will continue onward and upward across the stars. The spirit of family will be resurrected as the frontier ethics of hard work and familial support are reinforced through the simple need to survive and prosper in a hostile environment. Our relationship to the rest of the world will change, as we throw open the doors to a better tomorrow for all, and as we always do, offer to hold those doors open for all and everyone to follow. Opening the frontier will change what it means to be a human being. We will become a multi-planet species, assuring our survival, and that of the life forms for which we are responsible. And a child living in such times will know why they are alive, and be able to see an unending and ever opening panorama of possibility stretching out before them

## War

### Expansion into space would prevent global wars resulting in extinction

Asimov ’03

[Isaac Asimov, author, former president of the American Humanist Association, and biochemist, Speech at Rutgers University, "Our Future in the Cosmos-Space," http:/lwww.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 doing 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.

## Warming

### Colonization solves warming- mutual technology development

Siegfried 03

[W. H. Siegfried" 2003 The Boeing Company, Integrated Defense Systems “Space Colonization—Benefits for the World” http://www.aiaa.org/participate/uploads/acf628b.pdf]

The world population has finally recognized that we are polluting our nest. We are using energy at a prodigious rate (Fig. 1) (Siegfried, 1991). There is a demonstrated connection between the cost of energy, its availability and a nation’s standard of living. Long-term clean energy sources must be provided to assist not only with our future needs, but also with those of all nations’ current requirements. Energy sources are an important part of environmental thrusts. Nuclear research is progressing, but it does not promise near-term solutions and developing nations are reaching a plateau of available power. The emerging nations’ need for power must be balanced against potential environmental damage from such dangers as fossil fuel emissions (if there were enough fuel available), which could be greater than nuclear energy risks. Currently, the United States annually consumes approximately 3 trillion Kwh’s of electrical energy and, if this rate grows at only 2% per year, by 2050 United States power requirements will be around 9 trillion Kwh’s per year. Total world needs, assuming a very low use by developing nations (not a conservative estimate) easily exceeds an estimated 20 trillion Kwh’s by 2050. Even with an attendant tripling of non-nuclear systems, such as hydroelectric to avoid fossil fuel depletion, nuclear power system generation would have to increase by a factor of 6 to meet requirements. This increase in nuclear energy production flies in the face of a rising discontent with adverse environmental effects of nuclear waste disposal, where some plants are being converted to utilize fossil fuels. A clean renewable source of energy must be found and implemented. Space Colonization can lead to solutions to this problem. Three potential energy sources are described in Table 1. Helium 3, solar power satellites (SPS), and a lunar (solar) power system (LPS) all have significant feedback potential for other commercial applications. A space-based energy system would be global in scale and funding and would thus be a challenging goal for macro-engineering management to achieve. This management experience would be globally shared and would be utilized for other global projects. Robotics and artificial intelligence would also benefit from the use of smart and capable robots to autonomously conduct such functions as space assembly and lunar mining and processing. Computer systems would be extended in capacity and reliability, energy-transfer technology would be enhanced, and materials research would quest for more efficient space systems and learn to utilize in-situ materials. SPS and LPS will require advancement in photovoltaic cell technology. This quest can also influence transportation technology because at least one of the solutions could lead to more efficient space propulsion. This would reduce travel times and minimize exposure to potentially debilitating space environments.

### Extinction

Tickell 08

(Oliver, Climate Researcher, The Gaurdian, “On a planet 4C hotter, all we can prepare for is extinction”, 8/11http://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. Watson's call was supported by the government's former chief scientific adviser, Sir David King, who warned that "if we get to a four-degree rise it is quite possible that we would begin to see a runaway increase". This is a remarkable understatement. The climate system is already experiencing significant feedbacks, notably the summer melting of the Arctic sea ice. The more the ice melts, the more sunshine is absorbed by the sea, and the more the Arctic warms. And as the Arctic warms, the release of billions of tonnes of methane – a greenhouse gas 70 times stronger than carbon dioxide over 20 years – captured under melting permafrost is already under way. To see how far this process could go, look 55.5m years to the Palaeocene-Eocene Thermal Maximum, when a global temperature increase of 6C coincided with the release of about 5,000 gigatonnes of carbon into the atmosphere, both as CO2 and as methane from bogs and seabed sediments. Lush subtropical forests grew in polar regions, and sea levels rose to 100m higher than today. It appears that an initial warming pulse triggered other warming processes. Many scientists warn that this historical event may be analogous to the present: the warming caused by human emissions could propel us towards a similar hothouse Earth.

## A2: Space Col Impossible

### Space colonization is feasible- adaptation solves

White 87

[Frank White, author, 1987, The Overview Effect, p. 172-173]

Beyond these considerations, of course, is our having no idea what will occur when two people who have lived in zero C for even a brief period conceive a child. We know that lack of gravity has a tremendous effect on an adult human body in a short period of time. What would happen to a vulnerable embryo when no countermeasures are taken? It seems logical that if muscle mass diminishes, calcium disappears from the bones, and the cardiovascular system becomes less robust in an adult body, the same will happen to an embryo. The result may be children who look more like dolphins or whales than humans. What will happen when these children, conceived and born in zero C, grow up in zero C and conceive children who in turn are born and mature in the same environment? Reason suggests the emergence of a radically different kind of being, one highly adapted to living in the conditions of space and poorly adapted to planetary surfaces. Such a person would be un­able to return to Earth, or any planet, easily, because survival in a gravity-based environment would be difficult. Even if full biological speciation does not take place for thousands of years, a form of cultural speciation will probably take place far sooner. Human beings have shown themselves to be sensitive to such differences as skin color and language, and people living per­manently in space are going to begin looking and acting differently long before biological speciation occurs. Natural speciation is usually a slow process. In the case of higher-order life forms, it is measured in hundreds or thousands of gen­erations, not in years. The emergence of Homo spaciens as a sep­arate cultural being is likely to occur within the next century. The date for the emergence of Homo spaciens as a separate biological entity is unknown, but it ought to be the subject of intense study by space scientists. Such a species might find life on any planetary surface difficult and be able to exist only in the weightless envi­ronment of a spacecraft or space settlement. People who choose to live in a low-C environment may also speciate, but in a different direction from those in zero C. If Homo spaciens and Homo sapiens can work together, the emergence of *spaciens* will resolve the problem of how human beings, who cannot endure a period of weightlessness too long without becoming trapped by it, can explore regions beyond the orbit of Mars. Just as the nonorganic species of Technos promises to be a partner in the long-term human adventure, so may this new organic species be a great help in the realization of human purpose. Dramatic as this line of thought may appear to be, Jones and Finney might argue that it is much too tame. They state, This advance will not be limited to the birth of one new species. Space is not a single environment, but a residual category for every­thing outside the Earth’s atmosphere. There are innumerable en­vironments out there, and perhaps more niches to be developed for the exploitation of those environments. By spreading into space we will embark on an adaptive radiation of hominidae that will spread intelligent life as far as technology or limits placed by any competing life forms will allow. This radiation of evolving, intelligent life through space will be the galactic successor to the other great episodes of adaptive radiation in the evolution of life — that which followed the wandering of a few fish onto land, or the opportunistic multiplication of mammalian genera and species to fill the vacuum left by the disappearance of the dinosaurs.4 Finally, it should be mentioned that humanity may consciously choose to modify itself in order to explore space, actively bringing on the speciation process. Considering our advances in biotech­nology as well as space technology, the ultimate form of speciation may become a reality: an organism able to live in free space without a pressure suit or any artificial environment, just as a fish lives in water. It may be that the more radical alterations of the human organism are impossible. However, it is quite possible that genetic engi­neering would, at minimum, be used to optimize adaptation to environments like a space habitat or Mars. If that proves to be successful, the state of the art will probably be pushed as far as it reasonably can go. Whenever and however speciation takes place, it will contribute to humanity’s efforts to make space, and all its possible environ­ments, a permanent home. In addition, it will help humans learn to interact with a different but highly intelligent species, which promises to be the next challenge in climbing the evolutionary ladder to a galactic civilization.

## A2: Space Col Too Costly

### Feasibility arguments of space colonization misevaluate the economics of settlement

Zubrin ‘97

[Robert Zubrin, aerospace engineer and president of the Mars Society and Pioneer Astronautics "Thc Economic Viability of Mars Colonization," http://www.aleph.se/Trans/Tech/Space/mars.html]

A frequent objection raised against scenarios for the human settlement and terraforming of Mars is that while such projects may be technologically feasible, there is no possible way that they can be paid for. On the surface, the arguments given supporting this position appear to many to be cogent, in that Mars is distant, difficult to access, possesses a hostile environment and has no apparent resources of economic value to export. These arguments appear to be ironclad, yet it must be pointed out that they were also presented in the past as convincing reasons for the utter impracticality of the European settlement of North America and Australia. It is certainly true that the technological and economic problems facing Mars colonization in the 21st century are vastly different in detail than those that had to be overcome in the colonization of the New World in the 17th century, or Australia in the 19th century. Nevertheless, it is my contention that the argument against the feasibility of Mars colonization is flawed by essentially the same false logic and lack of understanding of real economics that resulted in repeated absurd misevaluations of the value of colonial settlements (as opposed to trading posts, plantations, and other extractive activities) on the part of numerous European government ministries during the 400 years following Columbus. During the period of their global ascendancy, the Spanish ignored North America; to them it was nothing but a vast amount of worthless wilderness. In 1781, while Cornwallis was being blockaded into submission at Yorktown, the British deployed their fleet into the Caribbean to seize a few high-income sugar plantation islands from the French. In 1802, Napoleon Bonaparte sold a third of what is now the United States for 2 million dollars. In 1867 the Czar sold off Alaska for a similar pittance. The existence of Australia was known to Europe for two hundred years before the first colony arrived, and no European power even bothered to claim the continent until 1830. These pieces of short-sighted statecraft, almost incomprehensible in their stupidity, are legendary today. Yet their consistency shows a persistent blind spot among policy making groups as to the true sources of wealth and power. I believe that it is certain that two hundred years from now, the current apathy of governments towards the value of extraterrestrial bodies, and Mars in particular, will be viewed in a similar light.

## A2: Space Debris

### Space debris is inevitable

Hoffman 98

[Russell Hoffman, host of High Tech Today, 1/23/1998, http://www.animatedsoftware.com/spacedeb/spacedeb.htm]

And--I've only touched the surface of this problem. For example, scientists recently calculated that the problem is so bad that in the future, near-earth orbit space debris will collide with itself so much and so often that there will be a permanent cloud of debris rather than the millions of discreet items that exist now. In other words, without doing a thing to add more debris to the equation, we've put so much up there the equivalent of a nuclear explosion will occur--actually is occurring--wherein pieces of debris collide with other pieces of debris, creating more pieces of debris, which in turn collide with each other, creating still more debris.

### Shielding protects objects against small debris

Seymour 98

[Jennifer Seymour, J.D., Georgetown University Law Center, Spring 1998, Georgetown International Environmental Law Review]

Attempts to protect newly-launched space objects from fragmentation or damage due to collisions with debris focus largely on shielding techniques. These employ the installation of buffers on the outside of space objects and, in the case of some U.S. space shuttles, on the inside of the cargo bay doors "to protect the coolant pipes of the shuttle's heat radiator system . . . ." "Shielding, while an added expense, can protect a spacecraft against some of the smaller items. The international space station that begins assembly in orbit [in August 1998 is protected against items up to almost an inch by sandwiched layers of foil and fabric similar to bulletproof vests." While this protection does not prevent larger objects from damaging space objects, most of the collisions in near-earth orbit involve debris particles that are smaller than four inches.

## A2: No Planets For Colonization

### Space power reactors, terraforming, and closed loop environments make space colonization possible

Young ’03 [John W. Young, former astronaut and associate technical director of NASA Johnson Space Center, "The BIG Picture: Ways to Mitigate or Prevent Very Bad Planet Earth Events," http:llspace.balettie.comNoung.htrnl]

What Are We Doing? We know that to live and work on the Moon or Mars, we will require the following: Reliable, Uninterruptable Power: We can readily achieve this with the Space Power Reactor which for 5 Curries of launch radiation will supply 750 kWh reliably on the Moon or Mars. Why does not the United States require that our electric power to be reliable and uninterruptible as a matter of national security and national survival? Lives are lost every year when electric power fails. On a high priority, Space Power Reactor development must be supported and accelerated with upgraded power capabilities. Terraforming: To survive on the Moon and Mars we must grow our own food in totally closed-loop systems. We continue to demonstrate how to do this. A National Geographic article recently reported that 80 bushels of wheat an acre is a great crop. Under IR light emitting diodes to avoid heat, our wheat produces 600 bushels an acre in 75 days. And, Dr. Bugbee has proposed a new higher production wheat with shorter growing times. Our engineering development demonstrations of our Terraforming ability should be supported and accelerated on a high priority basis. Closed Loop Environments: Humans on other places in the solar system will recycle everything they eat, drink and breathe. The recent 90-day tests at JSC and the future Bioplex are demonstrating these capabilities. These closed-loop systems will be controlled by sophisticated computer software with provisions for manual maintenance and repair. The Bioplex facility should be accelerated on a high priority basis.

### Humans can colonize space – planetary warming would release gases to make Mars livable for humans

Haynes ’93 [Robert H Haynes, Distinguished Research Professor of Biology, NY University, “HOW MIGHT MARS BECOME A HOME FOR HUMANS?”, http://www.users.globalnet.co.uk/~mfogg/haynes.htm]

On other planets, high and low extremes of atmospheric temperatures and pressures, lack of free oxygen and liquid water, high concentrations of toxic gases, and deadly radiation levels variously preclude the existence of life. Though presently barren, Mars, nonetheless, is a biocompatible planet. Its unalterable physical characteristics (e.g. size, density, gravity, orbit, rotation rate, incident sunlight) and its possible chemical resources are remarkably consistent with life. Indeed, it was the hope that organisms might be found on Mars that made life-detection the top priority for NASA’s Viking missions in 1976. However, all of the ingenious biological experiments carried out by the two robotic landers gave negative results.  The Viking data did reveal that environmental conditions on Mars are more severe than ever had been imagined. At the two ‘temperate zone’ landing sites, local temperatures exhibited wide daily variation averaging 60 degrees below zero celsius. The atmospheric pressure was found to be very low, just over six millibars, which is less than one hundredth of that at Earth’s surface. This thin atmosphere consists of 95% carbon dioxide and 3% nitrogen, with only trace amounts of water vapour, oxygen and other gases. There is no protective ozone layer to shield the planet from the ultraviolet radiation emitted by the sun. Most surprising was the absence from the soil of any detectable organic molecules, the building blocks of life. Even though such materials arrive on Mars in meteorites, they are subsequently destroyed, at least on the surface of the planet. Thus, any organisms which might arrive there unprotected today would be freeze-dried, chemically degraded, and soon reduced to dust. It would not be possible to ‘seed’ Mars just by sprinkling bacteria over its surface.  Despite its presently hostile environment, Mars did once possess a great northern ocean and substantial quantities of flowing water, together with a thick, mostly carbon dioxide, atmosphere. These conditions may have persisted long enough for early stages of chemical and cellular evolution to have occurred. It is largely for these reasons that some scientists have begun to consider whether Mars might ultimately be returned, by human intervention, to a habitable state. A major uncertainty in these discussions is whether there remains on Mars today adequate amounts of carbon dioxide, water and nitrogen to allow such a planetary-scale transformation. If most of Mars’ original endowment of these materials has been lost to space, then the regeneration of a habitable state would be impossible.  Preliminary studies have shown that if the surface crust and polar caps of Mars still possess sufficient and accessible quantities of carbon dioxide, water and nitrogen, and if acceptable planetary engineering techniques can be devised to initiate planetary warming and release these volatile materials from their geological reservoirs, then Mars could support a stable and much thicker carbon dioxide/nitrogen atmosphere than it does at present. This atmosphere would be warm and moist, and water would flow again in the dried up river beds. The average temperature at the surface would rise to about 15 degrees celsius and the atmospheric pressure would be roughly twice that on Earth. Appropriately selected, or genetically engineered, anaerobic microorganisms, and eventually some plants, could grow under these conditions. If future exploration reveals that the necessary volatiles are indeed available then a new home for life might someday be created on our sister planet.

# \*\*\*Space Colonization Bad

## Laundry List

### Space exploration causes war, viruses, and jacks the environment

Gagnon 99

[Bruce K. Gagnon, Global Network Against Weapons & Nuclear Power In Space, 1999, “Space Exploration and Exploitation,” http://www.space4peace.org/articles/scandm.htm]

We are now poised to take the bad seed of greed, environmental exploitation and war into space. Having shown such enormous disregard for our own planet Earth, the so-called "visionaries" and "explorers" are now ready to rape and pillage the heavens. Countless launches of nuclear materials, using rockets that regularly blow up on the launch pad, will seriously jeopardize life on Earth. Returning potentially bacteria-laden space materials back to Earth, without any real plans for containment and monitoring, could create new epidemics for us. The possibility of an expanding nuclear-powered arms race in space will certainly have serious ecological and political ramifications as well. The effort to deny years of consensus around international space law will create new global conflicts and confrontations.

## Extinction

### Space colonies will make space militarization inevitable and risk the planet

Gagnon ’02

[Bruce Gagnon, coordinator of the Global Network Against Weapons & Nuclear Power in Space, “Space Exploration and Exploitation What kind of seed will we take from Earth?”, http://www.space4peace.org/articles/scandm.htm]

Just as Queen Isabella sent in the Spanish Armada to protect the new found territory and resources of the New World, so too is the U.S. moving in a similar way. The Pentagon, through the U.S. Space Command, is working hard to ensure that the space corridor will remain open and free for private corporate interests. Weapon systems such as nuclear powered lasers and anti-satellite (ASAT) weapons are now being funded, researched, and tested in the U.S. It will only be a matter of time until deployment of space based weapons will follow. In the Space Command’s document, Vision for 2020, they state that "Historically, military forces have evolved to protect national interests and investments – both military and economic. During the rise of sea commerce, nations built navies to protect and enhance their commercial interests. …The control of space will encompass protecting U.S. military, civil and commercial investments in space…. Control of space is the ability to assure access to space, freedom of operations within the space medium, and an ability to deny others the use of space, if required." A parallel, military highway will be created between the Earth and the planets beyond. Documents commissioned by the U.S. Congress suggest that U.S. military bases on the Moon will enable the U.S. to control access to and from the planet Earth. The logo of the U.S. Space Command is "Master of Space." We are now poised to take the bad seed of greed, environmental exploitation and war into space. Having shown such enormous disregard for our own planet Earth, the so-called "visionaries" and "explorers" are now ready to rape and pillage the heavens. Countless launches of nuclear materials, using rockets that regularly blow up on the launch pad, will seriously jeopardize life on Earth. Returning potentially bacteria-laden space materials back to Earth, without any real plans for containment and monitoring, could create new epidemics for us. The possibility of an expanding nuclear-powered arms race in space will certainly have serious ecological and political ramifications as well. The effort to deny years of consensus around international space law will create new global conflicts and confrontations. Now is the time for all who care about peaceful and scientific space exploration to learn more about these issues and to begin organizing to prevent this insanity before it happens. An international debate must be created about the kind of seed we from Earth will carry with us as we explore space. Let this historic debate begin now.

## Accidents

### Space travel leads to nuclear material being launched in space killing millions

Caldicott ’02

[Helen Caldicott, Australian physician, author, and anti-nuclear advocate who has founded several associations dedicated to opposing the use of depleted uranium munitions, nuclear weapons, nuclear weapons proliferation, war and military action in general “The New Nuclear Danger: George W. Bush's Military-Industrial Complex”

The militarization of the s ace program has had a significant effect upon NASA’s nuclear commitment. One reason is that NASA insists on using nuclear power instead of solar power IS because the military Is enthusiastic about nuclear weapons in space. One recent NASA plutonium 238 space launch was the Cassini Saturn probe, which flew atop a Lockheed Martin Titan-4 military rocket. Cassini carried 27.3 pounds of plutonium 238-more plutonium than had ever been launched into space. The Titan-4 military rocket is an unreliable, dangerous old rocket with" a one-in-ten record - one catastrophic accident in every ten launches. Not long after the Cassini launch, three titan rockets blew up, either on the space pad or shortly after launching. NASA designed Cassini to circle Venus and then to return toward earth via a "gravity assist" slingshot in order to increase its momentum to Saturn. Cassini circled the earth above the atmosphere at 42,300 miles per hour, at an altitude of 700 miles on August '999. Luckily, unlike Apollo 13, the vectors were accurate, and Cassini with its, plutonium load did not enter the atmosphere to disintegrate and spread its deadly cargo across the planet. In its final environmental-impact statement, NASA said that if the flyby did not go as planned, and Cassini made an inadvertent reentry into the atmosphere, the plutonium 238 would have been re- released and "approximately five billion of the ... world population at the time .. could receive 99 percent or more of the radiation exposure.” NASA also acknowledged that if plutonium rained down on areas of natural vegetation, it might have to· "relocate animals"; if it fell\ on agricultural land, it might need to "'ban future a agricultural land uses"; and if it rained down upon urban areas it would have to “demolish all or some structures" and “relocate affected population permanently." Dr. Gofman of the University of California-Berkeley, - who is also the codiscoverer of uranium 235, predicted a death toll of 950,000 a result of a Cassini accident. 140-141

Asteroid Terrorism

### Space exploration causes asteroid terrorism and extinction

Singer ’01

[Clifford E. Singer, professor of nuclear engineering and director of the Program in Arms Control, Disarmament, and International Security at the University of Illinois at Urbana—Champaign, Spring 2001, Swords and Ploughshares, http://www.acdis.uiuc.edu/homepage\_docs/pubs\_docs/S&P\_docs/S&P\_XIII/Singer.htm]

However the technology to build isolated extraterrestrial settlementsnaturally brings along with it another potentially powerful technology–the ability to move sizeable asteroids. Back in1979it was shown that this is not as difficult as one might at first think**.** The requisite technique is to land a spacecraft on one asteroid, dig up material and throw it the path of another asteroid that will approach nearby, and perturb the orbit of that asteroid until it passes nearby another large object. Once an asteroid or comet makes a controlled approach near any planet but Mercury or Pluto, then it can easily be directed near or at the earth at enormous velocity. Fortunately for our hypothetical descendants here destroying all human life on earth by asteroid impact would likely require moving objects with a diameter in excess of ten kilometers. While there are many of these, the required orbit perturbation would require a lot of lead-time and work and could be very difficult to motivate and conceal. Nevertheless with contributions from this technology a dispute between the earth and a handful of its fragile far-flung offspring in space that is carried to the extreme could conceivably lead to human extinction**.** Only when settlements in space are sufficiently numerous or far flung would such a possibility effectively be ruled out, primarily by physical considerations.

## Diseases

### Space exploration causes space diseases and extinction

Mullen ’03

[Leslie, 8-25-2003, “Alien Infection,” Astrobiology Magazine, http://www.astrobio.net/news/modules.php?op=modload&name=News&file=article&sid=570]

Chris Chyba, who holds the Carl Sagan Chair for the Study of Life in the Universe at the SETI Institute, says there are two types of potential alien pathogens: toxic and infectious. Toxic pathogens act as a poison on other organisms. Infectious pathogens are viruses or bacteria that are passed between organisms, causing sickness. Some viruses and microbes rely on specific biological systems in order to replicate and infect their host, so not all pathogens affect all organisms the same way. Chicken farmers, for instance, can remain untouched by a disease that decimates their flocks. It could be that a martian microbe would enter the human body, but is rendered harmless because it is incompatible with human physiology. "After living in the dirt of Mars, a pathogen could see our bodies as a comparable host; they could treat us 'like dirt,'" says John Rummel, NASA's Planetary Protection Officer. "But, to quote Donald Rumsfeld, we're dealing with the unknown unknowns. It could be that even if the microbes lived inside us, they wouldn't do anything, it would just be this lump living inside you." The conditions on Mars are much different than those in the human body, so an inert pathogen seems the most likely scenario -- especially since any life on Mars would have evolved without humans being present. Co-evolution is why some pathogens only affect certain organisms. Infectious pathogens evolve based on the reactions of their hosts. As the host develops defenses against a predatory pathogen, the pathogen has to devise new means of sustaining itself within the host (or risk its own extinction). Some toxins also developed through co-evolution. As predatory organisms seek food, their prey develop ever more sophisticated means to escape being eaten. Many organisms developed specially targeted toxins as part of this evolutionary arms battle. Rummel says that humans have evolved a complex defense system to prevent us from getting sick from a whole host of disease and pathogens. But non-specific microbes - where human physiology did not influence their evolution - may evade our defense mechanisms. The best way to understand the spread of potential alien pathogens is to examine the spread of such non-specific pathogens on Earth. One example of a non-specific toxic pathogen is cyanobacteria that produce hepatotoxins (toxins affecting the liver) and neurotoxins. According to Chyba, cyanobacteria living in lakes on the alpine pastures of Switzerland have been implicated in a hundred cattle poisonings over the past 25 years. Chyba says the cyanobacteria most likely did not develop their toxins in order to escape predation from cows (or to kill the cows in order to eat them!). "Rather, the susceptibility of cattle to these toxins seems simply to be an unfortunate coincidence of a toxin working across a large evolutionary distance," Chyba writes. An example of an infectious pathogen working across large evolutionary distances is the bacterium Serratia marcescens. It is found in a variety of animal species, and also can be found free-living in water and soil. Its transmission from human sewage has resulted in the decimation of Caribbean elkhorn coral. "The distance between humans and corals emphasizes the possibility that certain organisms may prove pathogenic across a wide evolutionary divide," Chyba writes. Of course, the evolutionary divide between humans and coral would not be as wide a gulf as between any martian organisms and human beings. Yet one theory for the origin of life on Earth is that it was transferred here from Mars by meteorites. This variant of the "Panspermia" theory suggests that life on Earth and any life on Mars might be closely related. If Mars and Earth share the basis for life, this life would presumably have evolved well beyond the original form. Such a large evolutionary divide could provide protection from infection. But it could also mean that if infection does occur, it might be related closely enough to some Earth life to blaze through that population unchecked. Human infection is not the only concern of planetary protection. Life on Earth forms an interconnected, highly dependent web, so a pathogen affecting any life on Earth could have serious repercussions for the health and environment of our planet.

### Space exploration will cause superdiseases – Earth bacteria rapidly mutate

O’Neill, 08

[Ian O’Neill, 3-11-2008, “Germs Living In Space,” Universe Today, <http://www.universetoday.com/2008/03/11/germs-living-in-space-almost-three-times-as-likely-to-cause-disease/>]

In one experiment on board Space Shuttle Endeavor (STS-123) launched early this morning (at 2:28 am EST), the reaction of terrestrial bacteria to zero-G will be tested. When compared with test bacteria bred here on Earth, previous studies suggest that germs bred in space are far more potent and are more likely to cause illness to people in space. The Endeavor mission will continue this experiment in the aim to find some way to prevent these microscopic astronauts causing too many problems to the continuing missions on board the International Space Station and future space tourism companies. Until a solution is found, don't go ordering fish off the in-flight menu on your next spaceship ride… Wherever humans go, a whole zoo of bacteria will follow. Most of the bacteria hitching a ride on our skin and inside our bodies live in symbiosis with us, but occasionally problem bugs like salmonella or Escherichia coli (E-coli) can get out of control, causing problems such as common food poisoning to more serious, life-threatening ailments such as tetanus, diphtheria, syphilis, cholera… (the list is pretty long.) So, as humans venture into space, it is inevitable that bacteria will come too - the whole symbiotic and parasitic jungle - exploring space with us. Bacteria will mutate, often very quickly, adapting to the environment surrounding the little microbes. Mutation is the difference between a bacteria being harmless to becoming deadly. Mutations help bacteria to survive and as an example, they can become antibiotic resistant. This is a huge problem in places where antibiotics are used very regularly (such as hospitals); genetic information is passed down the generations of bacteria (often doubling in population in a matter of minutes). If just one microbe has the genetic ability to survive a type of antibiotic, its number will multiply, creating a strain of "superbug" that can avoid being killed by antibiotics - one of the most basic examples of "natural selection". Methicillin-resistant Staphylococcus aureus (MRSA) is one particular nasty strain of the otherwise benign Staphylococcus genus which has mutated to resist commonly used antibiotics.

## Environment

### Space exploration it destroys the ozone later and the environment causing extinction

Chistyakova ’99

[Ekaterina Chistyakova, “Space Activity Endangers Biosphere”, ENS, April 21, <http://www.climateark.org/articles/1999/nearspac.htm>]

At the same time, space activity has a negative side to which not enough attention is paid. The state-of-the-art astronautics is environmentally unfriendly. It is maintained at the expense of barbarian, free use of unrecoverable natural resources, has a harmful impact on human health. This is the subject of the world's first analytical review "Environmental Hazards of Space Activity," presented recently by the Center for Russian Environmental Policy. The authors are Professor Mikhail Vlasov and astronaut-tester Sergey Krichevsky, now a reserve lieutenant colonel. The main conclusion of the book is that the man's activity in space has already led to disturbance of important natural characteristics of near space especially the energy balance and chemical composition of the upper atmosphere. If the current trend in developing space continues, in 20 to 30 years the existence of humankind and biosphere of the Earth will be endangered, Vlasov and Krichevsky warn. Information given in the book casts doubt on the view that the ozone layer is destroyed due to industrial ejection of ozone-destructive substances alone. Instead, the authors conclude, the major part of the depletion of the Earth's protective ozone shield is due to disturbance of near space as a result of space activity. Some of the global climatic changes observed in recent decades can be attributed to the impact of space activity as well.

## Militarization

### Space travel and colonization facilitates the militarization of space

Gagnon ’02

[Bruce Gagnon, coordinator of the Global Network Against Weapons & Nuclear Power in Space, “Space Exploration and Exploitation What kind of seed will we take from Earth?”, http://www.space4peace.org/articles/scandm.htm]

Nuclear power has become the power source of choice for NASA. Not only has NASA, and the Department of Energy (DoE), been promoting the use of nuclear power for on-board generators for deep space missions, but there is growing evidence that the space exploration and exploitation "adventure" will soon be awash in nuclear materials. According to Marshall Savage, the founder of the First Millennial Foundation (a pro-space colonization organization), "We really can’t mess up the Moon, either by mining it or building nuclear power plants. We can ruthlessly strip mine the surface of the Moon for centuries and it will be hard to tell we’ve even been there. There is no reason why we cannot build nuclear power plants on the Moon’s surface with impunity. Equipped with limitless nuclear, the lunar civilization will be capable of prodigious rates of economic growth." One cannot help but wonder what would happen to the poor Moon miner who becomes contaminated by radioactive dust after removing his irradiated space suit inside the lunar habitat. There is a growing call as well for the nuclear rocket to Mars. Already work is underway on the project at Los Alamos Labs in New Mexico and at the University of Florida Nuclear Engineering Department. In his Space News op-ed called Nuclear Propulsion to Mars, aerospace industry engineer Robert Kleinberger states that the nuclear rocket "could be used for defending U.S. space systems, reboosting the International Space Station, returning to the Moon for exploration or mining, and for exploring and opening the inner solar system to scientific research. The nuclear vehicle could even assist in the eventual colonization of Mars." In fact, there is such a growing demand for plutonium for "space projects" that the DoE is now undertaking an internal review of its production process. The DoE is considering re-opening plutonium processing lines at such facilities as Hanford in Washington state, a site that has created enormous contamination during its years of bomb making.

### Efforts for colonization and exploration will advance military aims

Gagnon ’09

[Bruce K. Gagnon is the coordinator of the Global Network Against Weapons & Nuclear Power in Space and a contributor to Foreign Policy In Focus, “Arms Race in Space”, March 19, http://www.fpif.org/fpiftxt/5971]

NASA was created as a civilian agency with a mission to do peaceful space exploration. But the growing influence of the military industrial complex has rubbed out the line between civilian and military programs.  When George W. Bush appointed former Secretary of the Navy Sean O'Keefe to head NASA in late 2001, the new space agency director announced that all NASA missions in the future would be "dual use." This meant that every NASA space launch would be both military and civilian at the same time. The military would ride the NASA Trojan horse and accelerate space weapons development without the public's knowledge. NASA would expand space nuclear power systems to help create new designs for weapons propulsion. Permanent, nuclear-powered bases on the moon and Mars would give the United States a leg up in the race for control of those planetary bodies. The international competition for resource extraction in space (helium-3 on the moon) is now full on.  NASA's job is to do the research and development, and then be ready to turn everything over to private corporate interests once the technology has been sorted out. The taxpayers will fund the technology investment program. The military will create the space weapons systems to ensure free corporate access to the space highways of the future. The aerospace industry is already making record profits from the ever-escalating cost of space technology systems. Virtually every system now under development is well over budget. Just one illustration is NASA's International Space Station. Originally slated to cost the taxpayers $10 billion, the project has now grown to $100 billion and is not yet finished.

## Ozone

### Space launches hurt the ozone – they create chlorine

Aftergood ’91

[Steven Aftergood, Senior Research Analyst at Federation of American Scientists, 9-7-1991, “Poisoned Plumes,” New Scientists, http://space.newscientist.com/channel/space-tech/space-shuttle/mg13117854.400]

More recently, concern about depletion of the ozone layer has stimulated renewed interest in the role played by exhaust from solid-rocket boosters. Ozone occurs naturally in the stratosphere, the layer of the atmosphere that begins at an altitude of between 8 and 16 kilometres, depending on latitude, and extends up to about 50 kilometres. The ozone layer absorbs the bands of ultraviolet radiation that can induce skin cancer and decrease photosynthesis in plants. Free chlorine atoms, released when hydrogen chloride from the exhaust reacts with naturally occurring hydroxyl radicals, constitute the principal danger to the ozone layer from rocket launches**.** The chlorine acts as a catalyst in the breakdown of ozone and, as a catalyst, it is not consumed by the reaction. It becomes part of a continuous cycle of destructive reactions that are still not fully understood. The cycles continue until the chlorine is trapped in a chemical or physical 'sink'. Hydrogen chloride itself is considered a temporary chemical sink for chlorine, but while the hydrogen chloride remains in the stratosphere, it is also a source of free chlorine. Physical sinks include aerosols, which adsorb chlorine and eventually diffuse out of the stratosphere.

### Ozone depletion causes complete extinction – scientific consensus is on our side.

Greenpeace, ‘95

[Full of Holes: Montreal Protocol and the Continuing Destruction of the Ozone Layer, http://archive.greenpeace.org/ozone/holes/holebg.html]

When chemists Sherwood Rowland and Mario Molina first postulated a link between chlorofluorocarbons and ozone layer depletion in 1974, the news was greeted with scepticism, but taken seriously nonetheless. The vast majority of credible scientists have since confirmed this hypothesis. The ozone layer around the Earth shields us all from harmful ultraviolet radiation from the sun. Without the ozone layer, life on earth would not exist**.** Exposure to increased levels of ultraviolet radiation can cause cataracts, skin cancer, and immune system suppression in humans as well as innumerable effects on other living systems. This is why Rowland's and Molina's theory was taken so seriously, so quickly - the stakes are literally the continuation of life on earth.

## War

### Colonization leads to space wars

Caldicott ’02

[Helen, Australian physician, author, and anti-nuclear advocate who has founded several associations dedicated to opposing the use of depleted uranium munitions, nuclear weapons, nuclear weapons proliferation, war and military action in general, “The New Nuclear Danger: George W. Bush's Military-Industrial Complex”]

Military space forces is a recipe for space-based warfare. It is simultaneously belligerent, nationalistic, provocative, well researched, and extremely scary. And it forms the basis for much official US p9olicy regarding the militarization of space. Among other topics, Collins discusses the fact that the moon in particular is rich in many natural resources that could be mined and brought back to earth for economic returns. He says that parties "that hope to satisfy economic interests in space must maintain ready access to resources on the moon and beyond, despite opposition if necessary, and perhaps deny access to competitors who seek monopolies He warns, however, that rival forces may lie in wait to hijack shipments on return from the moon. Obviously, if America invests huge capital in mining the moon, it must then defend its investments. Antisatellite warfare is analyzed. Collins's thinking is dangerous, advocating "soft kill" weapons that penetrate target surfaces without impairing them, and that can selectively disorient, damage, or destroy human beings as well as damage sensitive-equipment within--s-a,etl1tes-orspace-stattonSo-He--' also suggests jamming communication systems, spray-painting satel- ' lite camera lenses, focusing blinding light onto laser reflectors, or the surreptitious introduction of foreign objects into booster fuel of enemy rockets, and he discusses the merits of laser-beam weapons, and of particle beam weapons consisting of highly energetic protons, neutrons, electrons, or hydrogen atoms. Be talks of the use of nuclear weapons in space and of the efficacy of various forms of nuclear radiation, which, he says, is unimpeded~ because there is no atmosphere in space, and could therefore cover much more space volume than if used in the atmosphere near the' earth's, surface. It would work especially well against targets in low space orbit. However, he concedes that nuclear radiation cannot distinguish friend from foe. Electromagnetic pulse from nuclear explosions could "wound" users as well as the-intended victims. Collins explores war on the moon·, saying that strike forces there could use the full range of offensive maneuvers that are now used on earth. Space mines could be easily positioned. He describes how A space-based "civilian" vehicles could be used surreptitiously for military activities. He- says that lasers, sensors, and telecommunication devices can be concealed within satellites that appear perfectly harmless. Weapons could "piggyback" on satellites that are ostensibly for reconnaissance and surveillance. He is particularly keen on biological and chemical warfare in space, saying that self-contained biospheres like a space station offer a “superlative” environment for these sort of attack because they rely on a closed-circuit life-support system that continually recirulates air and water. Clandestine agents could dispense into space stations lethal or incapacitating chemical or biological agents, which- because they are colorless and odorless – are impossible to spot before symptoms appear. 116

### Space colonization doesn’t solve war – replicates the earths problems

Lamb 01

[David Lamb, honorary reader in philosophy and bioethics at the University of Birmingham, 2001, The Search for Extraterrestrial Intelligence, p. 117]

2 There is also an objection that human efforts to transform Earth have resulted in a catalogue of man-made disasters and unforeseen catastrophes. How much worse would it be if we started in an environment of which we know less than we do of Earth? Something might go wrong, leaving things even worse off with regard to the planet’s ability to foster life. There might even be repercussions on Earth. 3 The fact that terraforming is a long-term project would act as a disincentive to governments with regard to investment. Moreover, scarce human talent and resources would be diverted from worthy projects on Earth, such as social and environmental problems. 4 If terraforming and hence colonization are successful, they would not divert resources away from warfare: on the contrary, wars would very likely be fought over the new territory; and military uses of the new colonies would simply extend the arena for socio-political problems.

## Colonization Impossible – Resources/Environment

### Lack of resources and poor environment makes colonization impossible

Deen ’08

[Munim Deen, “Column: Space Exploration Yields Few Results”, Oklahoma Daily, Nov 18, http://www.cbsnews.com/stories/2008/11/19/politics/uwire/main4615911.shtml]

The so-called space race first started in the 1950s as a pitched competition between the United States and the Soviet Union. As in all things during the Cold War, each superpower tried to outdo the other. By the 1960s, the United States was a bona fide space power, along with Russia. The space race instilled and embodied immense national pride in both nations and wsometimes even global pride among mankind. The 1969 lunar landing was indeed a giant leap for humanity. But what good did it really do? Not that much, honestly. The six NASA moon landings between 1969 and 1972 didnt directly improve anything tangibly. No magic source of perpetual energy was found. The lunar rocks did not yield the cure for the common cold or for any other earthly ailment. There was no breakthrough of any kind on earth that came from the moon landings. To be fair, some of the research and developmental work that went into making the moon landings happen did have some benefit in the real world. However, the most lasting and most recognized example of this has been a pen that can write upside down and under water. Infomercials and magazine ads still tout them as having flown into space . Can you think of anything else useful that we use regularly that came from the moon missions? I cant. The very fact that the moon missions were stopped after 1972 shows that there were little long-term benefits to be had from these missions. After the moon was conquered, attention turned to living in space. With this came the concept of the space station, in which astronauts could live for extended periods of time. Astronauts generally conducted scientific studies during their time up there. Scientific study is always good as long as it produces valid results, positive or negative. However, because of the particular environment of the space station, studies conducted in space are valid only in space. An experiment conducted in zero-gravity conditions produces results that are only applicable in zero-gravity conditions and therefore not valid on Earth. Considering thats pretty much the only place humans can live, the experiments, and therefore the missions, and the space stations themselves, are really of no direct benefit to earthlings. In todays world, there are not just two space powers. Several countries have conducted missions into space. The European Space Agency, Japan, India and China all have built up a long record of space missions. In addition, almost a dozen other smaller national agencies conduct minor space-related operations. Combined, the worlds space agencies have approved budgets of about $50 billion. NASA alone spends about $17 billion annually. While some of these missions involve launching or repairing useful technology such as communications and weather satellites or pertinent atmospheric and weather conditions, the majority of the missions involve scientific experiments whose results have little bearing on earth because the experiments are conducted in environments that are nothing like earth. Some defend space experiments as being necessary precursors to mans eventual colonization of other planets. I dont buy it. We have yet to find a planet remotely capable of sustaining humanity. Even the vaunted efforts to find evidence of life and water on Mars have come up short. The best evidence of life put forth thus far were fossilized remains of what could be bacteria. Most scientists, particularly bacterial microbiologists, describe this evidence as shaky at best. Mars has no magnetic field. This mens that Martian atmosphere is unable to stop solar wind and radiation from interacting directly with surface soil. This would make life as we know it on Earth impossible. NASAs earliest projections put a manned Mars mission no earlier than 2037. Because of Martian conditions, the mission would essentially be akin to an extended stay on a space station, but with gravity. A fully contained inside and outside on any structure on Mars would be absolutely necessary. That would be true of any attempts to live on Mars, as well. So, in 40 years, astronauts may set foot on another planet. But theyll have to wear spacesuits wherever they go. Their base will have to be artificially maintained to simulate Earth because the planet theyll be on is by most estimates incapable of supporting life. And any attempt to build civilization there will have to start from the ground up. There is nothing there. Imagine the most desolate desert on Earth, make it very cold, take away all the oxygen, and make it impossible to leave without rockets. Thats what Mars is like right now. Even with all of Earths problems, who would seriously want to go to Mars? You cant live there, you cant make a living there, and if something goes wrong, you probably wouldnt be able to leave there in time. Thus, justifying space experiments as leading the way to Martian colonization does not sw4ay me because the entire premise of Martian colonization is flawed. Aside from satellites that actually have some benefit to Earth and humans, what good is space exploration really doing? Its eating up money in the billions while not really yielding anything of solid value. Were in the middle of global recession right now. There are millions of people starving to death on Earth. Millions more barely make a living due to abject poverty. People die of curable diseases every day. Even factoring out the costs associated with maintaining useful satellites, ending space exploration would save billions of dollars that could be used to improve life on Earth. What good was a man taking a step on the moon when millions of malnourished children die before taking their first step on Earth? Instead of throwing money at outer space, lets make use of it on Earth, where it can actually do good for the people who live here.

## Colonization Impossible – Planets

### Space colonization impossible – the land is uninhabitable

Bell ’05

[Jeffrey F. Bell is a former space scientist and recovering pro-space activist, “The Dream Palace Of The Space Cadets”, Nov 24, <http://www.spacedaily.com/news/oped-05zzb.html>]

Unfortunately, the new generation of organizations like the Space Frontier Foundation and the Mars Society and even the staid National Space Society mostly lack something that the old L-5 Society and Space Studies Institute had: technical sophistication. Just look at Bob Zubrin's vision of Mars colonization. Nowhere in Zubrin's books is there the kind of detailed engineering design for Mars colonies that the O'Neillians produced for their L-5 colonies. The problems of sustaining human life on Mars are dismissed after superficial discussions devoid of any hard numbers. And there are obvious problems with colonizing Mars. The first one is that it gets incredibly cold there - probably down to -130C on winter nights. Every robot Mars probe has used small slugs of Pu-238 to keep its batteries from freezing at night. And there is air on Mars - not enough to breathe, but enough to conduct heat. The Martian regolith will not be the perfect insulator that the Moon's is. Thermal control on Mars will not be simply a matter of adding layers of aluminum foil to reflect the sun. Bases and rovers will need to be insulated and heated. And how do you keep a human in a spacesuit warm in this climate? And Mars has permafrost - at least in some places and those places are the ones to colonize. How do we keep the heat leaking out from our habitat or farm greenhouse into the ground from heating up the ice and melting or subliming it away? This is a severe problem in permafrost areas of the Earth - how bad will it be on Mars? Zubrin even proposes underground habitats. These will be in direct contact with the cold subsoil or bedrock which will suck heat out at a rapid rate. If Gerard O'Neill was still alive and advocating Mars colonies, he would be doing some basic thermal transfer calculations to see how bad the Martian cold problem really is. He would be figuring out how big a fission reactor to send along to keep the colony warm and how often its core will need to be replenished by fresh U-235 from Earth. He would even have a rough number for the amount of Pu-238 everyone will have to carry in their spacesuit backpacks. Bob Zubrin is perfectly competent to do these calculations since he has a Ph.D. in nuclear engineering. But you never see this kind of hard engineering analysis from the Mars Society. Instead, we get propaganda stunts like the Devon Island "Mars Base" which is only manned during the peak of the Arctic summer when the climate is tropical compared with that of Mars. Another thing you never see from the Mars Society is a realistic discussion of what would happen to the human body in the low Martian gravity. Zubrin has discussed at length the need for artificial spin gravity on the 6 month trip to Mars. But he assumes that the problem ends once the astronauts land on Mars. The problem of bone loss in a 0.38g field on Mars for 18 months is completely ignored. When I read Zubrin's book The Case For Mars, I was so intrigued by this surprising omission that I consulted a friend who is a space medic at JSC. He tells me that this issue was once discussed at a conference of medical doctors who had actually worked with the long-term residents of Mir and ISS. NONE of these experts thought that humans could adapt permanently to Mars gravity!

### Space colonization is impossible – distances are too large and planets are inhospitable

Robertson ’06

[Donald F. Robertson, freelance space 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-boggingly 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.

## Doesn’t Solve – Too Slow

### Can’t get off the Earth fast enough

Prantzos 2k

[Nikos Prantzos, nuclear astrophysicist in the Institut d'Astrophysique de Paris, France Our Cosmic Future, 2000 p. 84]

Not only science fiction readers, but also quite a few scientists are dreaming of ways to bring life to other planets in the Solar System, and in particular to Mars. Their motivation is certainly not a solution to overpopulation problems on Earth. Even though Mars has an area equal to all the land area on Earth, it would be impossible to transport any significant fraction of the population. In order to send a hundred million people (which constitutes a negligible fraction of the present population) , in let us say one century, three thousand departures would have to be organised each day. Therefore, the fascination for terraforming Mars is more closely related to the new frontier it represents. Conquest of such a frontier would help our civilisation to release its creative potential and find new vitality. Some have compared the situation with the American frontier, several centuries ago.

### Space exploration would take thousands of years, even if it succeeds

Robertson ’06

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

Dangerous it will be. Detailed exploration**,** let alone settlement, of nearby worlds will be the single most difficult task humanity has ever tackled. Most likely, it will take many hundreds, or even thousands, of years. Our first attempts to establish a base on Earth's Moon or Mars may well fail. As on the oceans, many people will die: we cannot insist on levels of safety that make the exercise technically impractical or unaffordable.

## Doesn’t Solve – Space Debris

### Increasing Space Debris could make future shuttle missions extremely dangerous or impossible

Hsu 10

(Jeremy Hsu, senior writer on staff with [TechMediaNetwork](http://www.techmedianetwork.com/). wrote stories on [InnovationNewsDaily](http://www.innovationnewsdaily.com/), and wrote many articles for [LiveScience](http://www.livescience.com/) and [SPACE.com](http://www.space.com/). master’s in journalism is from NYU’s [Science, Health and Environmental Reporting Program](http://journalism.nyu.edu/sherp/). previously freelanced for Popular Science, Astrobiology Magazine, Reader’s Digest Asia, Scientific American, Scientific American Mind, IEEE Spectrum and other publications. “Space Junk as Big a Threat as Space Weapons Agency Warns” http://www.foxnews.com/scitech/2010/12/23/space-junk-rivals-weapons-major-threat/)

What began as a minor trash problem in space has now developed into a full-blown threat. A recent space security report put the problem of debris on equal footing with weapons as a threat to the future use of space. Hundreds of thousands of pieces of space junk -- including broken satellites, discarded rocket stages and lost spacewalker tools -- now crowd the corridors of Earth orbit. These objects could do serious damage to working spacecraft if they were to hit them, and might even pose a risk to people and property on the ground if they fall back to Earth and are large enough to survive re-entering the atmosphere.  More than 21,000 objects larger than 4 inches (10 centimeters) in diameter are being tracked by the Department of Defense's U.S. Space Surveillance Network. Estimates suggest there are more than 300,000 objects larger than 0.4 inches (1 cm), not including several million smaller pieces.

### Space launches will increase space debris

Williams 10

(Lynda Williams, M.S. in Physics and a physics faculty member at Santa Rose Junior College, “Irrational Dreams of Space Colonization”, Peace Review: A Journal of Social Justice, 22.1, Spring, pg 7)

Since the space age began, the orbital environment around Earth has become crowded 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 past launches and space missions, orbit the Earth at the same distance as satellites, putting them at risk of collision. Every time a space mission is launched from Earth, debris from the rocket stages is added to 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 percent. The United States followed suit a few months later when, in February 2008, it used its ship-based antiballistic missile system to destroy one of its own satellites that had reportedly gone out of control. 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 United States and Israel. How can we hope to pursue peaceful and environmentally sound 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 such a thing as a space war were ever to occur, then space would become too trashed for further launches to take place without a great risk of destruction.

## A2: Space Prevents Extinction

### Space doesn’t prevent extinction – space only embraces a regressive mindset that stops reforms to prevent extinction level events

Jozef ’01

[Jozef Hand-Boniakowski, Ph.D, “THE STATE OF HUMANITY”, November, http://www.metaphoria.org/ac4t0111.html]

Human optimism is tempered by minds such as Stephen Hawking's who states, "I am afraid the atmosphere might get hotter and hotter until it will be like Venus with boiling sulfuric acid...I am worried about the greenhouse effect." Hawking's projection optimistically foresees the extinction of humanity within a millennium. I give it much less time than that. As a solution, Hawking suggests human transplantation into space where "at least it would ensure that people don't become extinct." Hawking does not offer how to prevent extinction, rather how to circumvent or cheat it. In my mind, this is analogous to the regressive mindset that ignores the pursuit of difficult solutions in favor of quick, short-sighted and often self-fulfilling prophetic courses of action. No need, for example, to eliminate the causes of war when bigger wars and bigger weapons of war (as the thinking goes) can lead to victory in those wars. No need to resolve the issues that lead to the terror of September 11, when reciprocal and bigger terror (under any name but) can be used in victorious vengeance.