### Non-Inherent – NanoSail-D Has Debris Cleaning Ability Now

Pearce 10 – Troy Pearce, Solar Power Technology Examiner, December 11 2010, “Solar Powered Micro-Satellite Will Clean Space Debris,” Examiner, Online: http://www.examiner.com/technology-in-tucson/solar-powered-micro-satellite-will-clean-space-debris

We are constantly sending satellites, experimental space planes, and privately owned space crafts into orbit. With all of the hype around these new projects the debris orbiting Earth is regularly overlooked. NASA, on the other hand, is working on a way to eliminate the thousands of unused satellites currently floating around us. NASA has recently launched the NanoSail-D from the Fast, Affordable, Science and Technology Satellite (FASTSAT). This makes them the first agency to eject a micro-satellite from a larger, solar powered satellite. This proves that NASA has the capability to deploy a small cubesat payload from an autonomous micro-satellite in space. The NanoSail-D satellite, which is not much bigger than a loaf of bread, was deployed into space by the Poly Pico-Satellite Orbital Deployer. After three days in orbit the NanoSail-D will release a gossamer-thin solar sail that will stretch out to 100 square feet. It will then test the practicality of solar travel. Once it has completed its mission it will burn up in the atmosphere, keeping it from adding to the debris. NASA hopes this system will allow them to either bring decommissioned satellites back to Earth, or burn them up in the atmosphere.

### Technology Prevents Space Debris Now – Cube Sail On New Satellites Now

Underwood 10 – Craig Underwood, Ph.D, Deputy Director Of The Surrey Space Center, Reader In Spacecraft Engineering At SSC, March 28 2010, PhysOrg, Online: <http://www.physorg.com/news189009246.html>

New UK technology is set to play a major part in clearing dangerous clouds of debris hurtling around the Earth's lower orbit.

More than 5,500 tonnes of debris is believed to be cluttering space around the planet as a result of 50 years of abandoning spacecraft, leading to a threat of collision to any manned or unmanned spacecraft, the destruction of hugely expensive technology and the potential threat of large debris plummeting back to Earth. The build-up of debris - expected to grow at a rate of 5% each year - is also believed to obstruct satellite television and other communications signals. Scientists at the University of Surrey, working on the project funded by the European space company Astrium, have devised a 3 kg miniature satellite or "nanosatellite" fitted with a "solar sail". "CubeSail" is a device which can be fitted to satellites or launch vehicle upper stages that are sent into orbit and then can be deployed to successfully de-orbit equipment that has reached the end of its mission. A 5 x 5 m, 3 kg, deployable sail is being developed to fit in a 10 x 10 x 30 cm nanosatellite and will be used in a demonstration mission to be launched in late 2011 demonstrating passive means of deorbiting for future satellites. Dr Vaios Lappas, lead researcher on the project and Senior Lecturer in Space Vehicle Control at the Surrey Space Centre, said: "Protecting our planet and environment is key for sustainable growth. CubeSail is a novel, low cost space mission which will demonstrate for the first time space debris/satellite deorbiting using an ultra light 5 x 5 sail stowed and supported on a 3 kg nanosatellite. “Successful deployment and testing of the sail can enable a low cost/mass solution to be used for future satellites and launch vehicle upper stages reducing dramatically the problem of space debris. "Following successful in orbit demonstration, the proposed deorbit system will be offered as a standard deorbit system for Low Earth Orbit missions for satellites with a mass of less than 500 kg at a very low cost." " CubeSail is due to be ready for launch on new satellites next year, and is expected to be available for shifting existing debris from 2013. Dr Craig Underwood, Deputy Director of the Surrey Space Centre, and Reader in Spacecraft Engineering at SSC, said: “The launch of this innovative new technology is very timely. This week's announcement of the creation of the UK's space agency is evidence of the commitment to space initiatives and their huge potential for creating growth in the UK economy. At the same time, this exciting future is increasingly dependent on finding a sustainable approach to launching and disposing safely of spacecraft."

### They Incorrectly Conflate The Kessler Syndrome Like A Japanese Anime – This Card Is From Kessler

Kessler, Johnson, Liou, And Matney 10 – Donald J. Kessler, Nicholas L. Johnson, J.-C. Liou, Mark Matney, Retired NASA And Current NASA Personnel, February 10 2010, “The Kessler Syndrome: Implications To Future Space Operations,” 33rd Annual AAS Guidance And Control Conference, Online: <http://webpages.charter.net/dkessler/files/Kessler%20Syndrome-AAS%20Paper.pdf>

A segment of the Japanese animated TV series Planetes, 2 set in the year 2075, is an example of a popular definition of the Kessler Syndrome that includes both factual and exaggerated components. While an episode appropriately defines the Kessler Syndrome as the cascading of fragments from collisions breaking up other intact objec5ts at an increasing rate, it goes on to say that, once initiated, “…. billions of other pieces [would be generated] in a very short time [and] the Earth would be surrounded by debris …. completely cut off from space.” In general, collisional cascading is a slow process, but very much depends on the population density and size of the objects in orbit. **Current population densities would require decades to produce a significant change in the small debris environment**, and much longer to approach a condition where the Earth might be “completely cut off from space”.

### No Timeframe On Impacts – Experts Agree The Situation Will Not Become Unstable

Choi 11 – Charles Q. Choi, Space.Com Contributor, March 17 2011, “Earth-Based Lasers Could Zap Space Jnk Clear From Satellites,” Space.Com, Online: <http://www.space.com/11157-nasa-lasers-shooting-space-junk.html>

"The buildup of debris is not a naturally reversible process. If we are to clean up space, it will certainly be complex and very expensive. If we continue, as we have, to use these very popular orbits in near-Earth space, the density of debris and collision events will surely increase," Kaplan told SPACE.com. The good news is that no immediate action is necessary in terms of removing debris objects, Kaplan advised, as experts estimate that the situation will not go unstable anytime soon.

### SSA Negative - Maneuvers Don’t Solve – 99% Of Risk Cannot Be Tracked

Johnson 10 – Nicholas L. Johnson, Chief Scientist For Orbital Debris In NASA, April 2010, “Orbital Debris: The Growing Threat To Space Operations,” NASA Archives, Online: http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20100004498\_2010003521.pdf

In addition to the obvious due diligence aspect of protecting operational spacecraft, one long-term benefit of collision avoidance is the prevention of collisions between two large objects, which in turn could further degrade near-Earth space with large numbers of new debris, as was the case with the collision of Iridium 33 and Cosmos 2251. On the other hand, over 99% of the risk to operational spacecraft from collisions with orbital debris comes from objects too small to track on a routine basis, i.e., smaller than 10 cm. Hence, only an improvement in the orbital debris environment itself can dramatically reduce the risks to operational spacecraft.

### No Solvency – We Can Never Fully Manage Space Debris

David 11 – Leonard David, National Space Club Press Award Winner, Editor-In Chief Of National Space Society’s Ad Astra And Space World Magazines, Space.Com Writer, May 10 2011, “The Ugly Truth Of Space Junk: No Feasible Solutions,” MSNBC, Online: http://www.msnbc.msn.com/id/42975224/ns/technology\_and\_science-space/t/ugly-truth-space-junk-no-feasible-solutions/,

Dealing with the decades of detritus from using outer space — human-made orbital debris — is a global concern, but some experts are now questioning the feasibility of the wide range of "solutions" sketched out to grapple with high-speed space litter. What may be shaping up is an "abandon in place" posture for certain orbital altitudes — an outlook that flags the messy message resulting from countless bits of orbital refuse. In a recent conference here, Gen. William Shelton, commander of the U.S. Air Force Space Command, relayed his worries about rising amounts of human-made [space junk](http://www.space.com/11305-space-junk-astronauts-bigger-threat.html). "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. "We catalog those routinely and keep track of them. That number is projected to triple by 2030, and much of that is improved sensors, but some of that is increased traffic," Shelton said. "Then if you think about it, there are probably 10 times more objects in space than we're able to track with our sensor capability today. Those objects are untrackable … yet they are lethal to our space systems — to military space systems, civil space systems, commercial — no one’s immune from the threats that are on orbit today, just due to the traffic in space."

### No Solvency – Cleaning Up Space Debris Produces More – Micro-Particles

Senechal 10 – Thierry Senechal, Policy Manager; International Chamber Of Commerce, 2010, “Space Debris Pollution: A Convention Proposal,” Papers On International Environmental Treaty-Making, Online: <http://www.pon.org/downloads/ien16.2.Senechal.pdf>

In his article ―Space Debris: Legal and Policy Implications, Howard Baker divides space debris into four classes: inactive payloads, operational debris, fragmentation debris and micro particulate matter. I refer to these categories in my paper as follows: (1) Inactive payloads or inoperative objects: Inactive payloads are primarily made up of satellites that have run out of fuel for station-keeping operations or have malfunctioned and are no longer able to maneuver. However, the use of the term ―inactive payloads‖ requires clarification. Because satellites can be deactivated for periods of time and then later reactivated, and because debris may include objects manufactured in outer space and not just payloads, the term ―inoperative objects may be more correct when referring to objects which entities can no longer control. (2) Operational debris: Operational debris includes any intact object or component part that was launched or released into space during normal operations. The largest single category of this type of debris is intact rocket bodies that remain in orbit after launching a satellite. (3) Fragmentation debris: Fragmentation debris is created when a space object breaks apart. This type of debris can be created through explosions, collisions, deterioration, or any other means. Collisions are another source of fragmentation debris. Debris of this type may result from collisions between space object and either natural or artificial orbital debris. (4) Microparticulate matter: Surface degradation is also a cause of space debris. Surfaces of spacecraft are exposed to the deleterious space environment of ultraviolet radiation, atomic oxygen, thermal cycling, micro-particulates, and micrometeoroids. This can lead to degradation in the optical, thermal and structural integrity of surfaces and coatings with subsequent shedding of materials into the space environment. Indeed, debris can be created as the result of the gradual disintegration of the surfaces on a satellite due to exposure to the space environment.

### Space Debris Inevitable – Every Launch Creates Space Debris

Hitches 5 – Theresa Hitches, Military, Defense Industry, And NATO Journalist, August 2005, “CDI Fact Sheet,” Space For Peace, Online: http://www.space4peace.org/articles/debris\_facts.htm

Space-faring nations are well aware of the dangers caused by space debris – from inactive satellites to discarded rocket stages to nuts and bolts left in orbit. Space debris is the inevitable consequence of the global uses of space; every space launch will create some amount and form of debris, just as every kind of transportation on Earth creates some amount and form of pollution. Even tiny pieces of debris such as paint flecks or bolts can damage or destroy a satellite or spacecraft, due to the tremendously high speeds of orbital objects (some 10 kilometers per second in Low Earth Orbit). Space scientists universally agree there is already too much orbital debris, particularly in the most heavily used orbits. Unfortunately, the amount of space debris is increasing rather than decreasing as more nations and commercial entities seek the economic and military benefits provided by satellites.