

A black and white photograph of a satellite in space. The satellite is a complex structure with a large cylindrical antenna or sensor pointing towards the viewer. It has several smaller cylindrical components and solar panels attached. The background shows the curved horizon of the Earth, with a thin layer of atmosphere and a dark, star-filled sky.

# What if Space Were Weaponized?

*Possible Consequences for Crisis Scenarios*

Jeffrey Lewis  
Center for Defense Information

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by  
Jeffrey Lewis

CENTER FOR DEFENSE INFORMATION  
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## **About the Author**

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## Forward

**U**nder the administration of President George W. Bush, there has been increasing emphasis by U.S. government officials on the perceived need for the United States to prepare for eventual war in space. Long-range U.S. Space Command and Missile Defense Agency plans already envision the deployment of space-based weapons (designed to attack satellites, ballistic missiles and/or terrestrial targets) as integral parts of future U.S. arsenals.<sup>1</sup>

The following analysis is an attempt to postulate the possible implications of space weaponization for future real-world crises. There are myriad factors to be accounted for in any such analysis, and just as many potential outcomes to any crisis war-gaming. Indeed, it is somewhat difficult to tease out the direct affect of space weapons in any single crisis situation vs. other factors, such as the overarching political relationships of the day or the dynamics of nuclear deterrence.

Obviously, not all analysts would come to the same conclusions in reviewing any one of the scenarios postulated here. For example, there is a significant school of thought within the U.S. military that, in many circumstances, space weapons capabilities might serve as crisis stabilizing mechanisms, in that such capabilities could provide options less dramatic than other methods of force application. Others are skeptical about the role for arms control. Former Pentagon counterproliferation chief Ashton Carter has argued

that not all space missions deserve protection from anti-satellite (ASATs) weapons and, moreover, that prohibitions on ASATs might encourage the development of space-based strike weapons.<sup>2</sup>

However, the intent of this study is to highlight situations where the use, or threatened use, of space weapons might work to exacerbate tensions or even catalyze war. There are strong reasons to consider these possibilities: even the U.S. Air Force's own space war games up to now have concluded that potential negative consequences from the use of space weapons – including the possibility of triggering a nuclear response from an enemy – cannot be dismissed.

Suffice to say that the key problem today is that not nearly enough public policy effort has yet been made to think through the potential risks and/or benefits to international peace from any U.S. moves to weaponize space. CDI's Space Security program, made possible by the generous support of Carnegie Corporation of New York, is aimed at educating the public and policymakers on this important issue. In line with that mission, this monograph is designed to provoke concrete debate on how space weapons might impact future national and global security.

*Theresa Hitchens*  
*Vice President and Director, Space Security Project*  
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## Executive Summary

*“Our preoccupation with military power as a political tool needs to be faced and overcome.”*

— Paul C. Warnke

**T**his is a monograph about space weaponization, but its arguments are part of a much larger debate about the limits and prospects of military power as a political tool.

The inauguration of the George W. Bush administration occasioned a subtle rhetorical shift in how the president of the United States describes the fact that United States and Russia each maintain thousands of nuclear weapons capable of destroying the other – the term “mutual deterrence” has been replaced with the less comforting “mutual vulnerability.”<sup>3</sup> Nothing good, of course, can be said of vulnerability. Defense Secretary Donald Rumsfeld took the rhetorical shift further, equating vulnerability with weakness: “Weakness is provocative,” Rumsfeld told the Senate Armed Services Committee, “Weakness invites people into doing things they wouldn’t otherwise think of.”<sup>4</sup>

But for much of the Cold War, vulnerability was an inescapable fact of life. The Soviet Union and the United States were, roughly speaking, committed to denying the other invulnerability, which might be used for coercion. In that light, the futility of finding a technological end-run around the arms race was a powerful force for détente and accommodation.

The Bush administration's Nuclear Posture Review suggests that the development of space-based and space-enabled systems – global strike, missile defense and enhanced command, control and intelligence capabilities – will revolutionize deterrence. The real problem is that the suite of space capabilities outlined in the Nuclear Posture Review creates the illusion that vulnerability is a policy choice, rather than a fact of life.

The U.S. denigration of mutual deterrence has caused consternation in China and Russia, which express concern that American rhetoric about moving beyond the Cold War belies an interest in acquiring the capability for highly intrusive, preemptive actions. Beijing and Moscow have pressed for negotiations in the Conference on Disarmament in Geneva on the issue of “preventing an arms race in outer space.” The U.S. position has been that there is no space arms race currently underway and that negotiations are unnecessary.

The prospect that space weapons might render the United States invulnerable to any kind of attack will remain tempting. And, for the foreseeable future, it will remain out of reach, for myriad reasons.

Many warn that space weapons will be technologically daunting and cost-prohibitive, while alienating nations allied to the United States and antagonizing others. These five scenarios attempt to explain a different, complicated idea: In a

world with space weapons, the United States may be better armed, but we may well be less secure.

- Scenario 1 argues that U.S. anti-satellite (ASAT) programs are likely to inspire and aid the ASAT programs of others. In a world where many states have ASATs, the United States, which is heavily dependent on space systems, has the most to lose.
- Scenario 2 argues that the tremendous value provided by space-based military systems is also very vulnerable to attack, creating perverse incentives for a U.S. president to rapidly escalate conflict in a crisis situation.
- Scenario 3 argues that Russia and China are likely to change their nuclear postures in response to expanding U.S. military capabilities in outer space, increasing the readiness of their forces at the expense of operational control, and undermining years of efforts at risk reduction.
- Scenario 4 argues that the space-enabled war-fighting strategies tangle nuclear and space forces together in a way that creates unnecessary risks of accident – such as a piece of space debris striking a Russian early-warning satellite that could be interpreted as an attack.
- Scenario 5 considers the possibility of conflicts that escalate into space, threatening American space assets through collateral damage, even if the United States is a third party.

In many of these scenarios, space weapons merely exacerbate underlying instabilities. In

others, space capabilities, by reinforcing the belief that vulnerability is a choice, may blind U.S. policymakers to the need to complement military power with political and diplomatic efforts. The over-riding message is that, at best, space weapons simply change the vulnerabilities faced – substituting one unstable situation for another. Public policy choices will always be about balancing risks and opportunity costs. Arms control and other types of international agreements may play an important, though not exhaustive, role in addressing some of these security challenges

One criticism leveled against arms control in particular, as well as those concerned with military activities in outer space, is that there is no definition of a “space weapon.” This is true, but it is irrelevant. The capabilities identified in this monograph may or may not be defined as “space weapons.” Still, many of these types of systems have little use in non-war-fighting strategies and some may even be counterproductive to winning a war. For these and other reasons (such as international opprobrium), a decision to invest heavily in them is one that the United States may come to regret.

It would therefore be incomprehensible if such decisions were to be made in a public policy vacuum, as is currently the situation. The Pentagon is moving forward with a number of research efforts to develop the capabilities to fight a war in, through and from space, and yet there has been almost no public discussion of the costs vs. benefits of such a strategy. The goal of this monograph is to help start that critical debate.

# U.S. Vulnerability to Foreign ASATS

## ASATS, Ours and Theirs, on the Korean Peninsula (2010)

**A**lthough proponents of anti-satellite (ASAT) weapons often assert that development of these weapons is inevitable, research on ASATs proceeded in fits and starts for the duration of the Cold War – and none were ever deployed, in part due to technical obstacles but also due to political considerations.

The Soviet Union tested a “co-orbital interceptor” – essentially a satellite loaded with explosives and launched into the same orbit as its target. The “interceptor” was designed to orbit the Earth until it caught up with the target and exploded. The test record for this system was unimpressive, although no one knows how the system would have functioned in a real war.

The United States did somewhat better in the 1980s, developing a miniature homing vehicle (MHV) that could be fired from an F-15 into Low Earth Orbit (LEO). The system was tested once against a satellite in orbit, but was canceled under congressional pressure.

Fast forward to 2010. By that time, the United States may be capable of developing a series of sophisticated ASAT weapons including a ground-based kinetic kill vehicle, ground-based lasers and so-called “microsatellites” to patrol space. These are not futuristic capabilities – the Pentagon has completed development of a ground-based kinetic kill vehicle. The Pentagon maintains a large infra-red chemical laser in New Mexico that participated in a test against a U.S. satellite

in 1997 and plans on launching a prototype microsatellite, the XSS-11, in 2004.<sup>5</sup>

It is important to understand that there is another, more likely “inevitability” involved if the United States pursues these capabilities, that is: other nations almost assuredly would, too. Although Russia and China have declared a moratorium on ASAT testing, it would be irresponsible for either state not to acquire their own deterrent to potential U.S. ASAT attacks. Russian and Chinese ASATs may, in turn, be a reason (or, perhaps, just an excuse) for states such as India to follow suit. Still other countries – and this includes North Korea and probably Iran – that have the desire, but not yet the skills, would then be able to “draft” in the wake of the big powers through espionage, declassification and, perhaps, the black market. The point is this: once the United States has gone down the ASAT road, there likely won’t be an option of negotiating a ban on ASATs or discouraging the proliferation of legitimate dual-use technologies such as microsatellites. As we have learned with nuclear and missile proliferation, once the genie is out of the bottle, it is out for good.

By 2010, then, it would be relatively safe to bet that if the United States has deployed sophisticated ASATs, a state like North Korea may have developed a crude array of co-orbital interceptors, space mines and, possibly, direct-ascent weapons. North Korea might find these

weapons very useful in a future conflict against the U.S. military, which is becoming increasingly dependent on space assets for targeting, communication, surveillance and navigation. These U.S. space systems are critical “force multipliers” designed to allow smaller numbers of U.S. forces to defeat the much larger armed forces of countries. North Korean leaders might calculate that selected strikes on U.S. satellites might help their two-million-man Army inflict enough casualties in a fight with the United States to impose a negotiated settlement.

Although ASAT attacks might not be enough to tip the balance against the more sophisticated U.S. military in a conflict with North Korea, the loss of space-based assets would be a major constraint on the operation of U.S. forces – and result in unnecessary American casualties. Army Gen. Tommy Franks, then CENTCOM commander, testified before the Senate in 2003 that “the pieces of this operation [Operation Enduring Freedom in Afghanistan] which have been successful would not have been so without space-based assets. It’s just very simply a fact.”<sup>6</sup>

It is not difficult to understand his outlook. Consider the role of constellation of Global

Positioning System (GPS) satellites that provide for precise navigation: almost one-third of all the munitions dropped in Operations Enduring Freedom and Iraqi Freedom were satellite-guided (See table). This reliance, in fact, would be much greater except that the U.S. inventory of such weapons is limited. In smaller operations in Bosnia (Deliberate Force) and Iraq (Desert Fox), nearly 90 percent of munitions were “precision” weapons of one sort or another. By 2010, it is possible that a majority of munitions used by the United States in any conflict will utilize satellite guidance.<sup>7</sup> GPS is also essential to enabling troops to maneuver around the battlefield. During Operation Iraqi Freedom, the U.S. Army employed more than 100,000 Precision Lightweight GPS Receivers (PLGRs) – one PLGR for each nine-person squad. During Operation Desert Storm, there was only one GPS receiver for each company – about 180 soldiers.<sup>8</sup>

The U.S. military is also heavily dependent on communications satellites (including commercial ones) to carry the enormous load of traffic required by modern weapons systems. For example, just one Global Hawk unmanned aerial vehicle (UAV) requires about 500 megabits per

<b>U.S. Reliance on Space: Air-to-Ground Munitions (excludes HARM)</b>				
	DesertStorm (Iraq 1991)	Allied Force (Serbia 1999)	Enduring Freedom (Afghanistan 2002)	Iraqi Freedom (Iraq 2003)
Unguided	210,000	16,000	8,000	9,300
	96%	70%	44%	38%
Laser/EO-guided	9,300	7,000	5,000	8,600
	4%	27%	28%	35%
GPS Guided	-	700	5,000	6,600

second of bandwidth – that is five times the total bandwidth required by the entire U.S. military during the Gulf War. The demand for bandwidth has become one of the principle constraints on U.S. military operations. The *Wall Street Journal* reported that the Pentagon was forced to keep half its fleet of Predator and Global Hawk UAVs grounded at any given time because too little bandwidth existed to fly all eight aircraft simultaneously. Global Hawk pilots reportedly turned off some sensors and transmitted lower-resolution video under bandwidth constraints.<sup>9</sup> In the future, demands for bandwidth will be stunning. A Defense Science Board (DSB) study predicted that, by 2010, the Pentagon would need 16 gigabits per second of bandwidth – the equivalent of about 208,000 simultaneous phone calls – to prosecute a major theater war. Just three years later, an Army officer heading a classified study to update the DSB projection told a trade publication that the requirement is now “significantly higher than what we forecast” in 2000.<sup>10</sup>

The Pentagon is also looking at moving tactical intelligence and reconnaissance systems into space. By 2010, the Pentagon anticipated the launch of the first satellites in a space-based radar constellation that will replace the Airborne Warning and Command System (AWACS) aircraft. The Pentagon is also hoping to deploy the first R&D satellites for a space-based tracking and surveillance system to support its missile defense architecture.<sup>11</sup>

These systems would make tempting targets for a North Korea that was able to develop ASATs. A scenario like this essentially unfolded in a 1997 “Army After Next Winter Wargame” – which envisioned a 2020 Russian invasion of the Ukraine. First, the opposing “Red” team was able

to launch a coordinated attack on NATO space systems that allowed it to over-run its smaller opponent leaving NATO unable and unwilling to intervene – ending the game on the second day. NATO was “completely paralyzed,” leaving one Blue participant to explain what had happened: “everything just ground to a halt.”<sup>12</sup> The lesson was an important one: the United States, more than any other country, has the most to lose from a shoot-out in space.

One phenomenon that did not occur in the 1997 war game, but has occurred elsewhere, is the risk that an ASAT attack against U.S. satellites might provoke the United States to dramatically escalate a conflict. Another war game demonstrates this “non-intuitive insight about information flow.” The disruption of information flow could “contribute to the rapid escalation of the war, eventually triggering nuclear weapon use.” As one participant explained, as either a Blue or Red commander, if “I don’t know what’s going on, I have no choice but to hit everything, using everything I have.”<sup>13</sup>

U.S. ASATs, by the way, were completely useless in these scenarios since the Red forces were relatively unreliant on space systems. This would be especially true for North Korea, which doesn’t have any satellites to speak of and doesn’t rely on commercial satellites to conduct military operations.

With regard to North Korea, some analysts argue that that North Korea could, already, improvise a crude ASAT attack using a nuclear weapon on a ballistic missile. It is true that any state with a basic nuclear weapon and an intermediate-range ballistic missile could effect what is known as a high altitude nuclear detonation (HAND) in LEO. Both U.S. military and com-

mercial imaging satellites are parked in LEO, and thus would be vulnerable to HAND – both from any direct, line-of-sight impact from the detonation and also, over time (weeks to months), from amplified radiation levels in the Earth’s magnetosphere.<sup>14</sup>

That said, the GPS satellites are in Medium Earth Orbit (MEO) and critical U.S. military and commercial communications satellites are in Geosynchronous Earth Orbit (GEO) – thus out of reach of a HAND for any nation without intercontinental ballistic missile- (ICBM) range missiles.

Unless the North Korean regime was sure that an ASAT attack would be decisive, the indiscriminate nature of a nuclear weapon in orbit would also likely have drawbacks for Pyongyang. Some of the satellites in LEO likely to be harmed by a HAND would belong to states such as Russia and China – states that the North Korean leadership might be counting on to provide diplomatic assistance in brokering a settlement (or at least post-war sanctuary for its leaders).

After the U.S. Army restarted the 1997 war game (and reduced the effectiveness of the ASAT attack to improve Blue’s chance), Red forces did – as a last resort – launch an indiscriminate attack. As Blue approached Red territory, the Red team placed 30 ASATs into orbit (armed with nuclear warheads) and destroyed the entire international space infrastructure – obtaining a ceasefire in the process. While an attack with a single nuclear weapon may or may not be decisive for North Korea, an attack of this scale and sophistication would more likely be.

While under current circumstances it is unlikely that North Korea could build 30 of its own nuclear warheads by 2010, there is always the

possibility that another nation or group might be willing to sell Pyongyang such capabilities in part due to fears about U.S. space dominance.

The point here, for either side in this scenario, may simply be that the use of ASATs could very well have unintended negative consequences for the side that decides to use them.

# Preemption Scenario

## Crisis Instability Over the Taiwan Strait (2010)

In the previous section, we discussed how the use of a fictional North Korean ASAT weapon might dramatically escalate a conflict, much to the surprise of both Pyongyang and Washington. There is a danger that Washington may learn this lesson too well – fearing that an opponent may disable crucial space-based systems early in a conflict, a president might choose to launch a surprise attack. In other words, basing U.S. security strategy on vulnerable systems such as satellites will reduce the amount of time available for diplomatic solutions to conflicts. The historical analogy is August 1914, where the presumed advantage from “going first” created an unstoppable momentum toward World War I. Such a scenario may have more potential relevance today, given the new preemptive strategy articulated by President George W. Bush during his 2002 address at West Point.<sup>15</sup>

Let’s examine, for example, a replay of the 1996 crisis that occurred across the Taiwan Strait. During the 1996 crisis, China announced a series of “military exercises” including ballistic missile launches and troop movements near Taiwan. Beijing, presumably, wanted to demonstrate its resolve and discourage further moves toward independence during the campaign for Taiwan’s presidency. Although some observers thought “China might conduct some limited military action using the exercise as cover,” the potential for escalation was limited because the Pentagon knew

that China could not successfully (and, therefore, would not) invade Taiwan.<sup>16</sup>

By 2010, China’s military likely will pose a much more credible threat to Taiwan. A recent Pentagon assessment concluded that China’s “offensive capabilities improve as each year passes, providing Beijing ... with an increasing number of credible military options to intimidate or actually attack Taiwan.” In this context, Washington may be more worried that a Chinese military exercise will be used to provide cover for a surprise attack.<sup>17</sup>

Washington would also have to worry that Beijing’s nuclear arsenal might be used to deter the United States from coming to Taiwan’s defense. “In response to external intervention in a regional conflict involving China,” the Pentagon expects “the [People’s Liberation Army] would attempt to weaken U.S. or other third party’s resolve by demonstrating the capability to hold at risk – or striking – high-value assets.”<sup>18</sup>

Many advocates of space weapons see these systems as a silver bullet to deal with Beijing’s nuclear arsenal. Mirroring the language in the Pentagon report, an influential architect of the Pentagon’s modernization plan suggests developing a “one-two punch” of conventional, offensive systems to attack enemy airfields and ballistic missiles on short notice; backed up by missile defenses to intercept any retaliation, which would be badly damaged and uncoordinated:

*“Perhaps the most limiting factor for Washington ... is the obvious fact that U.S. intervention would risk escalation to a large-scale theater war and Chinese ICBM threats against the U.S. homeland. Preserving the credibility of U.S. deterrence commitments in such circumstances would require Chinese leaders to believe that Washington would persevere despite their nuclear threats and possible regional nuclear use. ...*

*In sum, a U.S. deterrence policy for this case would focus on a “denial” deterrence threat, that is, a threat to defeat China militarily while significantly limiting potential U.S. civilian and military losses. The U.S. military posture supporting deterrence in this case would be capable of limiting prospective U.S. military and civilian losses, while also defeating China militarily, that is, a combination of offensive and defensive capabilities, including missile defense.”<sup>19</sup>*

This is an ambitious strategy that will be very, very difficult for the United States to achieve. For one thing, the strategy requires that the Pentagon provide around-the-clock coverage of almost the entire world – including the oceans where Russian

(and, perhaps someday, Chinese) missile submarines may patrol. For another, these systems must work together almost seamlessly because of the incredible time pressures involved: The Pentagon has set a requirement of being able to strike a target anywhere in the world just minutes after detecting preparations for a missile launch. Once a missile is actually launched, the missile defense system has less than five minutes before the missile completes the most vulnerable phase of its flight, the boost phase, and deploys countermeasures that could overwhelm the remaining layers of the system.

Most of these systems will eventually have to be based in space if the Pentagon is to provide continuous and global coverage. The Pentagon plans to initially place sensors to detect missile launches and track targets in space, followed in later years by missile defense interceptors and “force projection platforms” (the latter being Air Force-speak for what most of us think of as “space weapons”). These programs are already funded in the FY 05 budget and the Pentagon has plans to deploy prototypes near the end of the decade.

There are, however, dangers to placing such important assets in space. Satellites are inherently vulnerable. They travel in predictable, fixed orbits — this is the reason that some in the Air

U.S. Space-Based Systems in this Scenario	
PROGRAM	PURPOSE
Space-Based Tracking and Surveillance	Detect missile launches
Space-Based Radar	Track ground targets, like mobile ballistic missiles
Space-Based Interceptor	Shoot down incoming ballistic missiles
Common Aero Vehicle	Attack bunkers, silos and mobile ballistic missiles
Source: U.S. Air Force Transformation Flight Plan	

Force call intercepting a satellite “scheduling.” Because of the high velocities of objects in orbit, even a small object can destroy the most durable military satellite. For example, engineers cannot shield satellites against orbital debris larger than one centimeter in diameter – anything larger than an M&M.<sup>20</sup> Moreover, the space environment is harsh and subject to human manipulation. During a high-altitude nuclear test in the early 1960s, the United States discovered that a nuclear weapon detonated in space could create a lethal electromagnetic pulse that would deaden virtually all of the satellites in its line-of-sight, and leave a long-term radiation hazard that would disable large numbers of satellites over the next several months.<sup>21</sup>

Not surprisingly, the Pentagon is extremely worried about possible Chinese ASATs, and the threat that such weapons would pose to U.S. military superiority. The most recent Pentagon report on Chinese military power warns that “China is said to be acquiring a variety of foreign technologies which could be used to develop an active Chinese ASAT capability.”<sup>22</sup> The report also warns that, at the outset of a conflict, “the PLA would attempt to weaken U.S. or other third party’s resolve by demonstrating the capability to hold at risk – or actually striking – high-value assets. The PLA would seek to leverage emerging asymmetric capabilities to counter or negate an adversary’s superiorities.”<sup>23</sup>

These weapons could be used to blind the missile warning and radar satellites that allow the United States to target Chinese ballistic missiles on the ground or in flight, as well as the communications satellites that would direct systems such as the Common Aero Vehicle (CAV) to their targets. If the United States were to deploy space-based

missile defenses, or place a large number of CAVs in orbit (aboard a space maneuver vehicle like NASA’s X-37), China might target those weapons with anti-satellite weapons as well.

This situation would essentially put the United States on “hair trigger” alert in space. A Chinese military exercise, for example, involving the movement of large numbers of troops and mobilization of ballistic missile units might be mistaken in the United States as a prelude to a surprise attack. With a military strategy that absolutely depends on vulnerable space assets to protect the homeland, an American president would face the unenviable task of choosing between launching a surprise attack on China or risking the loss of space-based intelligence, strike and missile defense assets that protect against nuclear attack.

Such an attack could be very large or very small. The United States might attempt to use CAVs, aided by guidance from space-based radar systems, to attack Chinese command and control systems, disable the arsenal of Chinese ballistic missiles or merely attack the sites of suspected Chinese anti-satellite weapons. Missile defense, using space-based sensors and perhaps interceptors, would be used to discourage the Chinese from attempting any retaliation.

It is not clear whether even a very large American first strike would completely neutralize the 75 to 100 Chinese nuclear weapons that the CIA anticipates will be capable of reaching the United States in the next 10 to 15 years.<sup>24</sup> Controlling escalation, however, appears dicey – if the United States succeeded in severely degrading the Chinese command and control system, Chinese leaders might not even know that the original attack had been confined to conventional weapons.

Those who say this scenario is far fetched may be surprised to learn that it happened – in a war game sponsored by the Naval War College.<sup>25</sup> In that game, which was held August 14-25, 2000, a large Asian nation with over a billion people called Red (China) was conducting large-scale military exercises that the Blue Team (the United States) believed were a prelude to an attack on a U.S. ally located in region, designated Brown.

During these exercises, the commander of Blue Forces became concerned that Red might use ground-based lasers against U.S. satellites. Fearing the loss of such important assets, he ordered a limited preemptive strike – using a fleet of CAVs that he had deployed in space – against suspected ground-based laser sites deep inside Red’s country. At the same time, he refrained from striking other targets “rationalizing that the preemptive strike was only protecting high-value space assets, not initiating hostilities.”<sup>26</sup>

The Blue Team was stunned when Red viewed the strike on targets deep inside its territory as an act of war and retaliated – causing a general war. One flabbergasted participant, sounding not completely convinced of what had just happened, reportedly explained: “We thought these preemptive strikes might very well have stopped the crisis situation. But there were some who had a different point of view – that the strikes may have been provocative.”<sup>27</sup>

It is important to note that the Chinese don’t even have to actually acquire ASATs for this nightmare scenario to happen. The Pentagon’s assessments of Chinese ASATs are based largely on circumstantial evidence – a Hong Kong newspaper report here; a commercial purchase by a Chinese company there. In fact, the Pentagon admits that “specific Chinese programs for a laser

ASAT system have not been identified” and that press reports of a so-called “parasitic” microsatellite “cannot be confirmed.”<sup>28</sup>

Such gaps in U.S. knowledge are dangerous, given the natural tendency of defense planners to assume the worst. Although Blue claimed that it had acted on “unambiguous warning” of a threat to space assets, the mere fact that the Chinese might already have such system – or could improvise a crude ASAT in a pinch – would create a strong incentive to use U.S. space systems before they were lost. It is not too far fetched to imagine the president, faced with a crisis over Taiwan, deciding – as he did with Iraq – that “we cannot wait for the final proof – the smoking gun – that could come in the form of a mushroom cloud.”<sup>29</sup>

# Alert Rate Scenarios

## Russia and China in 2010

In the previous scenarios, we have looked at how space weapons might create adverse incentives for the United States to escalate a conflict. This is the first of two scenarios that consider how U.S. space weapons might create incentives for potential adversaries to behave in dangerous ways, including the possible impact of space weapons on what is already a delicate and complicated relationship among the three key nuclear weapons states, the United States, Russia and China.

Space weapons are frightening to potential opponents – this presents both opportunities and dangers. On one hand, proponents of space weapons focus on the ability of such weapons to dissuade potential opponents from developing certain military capabilities and deter them from threatening U.S. interests. Although space weapons may dissuade some states from investing in, for example, ballistic missiles, two states – Russia and China – are unlikely to get out of the business of nuclear deterrence. Both states are the subject of extensive nuclear war planning by the United States, despite political rhetoric from Washington about “moving beyond” the Cold War. Far from leaving behind such concerns, the most recent Nuclear Posture Review recommends sizing the U.S. nuclear forces for “immediate and unexpected contingencies.”<sup>30</sup> The NPR identifies China as “a country that could be involved in an immediate or potential contingency” and

notes that “a contingency involving Russia, while plausible, is not expected.”<sup>31</sup>

The suite of space capabilities outlined in the scenario concerning the Taiwan Strait – long-range strike systems, ballistic missile defenses and space-based surveillance – are largely designed to target the nuclear forces of these two countries. Leaked portions of the NPR call for “systems capable of striking a wide range of targets throughout an adversary’s territory” including “long-range precision strike weapons and real-time intelligence systems” that are capable of tracking and destroying “mobile ballistic missiles.”<sup>32</sup>

Cold Warriors have long desired the ability to hunt mobile ballistic missiles. The most difficult problem is time. It takes just minutes to launch a ballistic missile. If one wishes to destroy that ballistic missile before it launches, one must locate the target and continue to track it, while an aircraft moves within range of the target. During Operation Desert Storm, for example, the United States launched more than 1,500 sorties to hunt mobile Scud missiles – yet there is no evidence that any significant number of Scuds were destroyed.<sup>33</sup>

Some space systems, including space-based weapons, are being contemplated to resolve these problems. By placing reconnaissance and surveillance assets, such as the Space-Based Radar, in orbit, the Air Force hopes to conduct continuous

surveillance of mobile ballistic missiles much as the Navy monitors ballistic missile submarines. Space-based communications satellites could transmit the targeting information directly to strike platforms such as UAVs, CAVs or space-based interceptor systems.

The Pentagon has an overarching mission: to create a seamless system that can deliver “precision-guided weapons anywhere in the world within 90 minutes of launch.”<sup>34</sup> This goal doesn’t necessarily require space-based options – for example, the Air Force is reconsidering the concept of equipping ICBMs with non-nuclear warheads. Still, 90 minutes is not much time for the entire process of detection, decision-making and the actual conduct of a strike.

Ninety minutes is also about how long Chinese missile units take to fire a ballistic missile. For the Russians or the Chinese, one potential response to the development of such a U.S. arsenal could be to raise the alert levels of their ballistic missile forces and keep them on patrol. Further, given the relative vulnerability of Russian and Chinese communications infrastructures, both sides might also consider “pre-delegating” the authority to launch nuclear weapons to lower-level field commanders to ensure retaliation – this is what filmmaker Stanley Kubrick darkly referred to as “a retaliatory safeguard” in his 1964 satire about the nuclear arms race, “Dr. Strangelove.”

The United States actually had such a posture for a period during the Cold War, particularly for U.S. nuclear weapons stationed at overseas air bases that might come under surprise attack from the Soviet Air Force. Two academics pieced together the surprise that awaited a U.S. team inspecting American nuclear weapons based overseas:

*“The exact details are hazy, but the broad contours are clear: the inspection team found the control of the forward-based nuclear weapons inadequate and possibly illegal. In Germany and Turkey, they viewed scenes that were particularly distressing. On the runway stood a German (or Turkish) quick-reaction alert airplane (QRA) loaded with nuclear weapons and with a foreign pilot in the cockpit. The QRA airplane was ready to take off at the earliest warning, and the nuclear weapons were fully operational. The only evidence of U.S. control was a lonely 18-year-old sentry armed with a carbine and standing on the tarmac. When the sentry at the German airfield was asked how he intended to maintain control of the nuclear weapons should the pilot suddenly decide to scramble (either through personal caprice or through an order from the German command circumventing U.S. command), the sentry replied that he would shoot the pilot; [one member of the team] directed him to shoot the bomb.”<sup>35</sup>*

The Russians already continue to maintain their forces on high rates of alert – something that the United States has apparently been encouraging to reduce Russian fears about U.S. missile defenses. The follow-on Strategic Arms Reduction Treaty (START II) agreement contained provisions for eliminating missiles with multiple warheads (which are usually kept on higher rates of alert), but the administration of President George W. Bush abandoned that restriction in the Moscow Treaty and Russia may resort to multiple independently targetable reentry vehicles (MIRVs) to maintain a larger nuclear force.<sup>36</sup>

Russian President Vladimir Putin has called the prospects of space weapons “particularly alarming,” while the commander of Russian Space Forces implied that Russia would respond to U.S. deployments of space weapons.<sup>37</sup>

While China currently maintains its forces on a “no alert” status, Beijing has indicated considerable concern about how a U.S. space-based missile defense system might undercut its nuclear deterrent. The Chinese ambassador to the Conference on Disarmament warned that the deployment of space weapons would “jeopardize the global strategic balance and stability” and “trigger off ... another round of arms race.”<sup>38</sup> China currently does not appear to keep nuclear warheads mated to its ballistic missiles, nor aboard its single ballistic missile submarine (which stays in port). All Chinese nuclear weapons appear to be under lock and key in storage facilities that are physically separate from their launch pads. The deployment of space weapons could create strong incentives to reverse this restraint, and increase the alert rates of Chinese forces.<sup>39</sup>

Raising the alert rates of Russian and Chinese nuclear forces would undermine U.S. security on a day-to-day basis, because forces on alert are inherently more vulnerable to the inherent risks of accident or unauthorized use.

Accidents happen, including accidents with U.S. nuclear weapons. In some cases, the warheads were lost – the United States lost at least two nuclear weapons during aircraft crashes in 1958 off the coast of Savannah, Georgia, and in 1966 off the coast of Spain.<sup>40</sup> In other cases, warheads have been recovered: In 1996, an Energy Department tractor trailer overturned in a Nebraska blizzard carrying “classified cargo” – later confirmed to be several nuclear warheads.

Fortunately, the weapons were recovered undamaged after several hours.<sup>41</sup> These kinds of accidents are more likely to happen when forces are kept on alert and moved around.

There is also the risk that nuclear warheads might be stolen by terrorists or sold by military units. Although Russian soldiers are now paid regularly, obviating concerns that they might sell nuclear weapons on the black market, both Russia and China have indigenous terrorist groups with ties to al Qaeda. These groups would have strong incentives to attempt to steal one or more nuclear weapons – and mobile missiles patrolling in remote areas, for example, might be an inviting target.

Forces on high rates of alert are also vulnerable to the nightmare scenario of an unauthorized launch by a field commander. Although the United States has instituted extensive human reliability programs to ensure that U.S. military personnel are psychologically stable, there is little evidence of comparable programs in Russia or China. Even in a perfect program, mistakes are made. As one U.S. officer recalled:

*“I used to worry about Gen. [Thomas] Power. I used to worry that Gen. Power was not stable. I used to worry about the fact that he had control over so many weapons and weapon systems and could, under certain conditions, launch the force. Back in the days before we had real positive control, [Strategic Air Command] had the power to do a lot of things, and it was in his hands, and he knew it.”<sup>42</sup>*

These problems are a feature of what some call the “always/never” dilemma: “nuclear weapons

must always detonate when those authorized direct and never detonate when those authorized do not.” These are cross purposes – finding the right balance between the two requires making intelligent judgments about which risks one chooses to run. Given the enormous destructive power of nuclear weapons and important economic and political interests that the United States shares with both Russia and China, all sides should be more interested in the “never” part of the equation. Yet space weapons, by threatening the nuclear forces of both countries, could well create incentives for Russia and China to do the opposite.

# Accidental Nuclear War Scenario

## Crisis Over Kaliningrad (2010)

This is the second of two scenarios that consider how U.S. space weapons might create incentives for America's opponents to behave in dangerous ways. The previous scenario looked at the systemic risk of accidents that could arise from keeping nuclear weapons on high alert to guard against a space weapons attack. This section focuses on the risk that a single accident in space, such as a piece of space debris striking a Russian early-warning satellite, might be the catalyst for an accidental nuclear war.

As we have noted in an earlier section, the United States canceled its own ASAT program in the 1980s over concerns that the deployment of these weapons might be deeply destabilizing. For all the talk about a "new relationship" between the United States and Russia, both sides retain thousands of nuclear forces on alert and configured to fight a nuclear war. When briefed about the size and status of U.S. nuclear forces, President George W. Bush reportedly asked "What do we need all these weapons for?"<sup>43</sup> The answer, as it was during the Cold War, is that the forces remain on alert to conduct a number of possible contingencies, including a nuclear strike against Russia.

This fact, of course, is not lost on the Russian leadership, which has been increasing its reliance on nuclear weapons to compensate for the country's declining military might. In the mid-1990s, Russia dropped its pledge to refrain

from the "first use" of nuclear weapons and conducted a series of exercises in which Russian nuclear forces prepared to use nuclear weapons to repel a NATO invasion. In October 2003, Russian Defense Minister Sergei Ivanov reiterated that Moscow might use nuclear weapons "preemptively" in any number of contingencies, including a NATO attack.<sup>44</sup>

So, it remains business as usual with U.S. and Russian nuclear forces. And business as usual includes the occasional false alarm of a nuclear attack. There have been several of these incidents over the years.

In September 1983, as a relatively new Soviet early-warning satellite moved into position to monitor U.S. missile fields in North Dakota, the sun lined up in just such a way as to fool the Russian satellite into reporting that half a dozen U.S. missiles had been launched at the Soviet Union. Perhaps mindful that a brand new satellite might malfunction, the officer in charge of the command center that monitored data from the early-warning satellites refused to pass the alert to his superiors. He reportedly explained his caution by saying: "When people start a war, they don't start it with only five missiles. You can do little damage with just five missiles."<sup>45</sup>

In January 1995, Norwegian scientists launched a sounding rocket on a trajectory similar to one that a U.S. Trident missile might take if it were launched to blind Russian radars with a high

altitude nuclear detonation. The incident was apparently serious enough that, the next day, Russian President Boris Yeltsin stated that he had activated his “nuclear football” – a device that allows the Russian president to communicate with his military advisors and review his options for launching his arsenal. In this case, the Russian early-warning satellites could clearly see that no attack was under way and the crisis passed without incident.<sup>46</sup>

In both cases, Russian observers were confident that what appeared to be a “small” attack was not a fragmentary picture of a much larger one. In the case of the Norwegian sounding rocket, space-based sensors played a crucial role in assuring the Russian leadership that it was not under attack. The Russian command system, however, is no longer able to provide such reliable, early warning. The dissolution of the Soviet Union cost Moscow several radar stations in newly independent states, creating “attack corridors” through which Moscow could not see an attack launched by U.S. nuclear submarines.<sup>47</sup>

Further, Russia’s constellation of early-warning satellites has been allowed to decline – only one or two of the six satellites remain operational, leaving Russia with early warning for only six hours a day. Russia is attempting to reconstitute its constellation of early-warning satellites, with several launches planned in the next few years. But Russia will still have limited warning and will depend heavily on its space-based systems to provide warning of an American attack.<sup>48</sup>

As the previous section explained, the Pentagon is contemplating military missions in space that will improve U.S. ability to cripple Russian nuclear forces in a crisis before they can execute an attack on the United States. Anti-satellite

weapons, in this scenario, would blind Russian reconnaissance and warning satellites and knock out communications satellites. Such strikes might be the prelude to a full-scale attack, or a limited effort, as attempted in a war game at Schriever Air Force Base, to conduct “early deterrence strikes” to signal U.S. resolve and control escalation.<sup>49</sup>

By 2010, the United States may, in fact, have an arsenal of ASATs (perhaps even on orbit 24/7) ready to conduct these kinds of missions – to coerce opponents and, if necessary, support preemptive attacks. Moscow would certainly have to worry that these ASATs could be used in conjunction with other space-enabled systems – for example, long-range strike systems that could attack targets in less than 90 minutes – to disable Russia’s nuclear deterrent before the Russian leadership understood what was going on.

What would happen if a piece of space debris were to disable a Russian early-warning satellite under these conditions? Could the Russian military distinguish between an accident in space and the first phase of a U.S. attack? Most Russian early-warning satellites are in elliptical Molniya orbits (a few are in GEO) and thus difficult to attack from the ground or air. At a minimum, Moscow would probably have some tactical warning of such a suspicious launch, but given the sorry state of Russia’s warning, optical imaging and signals intelligence satellites there is reason to ask the question. Further, the advent of U.S. on-orbit ASATs, as now envisioned<sup>50</sup> could make both the more difficult orbital plane and any warning systems moot.

The unpleasant truth is that the Russians likely would have to make a judgment call.

No state has the ability to definitively determine the cause of the satellite’s failure. Even the

United States does not maintain (nor is it likely to have in place by 2010) a sophisticated space surveillance system that would allow it to distinguish between a satellite malfunction, a debris strike or a deliberate attack – and Russian space surveillance capabilities are much more limited by comparison. Even the risk assessments for collision with debris are speculative, particularly for the unique orbits in which Russian early-warning satellites operate.

During peacetime, it is easy to imagine that the Russians would conclude that the loss of a satellite was either a malfunction or a debris strike. But how confident could U.S. planners be that the Russians would be so calm if the accident in space occurred in tandem with a second false alarm, or occurred during the middle of a crisis?

What might happen if the debris strike occurred shortly after a false alarm showing a missile launch? False alarms are appallingly common – according to information obtained under the Freedom of Information Act, the U.S.-Canadian North American Aerospace Defense Command (NORAD) experienced 1,172 “moderately serious” false alarms between 1977 and 1983 – an average of almost three false alarms per week. Comparable information is not available about the Russian system, but there is no reason to believe that it is any more reliable.<sup>51</sup>

Assessing the likelihood of these sorts of coincidences is difficult because Russia has never provided data about the frequency or duration of false alarms; nor indicated how seriously early-warning data is taken by Russian leaders. Moreover, there is no reliable estimate of the debris risk for Russian satellites in highly elliptical orbits.<sup>52</sup> The important point, however, is that such a coincidence would only appear suspicious if the

United States were in the business of disabling satellites – in other words, there is much less risk if Washington does not develop ASATs.

The loss of an early-warning satellite could look rather ominous if it occurred during a period of major tension in the relationship. While NATO no longer sees Russia as much of a threat, the same cannot be said of the converse. Despite the warm talk, Russian leaders remain wary of NATO expansion, particularly the effect expansion may have on the Baltic port of Kaliningrad. Although part of Russia, Kaliningrad is separated from the rest of Russia by Lithuania and Poland. Russia has already complained about its decreasing lack of access to the port, particularly the uncooperative attitude of the Lithuanian government.<sup>53</sup> News reports suggest that an edgy Russia may have moved tactical nuclear weapons into the enclave.<sup>54</sup> If the Lithuanian government were to close access to Kaliningrad in a fit of pique, this would trigger a major crisis between NATO and Russia.

Under these circumstances, the loss of an early-warning satellite would be extremely suspicious. It is any military's nature during a crisis to interpret events in their worst-case light. For example, consider the coincidences that occurred in early September 1956, during the extraordinarily tense period in international relations marked by the Suez Crisis and Hungarian uprising.<sup>55</sup> On one evening the White House received messages indicating: 1. the Turkish Air Force had gone on alert in response to unidentified aircraft penetrating its airspace; 2. one hundred Soviet MiG-15s were flying over Syria; 3. a British Canberra bomber had been shot down over Syria, most likely by a MiG; and 4. The Russian fleet was moving through the Dardanelles. Gen. Andrew

Goodpaster was reported to have worried that the confluence of events “might trigger off ... the NATO operations plan” that called for a nuclear strike on the Soviet Union.

Yet, all of these reports were false. The “jets” over Turkey were a flock of swans; the Soviet MiGs over Syria were a smaller, routine escort returning the president from a state visit to Moscow; the bomber crashed due to mechanical difficulties; and the Soviet fleet was beginning long-scheduled exercises. In an important sense, these were not “coincidences” but rather different manifestations of a common failure – human error resulting from extreme tension of an international crisis. As one author noted, “The detection and misinterpretation of these events, against the context of world tensions from Hungary and Suez, was the first major example of how the size and complexity of worldwide electronic warning systems could, at certain critical times, create momentum of its own.”

Perhaps most worrisome, the United States might be blithely unaware of the degree to which the Russians were concerned about its actions and inadvertently escalate a crisis. During the early 1980s, the Soviet Union suffered a major “war scare” during which time its leadership concluded that bilateral relations were rapidly declining. This war scare was driven in part by the rhetoric of the Reagan administration, fortified by the selective reading of intelligence. During this period, NATO conducted a major command post exercise, Able Archer, that caused some elements of the Soviet military to raise their alert status. American officials were stunned to learn, after the fact, that the Kremlin had been acutely nervous about an American first strike during this period.<sup>56</sup>

All of these incidents have a common theme – that confidence is often the difference between war and peace. In times of crisis, false alarms can have a momentum of their own. As in the second scenario in this monograph, the lesson is that commanders rely on the steady flow of reliable information. When that information flow is disrupted – whether by a deliberate attack or an accident – confidence collapses and the result is panic and escalation. Introducing ASAT weapons into this mix is all the more dangerous, because such weapons target the elements of the command system that keep leaders aware, informed and in control. As a result, the mere presence of such weapons is corrosive to the confidence that allows national nuclear forces to operate safely.

## Third Party Escalation Scenario

### India/Pakistan (2010)

Previous scenarios outlined the relationship between U.S. pursuit of space weapons and their possible spread to other countries. Perhaps the most straightforward possibility for this phenomenon lies in the relationship between India and Pakistan.

India is a state that may pursue ASAT capabilities, if other states do so first. The chief of the Indian Air Force, S. Krishnaswamy, recently remarked that: “Any country on the fringe of space technology like India has to work towards such a command as advanced countries are already moving towards laser weapons platforms in space and killer satellites.”<sup>57</sup> Pakistan has a much smaller industrial base, but has long attempted to match Indian deployments – particularly in military matters. Pakistan is likely to emulate Indian ASAT efforts, given the enmity between the two countries and the relative advantage that India derives from the use of space for military operations.

Developing states like India and Pakistan could develop two types of ASATs by 2010. First, both states could create modified missile defense systems to intercept satellites. All missile defense interceptors have an inherent capability to intercept satellites in LEO. India already has an active program to develop its own indigenous missile defenses and has expressed interest in purchasing the U.S. Patriot PAC-3 and Russian S-300 short-range missile defense systems.<sup>58</sup> Sec-

ond, both states might develop so-called “killer satellites” based on civilian microsatellite technology. The Indian Space Research Organization is already supporting the development of a 60 kg technology demonstration microsatellite, called ANUSAT, to be launched in 2005.<sup>59</sup>

India may also be interested in directed energy weapons, although New Delhi probably lacks the technical expertise to develop such weapons. Nevertheless, India’s Chiefs of Staff Committee (COSC) reportedly commissioned a study on directed energy weapons and the Indian Defense Research and Development Organization (DRDO) funds research on laser weapons.<sup>60</sup> There are also reports that the Indian military has conducted studies on space-based lasers, as well as a “kinetic attack loitering interceptor.”

Although Pakistan has a smaller technological base than does India, Pakistan is also investing in space systems. Pakistan has created an indigenous space agency, the Space and Upper Atmosphere Research Commission (SUPARCO), to build and launch indigenous satellites. Pakistan has also signed an agreement to increase cooperation with the Chinese space program.<sup>61</sup>

The role that space systems will play in Indian and Pakistan military operations in the future remains unclear, and the nuclear arsenals of both countries remain inchoate. India has positioned itself to exploit space technologies. New Delhi has launched several remote-sensing satellites

under the Indian Remote Sensing (IRS) Satellite System, including the Technology Experimental Satellite with one-meter resolution.<sup>62</sup> Already New Delhi is sophisticated enough to eliminate any coverage of its military operations areas when selling the IRS data commercially. Pakistan is more likely to focus on strategies that deny India the use of space, rather than exploiting these advantages itself. Pakistan does, however, lease a U.S.-built communications satellite in geostationary orbit.

Space-based capabilities would provide India with a real advantage over Pakistan. When the U.S.-based Federation of American Scientists (FAS) purchased one-meter resolution images from a commercial satellite company, FAS analysts expressed surprise at the amount of detail available about the Pakistani nuclear force. Looking at one image, an FAS analyst said the image “shows the Pakistanis have all their eggs in one basket. These Pakistani missiles are vulnerable to an Indian first strike.”<sup>63</sup> The Indian military is also reportedly interested in acquiring military GPS receivers from the United States and has launched a national communications satellite constellation, INSAT, that will carry military traffic.<sup>64</sup> India may also be interested in supplementing national capabilities with commercial systems.

By 2010, these capabilities could provide India with a substantial advantage in a crisis. Both countries rely on offensively oriented conventional military doctrines. India reportedly considered limited conventional strikes on Pakistani targets in response to alleged Pakistani support for terrorists. Indian officials apparently believe that nuclear weapons would discourage the escalation of a low-intensity conflict into a

full-scale conventional war. The Pakistani Army, in contrast, emphasizes launching counter-offensives to respond to limited strikes.<sup>65</sup> Perhaps mindful of Pakistan’s strategy, India considered a round of air strikes during a recent conflict that would have been limited to the monsoon season, when heavy rains impede large-scale conventional armor operations.<sup>66</sup>

In war games conducted by the United States Navy, very similar scenarios were played out.<sup>67</sup> In each of these scenarios, Pakistan used limited nuclear weapon attacks to attempt to disrupt Indian conventional operations. During a conflict in 2010, Pakistan may have a strong incentive to launch preemptive strikes against satellites used by the Indian military for reconnaissance and communications.

Such strikes would pose substantial challenges to U.S. security policy.

First, even limited strikes against Indian satellites could very well endanger U.S. space assets, including imaging satellites and civil space missions. A 1985 ASAT test conducted by the United States created hundreds of pieces of debris, many of which remained in orbit for a decade. In 1999, one of these pieces of debris came within about one kilometer from the International Space Station.<sup>68</sup> Although unlikely, the National Academy of Sciences has warned of the possibility of “collisional cascading” from debris impacts at crowded altitudes.<sup>69</sup> High altitude nuclear detonations could also create substantial collateral damage, through electromagnetic pulse (EMP) and radiation effects.

Second, Pakistan might target third-party satellites used by the Indian Army. Potential targets would include commercial imaging and communications satellites, as well as the GPS or

European Galileo system if Indian forces were allowed to utilize those services during an offensive. Such attacks would have unanticipated effects on the United States. In one war game, the United States faced what one participant called “ugly choices” about commercial satellites being used by potential opponents. Participants discovered that they were unable to determine who might be affected by a decision to shoot down a commercial satellite. This, according to one participant, “vastly complicates the national security landscape.”<sup>70</sup>

The United States has made clear that it would regard a deliberate attack on U.S. space assets, including commercial satellites, as an act of war. The U.S. National Space Policy states: “Pur-posed interference with U.S. space systems will be viewed as an infringement on our sovereign rights. The United States may take all appropriate self-defense measures, including if directed by the National Command Authorities, the use of force to respond to such an infringement on U.S. rights.”<sup>71</sup> In practice, of course, the U.S. threat to treat attacks on satellites as an act of war may not be credible for commercial satellites supporting foreign military operations. Moreover, the lack of casualties in an attack on U.S. space assets also raises questions about the credibility of this commitment.

Perhaps more importantly, the risk of Pakistani ASAT attacks would create the same escalatory incentives for India that the United States faces in the second scenario. U.S. war games suggest that future conflicts in South Asia may not be very stable.<sup>72</sup> A contractor who has conducted more than two dozen war games for the Pentagon and other military-planning centers told the *Wall Street Journal* that the India-Pakistan scenarios usually

escalate to the use of nuclear weapons “within the first 12 ‘days’ of the war game.” “It’s a scary scenario,” said one participant. Anti-satellite weapons would reinforce the strong escalatory dynamic that many war games have revealed. For example, war games that quickly escalate to nuclear use are often restarted to allow the Indian side to reconsider some of the moves that lead to Pakistani escalation. The Indian side, however, generally learns the opposite lesson and attempts a “lighting strike” to destroy the Pakistani nuclear stockpile. When asked if the Indian Armed Force could really execute a preemptive strategy, one participant noted, “Probably not, but they believe they could.”

According to U.S. intelligence estimates, a limited nuclear exchange between India and Pakistan could kill as many as 12 million people.<sup>73</sup> The scale of the humanitarian catastrophe has led the military to war game possible scenarios for peacekeeping missions to prevent escalation. Participants learned that such interventions, as often as not, escalated into a crisis. In at least one game, the United States was compelled to send a rescue team to forcibly enter Pakistan and relieve a besieged division of U.S. peacekeepers – this force was attacked with nuclear weapons. Yet, will the United States really be able to keep out of a conflict if vital military and commercial assets in space are threatened, either deliberately or collaterally, by South Asian ASATs?



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# Acronyms

ASAT - anti-satellite weapon  
AWAC - airborne warning and command system  
CAV - common aero vehicle  
CENTCOM - Central Command  
DSB - Defense Science Board  
EMP - electromagnetic pulse  
GEO - geosynchronous Earth orbit  
GPS - global positioning system  
HAND - high altitude nuclear detonation  
ICBM - intercontinental ballistic missile  
LEO - low Earth orbit  
MEO - medium Earth orbit  
MIRV - multiple independently targetable reentry vehicles  
NATO - North Atlantic Treaty Organization  
NORAD - North American Aerospace Defense Command  
NPR - Nuclear Posture Review  
PLA - People's Liberation Army  
PLGR - precision lightweight GPS receiver  
QRA - quick-reaction alert airplane  
SAC - Strategic Air Command  
SUPARCO - Space and Upper Atmosphere Research Commission  
UAV - unmanned aerial vehicle