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## 1AC Plan

**Plan: The United States federal government should develop a military launch infrastructure that allows for launch on demand for small satellite development and constellation architecture and substantially increase satellite hardening, maneuverability, reconstitution capabilities, and space situational awareness.**

## 1AC Deterrence

**Advantage One – Deterrence**

**Current reliance on satellite assets undercuts hegemony’s effectiveness and makes a space attack inevitable**

**Rendleman, Air Force Colonel, 10** - Colonel, U.S. Air Force (Retired), (James, Astropolitics, 8:220–255, 2010, “A Strategy for Space Assurance,” Ebsco Political Science)

The 11 January 2007 test of a Chinese ground-based, direct-ascent anti-satellite (ASAT) kinetic-kill interceptor against one of their own defunct weather satellites generated considerable angst across the United States space community. The 2007 test demonstrated that the importance of space capabilities is also their Achilles heel, that is, their deadly weakness in spite of overall strength; it is far too easy to neutralize space systems and their power. In the broad strategic context, space capabilities have their own set of unique, inherent vulnerabilities, which are largely the result of orbital mechanics. This invites destruction, damage, and even just mischief delivered by even the least significant adversary. However, other nations may seek to deny U.S. advantages in space through a variety of negation and prevention actions. Negation Threats Satellite systems consist not only of spacecraft, each with their own payload and bus, but also a supporting infrastructure—ground control stations, tracking and control links, commonly referred to as the tracking, telemetry, and control (TT&C) links, data links, launch facilities, and an industrial base. Each of these components is at risk to threats of physical and cyber attack, and sabotage, and can be negated, simultaneously or each in detail. The satellite payload, bus, links, and infrastructure can be negated by using a variety of permanent or reversible means to achieve one of the five possible effects, known as the ‘‘five Ds’’—deception, disruption, denial, degradation, and destruction.5 Space-based threats proliferate as a result of the ever-growing global availability of technology and access to the space domain. There are huge incentives for states to invest in and use space, and the spread of space technologies has occurred. States with sufficient resources can now reach out to space and ‘‘touch’’ satellites through a variety of means, and achieve one and even more of the five Ds. Spacecraft are vulnerable to direct ascent weapons as demonstrated by the Chinese ASAT test, and to a variety of other groundbased, airborne, and space-based ASAT technologies. Direct-ascent launched, or orbit-based nuclear devices, can be detonated, generating radiation and other lethal effects to destroy unshielded electronics over a wide lethal range. Co-orbital ASATs could be employed, comparable to the old Soviet system that was tested extensively in the 1970s and early 80s. In a less likely scenario, space-borne mines can also be deployed in close proximity to spacecraft, or exploded to generate debris clouds that destructively engage whole classes of satellites in the same orbital plane or in crossing orbits. Ground, space-based, or airborne lasers could be used by adversaries to wreak havoc. Blinding operations could be executed and inflict effects ranging from temporary ‘‘dazzling’’ to permanent burnout of optical or other sensors with intense energy bursts. Ground systems, supporting communications, and their nodes, are vulnerable to diverse land, sea, or air kinetic attacks, including sabotage. Unprotected systems are also susceptible to electronic attack through jamming and electromagnetic deception techniques. Jammers emit signals that mask or prevent reception of desired signals; these methods can disrupt uplinks, downlinks, and even cross-links. By disabling the means of command and control, and data communications, jammers render satellites inoperable or unavailable. Electromagnetic deception techniques can be employed to confuse systems; this could include sending false, but deceptively plausible, commands that cause spacecraft to perform damaging or wasteful maneuvers, modify databases or execute configuration changes, or otherwise destroy it. Similarly, supporting terrestrial ground stations, computer networks, and links are vulnerable to information operation and cyber attacks. These attacks could involve directing global denial of service tasks, injecting fake commands, malicious software and viruses into the space system, performing unauthorized monitoring and disclosure of sensitive information (data interception), and causing unauthorized modification or deliberate corruption of network information, services, and databases. In sum, there is a wide span of kinetic and other types of attacks an adversary could consider and employ. There is potential that even non-state actors can access some of these technologies and space systems, and achieve several of the five Ds; however, it is unlikely they can obtain and then employ a full-spectrum of these means and achieve all of these effects. Conducting an attack within the space domain involves a rather substantial investment to develop, acquire, operate, and sustain needed shooter, sensor, and command and control systems. Given the scope and commitment needed to affect such a move, an on-orbit attack would probably be made only in the context of a larger strategic struggle, perhaps as a prelude to or part of early combat operations. On the other hand, inexpensive jamming technology is available to even the poorest potential adversaries. As such, jamming poses the most used and growing threat to space systems. Some argue that jamming also carries with it implicit political and legal sanctions since no major space power has moved to ban or make even temporary and reversible jamming illegal. This may change now that a number of nations have banned together to object to recent Iranian satellite jamming.6 Cyber adversaries and criminals are also beginning to hone their craft. They present an evolving threat to space systems; and like jamming, cyber threats can be developed and deployed for only modest investments. Prevention Threats Prevention actions generally involve economic, political, informational, and diplomatic instruments of national power. For example, an extremely large creditor nation could employ its considerable economic clout and leverage in an attempt to compel or blackmail the United States to not license or permit imaging of its territory, preventing its use, and reducing its exposure to such observation. The creditor nation could seek to accomplish its objective by destabilizing the world market place. It could refuse to purchase treasury offerings that underpin the burgeoning U.S. fiscal and trade deficits, perhaps arguing that remote sensing, especially commercial remote sensing, of its territory infringes on its territorial and sovereign rights, or that it constitutes ‘‘unlawful’’ industrial espionage, and is thus, an unfair trade practice.7 Commercial remote sensing systems are nowan important resource for the United States Government and its national security needs. U.S. Government orders help sustain and stabilize the remote sensing industry,8 and any limitations on activities, whether for U.S. Government customers or commercial ones, imposed in response to external economic threats could evolve to cause problems. In an alternative scenario, a state, acting through political allies and proxies, could exert considerable influence and dominance to affect a change in U.S. law. This change could restrict licensing of commercial remote sensing imagery, restricting the market place and impacting business models for producers.9 As a diplomatic prevention example, adversaries could attempt to use international forums and treaties to deny frequency rights needed by U.S. military or intelligence satellites by making spurious ‘‘paper satellite’’ filings with the International Telecommunications Union (ITU). ‘‘Paper satellites’’ involve ITU applications for satellite orbital slots, many for ‘‘speculative’’ systems that will never leave Earth. These filings can block access to scarce spectrum and orbital resources.10 The ability to place communications and other satellites in geosynchronous orbit (GEO) positions could be held at risk. Some characterize some of these types of actions as a form of ‘‘lawfare.’’ ‘‘The term lawfare describes the growing use of international law claims, usually factually or legally meritless, as a tool of war. The goal is to gain a moral advantage over your enemy in the court of world opinion, and potentially a legal advantage in national and international tribunals.’’11 Prevention actions taken to hobble U.S. space systems are not armed attacks. As is discussed later, the use of force is only authorized under the United Nations (UN) Charter in response to an armed attack, or upon authorization of the UN Security Council. As such, using armed force to deter and defeat prevention actions involving political or diplomatic subterfuge or intrigue may be unlawful under international law. Creative alternative solutions must therefore be found to assure access to space when facing these types of threats. Implications for U.S. Space Strategy The wide span of threats poses profound implications for U.S. space strategy and its execution. First, unlike the Cold War era, the United States now confronts a wide array of global actors, all operating with different motivations and incentives, some of which could become potential adversaries who can attack or threaten space capabilities. These state and non-state adversaries exhibit a wide array of political, economic, technical, and social differences. Having many potential adversaries makes each of them harder to understand. This complicates efforts to understand motivations and to influence perceptions for deterrence purposes. These differences, in turn, increase the likelihood of misperception, undercutting strategies to protect access to space capabilities. When one’s attention is divided, deterrent measures that are appropriate for one target may not be useful, or even counterproductive, for another. This requires tailored intelligence efforts, information operations, and transparency efforts in order to avoid or minimize disputes and prevent problems. Second, the broad array of adversaries exhibit widely varying risk-taking behaviors. Risk-taking behavior can strongly influence an adversary’s perception of a situation. Understanding this phenomenon can lead to better ways of influencing those perceptions. Unfortunately, potential adversaries may not care that space systems offer tremendous value and capabilities to all nations, or care whether conflict in space could create space debris that could cost all nations access to the domain. A strategy to assure continuing access to space assets must therefore be sufficiently flexible to address both risk-averse and risk-taking adversaries. Indeed, potential adversaries may shift from risk-taking to risk-adverse over a relatively short period of time. China may fit in this category. Within a decade or two, it will have its own extensive space-based communications, navigation, and intelligence, surveillance, and reconnaissance satellite constellations, all of which will be integrated into its military operations. No doubt, China will embrace that evolution and become very reliant on space capabilities; this will shift it from an asymmetric competitor to one similar to the United States or Russia. Third, with the demise of the Soviet Union, some political commentators and critics described the United States as a ‘‘hyperpower’’ not just a ‘‘superpower.’’ 12 Though buffeted by recent events involving Iraq, Afghanistan, the Global War on Terror, and the 2008 global financial meltdown, U.S. military supremacy continues. But, that supremacy does not make or guarantee a successful space strategy. Adversaries may believe they have a higher stake than the United States in the outcome of a particular crisis or conflict. Alternatively, the United States stake in the crisis may not be commensurate with the possible cost of involvement by the United States military and the rest of its national security apparatus. The first alternative may encourage mischief by adversaries; the second discourages U.S. action. As a result, adversaries may find threats of U.S. action in response to hostile acts affecting U.S. access to space systems to be non-credible. Fourth, while the United States has produced superlative space capabilities, it has not produced enough systems ready to survive the new kinetic, exotic, jamming, and cyber threat environment. The vulnerability exists because the spacecraft developed and deployed today are in many ways the same as those originally fielded during the Cold War. During that epic struggle, there was a tacit and then explicit understanding that each superpower would not attack and overwhelm the other’s space systems, except in the direst of circumstances, perhaps during the throes of a nuclear conflagration. Indeed, a number of agreements between the superpowers adopted the understanding and ruled out interference with national technical means, including space assets. This belief in the superiority of space systems and power blinds the United States to the inherent strategic weaknesses and vulnerabilities in these systems. This, predictably, can now be exploited by potential adversaries, such as China, who, with their recent ASAT test, appear more willing to fully explore the technologies needed to expand the limits of conventional war to include the space domain. Consequently, by historically and diplomatically reducing the threat, engineering of some satellite threat detection, attack avoidance, and other defense subsystems have not matured enough so that they are sophisticated, nimble, and robust enough to counter new 21st Century adversary attack capabilities.

**These risks are compounding globally – 40 countries have ASAT technology**

**Donahue, 10** – USAF Major (Jack, “CATASTROPHE ON THE HORIZON: A SCENARIO-BASED FUTURE EFFECT OF ORBITAL SPACE DEBRIS,” https://www.afresearch.org/skins/rims/q\_mod\_be0e99f3-fc56-4ccb-8dfe-670c0822a153/q\_act\_downloadpaper/q\_obj\_af691818-359f-4999-be24-f88ca154bd94/display.aspx?rs=enginespage)

Currently, the configuration of global space technologies and assets is highly desirable from a US perspective.67 The US has begun to rely heavily on space assets for a myriad of capabilities in recent years. Some have voiced worries that the United States will lose its lead as the global innovator in technology or that an enemy could make technological leaps that would give it significant advantages.68 That is possible, but by no means a foregone conclusion.69 However one thing is clear, “technology will proliferate.”70 Space technology has become increasingly available to any country or multinational corporation with the ability to fund the research or acquire the technology and place it in orbit.71 The increasing proliferation of launch and satellite capabilities, as well as the development of anti-satellite capabilities has begun to level the playing field.72 Adversary technological advances in kinetic-energy weapons causing structural damage by impacting the target with one or more high-speed masses, directed-energy weapons that are either ground- or air-based systems never getting close to their target, and nuclear weapons that detonate at an empty point in space could put our space assets at risk in the near future.73 Kinetic-energy weapons such as China‘s 11 January 2007 successful test of a direct-ascent, kinetic-kill anti-satellite (ASAT) vehicle destroying an inactive Chinese weather satellite generating thousands of pieces of space debris that threatened many operational spacecraft is of growing concern.74 Another kinetic energy weapon that is of concern is microsatellites (microsats). Currently, at least 40 countries have demonstrated some ability to design, build, launch, and operate microsats.75 Microsats can maneuver in such a way to observe and disrupt operations of orbiting assets. These microsats may soon be capable of harassing or destroying larger satellites at virtually any altitude.76 Because these satellites are so small, they may not be easily detectable as part of a payload or when maneuvering in space. Directed-energy weapons are laser, radio frequency, and particle beam weapons. Lasers operate by delivering energy onto the surface of the target and gradual or rapid absorption of this energy leads to several forms of thermal damage.77 Radio frequency (RF) weapons such as the high-power microwave (HPM) have either ground-and space-based RF emitters that fire an intense burst of radio energy at a satellite, disabling electronic components.78 Nuclear weapons are perhaps the technology of most concern to US space assets. Some argue though that adversaries would desist from using nuclear weapons in space out of fear of retaliation.79 While others say “what better way to use nuclear weapons than to destroy a key military capability of an enemy country without killing any of its population.”80 Regardless of the arguments, one thing is clear; a nuclear detonation would have three huge environmental effects in space: electromagnetic pulse (EMP), transient nuclear radiation, and thermal radiation.81 EMP from a nuclear detonation will induce potentially damaging voltages and currents in unprotected electronic circuits and components virtually rendering space assets inoperative.82 Increased radiation from such a detonation would also have profound effects on the space environment. This would severely damage nearby orbiting satellites reducing the lifetime of satellites in LEO from years to months or less and make satellite operations futile for many months.83 The risk of this potential threat is significant. To execute this mission, all that is needed is a rocket and a simple nuclear device.84 Countries such as Iran, North Korea, Iraq, and Pakistan possess such missiles that could carry warheads to the necessary altitudes to perform such missions.85 Technological advances in adversary weaponry are certainly hard to predict even in the near term. However, if this weaponry matures enough and is successfully used it will create additional space debris from the orbiting satellites being rendered inoperative (space junk) and becoming potential hazards to other satellites.

**Space is the new strategic high ground – 2.5 thousand years of history proves nations will compete because of terrestrial ties**

**Smith**, Colonel and PhD in IR, **11** (M.V., Colonel, PhD in Politics and IR @ University of Reading, Citing Colin Gray, “Chapter 17: Security and Spacepower, Part of “Toward a Theory of Spacepower,” Edited by Charles Lutes and Peter Hays, National Defense University Press, http://www.ndu.edu/press/lib/pdf/spacepower/spacepower.pdf, EMM)

It is a rule in strategy, one derived empirically from the evidence of two and a half millennia, that anything of great strategic importance to one belligerent, for that reason has to be worth attacking by others. And the greater the importance, the greater has to be the incentive to damage, disable, capture, or destroy it. In the bluntest of statements: space warfare is a certainty in the future because the use of space in war has become vital. . . . Regardless of public sentimental or environmentally shaped attitudes towards space as the pristine final frontier, space warfare is coming.20 The strategic value of space to states is not in question. Advanced spacefaring states are already reliant—and moving toward dependence—on space-derived services for activities across every sector of their societies. Spacepower is becoming critical to their styles of warfighting. Likewise, the injury that can be caused to such states by menacing their space systems can be considerable. Given these incentives, the beast of war will either break its chains all at once or stretch them slowly over time.21

**Multiple adversaries will use space as an asymmetric means to destroy US hegemony – deterrence by punishment will fail because the US lacks defenses and states could act through terrorist proxies**

**Rendleman, 10** - Colonel, U.S. Air Force (Retired), (James, Astropolitics, 8:220–255, 2010, “A Strategy for Space Assurance,” Ebsco Political Science)

The strategy to deter nuclear attack worked throughout the Cold War; the Soviet Union was powerful, but it was also a rational adversary. For this reason, the United States worked hard to understand the culture, goals, incentives, and ideals of the Soviet Union. The Soviet Union was also open to, and reciprocated, U.S. diplomatic engagement overtures. The United States has gained great advantage through development and integration of space capabilities. This has forced potential adversaries to evolve techniques to neutralize this superiority. Attacks on U.S. space systems can be performed through terrorist proxies, third parties, or covert acts that offer perpetrators plausible deniability for damage inflicted. The United States now confronts a diverse set of adversaries, and their rogue leaders are arguably much more risk prone, or perhaps, just oxymoronic, acting deliberately reckless. These adversaries know full well the importance of space capabilities to U.S. diplomatic, military, and economic success. They see that attacking and disrupting space capabilities presents a significant opportunity to deny U.S. national objectives, to retain or expand their own relative power, and to compensate for their own lack of conventional strength. Deterrence has failed throughout history ‘‘because the object of deterring measures fails to notice them, does not find the measures credible, or is pursuing an agenda sufficiently important enough to its interests that it is prepared to ignore the deterrence attempt.’’30 Given this, the United States cannot depend solely on deterrence to secure itself. It must prepare for the possibility that its measures could fail. Therefore, defenses should also be deployed; though the extent of these should be measured and balanced against their utility, and measured by projected costs, lost opportunity costs, likely effectiveness, and effects obtained in the end. Deterrence and defense tasks are inexorably linked to each other. As noted by Robert Butterworth, ‘‘Defenses offer protection, while deterrence threatens punishment. Defenses can succeed whether the enemy believes in them or not.’’31 There are a number of active and passive defensive capabilities that can be developed and deployed to protect space systems, particularly against kinetic-kill ASATs and jammers.

**Chinese doctrine, spending, and actions all portend an attack on US space assets – it will likely escalate**

**Wortzel, 8** - Colonel, United States Army (Retired) (Larry, Astropolitics, 6:112–137, “THE CHINESE PEOPLE’S LIBERATION ARMY

AND SPACE WARFARE,” Ebsco Political Science)

The PLA is exploring in theoretical research, basic research, and applied research a variety of forms of space weapons.77 These include:

. satellite jamming technology;

. collisions between space bodies;

. kinetic energy weapons;

. space-to-ground attack weapons;

. space planes that can transit and fight ‘‘up or down’’ in the upper atmosphere or space;

. high-power laser weapons;

. high-power microwave weapon systems;

. particle-beam weapons; and

. electromagnetic pulse.78

PLA authors credit the U.S. with having the most advanced capabilities in the areas of kinetic energy weapons, particle beam weapons, and directed energy. The PLA does have various forms of jamming capability, and has done a lot of work on the concept of colliding space bodies. The dilemma here for the military theorists or planner in the U.S., is that this is really space science and rocket science. Although Chinese military theory, basic research, and applied research into these areas are transparent, the successes or weapons systems that may become formal programs are not transparent. Regardless of whether the algorithms are correct or not, it is clear that the PLA is serious about space warfare. The destruction of their own weather satellite and the blinding of a U.S. satellite mean they are achieving some success. PLA theorists think that internal lines of communication are most favorable for successful military operations, whether the offense, defense, or maintaining a logistics chain.79 They see internal lines as superior to the conduct of military operations on external lines.80 The Chinese see their regional position in Asia as superior to that of the U.S. because the U.S. has to fight, communicate, and re-supply along extended exterior lines, while China enjoys interior lines of communication within the range of its aircraft, missiles, and submarine fleet. This means that in a conflict, they would probably use their jamming and antisatellite systems to disrupt American lines of communication, command and control, situational awareness, and efforts at coordination at the extended ranges of military conflict for the U.S.81 One of the most disruptive things the PLA could do, therefore, would be to neutralize the U.S. ability to use tracking and data relay satellites, which provide the global, real time sensor and communications capabilities for network centric operations. The PLA believes that the U.S. is heavily dependent on its satellite systems, more dependent than the PLA. That is changing, however. As the PLA modernizes its own Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4SIR) systems, it is becoming as dependent on space and information systems as the U.S. Therefore, its policies of space control and space deterrence for military purposes are no longer forms of asymmetric warfare. Rather, the contest will be over which force can most effectively disrupt the other’s military operations. Space warfare will likely become an integral part of traditional conflict. The Implications of Attacks on Reconnaissance Satellites One problem that begs an answer is whether the PLA is considering the implications of exercising the capabilities it is developing. That is, when researchers consider a form of space warfare, or develop capabilities to be applied in space weapons, are there also PLA officers in the policy or war planning sphere thinking through the implications of employing that capability? If not, an incident could quickly escalate and get out of control, leading to an exchange of weapons or a deeper crisis. For example, four officers from the PLA’s Second Artillery Command College, in Wuhan, have published an analysis of how to jam or destroy the space-based ballistic missile advanced warning systems of the U.S.82 In their article, the officers note, ‘‘a space borne missile early warning system will play a pivotal role in future space wars.’’83 They set out the capabilities and parameters of the U.S. Defense Support Program (DSP) early warning satellites, including the geosynchronous orbits of the satellite sets, their axis of look, the infrared bands they cover, and their shortcomings. The authors discuss how to destroy the U.S. DSP satellites with other satellites, ground-based lasers, or direct ascent weapons.84 They also have a discussion of how to jam the satellites, their satellite-to-ground transmissions, or to camouflage the infrared radiation emitted by a missile to make it more difficult for the warning satellite to detect an attack.85 In their conclusion, the authors find that maintaining a strategic ballistic missile capability is a powerful deterrent to prevent the U.S. from launching a large scale military attack or intervention aimed at China’s own military operations on its southeast coast, i.e., to intervene in Chinese military operations against Taiwan.86 Their view is that ‘‘destroying and jamming space borne missile early warning systems not only can paralyze such anti-missile systems, but also will help us [the PRC] win the war in space.’’87 The PLA is also aware of the most advanced U.S. synthetic aperture radar imaging systems and are thinking through how to neutralize or jam them.88 The problem in this reasoning is that there is no consideration given to a likely American reaction to the disruption of its missile early warning systems. One possible reaction by the U.S. is that it might well think it is coming under immediate attack and launch its own strike against China’s strategic missile forces. Another reasonable reaction by U.S. forces might be to strike the source of the Chinese attack, particularly if it came from a ground based laser or direct ascent launch. Even if such a reaction by the U.S. used conventional weapons, the PLA may find it has created a deeper crisis that led to an American strike on Chinese soil. These four PLA authors do not seem to have considered the ramifications of their own research. Space Deterrence Space power theorists, like Cai, advocate the ability to control parts of space for limited periods. Huang Zhicheng, in reaction to U.S. Air Force Space Command manual AFM 2–2.1, Space Warfare and Countermeasures, develops the concept further, advocating a regime of ‘‘space deterrence’’ to counter American space superiority. 89 For Huang, this shift toward space deterrence mirrors a trend in U.S. space theory.90 Huang defines this as ‘‘the use of strong aerospace power to create or demonstrate a threat to an opponent’s space power to deter that opponent in a practical way.’’91 The goal of this concept of deterrence is to increase the PLA’s power in weapons systems, information gathering, and command and control to improve national warning systems in China, create fear in an adversary, and degrade the adversary’s power.92 The key to achieving this level of deterrence, according to Huang, is to concentrate one’s own economic, military, and science and technology power to ‘‘ruin an opponent’s economy and ability to function in space.’’93 The intention behind the December 2006 blinding of a U.S. satellite by a Chinese laser and the 11 January 2007 destruction of a Chinese weather satellite by the PLA’s own direct ascent kill vehicle is clear when interpreted through this concept of demonstrating space deterrence.94 As Huang concedes, for a deterrent to be credible, one must demonstrate the capability. A deterrent must be demonstrated. It is also important to note that effective space deterrence, as conceived by this writer, includes crippling attacks on information networks and C4SIR systems. In the future, there could be other examples of space deterrence to let the U.S. and other countries know that they do not have free reign in space or over China. The PLA could demonstrate various forms of jamming. In doing so, the PLA would conduct operational tests of the work being done on jamming synthetic aperture radar satellites. Chinese journals do discuss maneuvering space bodies to intersect in orbit. This type of maneuvering lends itself to accidental collisions between space bodies. China could deny the hostile intent of such accidents, but they still would demonstrate a space deterrent capability. Conclusions There are a number of important findings to this research effort. First, in the event of conflict with the PLA, military operations carried out across all the domains of war, ground, sea, air, space, and the electromagnetic spectrum, or information- and cyber-warfare, are likely. Any military operations in space will be part of a more coordinated cyber or information attack on an enemy’s knowledge and command systems. Second, there will probably be strategic warning, even if there is operational or tactical surprise, in any future conflict between China and the U.S. Prior to direct conflict, the PLA and the Central Military Commission will likely justify any of its actions by conducting what it calls legal warfare.95 Third, the concept of legal warfare will be applied by the PRC Foreign Ministry, the security services, Chinese Communist Party liaison Department, and the PLA to exploit political divisions in the U.S. over nuclear testing and space-based weapon systems. Fourth, the PLA will seek to exercise space control in a limited area of conflict. The PLA will probably observe the internationally accepted definitions of commons in space, over 100,000 m, in peacetime. If direct conflict breaks out, altitude limits on space control are off, and any systems carrying adversary military traffic or signals are probably fair game for the PLA. U.S. Navy Secretary Donald Winter, on a visit to Australia in August 2007, said that the U.S. still wants to understand what the Chinese intention is in its military modernization.96 This concern over how China will engage in military operations in space is really about intentions. There are a number of China’s activities and policy positions coming from Beijing that make it hard to interpret Chinese intent. Among these are: China’s expansive territorial claims, combined with periodic incidents of the use of armed force to reinforce these claims;97 the justification for extending the territorial claims of China into the reaches of outer space outlined in this paper; and the shaping of the ‘‘space battlefield’’ with legal arguments that would justify China’s actions to prevent space observation over its territory. The U.S. has taken a course with China that is far different from the isolationist and confrontational approach with the former Soviet Union during the Cold War. Both states are heavily involved in trade, economic, and political engagements with each other. Nonetheless, both states are wary of the potential for conflict with the other, and there exist some deep fundamental differences of national interest. Whether one is a proponent of arms control agreements or not, the dialogue between the U.S. and the Soviet Union over arms control and treaties produced a body of mutual understanding that holds up today. The U.S. and the Soviet Union seemed to realize that it is potentially destabilizing to define the upper limits of sovereignty. Thus, neither country interfered with the other’s free passage in space. Also, they agreed that the ability to conduct strategic verification from space stabilized the nuclear balance. No such dialogue has taken place with China. The PLA has either ignored or rebuffed American efforts at such a dialogue. Often, senior military or Chinese Communist Party leaders have told Americans that to engage in such a dialogue is an example of a cold war mentality.98 Yet discussions on these issues are important to clarify the rationales for America’s positions on space and serve as threat reduction measures. Although China’s intentions are not fully known, they can be inferred from Chinese actions, like the attack on a U.S. satellite with a laser and the destruction of its own weather satellite as a demonstration of capability. PRC intentions can also be inferred from judicious reviews of its military literature. By observing the military capabilities China is acquiring and reading its military literature, it is clear that China’s leaders are preparing as though they may have to fight the U.S. To this end, the PLA is busily preparing the space battlefield in advance with legal arguments, as called for in its doctrine. As a result, there are very sound reasons to prepare to defend American interests in space, to engage in mutual threat reduction measures, and to pursue programs that will ensure that the U.S. military will have access to space in any future conflict.

**Chinese governmental structure and PLA independence makes the risk of conflict uniquely high—the plan is key to prevent a strike that would destroy conventional and nuclear deterrence**

**MacDonald, arms control director, 11** - Senior Director, Nonproliferation and Arms Control Program, U.S. Institute of Peace (Bruce, CQ Congressional Testimony, “MILITARY AND CIVIL SPACE PROGRAMS IN CHINA”, 5/11, lexis)

One characteristic of too many wars in the last century is that they are the result of miscalculation that ignites the tinder of fundamental geopolitical tensions. Averting major power conflict requires skillful management of tensions by senior leaders of the major powers. China has become much more internationally sophisticated, though with important exceptions, in its dealings with the rest of the world than has been true in the past, and this is reflected in its civilian leadership. Unfortunately, the PLA's senior officer corps trails its civilian counterparts in this respect. They have much less interaction with foreign official and travel abroad much less frequently than their U.S. counterparts. This means that the PLA overall views world events from a less knowledgeable and sophisticated perspective, a danger in this increasingly complex world, and could explain, for example, the political "tonedeafness" of the PLA in the manner they conducted their 2007 ASAT test. This PLA problem becomes more serious when one realizes that the PLA is organizationally separate from the rest of the Chinese government, and reports only to the Central Military Commission, currently chaired by President Hu Jintao. President Hu, and his likely successors, have no significant military background, and the majority of the CMC's members are top PLA officers, suggesting that civilian oversight of major military decisions and consideration of their larger implications are not as carefully reviewed as in the U.S. government. Normally this would not be too great a concern, but in a crisis this could be dangerous. Add to this the fact that China has no equivalent of our National Security Council, a critically important body for coordinating our security decisionmaking, and one comes away concerned about the relative insularity of the PLA in the Chinese power structure. In a crisis, the PLA probably cannot be counted on to show as sophisticated a sense of judgment as one would hope any country's military leaders, even an enemy's, to show. All these problems and many more pose potential threats to internal political stability and Communist Party control, providing ample opportunity for crisis and conflict in the years ahead. Overview of The Strategic Landscape of Space Space assets, and the communications and cyber links that enable them to function, are the means by which essential national security information is either generated, transmitted, or both. This information is the lifeblood of U.S. conventional military superiority and plays a key role in U.S. strategic nuclear posture as well. As such, these space related assets represent extraordinarily appealing targets in any future conflict, and their relative vulnerability can provide dangerously attractive incentives in a crisis to preempt, escalating to war. Resisting this temptation to attack may be morally virtuous but could be strategically unwise: going first in a space conflict with a nearpeer space adversary appears to offer many advantages, while absorbing such a strike, with all its attendant destruction of military capabilities, and then responding to the attack against an opponent fully expecting such a response, appears to be militarily and strategically quite undesirable. As technology advances, the ways of interfering with, disrupting, or destroying information streams in space or supporting space systems will likely increase, as will U.S. and others' dependence upon such systems. Providing defensive options for U.S. space assets should be pursued where appropriate, but most space observers believe that offense has the advantage in space over defense, as General Cartwright observed last May. Cartwright also noted that the challenging issues that space poses has made the Space Posture Review "the most difficult of all the defense reviews" the Obama Administration has undertaken. The overall U.S. goal in space should be to shape the space domain to the advantage of the United States and its allies, and to do so in ways that are stabilizing and enhance U.S. and allied security. The United States has an overriding interest in maintaining the safety, survival, and function of its space assets so that the profound military, civilian, and commercial benefits they enable can continue to be available to the United States and its allies. This need not mean that China and others must perforce be disadvantaged by such an arrangement - there should be ample opportunity for many countries to benefit and prosper from a properly crafted system of space management. There is an inherent risk of strategic instability when relatively modest defense efforts create disproportionate danger to an adversary, as with space offense. And there is a serious risk of crisis instability in space when "going first" pays off - destroying an adversary's satellites before he destroys yours. We don't know what would happen in a crisis, but the potential for space instability seems high and likely to grow.

**That risks miscalc and nuclear escalation**

**Burke, 6** – Lt Col, USAF, command space professional with operational experience in missile operations, space surveillance, space control, missile warning, and command and control (Alan, “SPACE THREAT WARNING: FOUNDATION FOR SPACE SUPERIORITY, AVOIDING A SPACE PEARL HARBOR,” https://www.afresearch.org/skins/RIMS/display.aspx?moduleid=be0e99f3-fc56-4ccb-8dfe-670c0822a153&mode=user&action=researchproject&objectid=07acf878-3a5f-4a2c-8259-4a34c0717e9b)

The erosion of the US ability to execute the space threat warning mission has serious implications for US national security to include: the loss of a key early warning indicator of an attack on the US homeland; the loss of space capabilities which would degrade US warfighting effectiveness; the preventable loss of critical high-value satellites, facilities or services; the increased possibility that adversaries could develop new weapons or covertly conduct probing attacks on US space systems; and the lack of a credible means to execute stated US policy in response to an attack against space assets**.** One of the most serious impacts of the failure to develop or execute a reliable space threat warning and attack verification system is the loss of a key early warning indicator of an attack on the US homeland or an attack that is part of a major regional action by a near-peer adversary such as an attack on Taiwan by the Chinese mainland. The Japanese attack on Pearl Harbor, whose goal was the destruction of the Pacific Fleet, was not done as an isolated act, but as part of the start of a larger campaign to establish a Japanese Pacific sphere of influence which included the forceful acquisition of US territories. At this time, the Pacific Fleet was viewed as a US center of gravity whose destruction would enable Japan to achieve regional domination and discourage future US intervention. Today, our space-based assets may represent the equivalent of the WWII Pacific Fleet. Further, other nations have stated they view the US reliance on space as a potential Achilles ’ heel and a center of gravity whose destruction or disruption is critical to future military success against the US.44Although a major attack on the US is not likely, the loss of US space-based early warning capability and ground-based missile warning radars could undermine nuclear deterrence strategy resulting in a devastating miscalculation that the US was vulnerable to a nuclear first strike. The perception that US space capabilities are vulnerable to a surprise attack also weakens conventional deterrence. In the case of a US-China conflict over Taiwan, the Chinese might seek to disrupt or destroy regional space capabilities as part of a delaying strategy to deny US forces access to the region until their military operations were well underway, making the Chinese takeover of Taiwan a fait accompli.45 A successful Pearl Harbor-type attack on US space assets would degrade US fighting effectiveness. Today, space represents the ultimate high ground and it is unlikely that a nation, whose military ambitions might provoke US involvement, will willingly cede that high ground. The level of battlespace awareness space-based platforms provide makes any attack using large massed forces difficult to accomplish. The ability to neutralize these platforms would improve the circumstances required to gain a strategic advantage over US and allied forces. As General Lord stated in his Congressional testimony: “A resourceful enemy will look at our centers of gravity and try to attack them. Our adversaries understand our global dependence on space capabilities, and we must be ready to handle any threat to our space infrastructure.”46 With the increased US reliance on space assets for communication, intelligence, surveillance, and reconnaissance (ISR); and command and control of our deployed forces; a successful space attack could significantly delay US response to regional aggression. During Operation IRAQI FREEDOM (OIF), over 60% of theater communications traveled via satellites.47 The Defense Satellite Communication System (DSCS) provided 90% of all protected communications and 70% of all military satellite communications into theater.48 These capabilities significantly enhanced command and control of US and allied forces. Further, the employment of the satellite-based Blue Force Tracker system resulted in an unprecedented level of situational awareness which decreased fratricide and facilitating search and rescue operations and reinforcement operations.49 The United States also maximized the use of the space-based Global Positioning System (GPS) to enable precision weapons delivery, allowing the use of fewer and smaller weapons to achieve effects; to enhance navigation in featureless terrain; and to aid in the location of both friendly and hostile forces.50 General Lord testified to Congress: “Space capabilities are no longer nice to have, but are now indispensable to how we fight and win our nation’s wars.”51 The failure to develop a credible space threat warning system increases the likelihood that a foreign nation would attack US space assets. The inability to detect and provide timely warning of a space attack could result in the preventable loss of critical high-value satellites, facilities or services. There are a number of scenarios where the timely detection of a threat would allow space operators to intervene, thwarting the attack. In many instances, the ability to find, fix, target and destroy the threat is currently a viable way to counter the attack. However, this is not always possible. In the case of a co-orbital ASAT attack, which involves the launch and maneuver of a satellite into a closing orbit of another satellite to destroy or disrupt it, the countermeasure require a pre-intercept maneuver of the target satellite. The support countermeasures for an attack on space ground facilities include increased physical and information security. Countermeasures for electronic warfare attacks or jamming of the space link segment exist but there is often a significant bandwidth cost when these measures are in effect.52 Degradations to space assets could also occur as a result of unintentional sources such as radio frequency interference or from scientific research such as laser research. In these situations, it is important to locate the source and terminate the activity to prevent loss of the space asset or service. The loss of these capabilities during critical operations could result in operational failure, loss of equipment, resources, and lives. The inability to rapidly neutralize sources of satellite communication (SATCOM) interference also has national security implications. In the area of airpower employment, successful SATCOM jamming could disrupt the US ability to command and control air assets in theater from geographically separated air operations centers. A delay of even one to two days might jeopardize US ability to support deployed forces. Satellite communication links to worldwide deployed forces are critical capabilities in protecting US security, sovereignty, and military combat capability. The inability to detect and assess space threats might allow adversaries to develop new weapon systems or conduct probing attacks on US space systems without our knowledge. Although US surveillance technology and systems are more sophisticated today, the US should not assume it will always be able to detect the development of a new weapon. Our experience in post-WW II with the Germans is one example. After the defeat of Nazi Germany, the US and Russia engaged in a race to uncover Germany’s scientific secrets. Major General Hugh-Knerr, deputy commander of the US Air Forces in Europe wrote: “The occupation of German scientific and industrial establishments has revealed the fact that we have been alarmingly backward in many fields of research.”53 Supersonic rockets, nerve gas, jet aircraft, guided missiles, stealth technology and hardened armor were just some of the technologies developed in WWII German laboratories.54 The Soviet Sputnik launches and the deployment of the FOB system are modern examples of technological surprise.55 Today, other nations are working to develop new weapons to counter US dominance and to take the lead in what is termed Fourth Generation Warfare—information war. The current coverage gaps in our space surveillance network, a fragmented intelligence network, a lack of discipline in anomaly reporting, the current inability to rapidly detect an attack on on-orbit systems, and overall erosion over the last decade of the space defense mindset makes it more likely an adversary could develop anti-satellite weapons without our knowledge. Finally, without a credible space threat warning capability the US will not have the ability to execute stated US policy to counter an attack against US space assets. In 1999, President Clinton signed into law DoD Directive 3100.10, US Space Policy, which specifically declared an attack on US space systems, to include commercial space systems, an attack on US sovereignty.56 One purposes of this policy is to deter an attack on US space assets. However, the lack of a credible space threat warning system undermines this policy. A senior officer in US Strategic Command recently stated that a nation or group could likely interfere with US satellites without fear of retribution.57

**Independently, perceived US vulnerability to a Chinese ASAT attack will cause a preemptive first strike – escalates to nuclear war**

**Tellis, 7** (Ashley, Senior Associate @ Carnegie, Survival, Autumn, “China’s Military Space Strategy”, ingenta)

Finally, the growing Chinese capability for space warfare implies that a future conflict in the Taiwan Strait would entail serious deterrence and crisis instabilities. If such a clash were to compel Beijing to attack US space systems at the beginning of a war, the very prospect of such a ‘space Pearl Harbor’94 could, in turn, provoke the United States to contemplate pre-emptive attacks or horizontal escalation on the Chinese mainland. Such outcomes would be particularly likely in a conflict in the next decade, before Washington has the opportunity to invest fully in redundant space capabilities. Already, US Strategic Command officials have publicly signalled that conventionally armed Trident submarine- launched ballistic missiles would be appropriate weapons for executing the prompt strikes that might become necessary in such a contingency.95 Such attacks, even if employing only conventional warheads, on space launch sites, sensor nodes and command and control installations on the Chinese mainland could well be perceived as a precursor to an all-out war. It would be difficult for all sides to limit the intensification of such a conflict, even without the added complications of accidents and further misperception.96

**Loss of space assets will annihilate US hegemony**

**Marshall, Ph.D., 8** - NASA Ames Research Center (Will, Astropolitics, 6:154–199, “REDUCING THE VULNERABILITY OF SPACE ASSETS: A MULTITIERED MICROSATELLITE CONSTELLATION ARCHITECTURE,” Ebsco Political Science)

Space assets are one of the most critical ‘‘Achilles’ heels’’ of the current military capability of the United States (U.S.). This is for two reasons: (1) the U.S. military space systems—in particular reconnaissance, navigation, signals intelligence, early warning, and communications systems—are critical to modern military warfare and intelligence; and (2) space systems are inherently vulnerable to attack. This combination is understood at the highest levels and was espoused in the ‘‘Rumsfeld Space Commission’’ with talk of a ‘‘Space Pearl Harbor.’’1 Whether one agrees with the tone, this is a genuine security problem for the U.S. in need of a near-term solution. While there have been numerous papers, and much media and academic attention, in the space security discussion focused on promoting or criticizing space-based weapons,2 there have been far fewer papers and studies offering constructive ways forward that deal with these genuine security concerns in a broader sense.3 The central motivation for this paper is to put forward one key element—the satellite architecture—in an effort to reduce the vulnerability of U.S. space assets. It is hoped that this idea, together with others like it, should stimulate and contribute to a debate on more constructive ways forward for how to achieve space security in the post-Cold war world. Importance of Space Assets For better or worse, it is clear that the U.S. military is to some significant extent dependent on its key satellites, which number about 86–105 operational satellites at present. These satellites constitute a significant part of the eyes, ears, and central nervous system of the modern military.4 A practical example that helps to illustrate this is the case of the U.S.-led invasion of Iraq in 2003. First, the decision to go was based in part on satellite imagery and signals intelligence from satellites; whether or not it was interpreted or used correctly is a separate issue. Second, the planning and operation were facilitated by satellite imagery. Third, many planes, ships, tanks, and units’ positions were known through Global Positioning System (GPS) satellites, and even most munitions were guided by GPS. Fourth, the operation was commanded from the U.S. in large part through the use of communications satellites. Perhaps more importantly than any of the functions in the Iraq example, early warning (EW) satellites are the U.S.’s and Russia’s first warning of nuclear missile attack. As Gray classified, space assets have moved from being ‘‘useful and important’’ to an ‘‘indispensable adjunct’’ in the military over the last decade.5 Space assets are definitely used a great deal by the U.S. military, but that does not mean necessarily as strong a dependence as Gray implies. The loss of U.S. space assets could range in its effect anywhere from a loss to the U.S. military in practical operations, to being catastrophic to U.S. security. The former would entail a reduction in operational effectiveness or speed, but fundamentally supposes that back-up systems and/or redundancy allow a near continuation of military capability. The latter scenario would entail an effective disablement of the U.S. military capability from normal operations. In reality, the significance lies between these boundaries, but this is a topic that could benefit from further research.

**This could result in global nuclear conflicts in every region of the world**

**Kagan, 7**[Robert, “End of Dreams, Return of History”, 7/19, web)

This is a good thing, and it should continue to be a primary goal of American foreign policy to perpetuate this relatively benign international configuration of power. The unipolar order with the United States as the predominant power is unavoidably riddled with flaws and contradictions. It inspires fears and jealousies. The United States is not immune to error, like all other nations, and because of its size and importance in the international system those errors are magnified and take on greater significance than the errors of less powerful nations. Compared to the ideal Kantian international order, in which all the world ’s powers would be peace-loving equals, conducting themselves wisely, prudently, and in strict obeisance to international law, the unipolar system is both dangerous and unjust. Compared to any plausible alternative in the real world, however, it is relatively stable and less likely to produce a major war between great powers. It is also comparatively benevolent, from a liberal perspective, for it is more conducive to the principles of economic and political liberalism that Americans and many others value. American predominance does not stand in the way of progress toward a better world, therefore. It stands in the way of regression toward a more dangerous world. The choice is not between an American-dominated order and a world that looks like the European Union. The future international order will be shaped by those who have the power to shape it. The leaders of a post-American world will not meet in Brussels but in Beijing, Moscow, and Washington. The return of great powers and great games If the world is marked by the persistence of unipolarity, it is nevertheless also being shaped by the reemergence of competitive national ambitions of the kind that have shaped human affairs from time immemorial. During the Cold War, this historical tendency of great powers to jostle with one another for status and influence as well as for wealth and power was largely suppressed by the two superpowers and their rigid bipolar order. Since the end of the Cold War, the United States has not been powerful enough, and probably could never be powerful enough, to suppress by itself the normal ambitions of nations. This does not mean the world has returned to multipolarity, since none of the large powers is in range of competing with the superpower for global influence. Nevertheless, several large powers are now competing for regional predominance, both with the United States and with each other. National ambition drives China’s foreign policy today, and although it is tempered by prudence and the desire to appear as unthreatening as possible to the rest of the world, the Chinese are powerfully motivated to return their nation to what they regard as its traditional position as the preeminent power in East Asia. They do not share a European, postmodern view that power is pass é; hence their now two-decades-long military buildup and modernization. Like the Americans, they believe power, including military power, is a good thing to have and that it is better to have more of it than less. Perhaps more significant is the Chinese perception, also shared by Americans, that status and honor, and not just wealth and security, are important for a nation. The Chinese do not share the view that power is passé; hence their now twodecades- long military buildup. Japan, meanwhile, which in the past could have been counted as an aspiring postmodern power — with its pacifist constitution and low defense spending — now appears embarked on a more traditional national course. Partly this is in reaction to the rising power of China and concerns about North Korea ’s nuclear weapons. But it is also driven by Japan’s own national ambition to be a leader in East Asia or at least not to play second fiddle or “little brother” to China. China and Japan are now in a competitive quest with each trying to augment its own status and power and to prevent the other ’s rise to predominance, and this competition has a military and strategic as well as an economic and political component. Their competition is such that a nation like South Korea, with a long unhappy history as a pawn between the two powers, is once again worrying both about a “greater China” and about the return of Japanese nationalism. As Aaron Friedberg commented, the East Asian future looks more like Europe ’s past than its present. But it also looks like Asia’s past. Russian foreign policy, too, looks more like something from the nineteenth century. It is being driven by a typical, and typically Russian, blend of national resentment and ambition. A postmodern Russia simply seeking integration into the new European order, the Russia of Andrei Kozyrev, would not be troubled by the eastward enlargement of the eu and nato, would not insist on predominant influence over its “near abroad,” and would not use its natural resources as means of gaining geopolitical leverage and enhancing Russia ’s international status in an attempt to regain the lost glories of the Soviet empire and Peter the Great. But Russia, like China and Japan, is moved by more traditional great-power considerations, including the pursuit of those valuable if intangible national interests: honor and respect. Although Russian leaders complain about threats to their security from nato and the United States, the Russian sense of insecurity has more to do with resentment and national identity than with plausible external military threats. 16 Russia’s complaint today is not with this or that weapons system. It is the entire post-Cold War settlement of the 1990s that Russia resents and wants to revise. But that does not make insecurity less a factor in Russia ’s relations with the world; indeed, it makes finding compromise with the Russians all the more difficult. One could add others to this list of great powers with traditional rather than postmodern aspirations. India ’s regional ambitions are more muted, or are focused most intently on Pakistan, but it is clearly engaged in competition with China for dominance in the Indian Ocean and sees itself, correctly, as an emerging great power on the world scene. In the Middle East there is Iran, which mingles religious fervor with a historical sense of superiority and leadership in its region. 17 Its nuclear program is as much about the desire for regional hegemony as about defending Iranian territory from attack by the United States. Even the European Union, in its way, expresses a pan-European national ambition to play a significant role in the world, and it has become the vehicle for channeling German, French, and British ambitions in what Europeans regard as a safe supranational direction. Europeans seek honor and respect, too, but of a postmodern variety. The honor they seek is to occupy the moral high ground in the world, to exercise moral authority, to wield political and economic influence as an antidote to militarism, to be the keeper of the global conscience, and to be recognized and admired by others for playing this role. Islam is not a nation, but many Muslims express a kind of religious nationalism, and the leaders of radical Islam, including al Qaeda, do seek to establish a theocratic nation or confederation of nations that would encompass a wide swath of the Middle East and beyond. Like national movements elsewhere, Islamists have a yearning for respect, including self-respect, and a desire for honor. Their national identity has been molded in defiance against stronger and often oppressive outside powers, and also by memories of ancient superiority over those same powers. China had its “century of humiliation.” Islamists have more than a century of humiliation to look back on, a humiliation of which Israel has become the living symbol, which is partly why even Muslims who are neither radical nor fundamentalist proffer their sympathy and even their support to violent extremists who can turn the tables on the dominant liberal West, and particularly on a dominant America which implanted and still feeds the Israeli cancer in their midst. Islamists have more than a century of humiliation to look back on. Israel has become its living symbol. Finally, there is the United States itself. As a matter of national policy stretching back across numerous administrations, Democratic and Republican, liberal and conservative, Americans have insisted on preserving regional predominance in East Asia; the Middle East; the Western Hemisphere; until recently, Europe; and now, increasingly, Central Asia. This was its goal after the Second World War, and since the end of the Cold War, beginning with the first Bush administration and continuing through the Clinton years, the United States did not retract but expanded its influence eastward across Europe and into the Middle East, Central Asia, and the Caucasus. Even as it maintains its position as the predominant global power, it is also engaged in hegemonic competitions in these regions with China in East and Central Asia, with Iran in the Middle East and Central Asia, and with Russia in Eastern Europe, Central Asia, and the Caucasus. The United States, too, is more of a traditional than a postmodern power, and though Americans are loath to acknowledge it, they generally prefer their global place as “No. 1” and are equally loath to relinquish it. Once having entered a region, whether for practical or idealistic reasons, they are remarkably slow to withdraw from it until they believe they have substantially transformed it in their own image. They profess indifference to the world and claim they just want to be left alone even as they seek daily to shape the behavior of billions of people around the globe. The jostling for status and influence among these ambitious nations and would-be nations is a second defining feature of the new post-Cold War international system. Nationalism in all its forms is back, if it ever went away, and so is international competition for power, influence, honor, and status. American predominance prevents these rivalries from intensifying — its regional as well as its global predominance. Were the United States to diminish its influence in the regions where it is currently the strongest power, the other nations would settle disputes as great and lesser powers have done in the past: sometimes through diplomacy and accommodation but often through confrontation and wars of varying scope, intensity, and destructiveness. One novel aspect of such a multipolar world is that most of these powers would possess nuclear weapons. That could make wars between them less likely, or it could simply make them more catastrophic. It is easy but also dangerous to underestimate the role the United States plays in providing a measure of stability in the world even as it also disrupts stability. For instance, the United States is the dominant naval power everywhere, such that other nations cannot compete with it even in their home waters. They either happily or grudgingly allow the United States Navy to be the guarantor of international waterways and trade routes, of international access to markets and raw materials such as oil. Even when the United States engages in a war, it is able to play its role as guardian of the waterways. In a more genuinely multipolar world, however, it would not. Nations would compete for naval dominance at least in their own regions and possibly beyond. Conflict between nations would involve struggles on the oceans as well as on land. Armed embargos, of the kind used in World War i and other major conflicts, would disrupt trade flows in a way that is now impossible. Such order as exists in the world rests not only on the goodwill of peoples but also on American power. Such order as exists in the world rests not merely on the goodwill of peoples but on a foundation provided by American power. Even the European Union, that great geopolitical miracle, owes its founding to American power, for without it the European nations after World War ii would never have felt secure enough to reintegrate Germany. Most Europeans recoil at the thought, but even today Europe ’s stability depends on the guarantee, however distant and one hopes unnecessary, that the United States could step in to check any dangerous development on the continent. In a genuinely multipolar world, that would not be possible without renewing the danger of world war. People who believe greater equality among nations would be preferable to the present American predominance often succumb to a basic logical fallacy. They believe the order the world enjoys today exists independently of American power. They imagine that in a world where American power was diminished, the aspects of international order that they like would remain in place. But that ’s not the way it works. International order does not rest on ideas and institutions. It is shaped by configurations of power. The international order we know today reflects the distribution of power in the world since World War ii, and especially since the end of the Cold War. A different configuration of power, a multipolar world in which the poles were Russia, China, the United States, India, and Europe, would produce its own kind of order, with different rules and norms reflecting the interests of the powerful states that would have a hand in shaping it. Would that international order be an improvement? Perhaps for Beijing and Moscow it would. But it is doubtful that it would suit the tastes of enlightenment liberals in the United States and Europe. The current order, of course, is not only far from perfect but also offers no guarantee against major conflict among the world ’s great powers. Even under the umbrella of unipolarity, regional conflicts involving the large powers may erupt. War could erupt between China and Taiwan and draw in both the United States and Japan. War could erupt between Russia and Georgia, forcing the United States and its European allies to decide whether to intervene or suffer the consequences of a Russian victory. Conflict between India and Pakistan remains possible, as does conflict between Iran and Israel or other Middle Eastern states. These, too, could draw in other great powers, including the United States. Such conflicts may be unavoidable no matter what policies the United States pursues. But they are more likely to erupt if the United States weakens or withdraws from its positions of regional dominance. This is especially true in East Asia, where most nations agree that a reliable American power has a stabilizing and pacific effect on the region. That is certainly the view of most of China ’s neighbors. But even China, which seeks gradually to supplant the United States as the dominant power in the region, faces the dilemma that an American withdrawal could unleash an ambitious, independent, nationalist Japan. Conflicts are more likely to erupt if the United States withdraws from its positions of regional dominance. In Europe, too, the departure of the United States from the scene — even if it remained the world’s most powerful nation — could be destabilizing. It could tempt Russia to an even more overbearing and potentially forceful approach to unruly nations on its periphery. Although some realist theorists seem to imagine that the disappearance of the Soviet Union put an end to the possibility of confrontation between Russia and the West, and therefore to the need for a permanent American role in Europe, history suggests that conflicts in Europe involving Russia are possible even without Soviet communism. If the United States withdrew from Europe — if it adopted what some call a strategy of “offshore balancing” — this could in time increase the likelihood of conflict involving Russia and its near neighbors, which could in turn draw the United States back in under unfavorable circumstances. It is also optimistic to imagine that a retrenchment of the American position in the Middle East and the assumption of a more passive, “offshore” role would lead to greater stability there. The vital interest the United States has in access to oil and the role it plays in keeping access open to other nations in Europe and Asia make it unlikely that American leaders could or would stand back and hope for the best while the powers in the region battle it out. Nor would a more “even-handed” policy toward Israel, which some see as the magic key to unlocking peace, stability, and comity in the Middle East, obviate the need to come to Israel ’s aid if its security became threatened. That commitment, paired with the American commitment to protect strategic oil supplies for most of the world, practically ensures a heavy American military presence in the region, both on the seas and on the ground. The subtraction of American power from any region would not end conflict but would simply change the equation. In the Middle East, competition for influence among powers both inside and outside the region has raged for at least two centuries. The rise of Islamic fundamentalism doesn ’t change this. It only adds a new and more threatening dimension to the competition, which neither a sudden end to the conflict between Israel and the Palestinians nor an immediate American withdrawal from Iraq would change. The alternative to American predominance in the region is not balance and peace. It is further competition. The region and the states within it remain relatively weak. A diminution of American influence would not be followed by a diminution of other external influences. One could expect deeper involvement by both China and Russia, if only to secure their interests. 18 And one could also expect the more powerful states of the region, particularly Iran, to expand and fill the vacuum. It is doubtful that any American administration would voluntarily take actions that could shift the balance of power in the Middle East further toward Russia, China, or Iran. The world hasn ’t changed that much. An American withdrawal from Iraq will not return things to “normal” or to a new kind of stability in the region. It will produce a new instability, one likely to draw the United States back in again. The alternative to American regional predominance in the Middle East and elsewhere is not a new regional stability. In an era of burgeoning nationalism, the future is likely to be one of intensified competition among nations and nationalist movements. Difficult as it may be to extend American predominance into the future, no one should imagine that a reduction of American power or a retraction of American influence and global involvement will provide an easier path.

**A firm commitment to ORS is vital to credible deterrence by denial – it will prevent attacks against US space assets**

**Sejba, 10** - USAF Congressional Budget Liaison Officer Budget and Appropriations Liaison Directorate Deputy Assistant Secretary for Budget Secretary of the Air Force Pentagon, Washington DC (Timothy, “ Deterrence for Space: Is Operationally Responsive Space Part of the Solution?”, High Frontier, May, http://www.afspc.af.mil/shared/media/document/AFD-101019-072.pdf)

The space domain, often referred to as “The High Frontier,” no longer is a sanctuary outside the reach of foreign intervention. The threat to space systems and their capabilities is broad, ranging from reversible effects such as jamming or blinding, to more destructive means such as anti-satellite weapons. It is now time to take actions for the sake of space, and assure its continued contributions across the full spectrum of military operations. Given the criticality of space to not only our military power, but also our economic power, it is time we develop policies and field capabilities to deter future adversaries from attempting to degrade, deny, or destroy space capabilities and services. The asymmetric advantages enabled by space can no longer be assumed and as a result, a new National Security Strategy for space must be forged, one that combines deterrence with basic protection capabilities never before afforded our space systems. Yet, space deterrence is not an “all in” strategy, nor can it reduce the risk of attack to zero.1 Should aspects of deterrence fail, we must take steps to defend and protect our space systems and the critical global services they provide. Operationally responsive space (ORS) by definition is “assured space power focused on timely satisfaction of joint force commanders’ needs.”2 Dissected further, one key word stands out: assured … being sufficiently robust, timely, agile, adaptive, and resilient, to achieve desired outcomes with a high degree of certainty.3 So while ORS intends to provide operational and tactical support to the joint warfighter, its true value will be the assurance it provides as a credible strategic deterrent against space attacks. As a deterrent, ORS provides access to existing capabilities, or rapid deployment and employment of new capabilities, denying the benefits our adversaries may seek by attacking our space capabilities. Through timely and accurate intelligence, we can work to understand our adversaries’ intent and armed with this knowledge, we gain the opportunity to influence their decision-making calculus. Understanding intent, coupled with credible and timely ORS capabilities, can effectively deny or greatly reduce the benefits they seek by attacking the asymmetric advantages enabled by space. ORS provides a responsiveness that will allow the commander, US Strategic Command (CDR USSTRATCOM), to respond and support our combatant commands real-time and near-term requirements. To support these requirements, ORS consists of three tiers of capabilities: Tier 1, the employment of existing capabilities within minutes to hours; Tier 2, the rapid call-up, launch and deployment of tailored, ready to field capabilities within days to weeks; and finally, Tier 3, the rapid development of a new capability to meet a combatant commander’s joint urgent operational need within months to a year. The Unified Command Plan assigns CDR USSTRATCOM the responsibility for all military space. The space systems under his authority and control provide our warfighters increased speed, precision, and lethality in military operations. In 2007, during an Air Force Association speech in Los Angeles, California, General C. Robert Kehler, commander, Air Force Space Command and former deputy commander, USSTRATCOM, stated that the biggest difference between 25 years ago and today, was that “space today is embedded in combat operations.”4 ORS’ strategic deterrent value has the potential to be just as important to future combat operations. Nuclear and Traditional Deterrence Theory – Misapplication When Applied to Space For years, deterrence theory centered solely on nuclear deterrence strategies, which relied heavily on threats of punishment and unacceptable losses or mutually assured destruction. These strategies effectively deterred the use of nuclear weapons throughout the Cold War to present day. However, strategies of threatening devastating nuclear retaliation do not apply to space. In fact, a deterrence strategy that includes the threat of punishment (i.e., impose cost) should be just one, if not a limited aspect of deterrence for space. For almost half a century, nuclear deterrence strategies formed the foundation for the Cold War waged between the US and the former Soviet Union. Both superpowers relied on the threat of nuclear weapons to deter even conventional military actions, for fear of rapid escalation. In its most unlimited form, mutual assured destruction was a key deterrence strategy; a doctrine of military strategy in which a full-scale use of nuclear weapons by two opposing sides would effectively result in the destruction of both the attacker and the defender.5 While nuclear weapons continue to be a strategic deterrent, the same destructive thought process and strategy is not directly applicable to space.6 Today, some theorists focus and apply more punishing or destructive deterrence practices and thinking to the space domain. They view credible deterrence in space as relying upon the threat of punishment against an aggressor; going so far as to suggest that an attack against us could be countered with an attack in kind. One specific definition limits deterrence to an “attempt to persuade an adversary by threat of force (and other measures) not to pursue an undesirable course of action.”7 Another theorist states, “Deterrence can only succeed if the enemy finds the threat of punishment to be believable.”8 These approaches are less likely to deter for space, especially given our dependence upon the domain. For example, destroying an adversary’s satellite, especially one in an operational orbit, would create a large debris field, potentially hampering or denying our own ability to access space. Instead, deterrence for space can only succeed if our enemies believe we have credible means of denying the benefits they seek to gain. Space deterrence theory should focus on credible ways and means to deny an enemy the benefits they seek; impose costs on our adversaries (against their most prized assets);9 and encourage their restraint. A New Focus of Deterrence What does deterrence look like in the 21st century? The US has not yet figured that out, said Marine Corps General James Cartwright, vice chairman of the Joint Chiefs of Staff. “You need something that deters a conflict, and you need more choices than just nuclear. ~ Sandra I. Erwin, Future of War—How the Game is Changing … Our deterrence strategy no longer rests primarily on the grim premise of inflicting devastating consequences on potential foes.… ~ US National Security Strategy, 2006 In fact, the US does have new and plausible thoughts on 21st century deterrence. Authored under the leadership of General Cartwright, then commander of USSTRATCOM, and signed out in December 2006, the Deterrence Operations Joint Operating Concept (DO-JOC) is the Department of Defense’s (DoD) latest view on deterrence. This approach extends beyond traditional nuclear deterrence theory, which dates back to the heralded days of Strategic Air Command. The DO-JOC states that the purpose or objective of deterrence operations is to “convince adversaries not to take actions that threaten US vital interests by means of decisive influence over their decision-making.”10 In order to influence our adversaries’ decision-making calculus, it focuses on and integrates three key elements: Deny the benefits the adversary seeks; impose costs the adversary fears; and encourage adversary restraint (by convincing them that restraint will result in an acceptable outcome).11 Of these three elements, denying the benefit should be our focus when fielding new ORS capabilities. Deterrence today can only succeed if our adversaries find ORS credible enough to enable military operations even in a contested environment. Deny the Benefits—ORS Tier 1 and Tier 2 Examples People’s Liberation Army’s (PLA) view of space: Space shifting from enabler to key battleground. Space characterized as important because it contributes to information dominance; space now described as important in its own right….many in the PLA see space as a likely future arena for conflict. ~ Space and PRC National Security,’ Dean Cheng, China specialist, The Heritage Foundation, 8 October 2008.12 The purpose to benefit denial is to convince an adversary that their intent will not be achieved, or have little to no value. Today, our ability to field ORS capabilities is minimal at best, and unconvincing as a credible deterrent. Instead, our adversaries likely perceive great benefit in attempting to deny the US’ space capabilities. These benefits, also referred to as “vulnerabilities gaps,”13 are reasons why we must pursue ORS with an increased sense of urgency. However, for benefit denial to be viewed as a credible deterrent, the Eisenhower Center for Space and Defense Study states “our adversaries (must) perceive that the US will retain superior warfighting capability even after an attack.”14 The space and cyberspace domains are increasingly important to how current and future wars will be fought and won. As recently as 4 November 2009, the People’s Republic of China’s (PRC) top Air Force Commander, Xu Qiliang, called the militarization of space an “historical inevitability.”15 This statement came on the heels of an historic visit to USSTRATCOM by General Xu Chihou, one of two vice chairmen of the PRC’s Central Military Commission. During this visit, General Kevin P. Chilton encouraged increased cooperation and comprehensive bilateral relationships between the two space-faring nations.16 Statements from Qiliang and actions such as the 2007 anti-satellite test highlight a growing disconnect between the PRC’s actions and stated policies, increasing concern amongst US leaders and lending credence to the need for new deterrence practices. Moving forward, to be a true deterrent, ORS must also win the race to space in both the speed and cost of fielding capability versus our adversaries’ attempts to counter, destroy, or deny them. Two examples highlight how ORS could play a credible role in deterring adverse actions against our space capabilities: (1) International cooperation and partnerships through shared space capabilities (Tier 1) and (2) the ability to rapidly augment or replace some aspect of existing on-orbit ISR assets in low Earth orbit (Tier 2). Tier 1 and Two ORS capabilities can be deployed and employed rapidly, within hours to days. The cost for Tier 1 includes implementing new concept of operations for deployed on-orbit systems, or the rapid, low cost launch and deployment of systems intended to augment existing systems for Tier 2.

**Expanding ORS will deter attacks against US space assets**

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DSCS III Operations duties at the 3rd Space Operations Squadron (Christopher, “Countering the Chinese Threat to Low Earth Orbit Satellites: Building a Defensive Space Strategy”, http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA510842&Location=U2&doc=GetTRDoc.pdf) HANE = High Altitude Nuclear Event

The United States has taken some initial steps to improve its defensive capabilities. The DoD stood up the joint Operationally Responsive Space (ORS) Office on May 21,2007 at Kirtland Air Force Base, New Mexico. The ORS effort seeks to meet emerging warfighter needs with new space capabilities. Ron Sega, DoD executive agent for space, stated that efforts will focus on the "ability to launch, activate and employ low-cost military-useful satellites, provide, search capability, reconstitute and augment existing capability, while providing timely availabilities of tailor-made, unique capabilities. ,,39 Further, the DoD's Plan for Operationally Responsive Space highlighted the need to increase "situational awareness and adaptability to the threat, as well as an ability to evolve the total suite of space capabilities to address emerging threats in new ways.,,40 The Commander of United States Strategic Command (STRATCOM) detailed three efforts vital to execute the plan: rapidly develop technological and operational innovations, rapidly modify or supplement existing systems to increase capabilities, and rapidly reconstitute space systems when necessary to maintain capability.41 Initial focus on capabilities will be on ISR and communication satellites, improvement of space situational awareness, rapid launch capabilities, and command and control. 42 The ORS effort will use a three tier capability approach to meet warfighter needs. Tier-1 implements activities immediately-to-days using existing or on-orbit systems. Tier-2 utilizes field-ready systems in days-to-weeks to provide rapid exploitation, augmentation or reconstitution of space capabilities. Finally, Tier-3 solutions take months-to-one year to satisfy needs while capabilities are modified or developed and then deployed.43 The ORS implementation timeline envisions eight tactical satellite demonstrators through fiscal year 2013. As of January 2009, two demonstrators have been launched with the third delayed from a scheduled spring 2009 launch due to technical issues. The program timeline also includes tests of operational employment and integration, command and control, and launch vehicles. The ORS program office recently purchased the first three launch vehicle specifically procured for ORS with launches scheduled for 2010 and 2011. Finally, the DoD expects the "Chiliworks" facility at Kirtland Air Force Base, which will focus onTier-2 satellite fielding, to be fully operational by 2015.44 While there are other ongoing efforts within the Intelligence Community and the DoD45 , ORS provides a good starting point for implementation of recommendations within this paper. The ORS plan identifies the need for both anticipatory and reactive elements. ORS planners should focus on the Chinese threat to build capabilities to fit within the Tier-1 and Tier-2 categories. The conflict with China would have to extend past a year to make use ofTier-3 capabilities. The United States must anticipate Chinese actions and have field-ready systems ready for either preemptive or immediate reactive use. Field-ready systems would provide a credible defensive deterrent against existing and likely Chinese offensive anti-satellite actions. PROPOSED DEFENSIVE ACTIONS The United States can choose from a wide variety of options to develop a defensive strategy to counter the Chinese threat to LEO satellites. The comprehensive approach should address space situational awareness (SSA), preplanned satellite actions, launch capability, small satellites, decreased dependence on space systems, nuclear explosion protection, institutional changes, transparency, and engagement. Space Situational Awareness Improving SSA is essential to the success of this strategy. The United States must have a comprehensive knowledge of all objects in orbit. Although the United States maintains a significant Space Surveillance Network (SSN) network, it lacks coverage in key areas and the capability to comprehensively predict the orbits of all objects in space; the February 10, 2009 collision between an Iridium commercial satellite and a Russian military satellite caught the SSN by surprise.46 The United States could build more fixed ground sites, but this would be limited by host country permissions and fiscal constraints. As a near term improvement to coverage, the United States should leverage the US Navy's AEGIS cruiser and destroyer-based radars into its SSN. The AEGIS radar highlighted its space surveillance capability when it tracked a decaying US satellite, enabling its destruction by a US anti-satellite weapon in 2008.47 While the Navy assets need to train and execute their primary mission, they could be given alternate tasking to search and track objects in LEO. This would entail development of procedures between services. Further, integration of land and space-based missile warning sensors into the SSN would yield benefits in the event of an anti-satellite launch. Finally, the United States should continue to pursue satellite as a sensor technology, where the satellite has the ability to self-identify and report on attacks. Improved SSA also allows the United States to characterize the resultant debris field of an anti-satellite attack and thus support reactive measures that may be required by other satellites. Intelligence Directly related to improved SSA is a robust intelligence effort that focuses on Chinese anti-satellite activity. Indications and warning may include increased communication at tracking stations, deployment of mobile tracking stations, and fueling and dispersal of launch vehicles. Identification and reporting of Chinese anti-satellite preparations would enable execution of preemptive defensive actions by the United States. Preplanned Satellite Actions Establishing preplanned actions is key to deterring and reacting to an anti-satellite attack. While the time from launch to impact for the SC-19 is on the order of minutes, intelligence of an impending launch can lengthen the timeline for taking preemptive defensive actions. While limited on-board fuel prevents large orbital maneuvers, a one-time small change to a satellite's orbit is possible. These orbital maneuvers must be executed before the launch of the anti-satellite weapon. Changes in orbit will produce a discrepancy between the anticipated satellite location and the final satellite tracking just prior to launch. The inconsistency may cause the Chinese to doubt the quality of their data and delay the launch as they develop new orbital tracking data, thus opening a window for additional US actions to prevent a launch. However, if the Chinese did decide to launch without updating their data, the slight change in orbit may cause the antisatellite weapon to miss. These same procedures would also be effective against ground-based anti-satellite weapons; a maneuver could lead to a laser missing the target. Having preplanned actions ready to execute provides United States planners another option. If a conflict looks to be inevitable, they could decide to rapidly execute minor maneuvers across satellite constellations. While not only complicating the Chinese targeting process, this could serve as non-destructive shot across the bow. If the conflict escalates into a conventional war, the single maneuver may buy the United States enough time to execute a kinetic strike that would dismantle the Chinese anti-satellite program. The importance of these strikes would move the priority high on the targeting list. Here again, intelligence is a key enabler. Targets must be accurately located, vetted, and updated to enable quick strikes on the anti-satellite targets. Variable and Rapid Launch Capability The current United States Department of Defense launch complex does not have the capability to rapidly replenish satellites in the event of destruction. Launch preparation and execution can take weeks to months. The United States must adopt rapid and flexible commercial launch technologies. Of at least equal importance to having a rapid launch capability is a launch system that deploys satellites from varying locations. When launched from the traditional space ports of Cape Canaveral and Vandenberg Air Force Base, China can easily monitor the launch and quickly determine the initial orbit and possibly satellite type. Having a capability that can unpredictably launch from unmonitored locations will delay China's ability to track and identify United States satellites, greatly inhibiting their ability to target satellites. This capability could be sea-based, where monitoring by an adversary is more difficult. The capability could also be airborne, like the Pegasus program which has successfully launched satellites using an L-I0ll aircraft from California, Virginia, Florida, the Canary Islands, and the Marshall Islands. 48 Small Satellites The United States must also make a move towards smaller satellites that use a common bus and architecture. A single launch vehicle could then deploy multiple small satellites, allowing the rapid establishment of a new constellation at the beginning of a conflict or replenishment of an old one. China would then face a dilemma as to which satellites they would attack. If China does decide to attack, the impact would be proportionately smaller because they would take out a lesser percentage of the constellation. The Iridium collision demonstrated the ability of a large constellation to absorb the loss of single satellite with minimal degradation. 49 Having numerous small satellites ready to launch can also lesson the need to perform defensive orbital maneuvers, as they can be quickly replenished. Finally, small satellites are inherently harder to track whether by radar or optical telescopes. While a requirement for large satellites remains; small satellites will help protect and complement the large satellites. Key to developing small satellites is a common command and control (C2) network regardless of function, rather than today's stovepiped C2 that are unique for each satellite type. A common bus and C2 system can also support small satellites by relying on a cross-linked network to control satellites and download mission data from a central location rather than on ground stations distributed around the globe. Decreased Dependence on Space Systems The United States must decrease its dependence on space systems, making attack on satellites a less appealing target. United States military forces should have weapons and procedures that can function with or without satellite support. For example, high altitude unmanned aerial vehicles can and should complement, and potentially replace, the LEO satellite ISR mission. Countering High-altitude Nuclear Explosions Although the possibility of a HANE may be remote, defense against the long term radiation effects must focus on hardening all future satellites against nuclear explosions. Without hardening, depending on the size of the constellation, satellite replenishment could take months and quickly exhaust satellite spares even with rapid reaction launch capabilities. Building satellites to withstand the nuclear weapon radiation effects beyond that required against the natural environment would add only 2 to 3 percent to total satellite cost.50 Consideration may be given to forgoing hardening for satellites designed for a short (days to weeks) lifetime; one should consider the radiation from a nuclear explosion may remain for up to two years, precluding the launch of non-hardened satellites into the affected orbital regime. 51 While some government low-earth orbit satellites are already hardened, the United States should harden all future satellites. Institutional Changes Changes must be properly incorporated into the DoD infrastructure to be effective. All aspects of doctrine, organization, training, materiel, leadership and education, personnel and facilities must be examined. Additionally, the changes must work across many organizations within the DoD and throughout the United States government. For example, STRATCOM should run comprehensive anti-satellite exercises that incorporate all applicable services and agencies, from the satellite operator to the end user. Transparency The above actions may deter China from further pursuing its anti-satellite programs, but only if executed in a transparent manner. Systems must be fully trained and tested; the United States must overtly demonstrate its capability to rapidly deploy satellites. China must be made fully aware of US capabilities to effectively counter its anti-satellite weapons. China may then realize that its actions will have minimal effect on US military capabilities. Engagement Beyond using a military response to protect government satellites, the United States should consider a holistic approach to China's anti-satellite capabilities by using the other elements of national power: diplomatic, information, and economic. China's current reliance on space is minimal when compared to the United States. China can therefore afford to use antisatellite weapons against the United States. Increased Chinese reliance on space would provide significant deterrents to Chinese use ofcertain weapons such as direct ascent, co-orbital, and nuclear, since collateral damage from these weapons would affect China. First, the United States should engage on Chinese proposed treaties limiting space weapons. Next, the United States should work to build Chinese economic dependence on space systems, while taking appropriate measures to limit technology transfer. With a gap between the Space Shuttle and Ares launch vehicles, an opportunity exists to bring China in as a partner on the International Space Station by providing equipment launch services. Working with China to build its reliance on and participation in space activities will help build deterrence to the use of anti-satellite weapons; the collateral effects would harm its own interests. ADDITIONAL RECOMMENDATIONS While this paper focuses on LEO satellites, the same rigor must also be applied to medium Earth orbit (MEO), highly elliptical orbit (REO), and geosynchronous (GEO) orbit satellites. Although current direct ascent anti-satellite capability can only reach LEO, China's ballistic· missile and space launch vehicles could reach higher orbits. Additionally, China has orbited GEO satellites which could already be carrying co-orbital anti-satellite weapons. China has expressed interest in combating the MEO GPS system through both kinetic and non-kinetic attacks.52 China is also actively developing jamming capabilities to combat United States military communications satellites found predominately in GEO. Additionally, the proposed defensive measures will do more than support deterrence against China. Numerous nations will seek to emulate Chinese actions with kinetic and nonkinetic options. In response to the recent anti-satellite activity of China and the United States, Russia announced the resumption of its anti-satellite weapons program.53 Ground-based actions such as jamming are within the realm of many nations and individuals. One only need look at the hijacking of the HBO satellite signal by "Capt Midnight" as an example of a single individual being able to steal a satellite transponder, in effect jamming the intended signal. 54 Further, proliferation of nuclear weapon and ballistic missile technology make the use of a HANE attractive to a rogue nation or terrorist nation that has little reliance on space capabilities. The Defense Threat Reduction Agency suggests this scenario as a possible last act of defiance by North Korean forces facing defeat,55 Lastly, these measures can be used to combat natural phenomena, such as a meteor shower or solar storms that can damage satellite systems. “A strategy that ensures access to and use of space is useful in times of peace just as in times of war, since space systems that provide critical services may fail or become inoperative in the absence of hostile action.”56 Finally, the United States must not stop at applying these recommendations merely to military satellites. While government satellites are critical in a conflict, commercial satellites in all orbital regimes have become an integral part of military operations to include weather, imaging, and communications. Although tightly tied to the world economy, China could decide to expand its anti-satellite program to attack the economic interests of the United States. While commercial satellites companies typically incorporate protective measures against natural threats, the United States government should share best practices and provide incentives to commercial entities to protect themselves against human threats. The government could do this through requirements to obtain licensing or guaranteed govemment contracts to companies that comply. CONCLUSION The fundamental U.S. security interest in the wake of China's 2007 anti-satellite test should be deterring China and others from attacking U.S. assets in space, using both a combination of declaratory policy, military programs, and diplomacy, and promoting a more stable and secure space environment.57 Council on Foreign Relations The United States government requires a comprehensive plan to counter the threat to its LEO systems posed by Chinese anti-satellite weapons. Failing to protect these key satellites would severely degrade US military capabilities in a conflict with China. The United States should rely on a defensive space strategy to deter Chinese anti-satellite actions. The strategy must include robust space situational awareness, preplanned actions, small satellites, rapid and variable launch capability, decreased dependence on space systems and institutional changes. In total, these actions would complicate the ability for Chinese anti-satellite weapons to easily strike US assets while providing the means to operate through an attack and then reconstitute lost capability. The DoD's ORS effort can be used as springboard, but must be accelerated to meet the rapidly emerging threat. Finally, its growth as a space faring nation may eventually be the best deterrence against a Chinese attack on United States satellites. However, the actions outlined in this paper can also be used to counter threats from other nations or natural phenomena. A rapid comprehensive defensive deterrence approach most effectively counters the Chinese threat and meets Presidential guidance to establish “contingency plans to ensure that U.S. forces can maintain or duplicate access to information from space assets and accelerating programs to harden U.S. satellites against attack.”58

**Swarms of small satellites create redundancy that makes successful attacks against US assets impossible**

**Smith, 11** – USAF Colonel, Director of the Air Force Space and Cyber Center at Air University. He served in the Pentagon’s National Security Space Office as the Chief of the Future Concepts shop (M.V., Toward a Theory of Space Power: Selected Essays, February, http://www.ndu.edu/press/lib/pdf/spacepower/spacepower.pdf)

Although offense is the dominant form of war in space today, this will not always be the case. Defense is possible. Three principles will likely guide the development of future space defenses.

First, if you can't see it, you can't hit it. Satellites are already getting smaller—too small for most space surveillance networks to detect and track. This trend will likely continue not only as a matter of cost savings, but also as a matter of stealthy defense. Avoiding detection includes maneuvering satellites to undisclosed wartime orbits.

Second, all warfare is based on deception.34 Potential adversaries collect intelligence on each other's space systems and make their estimates based on their intelligence assessments. Action must be taken to deceive potential adversaries into underestimating the value of critical systems and overestimating the value of inconsequential systems. In addition, the use of wartime-only modes of operation, frequencies, and other unanticipated behaviors will further complicate an adversary's problems.

Third, there is strength in numbers. The age of the capital satellites is over. Employing only one or two large, very expensive satellites to fulfill a critical mission area, such as reconnaissance, is foolish. Future space systems must be large constellations of smaller, cheaper, and, in many cases, lower-fidelity systems swarming in various orbits that exploit ground processing to derive high-fidelity solutions. In addition, swarms improve global access and presence.

**A stable, predictable funding stream is vital to ORS technology development**

**Dinerman, 6** – DOD space consultant, and senior editor at the Hudson Institute’s New York branch (Taylor, The Space Review, “Tactical IR satellites: operationally responsive spacecraft?,” 8/7, http://www.thespacereview.com/article/675/1

The troops on the ground need information they can use in a timely and easily understood format. Simply to provide them, or division or brigade intelligence staffs that support them, with raw satellite data is probably worse than useless. The next generations of US Army and Marine Corps units are going to require information that can be integrated into their “network-centric” information systems. Imagery from space-based infrared sensors that are specifically designed for tactical utility should be part of these networks. This is a mission for a future constellation of small “operationally responsive” satellites. Part of the constellation should be kept in orbits that take them over places such as south Lebanon or the Afghan-Pakistani border where we can assume that there will be trouble for a long time to come. These should be carefully calibrated on a constant basis, so that their positioning information is ultra-precise. Other satellites can be kept on the ground ready to be launched at relatively short notice to supplement the ones on orbit over the world’s trouble spots, or they could be launched to cover unexpected outbreaks of fighting. A model for the way such a program could be run is GPS, which, over almost three decades, has gone from prototypes to sets of more and more sophisticated and capable satellites. These spacecraft have, on the whole, been both cost effective and free of the kinds of nasty and expensive surprises that have plagued SBIRS and other Air Force satellite programs. An operationally responsive tactical IR satellite system would have to be both affordable and based on proven and reliable technology. The first generation of such satellites may not have all the desired features, but if properly designed—with the right filters and the right level of multi- or hyper-spectral sensitivity—such craft would give the ground forces a valuable early operational capability. To make the program affordable it would have to be designed to use already existing bus and power supply systems and probably also an in-service communications architecture. It would have to be light enough to be launched on a Delta 2 or on a future operationally responsive spacelift vehicle. Most important of all, the funding stream—no matter how much or how little—would have to be predictable so that the contractors would have the incentive to plan for the long term. This would be the most difficult part of the program since it would mean asking Congress to give up part of its power over the annual budget cycle. Another way to keep the program affordable would be to keep the early requirements to a minimum. The first versions should be strictly for ground force use only, with perhaps some applications for Marine Corps amphibious warfare requirements. Only after the system has proven itself should the program be allowed to move on to develop air-to-ground sensor-to-shooter loops. Ultimately a constellation of a dozen or so spacecraft in orbit, backed up by a similar number on the ground, would be ideal for the early versions of the full system. The ground segments will have to be as simple and as inexpensive as possible since it will need to be deployed with more than fifty Army and Marine brigade-sized units as well as with higher headquarters. If the idea of operationally responsive space means anything, it means that the military space forces, particularly Air Force Space Command, are ready to give priority to supporting the troops on the front lines worldwide. Enhancing the combat effectiveness of the Army and the Marines and helping to save American lives should be the highest goal. As Clausewitz put it, “The object of fighting is the destruction or defeat of the enemy.” The more that military space contributes directly to that objective, the better for the troops on the ground and for America as a whole.

**This stimulates commercial launch markets and substantially lowers launch costs – in addition to creating credible deterrence by denial**

**Colón, 10** - Lt Col, USAF, former Director of Operations to the 45th Operations Support Squadron at Cape Canaveral AFS, served as the deputy commander 595th Space Group responsible for the operational testing of space and missile weapon systems until leaving for his present assignment at the Air War College (Miguel, “ DETERRENCE 2035 –THE ROLE OF TRANSPARENCY AND DIVERSITY IN A WORLD OF NANOSATS,” https://www.afresearch.org)

A New Approach to Space Deterrence The book entitled Complex Deterrence states that deterrence works best among major great-powers and is therefore ineffective against rogue groups or terrorists.35 Thus, deterrence must evolve beyond the threat of potential costs imposed by a punishment strategy. Expressed mathematically, deterrence is comprised of gains (G) sought by the adversary and the cost imposed by punishment (C). Thus, if G > C the actor attacks and if C > G he does not. Usually deterrence concentrates on making the cost or punishment so great that the potential aggressor will not attack. This approach will not work for space because an attack is extraordinarily difficult to attribute to any adversary. For example, in 1998, PANAMSAT’s Galaxy IV satellite experienced a battery anomaly leading to a satellite failure that left nearly 40 million customers without paging services.36 What if this incident was not caused by the battery anomaly? Who then attacked the satellite and how? For deterrence to work, one must gather convincing evidence that attributes the attack to someone specific. Lack of attribution will convince the adversary to attack. First, the probability of a nation-state counterattacking, without demonstrable evidence, is low. Second, the inability to rapidly identify the responsible party reduces the probability of retribution thereby increasing the potential gains to an aggressor. As technology miniaturizes satellites, the potential target becomes smaller, cheaper and can effectively hide in the clutter of space debris. For this reason, the approach to space deterrence must concentrate on significantly reducing the perceived gain (G) or success to be won by an adversary. The conditions must be such that it becomes manifestly clear; attacking another asset in space is pointless and counterproductive. Space deterrence must revolve around two concepts: transparency and diversity. Transparency, or the ability to see without obstruction the events that occur in space, creates a peaceful environment which promotes understanding and accountability. Theoretically, when information is released, under the auspices of transparency, it produces an informed and engaged public, one that will hold a culprit accountable. 37 The ability to monitor and understand the rapidly changing conditions in space is critical to the preservation of security in space. While the US developed its current satellite capabilities in compliance with international rules and treaties it also deemed it prudent to develop a space surveillance network to monitor all near space activity and ensure a secure environment for all space faring nations. This network, of ground and space based sensors, provides radar and optical data used to characterize the mission of any satellite, identify the class and type or to simply aid in anomaly resolution.38 Currently, ground systems can track objects with a resolution of 12cm or greater39 making it challenging to track nanosats. Air Force Space Command’s 2030 vision is enabled by technological improvement. It includes upgrades to existing sensors and an increase in the number of space-based optical sensors in an attempt to provide persistent and complete coverage of the near space domain. The resolution of near-term upgrades will improve to 1cm increasing the ability to track nanosatellites.40 In order to ensure safe space operations and uphold its commitment to cooperation with other nations and the peaceful use of space, the US consistently provides the orbit positional data41 via a public website accessible by anyone. The principles and goals stated in the national space policy highlight the nation’s vision of leading the way in space surveillance in order to promote and provide a safe operating environment for machines and people.42 In the end, for transparency to work, space situational awareness must allow analysts to identify deliberate actions by a spacecraft and its owners and ultimately predict, detect, and attribute an attack43. The second concept in space deterrence is diversity. It provides a tailored approach, focusing on minimizing the impact of an attack, also known as graceful degradation, consequently driving the perceived gains (G) for the adversary as close to zero as possible. Diversity can be achieved through large networked constellations of space-based assets complimenting the existing ground based sensors, with a distributed architecture so that destruction of one or even several satellites does not take down the entire system. In the past, the US employed the costly approach of maintaining on-orbit spares, hardening on-board components, enhancing uplink and downlink encryption to increase satellite and signal survivability.44 In the future, nanotechnology will facilitate redundancy and rapid reconstitution. Presently, several companies, including the Defense Advanced Research Projects Agency, are currently demonstrating the technology. By 2035, on-orbit repair along with the robotic on-orbit refueling of satellites will become standard. Spacecraft will use autonomous navigation and conduct housekeeping tasks independent of a ground station. This is especially useful in the event of a communication failure or loss of the ground segment. Moreover, rapid reaction maneuvering capability will allow spacecraft to evade kinetic kill vehicles. The cornerstone of resilience is agile, capable, and functional technology able to diminish an adversary’s gain while increasing the cost of an attack – success in both enables deterrence. Above all, the space industrial base must grow to deliver the technical transformation required to employ this new approach to deterrence. Recommendations The US was shocked by a technological surprise on 4 October 1957 when the Soviet Union launched Sputnik, a 184 pound satellite, into orbit on top of a rocket weighing nearly 4 tons. In contrast, the Vanguard satellite the US developed and had yet to launch weighed only 3.5 pounds.45 Sputnik completely collapsed the technological comfort zone the US. It heated up the Cold War as peoples’ fear grew over what the Soviets might do next; the strategic deterrence calculus was fundamentally altered. Today the US has the opportunity to shape the future and set conditions for effective space deterrence. Reconstituting and energizing the space industrial base is critical to future deterrence. Air Force Doctrine Document (AFDD) 2-2 states, “Operators and planners must know as quickly as possible the origin of any anomaly and be able to identify and geolocate the threat in a timely manner.”46 In order to meet the intent of AFDD 2-2 the US must embrace the goals identified in the National Space Policy, most importantly to “enable a robust science and technology base supporting national security.”47 Without industrial base growth, the international community’s influence will grow and undermine the nation’s future space security. The US cannot allow its own space industry to abrogate its role in national security nor can it continue to set conditions through ITAR and national policies which leave industry with little choice but to divest itself of its space tools. The US government must focus on the following areas: improving space situational awareness, miniaturizing spacecraft and launch vehicles, promoting innovation and risk taking in technology development, and improving export control policies and procedures. First, the key enabler for transparency is space situational awareness. Today’s space surveillance network is composed of diverse sensors to include tracking radars, optical telescopes and space-based visible sensors. To prepare for tomorrow’s smaller target upgrades are required. The W-band upgrade to the Haystack sensor in Massachusetts increases the ground-based sensor’s collection bandwidth from 1GHz to 8 GHz thereby improving its resolution from 25 cm to 1cm and facilitating the tracking of nanosatellites.48 Although the upgrade is significant for the ground-based sensor network, it must be complimented with additional space based capabilities. In this instance, miniaturization becomes a force multiplier as it allows the next generation of space-based space surveillance to be configured with full motion video. Ground-based sensors can tip-off the space-based sensor to track a specific target. The video’s dynamic feedback can in turn provide greater insight into the intent of the adversary as it observes the target. CubeSat has already demonstrated the ability of one nanosat to take a picture of another (figure 3). Consequently, a successful deterrence strategy is dependent on the surveillance network’s ability to identify threats, characterize the potential damage, determine an aggressor’s intent and ultimately attribute the action to the adversary. Second, CubeSat redefined the approach to building satellites through the development of standard building modules and taking advantage of the latest breakthroughs in nanotechnology. This approach makes CubeSat the model for “smaller, cheaper, and faster”. The US government must adopt a similar approach. While tradeoffs are necessary, government interest and investment in the many facets of the space should allow for good decisions about when a technology is “good enough” to satisfy mission and national security requirements. The approach facilitates decreasing the size of satellites, increasing spacecraft redundancy and allowing a higher number of satellites per constellation thereby complicating the targeting equation for the adversary. Its centerpiece focused on driving down the adversary’s perceived gain (G) closer to zero. This approach will increase diversity and future space deterrence effectiveness within a dynamic security environment. Third, advanced miniaturization is creating a growing market for a very small, capable launch vehicle. As CubeSat gains momentum, it creates a strong market dynamic for a very 17 small and highly responsive launch vehicle. Currently, most CubeSats are launched on decommissioned Russian rockets as secondary payloads49. Up to this point, companies like Eurokot and Kosmotras have kept the launch cost to no more than $40K per CubeSat. As demand rises and slots for secondary payloads become scarce, the cost of each CubeSat will inexorably rise. Sensing a growing need for CubeSats, launch companies are developing a two-stage liquid propellant, launch vehicle capable of delivering 10 kg to a 250 kilometer polar orbit. If successful, such a capability will increase launch market share for the US space industry, enhance growth in other areas and lower launch costs.50 Affordable launch enables satellite replenishment. Even if the adversary destroys a satellite, the spacecraft can be quickly replaced minimizing the impact of the attack. Fourth, changes to US export control laws are required. The primary agencies governing export control are the Department of State (DOS) and the Department of Commerce (DOC). The DOS is responsible for maintaining the US’ munitions list which is used to identify which products or services are subject to export controls. Currently, satellites and all related space technologies are under DOS jurisdiction.51 However, DOS is not the most knowledgeable agency with regard to spacecraft or the associated technology and it uses ITAR to implement requirements established in the arms Export Control Act. According to the Defense Industrial Base Assessment on the US space industry, “US manufacturers have not introduced a new satellite bus since the Boeing 702 was developed in 1999. In contrast, European manufacturers have introduced 3 new busses in the last 5 years and are currently developing a 4th.”52 Players within the space industry argue that the US market share dipped from approximately 70% in 1995 to 25% in 2005. Compliance with export control cost US companies an average of $49M per year from 2003-2006.53 This cost was not applicable to foreign 18 competitors. Clearly, export controls provide foreign competitors an advantage in marketing to non-US customers because they limit what can be bought and who can buy it. It can also control the actions of the authorized buyers and users in terms of what they can use the technology for and whom they can share the technology with. Such restrictions adversely affect a US company’s ability to compete in foreign space markets consequently opening up opportunities for foreign space ventures whose governments are not as particular about how technology is used or who buys it.54 In the end, international competition is critical in order to reduce costs, preserve US dominance, forge closer relationships in order to globalize and thereby protect the use of space for all benevolent users. It enables an advanced form of deterrence denying the adversary the option of attacking. In short, space technology must move off the munitions list and into its own category which protects the technology that needs protecting while allowing the US space industrial base to sell non-critical space technology internationally. Conclusion Current developments in the field of nanotechnology are highlighting pathways for spacecraft to become smaller and ultimately affordable. As nanotechnology helps solve the problems of spacecraft mass, volume, and power consumption, national leaders must not lose sight of the fact that it is also opening access to space to virtually anyone. Adversaries understand the US’ increasing space reliance and will challenge the medium especially if it provides an audience and even worldwide recognition for their cause. As future adversaries benefit from smaller, lighter, and affordable satellites, the US must invest in an approach that 19 relies on transparency and diversity as the backbone of a strong deterrence posture to meet the threat in 2035. This new approach to space deterrence concentrates on significantly reducing the perceived gain (G) or success to be won by an adversary instead of solely focusing on the traditional approach of punishment. In order to lower the adversary’s perceived gain, the US’ future ability to deter an attack rests on a space surveillance network that allows for the identification and persistent tracking of miniaturized spacecrafts thereby highlighting intent and ultimately attributing an action to a specific actor. Equally important, the US must embrace nanotechnology as the cornerstone to materials magnifying ways for spacecraft to become smaller, lighter, and affordable while further developing the space industry base. Furthermore, nanotechnology will enable diversity or added redundancy in the more autonomous spacecraft and increase survivability in space while lessening dependency on ground stations making the perceived gains (G) of attacking the ground infrastructure close to zero. Lastly, export control reform will allow nanotechnology to power the industrial base engine and minimize the potential for a nation-state, group or individual actor to create a strategic shock to the space sector. After Sputnik’s voyage, public opinion blamed the government for not doing enough and ultimately risking US’ national security. The response was a significant increase in funding for military and civil space. In a post-9/11 world, the US cannot allow another technological surprise to occur, especially one perpetrated by non-state actors availing themselves of readily available and inexpensive space capabilities that can be used in ways to fundamentally alter the deterrence calculus. Once again, a significant commitment is required to strengthen the space industry and set the conditions needed for success in 2035. The natural deterrent created by high launch costs is disappearing and the ability to monitor and understand the rapidly changing 20 conditions in space continues to be critical to the preservation of national security. In short, the nation’s best technological approach for future space deterrence lies in becoming the world leader in the application of nanotechnology. It will increase the industrial base, lower launch costs, improve transparency and diversity ultimately setting the conditions for the deterrence calculus to tip in favor of the United States. Only then will the adversary’s gain/loss assessment dictate not to attack; effectively deterring him.