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***NEGATIVE

Launches DA – 1NC

A. Uniqueness – Space Debris is reaching a critical mass now

Doctorow 11 – Former European EFF Coordinator
Cory, former European Affairs Coordinator for the Electronic Frontier Foundation, 5-2011, "Space debris to go critical, reduce all satellites to junk?," http://boingboing.net/2011/05/11/space-debris-to-go-c.html

The amount of debris in the orbits used by our communications and weather satellites is building toward critical mass, a point of no return in which debris starts to smash into active satellites, turning them into more debris that smashes more sats, and so on. There's no cost-effective solution to the space-junk problem and none are on the horizon. Marshall Kaplan (Johns Hopkins Space Department) believes that it's inevitable that all the satellites in use will be percussively decommissioned and their orbits will be unusable. He speculates that we'll replace them with lower orbit satellite constellations that relay to one another in order to achieve the coverage attained by today's high-orbit sats. Here's Gen. William Shelton, commander of USAF Space Command: "The traffic is increasing. We've now got over 50 nations that are participants in the space environment," Shelton said last month during the Space Foundation's 27th National Space Symposium. Given existing space situational awareness capabilities, over 20,000 objects are now tracked.

B. Launches leave behind debris creating damage to other space assets

Australian Space Academy 7
"Briefing on Space Law," ASA, http://www.spaceacademy.net.au/spacelaw/spacelaw.htm

Since the start of the space age the problem of unwanted material or debris in space has been growing. **Each space launch** usually leaves considerably more than the desired satellite in orbit. Expended rocket boosters, attachment bolts, shields, solid rocket motor slag, and innumerable other items are placed into Earth orbit. Some of these decay (lose altitude) and burn up in the atmosphere - some are large enough to escape complete destruction by ablation and then may pose a potential hazard to life and property on the Earth's surface. In space, materials degrade and detach from satellites; stored energy in the form of unspent fuel and battery vapours may cause explosive rupture and fragmentation of space objects. Collisions between space objects at hypervelocity not only causes damage, but also creates thousands of other space objects (ie fragments of the original objects) which themselves then pose collision hazards to active spacecraft.

C. Increased debris collapses every major economic sector

Ansdell 10 – PhD Candidate @ GWU
Megan Ansdell, Graduate Student @ GWU, 2010, "Active Space Debris Removal," Princeton Publications, http://www.princeton.edu/jpia/past-issues-1/2010/Space-Debris-Removal.pdf

Although the probability of catastrophic collisions caused by space debris has increased over the years, it remains relatively low and there have been only four known collisions between objects larger than ten centimeters (Wright 2009, 6). Nevertheless, the real concern is the predicted runaway growth of space debris over the coming decades. Such uncontrolled growth would prohibit the ability of satellites to provide their services, many of which are now widely used by the global community. Indeed, in a testimony to Congress for a hearing on "Keeping the Space Environment Safe for Civil and Commercial Uses," the Director of the Space Policy Institute at George Washington University, Dr. Scott Pace, stated that, …space systems such as satellite communications, environmental monitoring, and global navigation satellite systems are crucial to the productivity of many types of national and international infrastructures such as air, sea, and highway transportation, oil and gas pipelines, financial networks, and global communications (Pace 2009).

Launches DA – 1NC

Economic collapse risks nuclear war

Harris and Burrows 9 PhD European History @ Cambridge, counselor in the National Intelligence Council (NIC) & member of the NIC's Long Range Analysis Unit
Mathew and Jennifer "Revisiting the Future: Geopolitical Effects of the Financial Crisis"
http://www.ciaonet.org/journals/twq/v32i2/f_0016178_13952.pdf Increased Potential for Global Conflict

Of course, the report encompasses more than economics and indeed believes the future is likely to be the result of a number of intersecting and interlocking forces. With so many possible permutations of outcomes, each with ample Revisiting the Future opportunity for unintended consequences, there is a growing sense of insecurity. Even so, history may be more instructive than ever. While we continue to believe that the Great Depression is not likely to be repeated, the lessons to be drawn from that period include the harmful effects on fledgling democracies and multiethnic societies (think Central Europe in 1920s and 1930s) and on the sustainability of multilateral institutions (think League of Nations in the same period). There is no reason to think that this would not be true in the twenty-first as much as in the twentieth century. For that reason, the ways in which the potential for greater conflict could grow would seem to be even more apt in a constantly volatile economic environment as they would be if change would be steadier. In surveying those risks, the report stressed the likelihood that terrorism and nonproliferation will remain priorities even as resource issues move up on the international agenda. Terrorism's appeal will decline if economic growth continues in the Middle East and youth unemployment is reduced. For those terrorist groups that remain active in 2025, however, the diffusion of technologies and scientific knowledge will place some of the world's most dangerous capabilities within their reach. Terrorist groups in 2025 will likely be a combination of descendants of long established groups_inheriting organizational structures, command and control processes, and training procedures necessary to conduct sophisticated attacks_and newly emergent collections of the angry and disenfranchised that become self-radicalized, particularly in the absence of economic outlets that would become narrower in an economic downturn. The most dangerous casualty of any economically-induced drawdown of U.S. military presence would almost certainly be the Middle East. Although Iran's acquisition of nuclear weapons is not inevitable, worries about a nuclear-armed Iran could lead states in the region to develop new security arrangements with external powers, acquire additional weapons, and consider pursuing their own nuclear ambitions. It is not clear that the type of stable deterrent relationship that existed between the great powers for most of the Cold War would emerge naturally in the Middle East with a nuclear Iran. Episodes of low intensity conflict and terrorism taking place under a nuclear umbrella could lead to an unintended escalation and broader conflict if clear red lines between those states involved are not well established. The close proximity of potential nuclear rivals combined with underdeveloped surveillance capabilities and mobile dual-capable Iranian missile systems also will produce inherent difficulties in achieving reliable indications and warning of an impending nuclear attack. The lack of strategic depth in neighboring states like Israel, short warning and missile flight times, and uncertainty of Iranian intentions may place more focus on preemption rather than defense, potentially leading to escalating crises. 36 Types of conflict that the world continues to experience, such as over resources, could reemerge, particularly if protectionism grows and there is a resort to neo-mercantilist practices. Perceptions of renewed energy scarcity will drive countries to take actions to assure their future access to energy supplies. In the worst case, this could result in interstate conflicts if government leaders deem assured access to energy resources, for example, to be essential for maintaining domestic stability and the survival of their regime. Even actions short of war, however, will have important geopolitical implications. Maritime security concerns are providing a rationale for naval buildups and modernization efforts, such as China's and India's development of blue water naval capabilities. If the fiscal stimulus focus for these countries indeed turns inward, one of the most obvious funding targets may be military. Buildup of regional naval capabilities could lead to increased tensions, rivalries, and counterbalancing moves, but it also will create opportunities for multinational cooperation in protecting critical sea lanes. With water also becoming scarcer in Asia and the Middle East, cooperation to manage changing water resources is likely to be increasingly difficult both within and between states in a more dog-eat-dog world.

Uniqueness

Near tipping point

Dunstan, et al, 9

James Dunstan practices space and technology law at Garvey Schubert Barer. Berin Szoka is a senior fellow at The Progress & Freedom Foundation, a director of the Space Frontier Foundation 9and member of the FAA's Commercial Space Transportation Advisory Committee, 12.17.09, (Forbes, Beware Of Space Junk, http://www.forbes.com/2009/12/17/space-junk-environment-global-opinions-contributors-berin-szoka-james-dunstan.html)

As world leaders meet in Copenhagen to consider drastic carbon emission restrictions that could require large-scale de-industrialization, experts gathered last week just outside Washington, D.C., to discuss another environmental problem: space junk. Unlike with climate change, there's no difference of scientific opinion about this problem--orbital debris counts increased 13% in 2009 alone, with the catalog of tracked objects swelling to 20,000, and estimates of over 300,000 objects in total; most too small to see and all racing around the Earth at over 17,500 miles per hour. Those are speeding bullets, some the size of school buses, and all capable of knocking out a satellite or manned vehicle. At stake is much more than the $200 billion a year satellite and launch industries and jobs that depend on them. Satellites connect the remotest locations in the world; guide us down unfamiliar roads; allow Internet users to view their homes from space; discourage war by making it impossible to hide armies on another country's borders; are utterly indispensable to American troops in the field; and play a critical role in monitoring climate change and other environmental problems. Orbital debris could block all these benefits for centuries and prevent us from developing clean energy sources like space solar power satellites, exploring our Solar System and someday making humanity a multi-planetary civilization capable of surviving true climatic catastrophes. The engineering wizards who have fueled the Information Revolution through the use of satellites as communications and information-gathering tools also overlooked the pollution they were causing. They operated under the "Big Sky" theory: Space is so vast, you don't have to worry about cleaning up after yourself. They were wrong. Just last February, two satellites collided for the first time, creating over 1,500 new pieces of junk. Many experts believe that we are nearing the "tipping point" where these collisions will cascade, making many orbits unusable.

Each new launch risks space debris

Jaggard 10 – National Geographic

Victoria Jaggard, National Geographic News Writer, 3-28-2010, "Tiny Solar Sail Pitched to Clean Up Space Junk," National Geographic, http://newswatch.nationalgeographic.com/2010/03/28/tiny_solar_sail_pitched_to_cle/

Collisions with even a small speck can damage working satellites or harm spacewalkers. And larger pieces left up there will eventually come down, creating potential hazards if they do not completely disintegrate during reentry. Not to mention that space junk is only increasing with each new launch—some experts say at a rate of 5 percent a year. That much clutter invariably blocks communications signals, making it harder to get reliable data streams from satellites surrounded by junk.

Link – Generic

Every new launch increases debris
AJC 6
Atlanta Journal-Constitution, 2-27-2006, "Final frontier littered with junk," Atlanta-Journal Constitution, pg. A6

In 2002, when U.S. shuttle astronauts changed out the solar panels on the Hubble Space Telescope and returned them to Earth for examination, engineers found them riddled with thousands of impact craters including 174 punctures none of them bigger than a BB. A speeding paint chip gouged a pit in one of the space shuttle's windows in 1983. Gravity, of course, eventually brings most of the junk back to terra firma. But each new launch adds to the problem. And as things collide and proliferate, space junk is becoming a self-renewing nuisance.

We are at critical mass – new launches create a pollution cloud that limits any economic benefit from space
Sénéchal 7 – PhD from Columbia
Thierry Sénéchal, PhD from Columbia University, 2007, "Space Debris Pollution: A Convention Proposal," Protocol for a Space Debris Risk and Liability Convention, http://www.pon.org/downloads/ien16.2.Senechal.pdf

The time is right for addressing the problem posed by orbital debris and realizing that, if we fail to do so, there will be an increasing risk to continued reliable use of space-based services and operations as well as to the safety of persons and property in space. We have reached a critical threshold at which the density of debris at certain altitudes is high enough to guarantee collisions, thus resulting in increased fragments. In a scenario in which **space launches are more frequent**, it is likely that we will create a self-sustaining, semi-permanent cloud of orbital –pollution that threatens all future commercial and exploration activities within certain altitude ranges. The debris and the liability it may cause may also poison relations between major powers.

Link – SPS

One SPS system requires at least 80 launches—the entire system takes 1.6 million launches

(80 launches * 20,000 satellites = 1.6 million launches)

Rapp, 7 – PhD in chemical physics from University of California (Berkeley), Research Professor, Viterbi School of Engineering, University of Southern California, former Senior Research Scientist and Division Chief Technologist at JPL independent contractor, BS in chemical engineering from Cooper Union, MS in chemical engineering from Princeton
[2/18, Donald, "Assessment of Concepts for Utilizing Lunar Resources", http://home.earthlink.net/~drdrapp/Space.solar.power.pdf]

While the NASA Reference System [S8] conjectured use of a launch vehicle with a payload of 424 tonnes to LEO, and a Japanese study utilized a launch vehicle with a payload to LEO of 500 tonnes, these launch vehicles are so far beyond present capabilities that they tax the credulity of this writer. The HLLV being developed for human missions to the Moon and Mars can lift 125 tonnes to LEO, and this appears to be about as large a launch vehicle as NASA can deal with for at least the next three or four decades. Hence delivery of elements for one 1 GW SPS to LEO would require at least 80 launches with such a 125 tonne (to LEO) HLLV if the SPS mass can be limited to 10,000 tonnes, and possibly a great deal more than 80 launches if the SPS mass is considerably greater. It is not clear how frequently such huge launches can be implemented from ground facilities but it seems likely (as a guess) that they might be limited to an extreme upper limit of perhaps one launch per month per launch site. If there were say, three gigantic launch sites capable of sending up HLLVs, the entire set of > 80 launches for one SPS could be carried out in a little over two years. For 5 GW systems, the above figures can be multiplied by 5. All of the above pertains to one SPS. For an entire family of up to 20,000 satellites, it would take over 40,000 years to launch all the materiel to LEO at the rate of 3 HLLV launches per month.

Once SPS becomes cost-competitive it will require mass launches to be successful

Globus 8 – chairs the space settlement committee of the National Space Society
Al Globus, space expert, chairs the space settlement committee of the National Space Society, Spring 2008, "On The Moon," Ad Astra, http://www.nss.org/adastra/AdAstra-SBSP-2008.pdf

The cost issue is obvious: the cheapest launches today run thousands of dollars per kilogram to low Earth orbit (LEO), and we need to get the materials all the way to geosynchronous Earth orbit (GEO), which is significantly more expensive. The cost of launch goes up very quickly with the change in velocity, which is measured in meters per second (m/s). For each increase in velocity, additional fuel is needed, and even more fuel to lift the additional fuel, and heavier structures to hold the increased fuel, and even more fuel to lift the heavier structures … you get the idea. In any case, the velocity change from the ground to LEO is 8,600 m/s, but to GEO it's 12,400 m/s. Paul Werbos (see references on page 36) estimates that launch costs must come down to somewhere in the neighborhood of $450/kg for SSP to deliver energy near current prices (5-10 cents/kw-h). Fortunately, a high launch rate drives prices down, just as the mass-produced Ford Model-T was far cheaper than the previous generations of automobiles. The environmental impact of these launches is also a concern. Today there are few launches and, therefore, they have little effect on the atmosphere. What will happen when hundreds of thousands of rockets are dumping exhaust, even clean exhaust, into the upper atmosphere? If the vehicles are reusable, which we expect, they will use atmospheric drag to come down. The heat generated will create a number of chemical reactions in the upper atmosphere. What will be the effect? We don't know. There's reason to believe the problems won't be severe, but the studies conducted so far are inadequate.

Link – Constellation

New launch vehicles require thousands of launches per year

Globus 4 – PhD, chair of the space settlement committee of the National Space Society

Al Globus, chairs the space settlement committee of the National Space Society, 2004, "Contest-Driven Development of Orbital Tourist Vehicles," The Space Settlement, http://www.thespacesettlement.com/tourism4.html

Aircraft developed much more rapidly in their first 50 years. Hundreds of thousands, if not millions, of flights occurred in that period, but we have only launched a few thousand payloads into space. Substantial launch vehicle improvement may require tens of thousands of launches per year, not the current 50-70. Unfortunately, current markets for space launch: communications, Earth-observing, science, national prestige, etc. **cannot support hundreds of launches per year, let alone tens of thousands**. However, a new space market has recently been created: Space Adventures, Ltd. and the Russian space program have flown three tourists to the International Space Station (ISS), reputedly for about $20 million apiece. While this sum does not, apparently, cover the entire cost of the flight, there is an extra seat available on the spacecraft which must be flown periodically to the ISS to provide a functioning life boat capability. Although the ISS was originally intended to serve a host of space applications, it has not yet done so for a variety of reasons. Space tourism may be the legacy of the ISS, and it could be a very good one indeed. The only market for humans-in-space potentially capable of sustaining thousands of flights per year is tourism; particularly if the cost is in the $10-20,000 range and catastrophic failures are extremely rare. Published market research suggests that the space tourism market may become very large if the price is right. In 1994, Patrick Colins, et al.5 found that the Japanese market could provide about one million customers per year for space flight at about $10,000 per passenger. In 1996, Sven Abitzsch6 found that approximately 20% of the U.S., Canadian and German populations and nearly 40% of the Japanese population would be will to pay over $10,000 (actually, six months salary) for a trip into space. This represents nearly a hundred million people. In 1999, Oily Barrett7 found that 12% of United Kingdom residents, representing 3.5 million people, said they were willing to pay over $10,000 for a trip to space. In 2001, Crouch8 surveyed the literature and found that the global space tourism market is a strong function of price, with an annual demand of five million per year at $10,000 per flight and 170 at $500,00 per flight, representing annual markets of $5 billion and $85 million respectively. Table 1 shows Crouch's demand vs. price per ticket. If these projections are optimistic by no more than a factor of ten, and the price per ticket can be brought down to about $10,000, there is good reason to believe space tourism can support tens of thousands of launches per year, a rate comparable to the early decades of aviation.

Impacts – Debris

Space debris is harmful- jeopardizes spacecrafts, telescopes, astronauts

Blakey 09 – AIA President
Marion C. Blakey, AIA President & CEO, 6/15/2009 ['Space Debris: A Threat We Can't "Duck"', June 15, 2009, http://www.aia-aerospace.org/newsroom/opinion_articles/space_debris_a_threat_we_cant_duck/]

Shouting "Duck!" is not enough when it comes to protecting critical national space assets and the lives of astronauts who regularly face tens of thousands of pieces of unforgiving, high-velocity space debris — some as small as nuts and bolts, others as large as whole sections of abandoned spacecraft — during missions above the Earth. The U.S. Air Force Space Command tracks more than 18,000 pieces of debris traveling in low Earth orbit at warp speeds in excess of 17,000 miles per hour (27,200 kilometers per hour). And there are estimates of more than 600,000 smaller pieces or particles measuring 1 centimeter or larger that are too small to be seen by today's sensors but large enough to jeopardize spacewalking astronauts, spacecraft and orbiting telescopes. A few months ago, crew aboard the docked Space Shuttle Discovery and the international space station hastened to undertake emergency maneuvers to avoid a small piece of debris that put their lives and craft in danger. More recently, NASA's safety chief expressed concern that space junk was one of the chief perils for the Space Shuttle Atlantis and its crew during their mission to repair the Hubble Space Telescope. As the number of objects in space grows, risk to U.S. systems and our ability to operate in space increases. Space technology is a critical infrastructure that needs to be safeguarded through ample funding for space protection and situational awareness programs, better data sharing with our international allies and stronger government-industry partnerships on safety.

Impacts – Ozone

Increased space launches risks massive ozone destruction.
Union of Concerned Scientists 02
(The Science of Ozone Depletion "© Union of Concerned Scientists Page Last Revised: 10.24.2002", http://www.ucsusa.org/global_environment/archive/page.cfm?pageID=551)

The solid rocket strap-on motors used in the most powerful space launch systems -- the US space shuttle and the Titan IV, as well as the European Ariane V -- produce copious amounts of HCl and possibly other reactive chlorine-containing exhaust products. Since these strap-on motors burn well into the stratosphere, a significant fraction of their exhaust gases is deposited there. The plume from each launch causes a temporary "mini" ozone hole, although since space launch trajectories are slant paths, the ozone depletion is not stacked up over a single surface point. Current launch levels are so low that the stratospheric chlorine injected by space launches is only a few tenths of a percent of that due to halocarbon decomposition. But if more frequent space launches occur in the future, care should be taken to design more stratospherically benign rocket propulsion systems for both US and foreign launch systems.

Impacts – Ozone

Ozone destruction causes extinction

Goodwin 01 – University of Bristol
Anna Goodwin et al, students at the University of Bristol, 2001,
(http://www.priweb.org/ed/ICTHOL/ICTHOLrp/82rp.htm)

The Permian-Triassic boundary extinction was the largest extinction the world has ever experienced. About 90 percent of all species vanished in this mass extinction 250 million years ago. Approximately 85% of all marine species and 70% of all terrestrial species went extinct in less than one million years. By studying the species which became extinct at this time, the rate at which they became extinct, and the regions of the Earth in which the greatest extinction occurred, hypotheses about possible methods for the cause of extinction have been devised. There are many theories which have been developed to understand this historic mass extinction. One theory is the formation of a super-continent which caused a reduction of shallow continental shelves. Such a reduction in oceanic continental shelves would result in ecological competition for space, perhaps acting as an agent for extinction. However, although this is a viable theory, the formation of Pangaea and the ensuing destruction of the continental shelves occurred in the early and middle Permian, and mass extinction did not occur until the late Permian Impact from an extraterrestrial object is a common theory for the explanation of this extinction. The collision wasn't directly responsible for the extinction but rather triggered a series of events, such as massive volcanism and changes in ocean oxygen, sea level and climate. Those in turn led to species extinction on a wholesale level. The collision would either weaken or kill much of the life that thrived during this time. Dust clouds and CO_2 in the atmosphere would have caused major climate changes for the species and make it unsuitable for them to thrive. Evidence of increased levels of atmospheric levels of CO_2 exists in the fossil record. Glaciation is also a viable theory. Simultaneous glaciation events on the north and south poles could have caused rapid warming and severe climatic fluctuations. In temperate zones, there is evidence of significant cooling and drying in the sedimentological record, shown by thick sequences of dune sands and evaporites, while in the polar zones, glaciation was prominent. This caused severe climatic fluctuations around the globe, and is found by sediment record to be representative of when the Permian mass extinction occurred. Another theory is volcanism. Basaltic lava eruptions in Siberia were large and sent a quantity of sulphates into the atmosphere. Evidence in China supports that these volcanic eruptions may have been silica-rich, and thus explosive, a factor that would have produced large ash clouds around the world. The combination of sulphates in the atmosphere and the ejection of ash clouds may have lowered global climatic conditions. The age of the lava flows has also been dated to the interval in which the Permian mass extinction occurred. Other than changes in atmospheric carbon, no other evidence exists for this theory. Scientists are working to precisely date volcanic ash from Permian fossil reefs in Texas and China. This will provide a kind of timeline for the extinction to build a global database of extinction for the Permian Age, which species died, where they died and when they died. This too will help him determine the timing of the extinction in more detail and highlight gaps in the fossil record that may be distorting palaeontologists' understanding of when various organisms went extinct and how rapidly they did so. Lastly**,** a new theory has been proposed- the Supernova explosion. A supernova occurring 30 light years away from earth would release enough gamma radiation to destroy the ozone layer for several years. Subsequent exposure to direct ultra-violet radiation would weaken or kill nearly all existing species. Only those living deep in the ocean will be secured. Sediments contain records or short-term ozone destruction-large amounts of NOx gasses and C14 plus "global and atmospheric cooling." With sufficient destruction of the ozone layer, these problems could cause widespread destruction of life.

Impacts – Turns SPS Affirmative

Space debris prevents satellite transmission – means SPS can't solve

Jaggard 10 – National Geographic
Victoria Jaggard, National Geographic News Writer, 3-28-2010, "Tiny Solar Sail Pitched to Clean Up Space Junk," National Geographic, http://newswatch.nationalgeographic.com/2010/03/28/tiny_solar_sail_pitched_to_cle/

Collisions with even a small speck can damage working satellites or harm spacewalkers. And larger pieces left up there will eventually come down, creating potential hazards if they do not completely disintegrate during reentry. Not to mention that space junk is only increasing with each new launch—some experts say at a rate of 5 percent a year. That much clutter invariably blocks communications signals, making it harder to get reliable data streams from satellites surrounded by junk.

Impacts – Turns Constellation Affirmative

Debris clouds massively increase launch costs – makes space exploration impossible – turns the case
Broad 7 – Pulitzer Prize winning science writer
William Broad, "Orbiting Junk, Once a Nuisance, Is Now a Threat," 2-2007, NYT, Proquest

In an interview, Mr. Kessler called the worst-case scenario an exaggeration. "It's been overdone," he said of the syndrome. Still, he warned of an **economic barrier to space exploration** that could arise. To fight debris, he said, designers will have to give spacecraft more and more shielding, struggling to protect the craft from destruction and making them heavier and more costly in the process. At some point, he said, perhaps centuries from now, **the costs will outweigh the benefits.** "It gets more and more expensive," he said. "Sooner or later it gets **too expensive** to do business in space."

Impacts – Turns Mining Affirmative

Debris turns mining

Bird 3 – Professor of Legal Studies @ Seton Hall
Robert Bird, Professor of Legal Studies @ Seton Hall, 2003, "SPECIAL ISSUE ON LEGAL ISSUES AFFECTING INTERNATIONAL BUSINESS: ARTICLE: PROCEDURAL CHALLENGES TO ENVIRONMENTAL REGULATION OF SPACE DEBRIS," American Business Law Journal, Lexis

Although less immediately obtainable, many other resources exist beyond earth's orbits. Helium-3, a rare isotope used to perform controlled nuclear fusion, is produced in great quantities by the solar wind. 57 The energy potential of lunar Helium-3 reserves is so great that it would contain ten times the potential of all recoverable fossil fuels on earth. 58 Researchers speculate that the market value of one ton of Helium-3 would exceed one billion dollars. 59 Extra-terrestrial mining on the moon and on asteroids could unearth massive deposits [*643] of silicon, aluminum, iron, calcium, magnesium and other elements. Asteroids with more valuable minerals could have a net mineral market value of one trillion dollars. 60 Any of these commercial activities are vulnerable to **interruption from collisions with the ever growing population of space debris**.

AT: China Launches

Statements about Chinese space programs are political propaganda – their space program is still in its testing phases and probably won't materialize

Boozer, 5/19 – MA and PhD candidate in astrophysics
[Rick, "United States Will Beat China in Newest Space Race", Yahoo News, http://news.yahoo.com/s/ac/20110519/sc_ac/8496119_united_states_will_beat_china_in_newest_space_race]

America is laying the groundwork for its greatest space endeavor since sending astronauts to the Moon. But that's not the story you will hear from a few senators and congressional representatives who are **more concerned with bringing home pork** than significantly advancing U.S. spaceflight prowess. Exaggerating China's future spaceflight plans is one of their favorite strategies. In fact **Chinese space ambitions are modest.** Their yet-to-be-started space station won't be complete until 2020 at the earliest. It will weigh only 60 tons compared to the International Space Station's 400 tons and less than half the defunct Russian MIR station's 130 tons. China's state news announced they are tentatively considering a gigantic super rocket. It prompted Rep. Frank Wolf of Virginia to say, "The announcement made clear that if the United States does not get serious about its own Exploration Program, the next flag planted on the moon may be a Chinese flag." Even before the announcement, Rep. Bill Posey of Florida made similar dire predictions about future Chinese space accomplishments. However, careful reading of the Chinese article reveals it is a preliminary feasibility study, NOT any actual plan to build the rocket. Furthermore, given that the rocket would carry a 130-ton payload, which is exactly the same payload weight as the super rocket demanded by certain U.S. Senators, the Chinese study is probably just a knee-jerk response to the Senators' efforts.

China's space station launch only requires 3 launches maximum

Xin, 3/4 – space writer for China Daily
[Dingding, "China fired-up about manned space station", China Daily, http://www.chinadaily.com.cn/china/2011-03/04/content_12113268.htm]

China plans to launch two manned spacecraft next year to dock with its space module, Tiangong-1, which will itself lift off later in 2011, according to a spokesman for the China Manned Space Engineering Office. The 8.5-ton Tiangong-1, or Heavenly Palace-1, is slated to blast off on top of a Long March 2F carrier rocket in the second half of this year, the spokesman said via a press release posted on the office's website late Wednesday. The space module, which is now undergoing tests, will first be the target of an unmanned docking by the Shenzhou VIII spacecraft, which will be launched after Tiangong-1 later this year, he said. Xinhua News Agency quoted Liang Xiaohong, Party chief of the China Academy of Launch Vehicle Technology, on Thursday as saying that the interval between the two launches will be two months.

Aff – Debris Is Non-Unique

There is already too much debris – will cause impacts

Imburgia 11 – Lt. Col. and Judge Advocate in Air Force
Joseph S. Imburgia, J.D., University of Tennessee College of Law (2002); LL.M., The Judge Advocate General's Legal Center & School, U.S. Army, Charlottesville, Va. (2009)), a Judge Advocate in the United States Air Force and is presently assigned as a legal exchange officer to the Directorate of Operations and International Law, Defence Legal, Australian Defence Force, Canberra, Australia, 2011, "Space Debris and Its Threat to National Security: A Proposal for a Binding International Agreement to Clean Up the Junk," Scholar

The "cascade effect" is "the greatest fear of those who study the problem of orbital debris."50 Even before the February 2009 satellite collision, many scientists agreed "that the number of objects in orbit had surpassed a critical mass,"51 the point at which "orbital debris would collide with other space objects, which in turn would create new debris that would cause [a chain reaction of] even more collisions."52 This "chain reaction" is often referred to as the cascade effect.53

Accumulation of debris has passed the point of no return.

David 11 - research associate with the Secure World Foundation, winner of the National Space Club Press Award
(Leonard, May 09, "Ugly Truth of Space Junk: Orbital Debris Problem to Triple by 2030", http://www.space.com/11607-space-junk-rising-orbital-debris-levels-2030.html)

The concern over orbital debris has been building for several reasons, said Marshall Kaplan, an orbital debris expert within the Space Department at the Johns Hopkins University Applied Physics Laboratory in Laurel, Md. In Kaplan's view, spacefaring nations have passed the point of "no return," with the accumulation of debris objects in low-Earth orbits steadily building over the past 50 years. Add to the clutter, the leftovers of China's anti-satellite (ASAT) test in 2007. "The fact that this single event increased the number of debris objects by roughly 25 percent was not as important as the location of the intercept. The event took place at an altitude of 865 kilometers, right in the middle of the most congested region of low-orbiting satellites," Kaplan pointed out. Toss into the brew the collision of an Iridium satellite with an expired Russian Cosmos spacecraft in February 2009 -- at an altitude similar to that of China's ASAT test. As a result of 50 years of launching satellites and these two events, the altitude band from about 435 miles (700 km) to a little over 800 miles (1,300 km) has accumulated possibly millions of debris objects ranging from a few millimeters to a few meters, Kaplan said.

Cascade is inevitable without removal

Imburgia 11 – Lt. Col. and Judge Advocate in Air Force, Joseph S. Imburgia, J.D., University of Tennessee College of Law (2002); LL.M., The Judge Advocate General's Legal Center & School, U.S. Army, Charlottesville, Va. (2009)), a Judge Advocate in the United States Air Force and is presently assigned as a legal exchange officer to the Directorate of Operations and International Law, Defence Legal, Australian Defence Force, Canberra, Australia, 2011, "Space Debris and Its Threat to National Security: A Proposal for a Binding International Agreement to Clean Up the Junk," Scholar

NASA scientists have warned about the threat of the cascade effect since the late 1970s.60 In the decades since, experts have worried that collisions caused by the cascade effect "would expand for centuries, spreading chaos through the heavens"61 and multiplying space "debris to levels threatening sustainable space access."62 "Today, next year or next decade, some piece of whirling debris will start the cascade, experts say."63According to Nicholas L. Johnson, NASA's chief scientist for orbital debris, the cascade is now "inevitable" unless something is done to remove the debris.64 Experts believe that if nothing is done to address the space debris problem, the amount of orbiting space debris greater than ten centimeters in size will increase to over 50,000 objects in the next fifty years.65 Considering that the number of objects in orbit has increased drastically since the beginning of 2007, the problem is, unfortunately, only worsening.

Aff – No Debris Impact

NASA solves orbital debris
Powell 08
David: Space.com staff writer 10-28-08 ["NASA Aims to Keep Moon's Skies Junk-Free," http://www.space.com/scienceastronomy/081028-st-lunar-orbit-junk.html]

There are well over 100,000 objects in Earth orbit, the vast majority being non-functioning junk in the form of satellites and debris from rocket launches. Nuts, bolts, chips of paint and other garbage all pose a threat to satellite operations. Having all this material speeding along at 17,500 miles per hour only a few hundred miles above us isn't of much concern for people on the planet, because although hundreds of objects fall back to Earth every year, almost all burn up in the atmosphere (with the exception of a few huge rocket parts). Earth's atmosphere acts like a closet door, preventing all our junk from spilling out and hitting us on the head. With no atmospheric barrier to shield the moon's surface, NASA is now taking steps to prevent a similar accumulation of debris in lunar orbit. "NASA's new robotic lunar exploration program and the eventual return of astronauts to the moon dictated that we address potential debris in lunar orbit," explained Nicholas Johnson, Chief Scientist for Orbital Debris at the NASA Johnson Space Center. "The new NASA procedural requirements for orbital debris mitigation identifies the issue of the disposal of objects in lunar orbit and assigns responsibilities for ensuring that end-of-mission actions do not pose a threat to future lunar missions or to operations on the lunar surface." This threat arises from the fact that any object dropping out of lunar orbit would impact the surface at a near horizontal 5,000 miles per hour. Very unhealthy for any astronaut in the line of fire and a potential danger to historic Apollo landing sites. "Even during the initial exploration of the moon in the 1960's and 1970's, efforts were made, whenever possible, to avoid leaving space hardware in lunar orbits," Johnson said. One reason for the extra caution is that lunar orbits are unstable.

Other things cause collisions.
Gorman 2005 - studies at School of Human and Environmental Studies
(Alice, "The Archaeology of Orbital Space", 2005, page 15
http://flinders.academia.edu/AliceGorman/Papers/77163/The_archaeology_of_orbital_space)

It is important to note that controlling human debris in the space environment does not automatically eliminate all hazards to materials or human life. Collisions with meteoroids, meteor swarms like the Leonids and Perseids, and high-energy particles, will still occur. There are many other elements of the space environment that cause material degradation and loss of function. One of the most significant results from the Long Duration Exposure Facility (LDEF), launched in 1984 to examine the effect of the space environment on commonly used materials, was the recognition that significant amounts of damage were caused by the synergistic effects of several environmental factors of LEO space including exposure to ultraviolet radiation and atomic oxygen erosion [5, 27]. The risks posed by debris of human origin cannot be considered in isolation from the total space environment, of which it now forms a part.

Aff – No Debris Impact

Either the status quo can track debris or the impact is inevitable.

Megan **Ansdell, '10** – Grad Student @ George Washington University's Elliot School of Int'l Affairs, where she focused on space policy. "Active Space Debris Removal: Needs, Implications, and Recommendations for Today's Geopolitical Environment," www.princeton.edu/jpia/past-issues-1/2010/Space-Debris-Removal.pdf.

Space debris is a specific type of space object that is human-made, no longer functional, and in Earth's orbit. Space debris ranges in mass from several grams to many tons, and in diameter from a few millimeters to tens of meters. Fragments exist from roughly 100 to more than 36,000 kilometers above the Earth's surface. In 2009, NASA alone conducted nine in-orbit maneuvers to avoid potential collisions between its satellites and pieces of space debris (NASA 2010, 2). The most dangerous pieces of space debris are those ranging in diameter from one to ten centimeters, of which there are roughly 300,000 in orbit. These are large enough to cause serious damage, yet current sensor networks cannot track them and there is no practical method for shielding spacecraft against them. Consequently, this class of orbital debris poses an invisible threat to operating satellites (Wright 2007, 36). Debris larger than ten centimeters, of which there are roughly 19,000 in orbit, can also incapacitate satellites but they are large enough to be tracked and thus potentially avoided. Debris smaller than one centimeter, in contrast, cannot be tracked or avoided, but can be protected against by using relatively simple shielding (Wright 2007, 36).

Aff – Alternate Causalities For Debris

Alternate causalities: 14 other spacefaring nations make debris inevitable.

Imburgia 11 — Lieutenant Colonel Joseph S. Imburgia, (B.S., United States Air Force Academy (1994); J.D., University of Tennessee College of Law (2002); LL.M., The Judge Advocate General's Legal Center & School, U.S. Army, Charlottesville, Va. (2009)) is a Judge Advocate in the United States Air Force and is presently assigned as a legal exchange officer to the Directorate of Operations and International Law, Defence Legal, Australian Defence Force, Canberra, Australia. He is a member of the Tennessee and the Supreme Court of the United States bars, and he is a member of the Australian and New Zealand Society of International Law. Prior to becoming a Judge Advocate, Lieutenant Colonel Imburgia was a Targeting Officer, United States Strategic Command, Offutt Air Force Base, Neb., " Space Debris and Its Threat to National Security: A Proposal for a Binding International Agreement to Clean Up the Junk"]

Additionally, more countries are vying to become space-faring nations. Algeria, Brazil, Chile, Egypt, India, Iran, Malaysia, Nigeria, North Korea, South Africa, and Thailand have all placed a priority on space utilization.141 China has discussed the possibility of traveling to the Moon, and the United States has recently discussed the possibility of traveling to Mars.142 In 2007, the space budgets for both India and Russia increased.143 In 2009, India, Iran, Japan, Europe, Australia, China, Russia, and the United States all expressed a greater interest in military uses of space to support national security.144 Currently, even North Korea is increasing its space efforts, announcing its plan to launch a "communications satellite" into space and fueling debate over its intention to develop long-range ballistic missiles.145 These outer space plans lend credence to the predictions that the space debris problem will be worse than the 2006 models suggested. In fact, those predictions have already come to fruition. The drastic additions to the space debris environment caused Nicholas Johnson, one of the two NASA scientists involved in the 2006 modeling, to predict the inevitability of the cascade effect.146 Other scientific experts agree with Johnson and say that the cascade effect will start sooner than predicted in the 2006 modeling.147 In short, scientists currently say that the space debris issue is now "a very big problem."148

Many other countries have launchers that could cause the impact.

NGN 9 [National Geographic News by Anne Minard; "Rocket Launches Damage Ozone Layer, Study Says"; 4/14/2009; http://news.nationalgeographic.com/news/2009/04/090414-rockets-ozone.html]

Rocket Pollution Currently the U.S., European, and Indian governments power their rockets with a mix of liquid and solid fuels, which generally take the form of powder or crystals. Russia and China use liquid fuels almost exclusively. In general, the liquid rocket propellants havent yet undergone the level of scrutiny that solid propellants have, noted study leader Martin Ross, an atmospheric scientist from the Aerospace Corporation in Los Angeles. "There is a general assumption that the various liquid rocket engines use 'green propellants,' and this is likely true to some extent," Ross said. "But how do liquids compare to solids as far as ozone loss is concerned? We do not know for sure. "What we have shown in the Astropolitics paper is that the rockets of the future will use liquid propellants and that they will fly ten or one hundred times more often than today's rockets," he continued.

Aff – No Ozone Impact

Rockets don't pose a threat to the ozone
Martin N. **Ross and** Paul F. **Zittel**, "Rockets and the Ozone Layer", 5/16/**07**, http://www.aero.org/publications/crosslink/summer2000/01.html

Space transportation, once dominated by government, has become an important part of our commercial economy, and the business of launching payloads into orbit is expected to nearly double in the next decade. Each time a rocket is launched, combustion products are emitted into the stratosphere. CFCs and other chemicals banned by international agreement are thought to have reduced the total amount of stratospheric ozone by about 4 percent. In comparison, recent predictions about the effect on the ozone layer of solid rocket motor (SRM) emissions suggest that they reduce the total amount of stratospheric ozone by only about 0.04 percent. Even though emissions from liquid-fueled rocket engines were not included in these predictions, it is likely that rockets do not constitute a serious threat to global stratospheric ozone at the present time. Even so, further research and testing needs to be done on emissions from rockets of all sizes and fuel system combinations to more completely understand how space transportation activities are affecting the ozone layer today and to predict how they will affect it in the future.

Even space shuttle launches don't cause lasting damage to the ozone
NASA 8 [NASA Q/A Page, "Frequently Asked Questions"; last update 2/24/2008; http://www.nasa.gov/centers/kennedy/about/information/shuttle_faq.html]

Q. Is it true that launching the Space Shuttle creates a local ozone hole, and that the Space Shuttle releases more chlorine than all industrial uses worldwide? A. No, that is not true. NASA has studied the effects of exhaust from the Space Shuttle's solid rocket motors on the ozone. In a 1990 report to Congress, NASA found that the chlorine released annually in the stratosphere (assuming launches of nine Shuttle missions and six Titan IVs -- which also have solid rocket motors -- per year) would be about 0.25 percent of the total amount of halocarbons released annually worldwide (0.725 kilotons by the Shuttle 300 kilotons from all sources). The report concludes that Space Shuttle launches at the current rate pose no significant threat to the ozone layer and will have no lasting effect on the atmosphere. The exhaust plume from the Shuttle represents a trivial fraction of the atmosphere, and even if ozone destruction occurred within the initial plume, its global impact would be inconsequential. Further, the corridor of exhaust gases spreads over a lateral extent of greater than 600 miles in a day, so no local "ozone hole" could occur above the launch site. Images taken by NASA's Total Ozone Mapping Spectrometer at various points following Shuttle launches show no measurable ozone decrease.

Aff – Alternate Causality For Ozone

Volcanoes and high altitude flights hurt the ozone

NAS 1

[NASA Advanced Supercomputing Division; "Major and minor sources of stratospheric chlorine"; 6/30/2001; http://www.nas.nasa.gov/About/Education/Ozone/depletion.html]

Major sources of stratospheric chlorine At this time human activity accounts for 75-85% of the chlorine in the stratosphere. The remaning 15-20% comes almost totally from Methyl chloride, most of that from natural sources and burning of biomass. Large, explosive volcanoes contribute an additional couple of percent.(1-5) Notice that care must be taken to specify major sources of stratospheric chlorine since sources of tropospheric chlorine are quite different (sea-spray, volcanoes, volatile organic compounds) (6,7) Most of the tropospheric chlorine compounds never make it to the stratosphere; they are quickly decomposed by natural oxidants and the chlorine converted to water-soluble species, such as HCl, which get rained out of the atmosphere. Chlorofluorocarbons are very non-reactive in the troposphere, with life-times ranging from 50-200+ years, and so they eventually make it up to the stratosphere. Summarized evidence on the sources of stratospheric chlorine: By analyzing the elevation at which the concentrations of certain compounds are found scientist get a good idea of how stable compounds are, and also some of the mechanisms by which compounds are degraded. (R.Parson. FAQ II) In repeated observations scientist have seen the stratospheric concentration of organic chlorine compounds decrease with altitude while the concentration of inorganic chlorine increases proportionatly; concentrations of both have been increasing proportionatly since the first systematic measurements in 1977.(8-12) Field observations are confirmed by experimenting with gases and gas reaction-rates in the laboratory, research which has been going on for over twenty years. The amount of fluoride released natually as organic compounds is very small, almost all of the flourine in the stratosphere comes from man-made compounds such as CFC's. Since CFC's should deposit chlorine and fluorine at approxiamately the same rate, measurements of stratospheric fluorine should indicate what proportion of the stratospheric chlorine is from CFC's. Minor sources of stratospheric chlorine Volcanoes: Volcanoes differ greatly in the amount of HCl they put out. But since, on the average, over 90% of a volcanic plume is water-vapor most of the HCl produced gets precipitated out of the atmosphere in 1-7days. Large amounts of sulfates also present in plumes cause water droplets to form quickly; the chemistry that can take place on these droplets is complicated and not fully understood. Within the last 200 years our planet has had six volcanoes with enough explosive power to project material into the stratosphere. The most recent two: El Chichon in 1982 and Mt.Pinatubo in 1991, were very closely studied by atmospheric scientist. Using balloons, satellites and even planes which flew through through the volcanic plumes, and large masses of data were collected and analyzed. Modeling and later observations have shown that more than 99% of the volcanic HCl is removed by absorbtion on to water droplets or ice crystals without ever becoming catalytically active in the stratosphere.(15,17). Somewhat of a stir in the popular press was created by active eruptions of an antarctic volcano, Mount Erebus, from 1976 through 1983, but its impact on stratospheric chlorine levels (16,17) was shown to be minimal. Space shuttle and other high altitude flights: In the early 1970's it was suggested than chlorine from solid rocket boosters might have a significant effect on the ozone layer. A study by Cicerone and Steadman,1974, found the resulting contribution of chlorine to be relitively small as have many studies since then. The most current article on the issue calculates that the shuttle program has relatively little effect on the stratospheric chlorine levels, although it does raise some concern about the particles of aluminum that the solid-booster engine sprays into the atmosphere. Each shuttle launch produces about 68 tons of HCl, most of that released in the troposphere. Ten launches per year would amount to less than 0.06% of the yearly chlorofluorcarbons released which was 1.2 million tons per year in the 1980's.(18)