Proliferation Papers

The Path to Deep Nuclear Reductions

Dealing with American Conventional Superiority

In collaboration with the Atomic Energy Commission (CEA)

Dennis M. Gormley

Fall 2009

ifri Security Studies Center

The Institut français des relations internationales (Ifri) is a research center and a forum for debate on major international political and economic issues. Headed by Thierry de Montbrial since its founding in 1979, Ifri is a non-governmental, non-profit organization.

As an independent think tank, Ifri sets its own research agenda, publishing its findings regularly for a global audience.

Using an interdisciplinary approach, Ifri brings together political and economic decision-makers, researchers and internationally renowned experts to animate its debate and research activities.

With offices in Paris and Brussels, Ifri stands out as one of the rare French think tanks to have positioned itself at the very heart of European debate.

The opinions expressed in this text are the responsibility of the author alone.

ISBN : 978-86592-600-8

Ifri
27 rue de la Procession
75740 Paris Cedex 15 – FRANCE
Tel : 33 (0)1 40 61 60 00
Fax : 33 (0)1 40 61 60 60
Email : ifri@ifri.org

Ifri-Bruxelles
Rue Marie-Thérèse, 21
1000 – Brussels – BELGIUM
Tel : 32 (0)2 238 51 10
Fax : 32 (0)2 238 51 15
Email : info.bruxelles@ifri.org

Website : *Ifri.org*

Fall 2009

The Path to Deep Nuclear Reductions

Dealing with American Conventional Superiority

Dennis M. Gormley

Proliferation Papers

Though it has long been a concern for security experts, proliferation has truly become an important political issue with the last decade, marked simultaneously by the nuclearization of South Asia, the weakening of international regimes and the discovery of frauds and traffics, the number and gravity of which have surprised observers and analysts alike (Iraq in 1991, North Korea, Libyan and Iranian programs or the A. Q. Khan networks today).

To further the debate on complex issues that involve technical, regional, and strategic aspects, Ifri's Security Studies Center organizes each year, in collaboration with the Atomic Energy Commission (CEA), a series of closed seminars dealing with WMD proliferation, disarmament, and nonproliferation. Generally held in English, these seminars are structured around the presentation of an international expert.

Proliferation Papers is a collection, in the original version, of selected texts from these presentations. An anonymous peer-review procedure ensures the high academic quality of the contributions. Download notifications are sent to an audience of several hundred international subscribers upon publication.

About the Author

Dennis M. Gormley is a Senior Fellow at the Monterey Institute's James Martin Center for Nonproliferation Studies in Washington, D.C. and a member of the faculty of the Graduate School of Public and International Affairs at the University of Pittsburgh. Mr. Gormley served as a senior vice president for 20 years with Pacific-Sierra Research (PSR), where he founded PSR's Military Operations and Policy Analysis Group. Mr. Gormley has chaired or served on many Department of Defense and intelligence community advisory panels – most recently on a panel assisting the Deputy Director of National Intelligence (Analysis) plan to implement the 9/11 Commission's recommendations for improving intelligence integration. He frequently furnishes expert testimony to Congress and has served as a consultant to Sandia National Laboratories and the RAND Corporation, among many others.

Before joining PSR in 1979, he was head of foreign intelligence at the U.S. Army's Harry Diamond Laboratories in Washington, D.C. Mr. Gormley received a BA and MA in history from the University of Connecticut in 1965 and 1966 and attended Officer Candidate School at Aberdeen Proving Grounds, Maryland, where he was commissioned a Second Lieutenant in the U.S. Army Ordnance Corps, serving on active duty from 1966 to 1969. He is the author of three books, the most recent of which is Missile Contagion: Cruise Missile Proliferation and the Threat to International Security (Praeger, 2008), while his journal articles have appeared in Survival, the Washington Quarterly, the Bulletin of the Atomic Scientists, Nonproliferation Review, Orbis, and many others.

The author wishes to thank Janne Nolan and Stephen Schwartz for reading and commenting on the first draft of this paper. He also benefited from the comments of several participants at a workshop on Evaluating and Strengthening the Nonproliferation Regime, sponsored by the Council on Foreign Relations, in Washington, D.C., on May 18 and 19, and at a seminar talk given at the *Institut français des relations internationales* in Paris, on May 29, 2009, when he presented the main arguments of this paper.

Contents

Introduction

The transformation of the U.S. conventional capabilities has begun to have a substantial and important impact on counterforce strike missions particularly as they affect counterproliferation requirements. So too have improvements in ballistic missile defense programs, which are also critically central to U.S. counterproliferation objectives. These improved conventional capabilities come at a time when thinking about the prospects of eventually achieving a nuclear disarmed world has never been so promising. Yet, the path toward achieving that goal, or making substantial progress towards it, is fraught with pitfalls, including domestic political, foreign, and military ones. Two of the most important impediments to deep reductions in U.S. and Russian nuclear arsenals – no less a nuclear disarmed world – are perceived U.S. advantages in conventional counterforce strike capabilities working in combination with even imperfect but growing missile defense systems.

The Barack Obama administration has already toned down the George W. Bush administration's rhetoric surrounding many of these new capabilities. Nevertheless, it is likely to affirm that it is a worthy goal to pursue a more conventionally oriented denial strategy as America further weans itself from its reliance on nuclear weapons. The challenge is to do so in the context of a more multilateral or collective security environment in which transparency plays the role it once did during the Cold War as a necessary adjunct to arms control agreements. Considerable thought has already been devoted to assessing many of the challenges along the way to a nuclear-free world, including verifying arsenals when they reach very low levels, more effective management of the civilian nuclear programs that remain, enforcement procedures, and what, if anything, might be needed to deal with latent capacities to produce nuclear weapons.[1] But far less thought has been expended on why Russia – whose cooperation is absolutely essential for abolition to happen – might ever wish to proceed toward such a post-nuclear world that would be dominated militarily by American conventional military capabilities and what might be needed to allay legitimate concerns in this regard. At the very least, it will become increasingly important to separate fact from fiction in regard to the state of various conventional offensive and defensive counterproliferation capabilities and begin the challenge of addressing what kind of concrete steps are needed to alleviate Russian or Chinese concerns. It is precisely that objective to which this paper is addressed.

[1] These issues are usefully taken up in George Perkovich and James M. Acton, "Abolishing Nuclear Weapons", *Adelphi Paper*, No. 396, The International Institute for Strategic Studies, 2008.

The paper is organized along the following lines. It first addresses the origins of U.S. interests and improvements in conventional strike capabilities, and then explores the emergence of counterproliferation as a chief mission for conventional offensive and defensive forces. It next examines the extent to which new conventional capabilities can perform three key missions previously the exclusive domain of nuclear weapons. Armed with this background, the paper then examines Russian perceptions of U.S. advances in conventional warfighting and evaluates the extent to which these perceptions are real or exaggerated. Finally, in light of Russia's concerns, the paper closes with a set of policy options designed to help allay these concerns on the path toward deep reductions in nuclear arsenals.

Conventional Solutions for Nuclear Problems

Since the end of the Vietnam War, U.S. armed forces have engineered major increases in their conventional capabilities, first by taking advantage of recent technological progress in precision guidance, communications, and sensors, and also by evolving appropriate doctrines, tactics, and procedures. Once these new capabilities had proven their effectiveness during Operation Desert Storm, they were integrated in the new "Counterproliferation" policy initiated by the Department of Defense during the 1990s as a set of more proactive means to reduce the dangers of nuclear proliferation. Three core missions of the counterproliferation initiative benefited from these advances: defeating deeply buried targets, finding and destroying mobile targets such as missile launchers, and missile defense.

Origins of the U.S. Revolution in Conventional Strike Operations

America's offensive global reach via both conventional and nuclear means became clearly manifest in President George W. Bush's Nuclear Posture Review (NPR) of December 2001, which sought to conflate previously nuclear-only attack options into a new concept called "Global Strike". This new concept focused on joining advanced conventional and tailored nuclear strike options together to deal with various regional contingencies requiring prompt decisionmaking.[2] To be sure, so-called Global Strike capabilities, whether they are large volume land-attack cruise missiles launched from converted Trident submarines or future conversions of previously nuclear-armed Trident missiles converted into conventionally armed ones, have begun to worry Russian and Chinese planners alike. Yet, the origins of seeming U.S. interest in a conventional Revolution in Military Affairs (RMA) date back at least to the post-cold war period when the early signs of this interest became manifest during Operation Desert Storm against Iraq.[3]

---

[2] The intent of Global Strike clearly had the character of destroying critical targets via preventive or preemptive means. For background on the origins of the U.S. Global Strike concept, see Dennis M. Gormley, "Conventional Force Integration in Global Strike", in James J. Wirtz and Jeffrey Larsen (eds.), *Nuclear Transformation: The New U.S. Nuclear Doctrine*, New York, Palgrave, 2005 and Hans M. Kristensen, "U.S. Strategic War Planning After 9/11", *Nonproliferation Review*, Vol. 14, No. 2, July 2007, pp. 373-390.

[3] In fact, Soviet military theorists took note of American use of precision-guided munitions in the 1970s and foresaw that these systems could create the conditions

What signs there were of an RMA in conventional warfare during the 1991 Persian Gulf War were only dimly glimpsed; virtually all the weapons that were employed in that war were decades old, and there were no dramatic doctrinal, operational, or organizational innovations demonstrated during that conflict. Yet, there was evidence of revolutionary increases in effectiveness of long-range precision strikes. Post-war analyses showed that while comparatively few precision-guided munitions (PGMs) were used compared to "dumb" (unguided) bombs, to the extent that they were employed, each aircraft equipped with them could attack two targets in a single flight. By comparison, aircraft loaded with dumb bombs needed six sorties to attack only one target. This difference reflected an order-of-magnitude increase in effectiveness for PGMs.[4]

Equally portentous in signaling fundamental changes in conventional operations were the various forms of information communicated and used around battlefield in 1991. In past wars information about the enemy's strength, location, and intentions had often played an important but secondary role, mainly due to its lack of precision. Operations occurred no matter the absence of information, and the means of collecting, analyzing, and disseminating information more frequently than not failed to pierce the "fog of battle", or worse, added to it. But during the 1991 war, the American-led coalition had unprecedented access to precise information, from satellite-gathered intelligence, global positioning and meteorological data, maps derived from remote sensing, airborne surveillance radars detecting moving vehicles, to missile-launch detection data. At the same time, Iraq was denied access to similar kinds of information by virtue of the coalition's precision strikes on their command-and-control system, which were executed swiftly within minutes of the war's start and continued throughout the air campaign.[5]

What seemed evident from these early signs of change was that information had become at least the equal of, if not even more important than, attrition and maneuver in modern warfare. In effect, information allows attrition and maneuver capabilities to be applied with unprecedented effectiveness. What was only forecasted a few short years ago has become today's reality: microprocessors have become ubiquitous throughout the American force structure, joined by remote sensing technology, unmanned systems, and high-speed, large-capacity communications networks, which together form a huge grid that enable the precise application of force against an enemy's vital centers of gravity. Increasingly, the principal

---

for what they called a "military-technological revolution", since they had the potential to create new operational concepts and changed organizational approaches to the conduct of warfare. Only later, after supporting studies on these Soviet-era assessments, did Andrew Marshall of the Pentagon's Office of Net Assessment, alter the notion of revolutionary military change from the Soviet appellation "military-technological revolution" to "Revolution in Military Affairs" because he believed that these intense periods of military change had less to do with technology than with a willingness to experiment with new operational concepts of warfare and companion organizational adaptation.

[4] Thomas A. Keaney and Eliot A. Cohen, *Gulf War Air Power Survey: Summary Report*, Washington, Government Printing Office, 1993, p. 243.

[5] *Ibid*., pp. 66-71.

measure of effectiveness is represented less by the number of platforms that can be brought to bear than by the quality of networking between sensors and shooters. This became palpable during initial American operations in Afghanistan after 9/11 when U.S. Special Operations Forces slipped behind enemy lines and called in devastatingly effective airstrikes on enemy forces that enabled Afghan resistance fighters to ride into battle on horseback to achieve a rapid (if impermanent) victory over Taliban forces.[6]

What proved to be so innovative involved the integration of U.S. Air Force ground controllers into U.S. Special Forces units and their equipping with GPS receivers and commercial off-the-shelf laser binoculars. At the same time, combat aircraft were armed with the 2,000-pound Joint Direct Attack Munition (JDAM) – a relatively cheap modification to an existing "dumb" bomb that enabled it to be guided precisely to its targets by signals from GPS satellites.[7] During combat operations in Kosovo in 1999, NATO aircraft armed with JDAMs took off from their bases with predetermined target coordinates; this greatly reduced their targeting effectiveness against time-critical targets that had managed to move during the aircraft's flight time. In Afghanistan, air controllers on the ground, armed with proper equipment, were able to shrink the amount of time between identifying a target and attacking it from hours to minutes by passing precision coordinates on the target to aircraft circling overhead at 35,000 feet altitude. However wrongly, this has fostered the notion that what can be seen can be hit, and what can be hit can be killed on the modern battlefield.

Conceptually, these changes augured a potential revolutionary change in air warfare. In past military campaigns, airpower was prosecuted in pre-defined increments. Intelligence platforms would collect information largely on fixed targets, and a target list would be drawn up against which to task specific aircraft as part of an overall air plan. A wave of aircraft would then execute this plan and return to their bases for subsequent pre-defined missions. In Afghanistan, airpower was employed in near simultaneous rather than sequential form due to the rapid integration of sensor data into the allocation of airpower. Akin to civilian air-traffic controllers, ground air controllers just outside the target area called in any number of fighters or heavy bombers to hit targets identified and subsequently approved for targeting within minutes of their disclosure. Compared to the target-to-sortie metric of 2:1 in the 1991 Persian Gulf War, it is now conceivable for each fighter carrying eight smart bombs and B-2

[6] For a broader treatment of these changes in warfare, see Dennis M. Gormley, "Technology and Revolutionary Changes in Military Affairs: World War II to Present", in Peter Karsten (ed.), *The Encyclopedia of War & American Society*, Thousand Oaks, Sage Publications, 2005, pp. 819-826.

[7] Despite the fact that the JDAM is not really a stand-alone weapon system at all, but rather a "bolt-on" adjunct to an unguided bomb, the development program for this weapon took roughly six years of research, development, and testing before it became operational. This demonstrates that such military technology is far more complex than first meets the eye. See Dennis M. Gormley, *Missile Contagion: Cruise Missile Proliferation and the Threat to International Security*, Westport, Praeger Security International, 2008, p. 86.

stealth bombers carrying 216 such weapons to achieve on a single sortie as many target kills as the number of bombs they carry.

Ubiquitous information gathering is central to these revolutionary changes. Much ink has been spent on the transformational potential of network centric warfare, or the capacity of geographically dispersed forces to perceive substantially the same picture of event occurring with a broad battle area.[8] This allows dispersed forces to mass weapon effects without massing forces, which takes time and increases force vulnerability to counterfire. Afghanistan also demonstrated the increasingly powerful role that space-based communications and unmanned aerial vehicles (UAVs) played in network centric warfare. Satellite communications and overhead reconnaissance systems displayed dramatic improvements over their performance during the 1991 Persian Gulf War, when these systems were largely controlled by the national intelligence community rather than by soldiers in the field. In Afghanistan, near-real-time video data from UAVs was relayed via orbiting communications satellites to command centers and ground air controllers. This radical broadening of awareness about what was occurring on the battlefield enabled the operation's commander to direct the battle from his headquarters in Tampa, Florida, while maintaining instantaneous connection to forward headquarters in Kuwait and Uzbekistan. As only one indication of the growing importance of information, the Pentagon leased 800 Mbps of commercial satellite support compared with 100 Mbps during the 1991 Gulf war – a seven-fold increase in bandwidth to support one-tenth the number of troops.[9]

The Emergence of Counterproliferation

The declining value of nuclear weapons began to gather steam in the U.S. military with the collapse of the Warsaw Pact and its Soviet architects. At the same time, the U.S.-led coalition's success in the 1991 Persian Gulf campaign drove up the assessed value of conventional weapon equities. New smart weapons rapidly began to be perceived as far more credible and flexible than nuclear weapons as instruments of post-Cold war

[8] The late Vice Admiral Arthur K. Cebrowski, formerly the Director of the Pentagon's Office of Force Transformation, was arguably the strongest and most influential proponent of Network Centric Warfare. For a comprehensive bibliographic listing of work both advocating and critiquing the concept, see the RMA Debate website at http://www.comw.org/rma/fulltext/netcentwar.html.

[9] Of course, it is important to keep in mind that once Taliban and al Qaeda forces transitioned to asymmetric and more fleeting forms of warfare (in al Qaeda's case, disappearing into western Pakistan), U.S. military performance suffered. The U.S. decision to invade Iraq in 2003 also diminished its capacity to focus on operations in Afghanistan. Nonetheless, however revolutionary many of these information-driven capabilities may be, they are best applied against regional foes like Iran or North Korea rather than against insurgencies. On the other hand, operating against truly near-peer competitors such as Russia or China, where modern integrated air defenses would present stiffer challenges than against regional foes, is quite another matter—not least because of the threat on nuclear escalation. For a quite different view on the implications of U.S. operations in Afghanistan, see Stephen Biddle, "Iraq, Afghanistan, and American Military Transformation", in John Baylis, James Wirtz, Colin S. Gray, and Eliot Cohen (eds.), *Strategy in the Contemporary World*, Oxford, Oxford University Press, 2007, pp. 274-294.

deterrence and war. One of the principal organizers of a series of RAND Corporation war games held between 1991 and 1993 was left with the impression that then-contemporary military planners saw nuclear weapons as largely unnecessary, because they believed that new smart weapons could destroy virtually every military target once assigned to nuclear weapons.[10]

The nature of deterrence also began to change with the demise of the Soviet threat. If nuclear deterrence during the Cold War depended ultimately on the punitive notion of inflicting nuclear damage on an opponent's society, conventional deterrence hinges on a more diverse array of needs.[11] Punishing one's adversary, particularly its political leadership, remains important, but the chief requirement has become the denial of an adversary's military objectives. Of course, the vast majority of the U.S. nuclear arsenal was designed for counterforce strikes, but today that role has chiefly reverted to conventional weapons. Denial presupposes the possession of robust defensive and offensive forces, the former to protect the homeland, friends and allies included, as well as the introduction of forces into far-flung regions; the latter to complete destruction of the adversary's military forces. Whereas the credibility of Cold War nuclear deterrence hinged ultimately on the perception of societal catastrophe, conventional deterrence will only succeed to the extent it is seen as highly effective in achieving its denial objectives – most notably against weapons of mass destruction (WMD).

Conventional deterrence was given considerable intellectual muscle in early 1994. Writing in the *Washington Post*, Paul H. Nitze, one of the principal architects of American nuclear deterrence, argued that it was time for the United States to re-examine its reliance upon nuclear deterrence. Because he believed that the threat of nuclear retaliation would be unlikely to deter aggression by regional powers, and that the United States would be unwilling to use nuclear weapons to punish such a move, he recommended converting the principal U.S. strategic deterrent from nuclear weapons to precision guided conventional weapons.[12] In effect, Nitze's argument formed the basis for the notion of global conventional strike.

Responding to the perceived lessons of the 1991 Persian Gulf War that future regional adversaries armed with WMD could deter America and its partners from taking any action at all by making the costs of such action unacceptable, the Clinton administration launched the Defense Counterproliferation Initiative in December 1993.[13] Specialists immediately criticized the notion of "counterproliferation" as an unfortunate conflation of military and nonproliferation policy initiatives and thus potentially a

[10] Marc Dean Millot, "Facing the Emerging Reality of Regional Nuclear Adversaries", *Washington Quarterly*, Vol. 17, No. 3, Summer 1994, pp. 50-51.
[11] Dennis M. Gormley and Thomas G. Mahnken, "Facing Nuclear and Conventional Reality", *Orbis*, Vol. 44, No. 1, Winter 2000, pp. 109-125.
[12] Paul H. Nitze, "Is It Time to Junk Our Nukes?", *Washington Post*, January 16, 1994, p. C1.
[13] The 1993 "Bottom Up Review" had earlier specified that WMD represented the most direct threat to U.S. security interests.

diminishment of non-military utilities.[14] The new thrust nonetheless focused proper attention on precisely the most difficult military challenges facing America's new emphasis on conventional over nuclear solutions.[15] Specifically, according to then Secretary of Defense Les Aspin, those needed capabilities included finding and defeating deeply buried targets; locating, identifying, and attacking WMD-armed mobile missiles; and finally, shooting down enemy missiles that managed to survive counterforce attacks.[16] These three areas dominated consideration of counterproliferation priorities in 1993 because America's adversaries were assessed to be investing heavily in WMD, mobile missiles, and deeply buried facilities to shelter these precious investments from successful U.S. attacks.

Not surprisingly, counterproliferation and robust counterforce means found a featured place in the Bush administration's December 2001 NPR. But instead of elevating Paul Nitze's notion of conventional strategic strike to a premier position, the 2001 NPR married Nitze's ideas to a substantially reduced nuclear force, ballistic missile and passive defenses, and a

[14] For useful appraisals, see John Baylis and Mark Smith, "The Control of Weapons of Mass Destruction", in John Baylis, James Wirtz, Colin S. Gray, and Eliot Cohen (eds.), *Strategy in the Contemporary World*, *op. cit.*, pp. 228-252 and Chris Williams, "DOD's Counterproliferation Initiative: A Critical Assessment", in Henry Sokolski (ed.), *Fighting Proliferation: New Concerns for the Nineties*, Maxwell AFB, Air University Press, 1996, pp. 249-256.

[15] As formulated by the Clinton-era National Security Council, the Counterproliferation Initiative included "the activities of the Department of Defense across the full range of US efforts to combat proliferation, including diplomacy, arms control, export controls and intelligence collection and analysis, with particular responsibility for assuring US forces and interests can be protected should they confront an adversary armed with WMD or missiles". The Bush administration, in December 2002, articulated counterproliferation almost exclusively in military terms, to include interdiction of WMD transfers, deterrence of WMD use, and defense.

[16] Les Aspin, "The Defense Department's New Nuclear Counterproliferation Initiative", Address to the National Academy of Sciences, Washington, December 7, 1993. These three priorities emanated from changes in the economics of underground construction where commercially available boring equipment can now excavate a tunnel 18 meters in diameter at the rate of 70 meters a day. The construction of underground facilities buried beneath hundreds of meters of rock is well within today's state of the art. Counterforce attacks against mobile missile launchers in the early 1990s were seen as problematic because of the U.S. Air Force's failure to successfully find and attack any of Iraq's mobile launchers during the 1991 Gulf war. Ballistic missile defenses apparently proved nearly as ineffective in that, according to a U.S. House of Representatives Committee on Government Operations hearing, a good case can be made that Patriot missile batteries hit only 9% of the Scud warheads that they engaged. For details, see http://www.turnerhome.org/jct/patriot.html. The debate over Patriot's 1991 performance revolves around defining what to declare an effective intercept: one that merely slightly diverts the missile away from its intended target or one that destroys the incoming missile's warhead. For more on this debate, see George N. Lewis and Theodore A. Postol, "Technical Debate over Patriot Performance in the Gulf War: American Physical Society Panel Correctly Rejects Criticisms of Analysis Showing Patriot Failed to Destroy Scud Warheads", *Science & Global Security*, Vol. 8, No. 3, 2000, pp. 357-398.

revitalized defense infrastructure, to create a "New Triad".[17] The New Triad reflected President Bush's November 2001 decision to reduce "operationally deployed" U.S. nuclear warheads by two-thirds to a level of 1,700-2,200 by December 2012, which in May of 2002 became formalized in the Strategic Offensive Reduction Treaty (SORT) signed in Moscow. This provided the chief architects of the NPR room to argue that the New Triad would at once reduce reliance on nuclear weapons while necessitating improvements to existing nuclear weapons to make them more responsive to emerging threats. These threats corresponded quite remarkably with those outlined by Les Aspin in 1993: hardened underground targets, mobile and relocatable targets, and chemical and biological agents.

Nor was the idea of former nuclear delivery systems being armed with conventional warheads entirely new in the 2001 NPR. Besides Nitze's 1994 call for such a transformation, the 2001 NPR's inception of the non-nuclear leg of the New Triad was prefigured in the report of the congressionally mandated National Defense Panel in 1997. As that panel concluded, "Advancing military technologies that merge the capabilities of information systems with precision-guided weaponry and real-time targeting . . . may provide a supplement or alternative to the nuclear arsenals of the Cold War".[18]

While the Clinton administration's counterproliferation initiative focused primarily on new conventional options to solve its most taxing targeting requirements, the Bush administration tried unsuccessfully to rationalize new requirements for nuclear weapons to deal with roughly the same set of challenges. Existing nuclear weapons were believed insufficient to deal with these threats because they were generally not accurate enough and their nuclear yields were too large to make them a discrete and credible threat in the eyes of the targeted adversary. The 2001 NPR's authors devoted most attention to earth-penetrating nuclear weapons. They proposed studying the feasibility of converting existing nuclear bombs into earth penetrators adequate to contain collateral damage while destroying WMD stored in deeply buried facilities. Both houses of the U.S. Congress, however, rejected sponsoring or even studying new nuclear weapons programs. In its stead, the Bush administration turned its attention to supporting the Reliable Replacement Warhead (RRW) program, which was approved by Congress in late 2004 and was designed to "improve the reliability, longevity, and certifiability of existing weapons and their constituents".[19] Opponents of the RRW program

[17] The 2001 NPR remains a classified document today, but major portions of it were leaked on its publication and can be found at http://globalsecurity.org/wmd/library/policy/dod/npr.htm. The three legs of the old triad consisted of nuclear-armed land-based ballistic missiles, submarine-launched ballistic missiles, and strategic aircraft.

[18] *Transforming Defense: National Security in the 21st Century*, Report of the National Defense Panel, Washington, December 1997at http://www.fas.org/man/docs/ndp/front.htm.

[19] For details on the program, see Jonathan Medalia, *Nuclear Weapons: The Reliable Replacement Warhead Program*, RL32929, Washington, Congressional Research Service, February 8, 2007, at http://www.fas.org/sgp/crs/nuke/RL32929.pdf. For an analysis of debates about the future of U.S. nuclear weapons, see Dennis

feared that it would inevitably gravitate toward developing new nuclear weapons and pressure to resume nuclear testing, even though no military requirement currently exists for such new weapons. In late February 2009, the Obama administration called for the termination of the program in its 2010 budget request to Congress.[20]

State-of-the-Art Conventional Capabilities

Sometime before the end of 2009 the Obama administration will release its first Nuclear Posture Review, which is expected to establish precisely what roles and missions are appropriate for U.S. nuclear weapons. There is growing sentiment within the specialist community that America can confidently turn to conventional weapons to meet the kinds of counterforce challenges outlined at the outset of the 1993 Counterproliferation Initiative and emphasized yet again in the Bush administration's 2001 NPR.[21] These include successfully attacking deeply buried targets, finding and successfully destroying mobile missile launchers armed with WMD, and detecting and shooting down missiles that manage to avoid counterforce strikes.

An important caveat is needed here. Comparing nuclear and precision conventional weapons is surely an apples versus oranges proposition. The sheer scale of a nuclear explosion, even a low-yield one, dwarfs the energy potential of today's advanced conventional weapons. To that extent, the huge scale of the damage created by a nuclear explosion compensates greatly for any weaknesses in accuracy of delivery or targeting uncertainty (i.e., knowing precisely where the target is located and its attendant vulnerabilities). On the other hand, precision conventional weapons depend critically on a huge supporting cast of players and functions: highly accurate intelligence collection, analysis, and dissemination; rigorous mission planning; knowledge of the target's vulnerabilities to permit selection of precise aimpoints; post-attack damage assessment capabilities to determine how best to exploit the first attack's true effects; and perhaps mostly important of all, an agile command and control system networked together seamlessly to make rapid-fire decisions needed to achieve near-simultaneous waves of precision conventional strikes. Thus, while nuclear weapons are forgiving due to their broad effects, precision conventional systems cannot afford a breakdown in the

---

M. Gormley, "Silent Retreat: The Future of U.S. Nuclear Weapons", *Nonproliferation Review*, Vol. 14, No. 2, July 2007, pp. 183-206.

[20] Proponents of terminating the RRW program argue that the more cost-effective and nonproliferation-sensitive approach to extending the life of existing nuclear weapons is to maintain the Department of Energy's Life Extension Programs, which currently extend the life of U.S. nuclear warheads through refurbishment and replacement of parts that have deteriorated over time.

[21] See for example, Michael A. Levi, *Fire in the Hole: Nuclear and Non-Nuclear Options for Counterproliferation*, Working Papers, no. 31, Washington, Carnegie Endowment for International Peace, 2002; Ivan Oelrich, *Missions for Nuclear Weapons after the Cold War*, Washington, Federation of American Scientists, 2005; and Dennis M. Gormley, "Securing Nuclear Obsolescence", *Survival*, Vol. 48, No. 3, Autumn 2006, pp. 127-148.

performance of its critically important supporting cast if they are to succeed as desired.

Of course, the decided advantage that precision conventional weapons have over nuclear weapons is that an adversary knows full well that the United States is highly likely to use its conventional advantage should its security interests become seriously threatened. As for nuclear threats, the only ones that may prove salient are ones that threaten nuclear retaliation during an ongoing conventional war against a regional state in possession of a small nuclear capability. But still, U.S. reliance on precision conventional weapons represents the best form of deterrence – pre-war and intra-war – if only because of the declining value of the threat of nuclear use. As previously noted, Paul Nitze argued in 1994 that nuclear weapons were unlikely to deter regional aggressors as well as precision conventional weapons, not least because of the growing effectiveness of non-nuclear options but also because American presidents would be unwilling to use nuclear weapons.[22] Notably, after the 1991 Persian Gulf War, Colin Powell dismissed the utility to nuclear use, while his commander-in-chief, President George H.W. Bush, acknowledged in his memoir that he had ruled out a nuclear response in that war.[23]

Attacking Deeply Buried Strategic Targets

Attacking strategic underground targets seems superficially to be the role for which nuclear weapons are most indispensable. According to the U.S. Intelligence Community, there are roughly 2,000 of these targets of interest to U.S. military planners. Due to their burial depth, a good number of these facilities are beyond the reach of existing conventional earth-penetrator weapons.[24] Many are susceptible to destruction by one or more nuclear earth penetrators, but not without unwanted consequences. Because more than half of these strategic underground targets are located near or in urban areas, a nuclear attack could produce significant civilian casualties (depending on yield, between thousands and more than a million, according to the U.S. National Academy of Sciences); even in more remote areas, casualties could range between a few hundred to hundreds of thousands, depending on yield and wind conditions.[25] A new nuclear earth-penetrator weapon, which the Bush administration favored studying and their NPR endorsed but Congress rejected, would effectively capture a few

[22] Nitze, “Is It Time to Junk Our Nukes?”, *op. cit.*

[23] Colin Powell with Joseph E. Perisco, *My American Journey: An Autobiography*, New York, Random House, 1995, pp. 323-324, 485-486, and 540-541. See also George Bush and Brent Scowcroft, *A World Transformed*, New York, Knopf, 1998, p. 463: “. . . No one advanced the notion of using nuclear weapons, and the President rejected it even in retaliation for chemical or biological attacks. We deliberately avoid spoken or unspoken threats to use them on the grounds that it is bad practice to threaten something you have no intention of carrying out. Publicly, we left the matter ambiguous. There was no point in undermining the deterrence it might be offering”.

[24] Information on the characteristics and number of underground targets is derived from *Nuclear Earth Penetrator: Effects of Nuclear Earth-Penetrator and Other Weapons*, Washington, National Academy of Sciences, 2005, at http://www.nap.edu/catalog/11282.html.

[25] *Ibid.*

hundred of these strategic underground targets but some uncertain number would presumably remain beyond reach, and such weapons would still produce unwanted collateral effects.[26]

Since at least 1994, when the U.S. Strategic Command and the U.S. Air Force's Air Combat Command issued a new military need statement for a "hard and deeply buried target defeat capability", the Pentagon has pursued improved conventional means for defeating strategic underground targets.[27] In support of this new requirement, Lockheed Martin Missile & Space Company began investigating a promising solution involving a conventional penetrator for the Trident submarine-launched ballistic missile (SLBM). The chief challenge involved designing a modified reentry body aeroshell that encased a unitary penetrator while coupling it to a much more accurate navigation system, improved by adding a GPS receiver to the inertial measurement unit. What makes the Trident SLBM particularly attractive for this mission is that its substantially faster impact velocity compared with airdropped weapons (roughly twice as much) translates into dramatic increases in penetration depth. Still, to achieve success requires slowing down the reentry body to achieve the desired penetration velocity.[28] That some notable success with the conventional Trident modification has occurred seems evident from the fact that when the Pentagon announced its desire to spend $500 million through 2011 on replacing nuclear warheads with conventional ones on some of its submarines, it described one its chief objectives as permitting quicker preemptive strikes on deeply buried targets.[29]

There are other promising conventional attack concepts under consideration that perhaps offer even more promising results than using strategic missiles to impart improved penetration velocities. One takes advantage of precision location accuracy by attacking a single entry point repeatedly, thus drilling down the same entry hole until the process achieves the required depth. Naturally, a high degree of accuracy is

[26] Roger Speed and Michael May, "Dangerous Doctrine", *Bulletin of the Atomic Scientists*, Vol. 61, No. 2, March/April 2005, pp. 38-49. Instead of employing a surface burst, Speed and May note that new weapons with perhaps 5-10 kilotons yield would penetrate the earth's surface to a depth of a few meters in granite and perhaps 30 meters in soil in order to destroy facilities buried up to 100 meters underground. But even here collateral damage could be significant.

[27] "Hard and Deeply Buried Target Defeat Capability", SECRET, CASMNS 317-92, May 1994, cited in Nancy F. Swinford and Dean A. Kudlick, "A Hard and Deeply Buried Target Defeat Concept", Lockheed Martin Missiles & Space, Sunnyvale, CA 94088, Defense Technical Information Center document no. 19961213 060, no date, at http://www.stormingmedia.us/86/8678/A867813.html.

[28] *Ibid.*, pp. 1-2.

[29] Tony Capaccio, "U.S. May Arm Subs with Conventional Warheads for Quicker Strike", Bloomberg.com, January 17, 2006, at http://www.bloomberg.com/apps/news?pid=10000103&sid=aZeqovAl9zgY&refer=us. Capaccio reports that improved Trident accuracy has reached the point of 10 meters.

needed – perhaps an order of magnitude improvement over today's weapons.[30]

Yet, no matter how much improvement is achieved, eliminating certain WMD targets – most notably, biological agents – deeply buried underground will remain problematical for both conventional and nuclear penetrating weapons. Because the intense fireball created by either a nuclear or conventional weapon would, in principle, sterilize biological agent stored in a confined space, knowing exactly where that space is located becomes critical. Sometimes U.S. intelligence satellites succeed in closely monitoring the construction of strategic underground structures, as they have at the Iranian facility at Natanz, where uranium enrichment is taking place. But such success may be the exception rather than the rule, as these facilities frequently are not detected until it is too late to disclose the precise location of the WMD storage area, and the specific techniques and materials used in its construction.[31] In the end, the best targeting strategy may lie in persistent harassment, consisting of precise and repeated attacks with smart conventional weapons against ground-level adits supporting underground facilities. In 2003, Adm. James O. Ellis Jr., then head of the U.S. Strategic Command, agreed that precision conventional weapons could do just about as good a job as any nuclear earth-penetrating weapons by sealing off underground facilities through repeated attacks.[32]

Counterforce Attacks against WMD-Armed Mobile Missiles

Just as counterforce has always played the lead role in U.S. nuclear targeting, so too has it always been a critical component of U.S. missile defense policy. Immediately in the aftermath of the December 1993 launch of the Clinton administration's Counterproliferation Initiative, the U.S. Joint Chiefs of Staff announced a new joint doctrine governing missile defense that featured four necessary pillars to achieve success against ballistic and cruise missiles.[33] They included attack operations (counterforce), active defenses (against launched missiles), passive defenses (e.g., gas masks, vaccines), and means of commanding and controlling the first three pillars. While all of the respective pillars were seen as necessary, joint doctrine specified counterforce attacks as the preferred method for countering enemy missiles. In part, this preference reflected a longstanding military bias toward attacking rather than defending, yet one can hardly deny the obvious advantages of destroying WMD payloads on enemy territory before countermeasures (like decoys) could be employed to complicate missile defense performance.

---

[30] Improvements in accuracy will occur naturally as Global Positioning System upgrades are made. However, this particular concept could be developed more rapidly with adjustments to existing space-borne systems. Interview with defense industry official, April 2006.

[31] "US Military Options Against Emerging Nuclear Threats", *IISS Strategic Comments*, Vol. 12, No. 3, April 2006.

[32] Walter Pincus, "Rumsfeld Seeks to Revive Burrowing Nuclear Bomb", *Washington Post*, February 1, 2005, p. A2.

[33] Joint Publication 3-01.5, *Doctrine for Joint Theater Missile Defense*, Washington, Government Printing Office, 1994.

Despite the preferred status given to counterforce attacks against WMD-armed missiles, U.S. military forces have come up short in dealing with this mission until quite recently. Witness the fact that during the Persian Gulf War of 1991, the only major failure during that brief campaign was the inability of coalition air forces to destroy a single Iraqi mobile missile launcher. And this was not for want of trying; roughly 15 percent of the coalition's air sorties focused on the "Scud hunt".[34] Cold War nuclear planners entertained the notion that nuclear weapons could compensate for both conventional weapon imprecision together with targeting uncertainties associated with such fleeting targets. Today's aversion to collateral damage would suggest that were small-yield nuclear weapons considered for use against WMD-armed mobile missile launchers, it might only conceivably occur were they operating in unpopulated desert areas, for example. But even in that case, weather uncertainty could yield highly unwelcome casualties. Fortunately, any consideration of employing a nuclear solution to this challenge has been rendered unnecessary by the extraordinary progress the U.S. Air Force has achieved in finding and attacking fleeting targets.

Progress in finding and attacking fleeting targets has more to do with conceptual and organizational changes than with the introduction of revolutionary new technology. Conceptually, the U.S. Air Force has only recently recognized that finding and attacking WMD-armed mobile missile launchers cannot succeed with a one-size-fits-all doctrine, or one pretending that all targets are the same. Instead, such fleeting targets now constitute a distinctively different combat goal, meriting specialized conceptual treatment.[35] This may mean that the air force cannot succeed in this difficult task on its own. But with special operations forces or unmanned systems operating on the ground or just above it, seamlessly integrated with attack forces in the air, shortening the attack cycle against fleeting mobile missile launchers is eminently possible. The average time required to execute a time-sensitive targeting strike has fallen from two hours in 2002 to 10 minutes in 2004.[36] The U.S. Air Force goal is now to achieve what their former chief of staff, Gen. John Jumper, called "time of flight" time-sensitive targeting, or hitting the target in the amount of time it takes for delivering the weapon – meaning less than a minute for a manned or unmanned weapons platform loitering nearby.

---

[34] Although air forces failed to destroy any Iraqi mobile Scud launchers, Special Operations Forces achieved the only recorded success. Clyde Walker, director of the Defense Intelligence Agency's Missile and Space Intelligence Center, acknowledged this in his public remarks at the April 27, 2006 Cruise Missile Defense and IED Conference, held in Arlington, VA.

[35] In military parlance, this means that such fleeting targets require the development of special tactics, techniques, training, and procedures to achieve the desired effects. See Robert P. Haffa Jr. and Jasper Welch, "Command and Control Arrangements for the Attack of Time-Sensitive Targets", Northrop-Grumman Analysis Center, November 2005, p. 34.

[36] Gen. Hal M. Hornburg, Commander of the U.S. Air Force's Air Combat Command, quoted in John A. Tirpak and Peter Grier, "Air Power and the Long War", *Air Force*, Vol. 87, No. 11, November 2004, p. 72.

Real-world signs of dramatic improvements in time-sensitive counterforce targeting illustrate the effects of these conceptual and organizational changes. In his book on the 2003 Iraq war and its aftermath, *Washington Post* reporter Tom Ricks tells the story of how, in the midst of a huge three-day sandstorm and rainstorm that stalled the U.S military's advance on Baghdad, the U.S. Air Force nonetheless managed to find, attack, and destroy an Iraqi missile launcher and its related support vehicles – despite the fact that they were off the road, hidden deeply under trees, at night, in one of Baghdad's northern suburbs. An Iraqi Republican Guard captain later reported that the missile troops were so demoralized by the attack's effectiveness that they fled the area without returning to their unit. Word spread that a spy must have reported on the unit's location because no satellite or aircraft could operate with such effectiveness, given the combination of their careful attention to covering their presence and the adverse weather.[37] Israel, too, employed a similar concept of operations during the 2006 war in Lebanon. While Israeli forces struggled to find and attack Hezbollah's ubiquitous short-range Katyusha rockets, which can be emplaced by one man in a matter of seconds, Israeli air and ground forces effectively flooded the skies with UAVs networked together to provide loitering aircraft with precise targeting coordinates of medium- and long-range Hezbollah rocket launchers. Consequently, Israel destroyed between 80 and 90 percent of these longer-range rocket launchers (around 125), all within a time frame of between 45 and 60 seconds between detection and attack.[38] Unlike during the 1991 Persian Gulf War, these examples illustrate that counterforce strikes against time-sensitive, high-priority targets have become a highly specialized operational endeavor that now routinely is tailored to the unique demands of tracking and targeting mobile missiles around the clock.

Improving Missile Defenses

Counterforce strikes against WMD-armed mobile missile launchers represent only one layer of an effective conventional denial strategy. Yet to the extent that counterforce attacks reduce the in-flight missile threat, they improve the prospects that ballistic and cruise missile defenses, together with passive defenses, can handle surviving missile threats. Of course, achieving perfection in any such denial strategy is a daunting quest. Where nuclear threats still exist, the United States has no choice but to rely on the threat of nuclear retaliation should states threaten to use nuclear weapons against American or allied territory. Indeed, even the Bush administration admitted in 2006 that the threat of nuclear retaliation was more than

[37] Thomas E. Ricks, *Fiasco: The American Military Adventure in Iraq*, New York: Penguin Press, 2006, pp. 124-125. It should be noted, however, that Iraqi missile units continued firing both ballistic and cruise missiles during the brief military campaign. For details and the implications of the missile defense war during the campaign, see Dennis M. Gormley, "Missile Defence Myopia: Lessons from the Iraq War", *Survival*, Vol. 45, No. 4, Winter 2003-04, pp. 61-86.

[38] Barbara Opall-Rome, "Sensor to Shooter in 1 Minute", *Defense News*, October 2, 2006, p. 1. Opall-Rome reports "over 100" Hezbollah launchers were destroyed. The figure, 125, is reported in No'am Ofir, "Look Not to the Skies: The IAF vs. Surface-to-Surface Rocket Launchers", *Strategic Assessment*, Vol. 9, No. 3, November 2006, e-mail text published by the Jaffee Center for Strategic Studies, Tel Aviv, Israel, at http://www.tau.ac.il/jcss.

adequate to deter enigmatic countries like North Korea.[39] Nonetheless, the perceived effectiveness of missile defenses – particularly as seen by prospective adversaries – has become a key measure of any conventional denial strategy's potency.

Nuclear weapons figured heavily into America's early quest to design and deploy effective missile defenses, but today that quest is decidedly dependent on advances in precision conventional weapon technologies. From its inception to the demise of the Safeguard missile defense system in 1976, the United States – like the Soviet Union – equipped its interceptors with nuclear warheads. Indeed, Russia's anti-ballistic-missile system around Moscow remained nuclear-armed until apparently 1998 when its endoatmospheric interceptors, at the very least, were armed with conventional warheads due to nuclear fratricide concerns.[40] With the advent of President Reagan's Strategic Defense Initiative, the United States turned its back on nuclear-armed interceptors and instead focused on using the kinetic force of the interceptor colliding with the intended target to destroy it. Called "hit-to-kill", the technology has proven itself in both actual combat (Iraq, 2003) and during extensive testing. Still, critics of missile defense have challenged its application against ballistic missile re-entry vehicles outside the atmosphere by arguing that radars cannot adequately discriminate between real and decoy objects. This caused then-Secretary of Defense Donald Rumsfeld, in 2002, to ask the Defense Science Board, an advisory arm of the Pentagon, to study using a small nuclear-tipped interceptor, which would destroy both real and fake objects. But nuclear indiscriminateness in space has its own drawbacks, specifically with regard to damaging unhardened commercial satellites.[41] Not surprisingly, the Missile Defense Agency promptly responded to the Rumsfeld idea by saying that it had no plans for nuclear-tipped interceptors. And Republicans joined Democrats in the Congress in banning any money for such plans. Given the state of advances in U.S. conventional capabilities over the last three decades, the initial decision to abandon nuclear interception three decades ago was surely the right course of action, technically and politically.[42]

There is little evidence that foreign audiences share the missile defense critics' belief that current or future missile defense systems will not eventually perform as promised. One need simply point to near-term Russian concerns about U.S. missile deployments in Poland and the Czech

[39] David Sanger, "Don't Shoot. We're Not Ready", *New York Times*, June 25, 2006, Section 4, p. 1.

[40] See MISSILETHREAT.com, "Gorgon (SH-11/ABM-4)", at http://www.missilethreat.com/missiledefensesystems/id.25/system_detail.asp. According to this website, it remains unclear whether or not all interceptors, including long-range exoatmospheric ones, have become non-nuclear ones.

[41] For an unfavorable critique of nuclear-tipped interceptors, see Peter D. Zimmerman and Charles D. Ferguson, "Sweeping the Skies", *Bulletin of the Atomic Scientists*, Vol. 59, No. 6, November/December 2003, pp. 57-61.

[42] While it is one thing for North Korea or Iran to build simple decoys, it is quite another for them to have any confidence that they would work as intended. The latter requires actual flight-testing and validation, which hinges on possessing sensors and engineering forensic skills needed to achieve such validation.

Republic and the longer-term potential of a U.S. breakout permitting increasingly layered missile defense systems – a threat perception that China also shares.[43] Even the critics of missile defense understand that the reasons for poor missile defense test performance turn less on the mission's impossibility than on the intense political pressures to maintain politically mandated development and deploying decisions – notably between President Bush's directive to deploy an initial if limited missile defense system in 2002 and the 2004 mid-term election. Responding to increased pressure after Republicans took over control of the U.S. House of Representatives in 1994, the so-called "rush to failure" was evident as well during the Clinton administration.[44]

The Bush administration's goal was to provide a layered if limited global missile defense to provide protection of the entire U.S. homeland, its overseas forces, friends, and allies. The first increment was to consist of 20 ground-based interceptors (deployed between sites in Alaska and California) with future growth to 44 interceptors, three Aegis-class cruisers/destroyers armed with Standard SM-3 interceptors, and an unspecified number of Patriot PAC-3 interceptors deployed both on U.S. soil and overseas. Various early-warning and command, control, and communications systems furnish the means to control and enable interceptor success. The Bush administration's controversial third site for stationing mid-course ground-based interceptors and radars in Poland and the Czech Republic by 2013 is currently under review by the Obama administration, but it has already become clear that cuts in the Pentagon budget will affect missile defenses.[45] Additional missile defense interceptors, such as the U.S. Army's Terminal High Altitude Missile Defense (THAAD) system and U.S., German, and Italian Medium Extended Air Defense System (MEADS), slated to replace aging Patriot systems in Europe, would also eventually join the global missile defense system.

Besides contributing to the counterproliferation goal of denying one's adversaries the achievement of their military objectives, U.S. defense

[43] Tom Sauer, Bulletin 22 — Nuclear Policy, Terrorism and Missile Defence, International Network of Engineers and Scientists Against Proliferation, at http://www.inesap.org/bulletin22/bul22art31.htm.

[44] The characterization "rush to failure" came from a panel chaired by General Larry Welch, U.S. Air Force (ret.). The panel met in late 1997 to investigate ways of reducing risk in missile defense flight-testing. For the full panel report, see http://www.fas.org/spp/starwars/program/welch/.

[45] The administration plans $1.2 billion in missile defense cuts from the Missile Defense Agency's request for $9 billion for the next fiscal year and has decided to cap the number of ground-based interceptors at 30 instead of 44. According to Brad Roberts, who leads both the missile defense and Nuclear Posture Review efforts, the Obama administration will not depart significantly from the past 20 years of missile defense policy. To that end, the U.S. will procure enough intercept capability to ensure that regional actors are not capable of putting the U.S. or its friends and allies at risk. On the other hand, according to Roberts, the U.S. will stop short of threatening major powers by deploying more than what is needed to deal with regional threats. Capping ground-based interceptors at 30 is consistent with such a goal. See Martin Matishak, "Obama to Largely Preserve Missile Defense Policies, U.S. Defense Official Says", Global Security Newswire, July 30, 2009, at http://www.globalsecuritynewswire.org/gsn/nw_20090730_1285.php.

planners have also envisioned missile defenses as dissuading states from taking political, military, and technical actions that could threaten U.S. and allied security.[46] Notably in regard to missile proliferation, the objective has been to convince states that missile defense performance has become so effective that their investments in ballistic missiles were futile. Much has been accomplished since the 1991 Persian Gulf War, when Patriot missile defenses performed so poorly, to greatly improve the perceived value of ballistic missile defenses. During the 2003 war in Iraq, for example, Patriot missile batteries achieved a perfect record of nine successful intercepts of threatening Iraqi ballistic missiles. Yet, Patriot's performance against Iraq's surprise use of primitive cruise missiles contributed precisely the opposite effect: cruise missile defenses were broadly seen to be grossly inferior to ballistic missile defenses. This was because Patriot units failed to detect or engage any of Iraq's cruise missiles, and instead, their surprise use sowed confusion leading to friendly-fire casualties, including the loss of three crew members and two high-performance aircraft. The widely perceived shortcomings of U.S. cruise missile defenses have now become a central narrative element of increasing state interest in acquiring land-attack cruise missiles, not only because they are potentially so effective a means of delivering both conventional and WMD payloads, but also because they are now seen as the best way to foil currently available missile defenses.[47] To begin to dissuade states from acquiring cruise missiles will require a much more evenhanded way of funding respective ballistic and cruise missile defense programs than ever before, as well as much greater cooperation among air, ground, and naval forces in fashioning a truly integrated approach to detecting and engaging low-flying cruise missiles. The abysmal performance against Iraq's use of cruise missiles in 2003 has already led to modest progress, but much more needs to be done to alter the growing appeal of cruise missiles.[48]

---

[46] See, for example, excerpts on dissuasion from the Bush administration's Nuclear Posture Review, published on December 31, 2001, at http://globalsecurity.org/wmd/library/policy/dod/npr.htm.

[47] It should be noted that cruise missiles like Iraq's converted Chinese Seersucker missiles carry a 500kg warhead, which is sufficiently large to accommodate a first-generation nuclear device. Moreover, cruise missiles are at least 10 times more effective than ballistic missiles in disseminating biological weapons. Both of Pakistan's new land-attack cruise missiles are believed to be nuclear-capable systems.
For an analysis of performance of missile defenses during the 2003 war and details on cruise missiles equipped with WMD payloads, see Gormley, *Missile Contagion*, *op. cit.*, chapters 5, 7 and 9**.**

[48] Evidence of a U.S. government shift toward a more evenhanded approach to ballistic and cruise missile defense investments can be seen in the recent remarks of Gen. James E. Cartwright, Vice Chairman of the Joint Chiefs of Staff, at the 7th Annual Missile Defense Conference in Washington, D.C. on March 23, 2009. There, Cartwright said that "ballistic missiles are about as passé as sea mail", and later observed that ballistic missile threats were no longer as significant as they once were. He also noted that the Pentagon's new focus would shift to greater attention to sensors and command and control—critical components of improved cruise missile defenses. See Michael J. Carden, "Missile Defense Requires New Focus, Vice Chairman Says", *American Forces Press Service*, March 23, 2009, at http://www.defenselink.mil/news/newsarticle.aspx?id=53605.

Alleviating Russian Fears

Confronted both by the U.S. lead in conventional capabilities and the erosion of its nuclear forces due to readiness reductions coupled with lapses in its early warning system, Russia has evinced a growing sense of vulnerability. Although this threat perception is only partly justified, it still could impede further steps in achieving deep nuclear reductions. To achieve its ambitious objectives in nuclear arms control, the Obama administration must first understand and then try to alleviate legitimate Russian fears concerning asymmetric American advantages in conventional counterforce capabilities.

Russian Perceptions of U.S. Advanced Conventional Systems

American advances in precision global strike capabilities coupled with a seemingly unfettered ability to exploit missile defense technologies in the absence of any treaty constraints provides a challenging backdrop to obtaining deep reductions in Russian and American nuclear arsenals. The cavalier way in which the Bush administration unilaterally opened negotiations with Poland and the Czech Republic on stationing mid-course interceptors and radars, respectively, on these nations' territories catapulted the missile defense issue to center stage. But equally worrisome to Russia are developments in precision conventional strike weapons that are seen as capable of destroying strategic targets. Russia sees the combination of conventional offense and defense as leaving it at a decided and uncomfortable disadvantage vis-à-vis the United States in the aftermath of deep nuclear reductions, no less a world without nuclear weapons.[49]

Controversy surrounding the U.S. decision to negotiate rights to deploy a "third site" for midcourse ground-based interceptors in Poland and the X-band radar in the Czech Republic make missile defense the premier issue standing in way of progress in deep nuclear reductions. Indeed, Premier Vladimir Putin told Japanese media on May 10, 2009 that U.S. plans for missile defenses in Europe would be linked to strategic arms reductions.[50] Despite the limited technical capacity of U.S. interceptors in Poland to threaten Russian strategic forces, Russia's reaction to U.S. plans

[49] For a comprehensive treatment of Russian perceptions of growing U.S. military superiority, see Stephen J. Blank, *Russia and Arms Control: Are There Opportunities for the Obama Administration?*, Carlisle: Strategic Studies Institute, U.S. Army War College, 2008.

[50] "Russia to link missile defense in Europe with nuclear arms treaty", *RIA Novosti*, May 10, 2009.

was vitriolic for reasons that go beyond technical threat analysis.[51] The Bush administration's discussions with the Poles and Czechs occurred against the backdrop of NATO's inchoate plans for a missile defense system of its own, including one that could conceivably include Russia at some future point. In January 2008, with Germany as the host nation, NATO's Theater Missile Defense Ad Hoc Working Group – operating under the aegis of the NATO-Russia Council – conducted the fourth in a series of theater missile defense exercises, with eleven NATO nations joining Russia in a command and control exercise of missile defense forces. Some might forgive Russians for believing that the U.S. rush to deploy its own missile defense system in Europe represents a way of edging Russia out of any future NATO missile defense system.

Russia might also be excused for worrying about the open-ended U.S. approach toward determining when to deploy new missile defense components as well as the opaque nature of what the U.S. notion of global missile defenses truly means. Missile defense opacity reflects the diametrically opposed acquisition strategies for missile defense practiced before and after the terrorist attacks of September 11, 2001. Before 9/11, particularly in regard to Democratic administrations, support for any complex military system occurred only after the threat had been amply explicated and then the system was subjected to thorough testing – a "fly-before-you-buy" practice in which any particular missile defense system undergoes enough operational tests to determine its reliability and performance effectiveness.[52] The administration of George W. Bush introduced the notion of capabilities-based planning, which overturned the need for a thorough vetting of the threat and instead sought to develop a full range of capabilities needed to cope with likely future contingencies. The logic for capabilities-based planning was laid out in the 2001 Quadrennial Defense Review.[53] It was predicated on the belief that, since one cannot know with enough confidence precisely what threats will emanate from either nations or terrorist groups, defense planners must identify specific capabilities needed to dissuade enemies from pursuing threatening options, deter them by deploying forces for rapid use, and defeat them if deterrence fails. With such a broad writ in hand, the chief lesson of 9/11 for the Bush administration was that a determined adversary would stop at nothing – including even acquiring ballistic missiles – in order

[51] For a technical appraisal of how Russian military analysts might plausibly view Polish-based interceptors as a threat, see George N. Lewis and Theodore A. Postol, "European Missile Defense: The Technological Basis of Russian Concerns", *Arms Control Today*, October 2007, at http://www.armscontrol.org/act/2007_10/LewisPostol.

[52] For an illustration of this position from a practitioner, see "What are the Prospects, What are the Costs? Oversight of Ballistic Missile Defense (Part 2)", Testimony of Philip E. Coyle, III, Senior Advisor, World Security Institute, before the House Committee on Oversight and Government Reform, Subcommittee on National Security and Foreign Affairs, April 18, 2008.

[53] Quadrennial Defense Review Report, September 30, 2001, at http://www.defenselink.mil/pubs/pdfs/qdr2001.pdf.

to attack the United States.[54] With longstanding metrics for measuring performance no longer applicable, the Bush administration abjured relying on extensive flight tests to determine system reliability and performance. Deployment decisions were based instead on simulations that integrated limited real-world test results with conceptual components reproduced in a model. Moreover, no longer did the Missile Defense Agency specify an overall system architecture. Whatever components passed the muster of this admittedly risky approach were deployed immediately in two-year block intervals, leaving critics aghast at such a something-is-better-than-nothing approach to deployment. But to observers in Russia, such opacity produced confusion and uncertainty with respect to future U.S. missile defense plans and capabilities.[55]

What animates Russian officials most is that the U.S. deployment of highly powerful ground- or sea-based X-band radars and spaced-based infrared sensors (known as the Spaced-Based Infrared System, or SBIRS-Low), America will have a break-out potential in place for a thick, global system of missile defense.[56] Compared with the poor discrimination performance of earlier warning radars, X-band systems have a resolution of 10-15cm, good enough to discriminate between real warheads and decoys. More ominously, once they are deployed globally, not only will midcourse ground-based interceptors be able to take advantage of their improved resolution, but so too will a growing network of sea-based interceptors on Aegis cruisers/destroyers and land-based upper-tier THAAD interceptors. Of course, X-band, and especially SBIRS-Low, may not prove to be as effective as promised, but this does not lessen the concern of Russian defense planners who see uncontrolled expansion of American global missile defenses as a potential threat to their diminishing nuclear deterrent.

Prospective missile defense advances represent only the most visible impediment to progress in nuclear arms control. Lurking just behind are concerns about U.S. advanced conventional weapons. In the U.S. debate, much has been made of Russia's fear of U.S. nuclear primacy.[57]

---

[54] For this author's analysis of 9/11's lessons, see Dennis M. Gormley, "Enriching Expectations: 11 September's Lessons for Missile Defence", *Survival*, Vol. 44, No. 2, Summer 2002, pp. 19-35.

[55] Maj. Gen. Vladimir Dvorkin (ret.), observed that "there is no telling how far the United States will go with its missile defense deployment plans". See his "Reducing Russia's Reliance on Nuclear Weapons in Security Policies", in Christina Hansell and William C. Potter (eds.), "Engaging China and Russia on Nuclear Disarmament", *Occasional Paper*, No. 15, James Martin Center for Nonproliferation Studies, April 2009, p. 95.

[56] This was a concern even before the U.S. withdrawal from the ABM treaty in 2002. See Jack Mendelsohn, "The Impact of NMD on the ABM Treaty", in Joseph Cirincione et al., *White Paper on National Missile Defense* Washington, Lawyers Alliance for World Security, 2000.

[57] Most notable was the reaction in both the U.S. and Russia to a 2006 article in *Foreign Affairs* magazine arguing that the U.S is close to obtaining an effective nuclear first-strike capability against Russian and Chinese strategic retaliatory forces. See Keir A. Lieber and Daryl G. Press, "The Rise of U.S. Nuclear Primacy", *Foreign Affairs*, March/April 2006, at http://www.foreignaffairs.com/articles/61508/keir-a-lieber-and-daryl-g-press/the-rise-of-us-nuclear-primacy. For reactions, see "Nuclear Exchange: Does Washington Really Have (or Want) Nuclear

But Russian strategic analysts have begun to write in some detail about the prospects that future advanced conventional weapons – together with improved missile defenses – could place Russia in a position of unacceptable vulnerability.[58] This perception is not merely the product of wild speculation by non-specialists in the Russian press. The well-respected Maj. Gen. Vladimir Dvorkin (Ret.), who formerly directed fundamental research in mathematical modeling in nuclear planning, and then participated in virtually every major U.S.-Soviet strategic arms control negotiation, reflects the broad concern now existing in Moscow that conventional weapons imbalances represent a key roadblock to deep nuclear reductions. As Dvorkin notes:

> "[A Russian] concern is the possibility that high-precision conventional weapons could be used to destroy strategic targets. Precision-guided munitions (PGMs) pose a threat to all branches of the strategic nuclear triad, including the silo and mobile launchers of the Strategic Rocket Force (SRF), strategic submarines in bases, and strategic bombers. The types of PGMs to be used against each of these components, the vulnerability of these components, the vulnerability of assets, and operation requirements would require . . . study".[59]

U.S. plans to arm Trident D-5 missiles with conventional payloads as part of its plans for prompt global strike has already raised concerns – in the United States and Russia alike – about missile warning ambiguity and inadvertent retaliatory actions. These developments are of sufficient concern to Russian planners that Moscow arms officials have proposed strategic conventional delivery vehicles as candidates for possible limits in future strategic weapons treaties with the United States.[60]

If U.S. strategic conventional denial capabilities are just emerging today, Russian military planners must also worry about where such programs might be in a decade or two. The U.S. Strategic Command's initial complement of forces comprising the Global Strike mission included

---

Primacy?", *Foreign Affairs*, September/October 2006, at http://www.foreignaffairs.com/articles/61931/peter-c-w-flory-keith-payne-pavel-podvig-alexei-arbatov-keir-a-l/nuclear-exchange-does-washington-really-have-or-.

[58] See for example, "U.S. Can Attack Russia in 2012-2015", *Moscow Agentstvo Voyennykh Novostey* (internet in English), February 26, 2008 [FBIS].

[59] Vladimir Dvorkin, "Reducing Russia's Reliance on Nuclear Weapons in Security Policies", *op. cit.*, p. 100. For its part, Russia would prefer to proceed along the conventional-oriented path that the United States has pursued since 1991. Russia's National Security Concept, published in 2000, notes that reliance on nuclear weapons is a temporary phenomenon. Once current plans to develop new air- and sea-launched cruise missiles and PGMs come to fruition by 2020, Russia will no longer need to rely predominantly on nuclear weapons for deterrence purposes. See Nikolai N. Sokov, Jing-dong Yuan, William C. Potter, and Cristina Hansell, "Chinese and Russian Perspectives on Achieving Nuclear Zero", in Hansell and Potter (eds.), *op. cit.*, p. 4.

[60] The United States reportedly would prefer to keep any conventionally-armed delivery systems, like Trident, out of future nuclear arms control treaties. Author interview with a former government official, Washington, D.C., April 2009.

the U.S. Air Force's F-22 fighter providing penetration corridors for B-52, B-1, and B-2 bombers loaded with conventional precision strike weapons.[61]

The U.S. Navy has converted four of its 18 Trident Ohio-class submarines to each carry 154 Tomahawk land-attack cruise missiles, the latest version of which features a two-way satellite data link that permits the missile to attack one of 16 preprogrammed targets or take new GPS coordinates to attack a fleeting target of opportunity. Assuming it has reserve fuel, the missile can also loiter in the area for hours awaiting a more important target, as well as pass information from its own TV camera on battle damage. Instead of filling each of the four Trident submarines with its full complement of 154 Tomahawks, a few missiles can be traded of for special-operations mini-subs or small reconnaissance UAVs. The Pentagon has also sought, without success thus far, to spend $503 million to outfit a small number of the Trident D-5 nuclear missiles on the remaining 14 Ohio-class Trident submarines with conventional warheads (either small diameter bombs or bunker-buster penetrating warheads). Even more robust global strike systems could emerge from current research and development programs, including small launch boosters capable of launching highly maneuverable hypersonic glide vehicles armed with a 500kg conventional payload over international distances and reusable unmanned hypersonic cruise vehicles capable of carrying 5,500kg payloads over 14,500km within two hours.[62]

The U.S. Conventional Strategic Threat to Russia: Separating Fact from Fiction

Any American president – Barack Obama included – wishing to wean the United States from its longstanding reliance on nuclear weapons would find it difficult not to pursue a robust conventionally oriented denial strategy. Yet, the challenge facing the United States is to make more transparent precisely where current advanced conventional and missile defense programs stand today, and what restrictions or operational constraints the United States might be willing to accept, if any, on their development or operation to accelerate the path toward nuclear abolition.

If the U.S. decision to arm a small number of Trident D-5 missiles with conventional warheads is any indication, virtually no thought went into how such plans would be viewed in Moscow or Beijing, or indeed, even in the U.S. Congress. The impervious nature of conventional strategic strike programs is less a matter of intention and more related to the fact that programs are mired in vagueness with differing interpretations of missile requirements and capabilities existing within various bureaucratic stake

[61] It should be noted that when the Global Strike mission was first constituted, it counted nuclear weapons among its constituent components.

[62] These programs are joint U.S. Air Force/DARPA efforts conducted under the rubric, "Force Application and Launch from CONUS [continental United States]" or FALCON program. See http://www.darpa.mil/tto/programs/Falcon.htm for a brief outline of the FALCON program and *Alternatives for Long-Range Ground-Attack Systems*, Washington, Congressional Budget Office, March 2006, at http://www.cbo.gov/ftpdocs/71xx/doc7112/03-31-StrikeForce.pdf.

holders. Programs are diffused across the entire Department of Defense, including the Defense Advanced Research Project Agency and the military services. And rather than being driven by any well-conceived concept of operation dictating how these various programs will transform military operations – the bellwether of truly revolutionary change – these efforts are propelled for the most part by raw technological momentum.[63] The opaque nature of U.S. global missile defense ambitions in the Bush administration largely emanated from the imperative to deploy systems as quickly as possible to meet political, if not threat-driven, needs. Global strike capabilities, on the other hand, have the advantage today and in the future of appearing to transform deterrence-oriented nuclear ballistic missiles that no one ever wishes to be used into denial-oriented counterforce systems possessing an array of future mission possibilities – a factor that surely animates the interest of all three military services. But Global Strike's exclusive affiliation with advanced conventional strike is today more promise than reality. However much the U.S. Air Force may have envisioned the Prompt Global Strike mission as a decidedly conventional one, its initial implementation proved otherwise, not least because of the dearth of truly global conventional capabilities.[64] In fact, Global Strike's June 2004 implementation as an approved operational plan mirrored the Bush administration's 2001 NPR conflation of nuclear and conventional capabilities.

President Bush's elevation of preemption (actually, prevention) from military option to national doctrine in 2002 gave real impetus to making the Global Strike concept operational. Grave concern over the toxic mix of WMD and the presumed nexus between so-called "rogue" states and a new brand of apocalyptic terrorism led to specific guidance to the U.S. military to integrate selected bombers, ICBMs, ballistic-missile submarines, and cyber-warfare assets into a strike force capable of promptly attacking high-value targets associated with specific regional contingencies. Some advanced conventional capability figured into the original Global Strike operational implementation, probably consisting of joint direct attack munitions (JDAMs) launched by B-2 bombers and Tomahawk cruise missiles launched from submarines and surface vessels. But Global Strike as a purely conventional capability was overtaken not only by limited capabilities but also by the Bush administration's desire to make nuclear strike options more credible and tailored to the post-Cold War requirements reflected in its 2001 NPR.[65]

---

[63] The development of the aircraft carrier during the 1930s furnishes perhaps the finest exemplar of concept rather than technology driving revolutionary military innovation. See Williamson Murray and Allan R. Millett (eds.), *Military Innovation in the Interwar Period*, Cambridge: Cambridge University Press, 1998, pp. 191-226 and pp. 329-368.

[64] For a pre-9/11 view of U.S. Air Force plans, see Matt Bille and Maj. Rusty Lorenz, "Requirement for a Conventional Prompt Global Strike Capability", briefing presented to the National Defense Industrial Association's Missile and Rockets Symposium and Exhibition, May 2001 (copy available from the author).

[65] For an incisive appraisal of the operational implementation of Global Strike, including the creation of its organizational components to direct planning and execution, see Kristensen, "U.S. Strategic War Planning After 9/11", *op. cit.*

Where does Prompt Global Strike stand today in the aftermath of Barack Obama's election and the Democrats taking decisive control of both houses of the U.S. Congress? The Next-Generation Bomber, originally slated for deployment by 2018, has been delayed not only because of budget limitations but also due to uncertainties with respect to what kind of impact current Strategic Arms Reduction Treaty (START) renewal will have on the mix of nuclear delivery systems.[66] According to congressional staff member on the Senate Armed Services Committee, there is no longer any prospect for either Trident or Minuteman land-based nuclear missiles undergoing conversion to meet the Pentagon's requirement for prompt conventional strikes, while research funding for hypersonic glide vehicles will remain in place, but without prospect for any deployment decisions any time soon.[67] As one senior U.S. Strategic Command officer evinced to this writer recently, "Global Strike has been throttled back".[68] One might argue, of course, and the Russians do, that the requirement for converting Trident might be resurrected in future. They surely observed that an independent study panel of the bipartisan National Research Council (NRC) had endorsed a limited application for the conventionally-armed Trident before the 2008 election. The NRC panel only gave its support for the mission of a time-critical strike against a fleeting target of opportunity (e.g., counter-terrorist target or rogue state activity), which would involve no more than one to four weapons. The U.S. Navy had pressed for funding to convert two Trident missiles on each of 12 deployed Trident submarines for a total of 24 conventionally armed Tridents. Importantly, the NRC panel drew a distinction between the more limited mission and conventional Trident's broader application. The limited use would not carry the same stiff operational and political demands as a larger use of conventional Trident would in providing leading edge attacks in support of major combat operations. In the latter regard, Trident would probably join substantial numbers of Tomahawks and other PGMs on bombers as part of a counterforce strike at the outset of a major regional contingency. The NRC panel properly noted that in contrast to using one to four Tridents alone, any large-scale prompt conventional strike would present much stiffer operational demands related to intelligence support and command and

[66] Bombers are credited with counting rules that apply to capability rather than actual operating load-outs of nuclear weapons. Thus, there is a reluctance currently to firm up a Next-Generation bomber design before START counting rules are made clear. See David Fulghum, "USAF Bomber Grounded by More Than Budget", *Aviation Week & Space Technology*, April 22, 2009, at http://www.aviationweek.com/aw/generic/story.jsp?id=news/NGB042209.xml&headline=USAF%20Bomber%20Grounded%20by%20More%20than%20Budget&channel=defense. For details on the new bomber, see Norman Polmar, "A New Strategic Bomber Coming", Military.com, April 14, 2008, at http://www.military.com/forums/0,15240,165805,00.html.

[67] Telephone interview, April 2009. My thanks to Monterey Institute colleague, Miles Pomper, for this information. The U.S. Navy, using money from outside the funding account for prompt global strike, plans to conduct a flight test in August 2009 of a version of the conventional Trident missile. The Congress earlier had eliminated funding of $43 million in fiscal 2009 for the Conventional Trident program. See Elaine Grossman, "U.S. Navy Plans August Test for Conventional Trident-Related Technology", *Global Security Newswire,* May 21, 2009, at http://gsn.nti.org/gsn/nw_20090521_3036.php.

[68] Interview, March 2009.

control, as well as drastically different political implications with regard to warning ambiguity. Whether the contingency involves using one or many conventional Tridents, as the NRC panel observed, "the ambiguity between nuclear and conventional payloads can never be totally resolved . . .".[69] Yet, the larger the Trident salvo of conventional missiles, the higher the prospects for misinterpretation and inadvertent responses. At the same time, because Russian early-warning systems are incomplete, even smaller numbers may be wrongly interpreted as a larger-than-actual salvo or incoming missiles. Concerns about ambiguity leading to inadvertent nuclear war – rightly or wrongly conceived – largely explain the congressional decision not to support conventional Trident's funding.

Arming Trident with a conventional warhead is not the only way to deal with fleeting terrorist targets. As examined earlier in this paper, the combination of U.S Special Forces on the ground and armed Predator UAVs in the air represents a potent and now broadly used new capability to deal with fleeting targets. The NRC panel noted the importance of UAVs and special forces as sources of intelligence supporting conventional Trident strikes, which begs the question: why can't less provocative capabilities – if perhaps less effective under some circumstances – obviate the need for conventional Trident in regard to this limited mission?[70] Another option to evaluate would be a new missile altogether, rather than one with a nuclear legacy, like the U.S. Navy's concept of a "Sea-Launched Global Strike Missile", or even the Navy's effort to develop a supersonic version of the Tomahawk cruise missile.[71] For the time being, the Obama administration and Congress have taken an appropriate time out with Prompt Global Strike, which will surely not allay Russian concerns over the long run. But it does provide space to consider future prompt-strike missile options and their effect on military stability in the context of a world that may well become far less dependent on long-range, nuclear-armed ballistic missiles in future.

Research and development programs attempting to achieve technological breakthroughs in global strike capabilities by 2025 are, frankly speaking, problematic at best. These include the hypersonic cruise vehicle that could take off and land from a U.S runway and be anywhere in the world in one to two hours. The idea for such a space plane has been

---

[69] "Conventional Prompt Global Strike Capability", Letter Report of the National Research Council's Committee on Conventional Prompt Global Strike Capability, dated May 11, 2007, at http://www.nap.edu/catalog/11951.html.

[70] A point made by Joshua Pollack, "Evaluating conventional prompt global strike", *Bulletin of the Atomic Scientists*, Vol. 65, No. 1, January/February 2009, pp. 13-20. The less effective circumstances would entail Predator's problematic survival against sophisticated and thick air defenses, which would be less likely to be the case in the limited counter-terrorist scenario and more likely in major combat operations against a regional adversary.

[71] The Seal-Launched Global Strike Missile is mentioned in "Conventional Prompt Global Strike Capability" (see n. 61), while a related (if not precisely the same) concept for a Submarine-Launched Intermediate-Range Ballistic Missile is discussed in detail at http://www.globalsecurity.org/wmd/systems/slirbm.htm. On supersonic Tomahawk, see Dennis M. Gormley, *Missile Contagion, op. cit.*, p. 54.

around since the 1950s.[72] President Ronald Reagan accelerated the push in his 1986 State of the Union Address, yet his director of the Strategic Defense Initiative (Star Wars), Henry Cooper, told a congressional panel in 2001 that after the expenditure of some $4 billion on the development of the space plane concept from the early 1970s to the end of the 1990s (discounting various programs in the 1950s and 1960s, as well as the space shuttle investment), the only thing produced was "one crashed vehicle, a hangar queen, some drop-test articles and static displays".[73] Current Pentagon hypersonic programs face, among many, the difficult challenge of developing lightweight and durable high-temperature materials and thermal management techniques needed to cope with hypersonic speeds. This is because hypersonic glide vehicles require a thermal protection system capable of preventing their payloads from melting at re-entry speeds of up to Mach 25 (or 25 times the speed of sound). The quest to master and deploy hypersonic systems will not come easily, not only because of the huge technical challenges associated with these systems but also because the strategic environment is so uncertain. No defense agency would likely be willing to bet on any one solution to the global-strike requirement under such circumstances. However, the U.S. Congress appears to have chosen to continue down the risky and potentially costly path of pursuing hypersonic delivery vehicles. If nothing else, this course removes the nearer-term solutions like conventional Trident from becoming any kind of impediment to progress in strategic arms control negotiations.

If converting Trident to deliver non-nuclear payloads and more futuristic advanced conventional programs represent non-existent threats to Russia today, that is not the case in regard to hundreds of Tomahawk cruise missiles (616 maximum, if UAVs or special forces are not fitted out in launch tubes instead) that comprise the four Ohio-class Trident submarines converted from nuclear ballistic missile submarines (SSBNs) to guided-missile (i.e., cruise missile) submarines between 2002 and 2008. In worrying about this threat, Russian analysts take particular note of the precision accuracy and re-targeting capability of the latest generation Tomahawk cruise missile. This, it is asserted, means that highly accurate Tomahawks could threaten Russian silo-based intercontinental ballistic missiles, while the fact that they possess their own means of reconnaissance, can loiter in the target area, and can be retargeted after launch, suggests they can find and destroy mobile missiles like the new Topol-Ms about to begin deployment in December 2009. Such a preemptive strike of this sort could, by 2012-2015, destroy between 70 and 80 percent of Russian's nuclear forces. The remaining missiles, it is

[72] The first publicly acknowledged program, in 1957, was the U.S. Air X-20 Dyna-Soar, which was supposed to be launched vertically off the ground and then glided back to earth for landing. The current hypersonic cruise vehicle would be expected to operate at between 30 to 50km altitude.

[73] Testimony by Henry F. Cooper to the House Subcommittee on Space and Aeronautics Committee on Science, October 11, 2001, at http://www.tgv-rockets.com/press/cooper_testimony.htm. Cooper largely placed blame on Pentagon management inefficiencies for the program's poor performance.

asserted, could then be readily intercepted by the U.S. global missile defense system.[74]

Granting that the current state of Russian strategic missile forces is today substantially below its Cold War form and that they are likely to suffer funding shortfalls over the next decade, the expectation that U.S. conventionally-armed Tomahawks, even ones with high accuracy and retargeting capability, could, on their own, accomplish such successful results is – kindly put – the height of excessive imagination. Observing U.S. advances in precision conventional strike linked to advanced reconnaissance systems, Soviet-era military theoreticians did indeed become fascinated with the prospect that "automated search and destroy complexes" could one day come close to approximating the effectiveness of at least tactical nuclear weapons.[75] But a closer look at what Soviet-era planners truly had in mind had nothing to do with anticipating that missiles alone could dominate a major military campaign. Instead, their role was seen as leveraging the effectiveness of a multiplicity of other strike elements (aircraft, bombers, electronic jamming, airborne assault and heliborne forces, etc.) in a major combined arms campaign. Tomahawk cruise missiles are surely accurate enough to hit on or very near to a Russian missile silo, but their warhead carries only 450kg of either blast fragmentation or combined-effects submunitions. The former is a mere pinprick vis-à-vis hardened missile silos; the latter is only relevant against soft targets. Indeed, even a Trident missile armed with a conventional penetrator would require Herculean accuracy and absolutely perfect targeting conditions to have any chance whatsoever of threatening silo-based missiles.[76]

What about advanced Tomahawk's reputed new capabilities against mobile missiles? As discussed earlier, the U.S. Air Force in particular has accomplished major improvements in counterforce targeting as fleeting targets, largely as a by-product of nearly continuous combat operations in Afghanistan and Iraq over the last eight years. Nevertheless, it is critical to distinguish between what piloted aircraft can accomplish against a rogue state's mobile missiles compared with autonomous missiles equipped with a data link and TV camera facing arguably the most skilled nation there even has been when it comes to operating intermediate- and strategic-range mobile missiles.[77] It's one thing to track, detect, and successfully

[74] "U.S. Can Attack Russia in 2012-2015", *op. cit.*

[75] Most notably, see N.V. Ogarkov, *Krasnaya Zvezda*, May 9, 1984 (BBC Monitoring Service translation [SU/7/639/C/10]).

[76] Russian concrete silo covers are dome-shaped and approximately 20 feet in diameter and 5 feet high in the center. This means that they have a radius of curvature of about 12.5 feet. Employing the targeting requirement of approaching the target at less than 2 degrees from the vertical, the penetrator would have to impact less than 5 inches from the absolute center of the silo cover, or within a 10-inch diameter circle whose center is at the apex of the dome. My thanks to Dr. Gregory DeSantis, a former U.S. Department of Defense scientist, for making these calculations based on the penetrator design discussed in Nancy F. Swinford and Dean A. Kudlick, "A Hard and Deeply Buried Target Defeat Concept", *op. cit.*

[77] The Soviet Union first deployed intermediate-range ballistic missiles on mobile launchers in 1976 (the SS-20).

attack fleeting groups of Taliban or al Qaeda fighters in Afghanistan or Iraq, or Iraqi mobile missile units who believed they are impervious to ubiquitous battlefield reconnaissance systems while being otherwise overwhelmingly dominated (in the case of Iraq in 2003) by large numbers of American conventional forces, and quite another to expect 600 or so conventionally-armed Tomahawks to do decisive damage to 180 Russian nuclear-armed mobile missiles proficient in the practice of employing camouflage, cover, and concealment methods once they have moved from their peacetime bases. Moreover, there is the stiff challenge of operating impervious to Russia's advanced air and missile defenses. U.S. counterforce targeting against mobile missiles has indeed improved greatly since coming up completely short in the 1991 Persian Gulf War, but even in Iraq in 2003, only anecdotal evidence suggests that more success was achieved against a greatly diminished Iraq missile force compared to its 1991 holdings. Success did not mean halting the admittedly low launch rate over the 21-day war, nor did it mean that Iraq's entire missile stores were eliminated via either counterforce or missile defenses by the war's conclusion. For example, 33 Iraqi cruise missiles – a threat that had surprised American missile defenders and contributed to friendly-fire losses – were found intact on the Faw peninsula after the war.[78] Simply put, we fall prey to a fallacy of division to think that because tactical counterforce operations using advanced strike systems (like Tomahawk) have improved remarkably during the last eight years, they can also succeed in strategic counterforce operations where even nuclear strike systems were expected at best to provide only problematic results due to inevitable target location uncertainties.[79] Finally, there is the stark reality that the inevitable failure to locate and destroy all of Russia's strategic nuclear weapons would expose the United States to a devastating nuclear riposte.

The open-ended nature of the U.S. missile defense system raises perhaps the most legitimate area of concern from a Russian perspective, although the Obama administration's decision to cap ground-based mid-course interceptors at 30 ought to allay such concerns. Vladimir Dvorkin has written that Russia has little to worry about from American missile defenses until roughly 2015. Until then, Russian offensive missiles have adequate "defense suppression systems" to require as many as 10 U.S. ground-based interceptors to destroy one warhead. Even the addition of the third site in Poland will not change these circumstances. But as time passes, and if the United States were to deploy space-based laser and kinetic-kill weapons "on a massive scale", Russia's nuclear deterrent could conceivably to be seen to be at risk.[80] Given the stance of the Obama administration thus far, notably its insistence on demonstrating missile

[78] Gormley, "Missile Defence Myopia: Lessons from the Iraq War", *op. cit.*

[79] The Russian supposition that American intelligence, surveillance, and reconnaissance capabilities are so ubiquitous that anything that moves will be detected and instantly killed flows from the exaggerated expectations of such books as Harlan Ullman and James P. Wade, Jr., *Shock and Awe: Achieving Rapid Dominance* Washington, National Defense University, 1996. For a more grounded treatment, see Barry Watts, *Clausewitzian Friction and Future War*, Darby, Diane Publishing Co., 2004.

[80] Vladimir Dvorkin, "Threats Posed by the U.S. Missile Shield", *Russia in Global Affairs*, Vol. 5, No. 2, April/June 2007, at http://eng.globalaffairs.ru/numbers/19/.

defense performance and system cost effectiveness before deployment decisions are taken, the likelihood of the United States taking the path that worries Russians most is highly doubtful. Yet, without the constraints once associated with the 1972 Anti-Ballistic Missile Treaty, from which the United States unilaterally withdrew in 2002, nothing legally bars a future U.S. administration from pursuing such an open-ended course of action.

Cooperative Engagement with Russia: Options for Consideration

The daunting challenge of achieving complete abolition of nuclear weapons will surely entail several stages of nuclear reductions along the path to lower, and one hopes, safer arsenals. And dealing with conventional imbalances along this uncertain path not only is a U.S.-Russian dilemma but also includes conventional imbalances in the Middle East, South Asia, and Northeast Asia. Within these three regional settings lately, a contagious outbreak of interest in preemptive strike doctrines linked to advanced conventional strike weapons (most notably cruise missiles) shows worrisome signs of producing even greater instability in the future.[81] For many states on the unequal end of such developments, it will be difficult to imagine why they would wish to eliminate their nuclear weapons. Former Senator Sam Nunn suggests the need to reach a "base camp [or] vantage point from which the summit [a nuclear-free world] is visible and the final ascent to the mountaintop is achievable".[82] The first step along the way to that base camp is for the United States and Russia to restart a critical feature of Cold War arms control negotiations: the elevation of transparency, or making both sides of any competition aware, with the limits of security, of what the other side is doing.

The notion of greatly improved transparency and perhaps even substantial cooperation between the United States and Russia is not a novel concept; it rose to center stage after 9/11. In November 2001, the two presidents signed a "Joint Statement on a New Relationship Between the United States and Russia", followed by another in May 2002 specifying a range of possibilities for cooperative engagement, including strengthening confidence and increasing transparency in the area of missile defenses, exchanging information on missile defense programs and tests, reciprocal visits to observe tests, and work on bringing a joint center for exchanging data from early warning systems into effect. Most importantly, the two sides agreed to study possible areas for missile defense cooperation beyond joint exercises to include joint research and development on missile defense technologies within the limits of security and protecting property rights. The Russia-NATO Council was singled out as the framework to examine cooperative engagement in missile defense.[83]

---

[81] This trend is documented in Dennis M. Gormley, *Missile Contagion, op. cit.*

[82] Quoted in Philip Taubman, "The Trouble with Zero", *New York Times*, May 10, 2009, at http://www.nytimes.com/2009/05/10/weekinreview/10taubman.html.

[83] "Text of Joint Declaration on the New Strategic Relationship", The White House Office of the Press Secretary, May 24, 2002.

What greeted Moscow in the aftermath of the 2002 attempt to foster missile defense cooperation with the United States was little in substance and provocative instead of cooperative, namely Washington's unilateral engagement of Poland and Czech Republic on their involvement in the U.S. missile defense program. U.S. efforts to bring Georgia and Ukraine into NATO didn't help either. U.S. attempts to allay Russia's concerns about these developments failed to impress, and gestures toward transparency and an examination of the potential contribution of Russian radars were less than wholeheartedly dealt with, at least in Russian eyes.

Seek Consensus on Missile Threats to NATO and Russia

The first step in achieving real and lasting cooperation in missile defense is for Russia and the United States, through the NATO-Russia Council, to reach consensus on pace and scope of Iran's ballistic and cruise missile threat to the whole of NATO. Extant threat assessments facing the NATO region focus in the main on ballistic missile systems. The debates focus less on Iran's ballistic missile capacity than on the pace of Tehran's success in weaponizing a suitably compact nuclear reentry vehicle that could survive the rigors of reentry, as well as how quickly their solid-fuel missile developments will mature. Far less attention is given to the growing cruise missile threat on the periphery of Europe. Iran is among a rapidly growing number of countries that have begun pursuing land-attack cruise missile programs. According to a 2004 NATO Parliamentary Committee report, Iran was converting some 300 Chinese anti-ship cruise missiles into land-attack systems by fitting them with turbojet engines and new guidance systems. Such designs have been demonstrated as capable of achieving around 1,000km range and could be readily launched from merchant ships to target substantial portions of Europe. Even more worrisome over the longer-term was the 2005 disclosure that Russian and Ukrainian arms dealers had collaborated with the head of Ukraine's export control agency in the illegal sale of 12 to 20 Ukrainian/Russian Kh-55 strategic (and nuclear capable) cruise missiles to China and Iran. The Kh-55's range is 3,000km. Even though the illegal transfer of at least six Kh-55s to Iran also included a ground support system for testing, initializing, and programming the missiles, such a small number of cruise missiles was probably acquired primarily for purposes of examination and reverse engineering, leading eventually to the development of Iran's own long-range cruise missile program.[84] A common view of the threat of both ballistic and cruise missiles offers opportunities for broader cooperation beyond just ballistic missile defense to include warning, detection, and defeat of airborne threats.

U.S. cruise missile defense programs today are not in good shape. Fighters equipped with advanced detection and tracking radars will eventually possess some modest capability to deal with very low-volume attacks, assuming advance warning information is available. But existing U.S. programs are underfunded, while interoperability, doctrinal, and organizational issues discourage the military services from producing joint and effective systems for defending U.S. forces and allies in regional

[84] Dennis M. Gormley, *Missile Contagion*, *op. cit.* chapters 3 and 4.

military campaigns.[85] NATO's own cruise missile defenses are no better off. The poor state of cruise missile defenses raises the question: can either or both the U.S. and Europe find security by fielding only half a missile defense system, capable of handing but one dimension of the missile threat?

Expand the Cooperative Airspace Initiative (CAI)

Launched within the NATO-Russia Council in 2002, the CAI's goal is to achieve a system of air traffic information exchange along the borders of Russia and NATO member countries. Four sites each currently exist in Russia and NATO countries – from the far north in Russia (Murmansk) and Norway (Bodø) to Turkey (Ankara) and Russia (Rostov-on-Don) in the south. Poland hosts a NATO coordination center in Warsaw, while the companion Russian center is located in Moscow. Besides forming a basis for NATO and Russia to establish greater confidence in working together, the CAI has focused especially on aircraft that might be under the control of terrorists or a rogue state. CAI is complemented as well by a functionally equivalent system of Air Sovereignty Operation Centers (ASOC) that the United States funded in former Warsaw Pact states beginning in 1997. Although the CAI information exchange system had successfully passed joint testing qualifications in July 2008, it along with other bilateral NATO-Russia initiatives were suspended in August 2008 in protest for Russia's intervention in Georgia. CAI only recently resumed in March 2009.[86]

CAI, working in possible cooperation with the ASOCs, could form the basis for investigating an expansion of air monitoring capabilities to the domain of cruise missile warning and defense. Russia initially balked at the formation of ASOCs, arguing that they together could create a common airspace picture useful for tracking and providing guidance against threats. But to the extent CAI starts taking on the character of ASOCs, the closer it gets to becoming a useful NATO-wide and Russian vehicle for starting collaboration on defending against cruise missiles. About $6.5 million has been invested in CAI thus far, with financial support coming from 12 countries, including Russia and the United States.[87] The virtue of engaging Russia's participation in an expanded CAI concept – including its role in cruise missile defense – goes much beyond trust building and improved air safety and security. Rather, an expanded CAI offers Russia the chance to become a full participant in an inchoate but potentially constructive endeavor to kick-start the lesser-included dimension of missile defense. Russia's longstanding prowess in developing effective air defense systems, including the S-400, which boasts capability to intercept ballistic and cruise missiles as well as aircraft, could fit nicely into a broad-area concept for European cruise missile defense. Directing Moscow's export energies away from S-300 and S-400 transfers to countries like Syria and Iran and toward

[85] *Ibid.*, chapter 9.
[86] Brooks Tigner, "NATO and Russia near air traffic information exchange", *International Defence Review,* April 29, 2009. See also Press Release of the Russian Mission to NATO, at http://natomission.ru/en/societ/article/society/artnews/40/.
[87] The other sources of financial support include Canada, France, Greece, Hungary, Italy, Luxembourg, Norway, Poland, Turkey, and the United Kingdom. See *ibid*.

the prospect of a more effective collaborative working environment within the NATO-Russia Council is worthy of serious evaluation.

Engage Russia on Ballistic Missile Defense

There is already broad support in Washington for engaging Russia in a manner substantially different from the Bush administration's efforts in early 2008 by both Secretaries Gates and Rice. While the Moscow-Washington agenda on strategic arms control will surely dominate the two states' bilateral relationship over next several months, perhaps the easiest way to jump-start missile defense cooperation would be to move toward implementing the Joint Data Exchange Center (JDEC) in Moscow. Russia and the United States first agreed on a joint warning concept involving notifications of ballistic missile flights to each side in 1998, which was formalized in a June 2000 meeting between Presidents Clinton and Yeltsin, who agreed to establish the center in Moscow. Legal and tax issues have prevented the center from becoming operational. All of the operational details have been worked out already, so movement toward implementation should be comparatively straightforward. It would also be appropriate to examine more closely Russian President Putin's 2007 proposal to establish a second data exchange center in Brussels.

U.S. officials have already signaled their willingness to examine the use of Russian low-frequency warning radars at Gabala in Azerbaijan and Armavir in Russia's Krasnodar Region as part of the U.S.-led global missile defense system.[88] As nongovernmental radar specialists have noted, there is the chance that combining an X-band radar deployed either in Azerbaijan or Turkey with the Armavir radar could possibly offer three to four more minutes of additional warning than could the X-band radar operating on its own from the Czech Republic.[89] At the very least, American radar specialists need to investigate precisely how these two radars might contribute not only to improved missile defense performance but also partnerships with Russia in areas where Russian technological prowess might complement American and European missile defense skills.

If cooperation in missile defense warning isn't difficult enough, it is even more so when it comes to cooperation in interceptors. Security and intellectual property rights issues have always stood in the way of achieving much progress. Assuming, however, that U.S.-Russian relations improve in the aftermath of successful strategic arms control treaties, it would make good sense to explore avenues toward cooperation in missile defense

[88] Ellen Barry, "U.S. Negotiator Signals Flexibility Toward Moscow Over New Round of Arms Talks", *New York Times*, May 5, 2009 and "U.S. is ready to discuss proposal on using Gabala radar as part of global missile shield – U.S. ambassador", *Moscow Interfax*, April 27, 2009.

[89] See, for example, Theodore Postol, "A Ring Around Iran", *New York Times*, July 11, 2007, at http://www.nytimes.com/2007/07/11/opinion/11postol.html. Postol argues that the Gabala radar's lower frequency radar could crudely yet effectively provide earlier warning than a Czech-based X-band radar, whose higher frequencies and resolution are useful to characterize the target initially detected by the Russian radar. Thus, the sum of the two could furnish additional warning time with loss of much-needed target resolution.

interceptors. One competitive advantage that Russia once had is in directed energy technologies. In the early 1990s, U.S. and Russian technical cooperation exchanges disclosed that Russia then led the world in carbon dioxide and high-power solid-state lasers. Again, in the 1990s at least, there was significant cooperation between U.S. and Russian scientific and academic organizations, including in the area of solid-state lasers for non-military applications.[90] The U.S. missile defense program has experienced less than optimal success in the airborne laser program – witness the recent Pentagon decision to cancel the second ABL prototype – an effort seen as critical to achieving some modest capability in defeating ballistic missile threats shortly after they are launched (or during the so-called boost phase). Building on past endeavors in the 1990s, it makes good sense to explore once again opportunities to cooperate in directed energy interceptors.

The purest form of reassurance would resurrect formal arms control constraints designed to allay Russian (and Chinese) concerns about the open-ended nature of U.S. global missile defense program. Foremost on Russian minds are U.S. intentions to deploy interceptors in space, which could perform double duty as both ballistic missile interceptors, with potentially significant capabilities against Russian offensive forces in the aftermath of deep reductions, and anti-satellite weapons to maintain or extend American dominance in space. The American pursuit of such options would be foolhardy, in the first case because no conceivable rogue-state threat would merit such an expansion, and in the latter case, because American dependence on space to sustain its conventional superiority would potentially suffer were such a decision to trigger an arms race in anti-satellite weapon capabilities. A preferred alternative would be for the United States to examine what it might be willing to accept in limits on mid-course and upper-tier interceptors, which could be incorporated in a new legally binding treaty with Russia. At the same time, the United States should take the lead with Russia and China to negotiate “rules of the road” for space operations akin to ones that govern air, ground, and naval operations on earth.

Were the Iranian nuclear missile threat to accelerate unexpectedly, and reasons for deploying the third site in Poland and the Czech Republic determined to be necessary, it is not inconceivable to imagine a significant degree of Russian cooperation nonetheless. This would entail dusting off the assurance proposals of the Bush administration introduced in 2007, which involved restricting the radar’s angle of view so as not to threaten Russian missile launches and agreeing not to activate the site until the Iranian threat was palpable to both sides. Russia had also insisted on a permanent observer presence at both the Czech and Polish bases, but one well-placed Russian observer has suggested that a Polish proposal, allowing for an “almost permanent presence” by Russians, would be satisfactory to Moscow. This would entail aperiodic visits by Russian observers who would be accredited to the Russian embassies in the Czech

[90] K. Scott McMahon, *Pursuit of the Shield: The U.S. Quest for Limited Ballistic Missile Defense*, Lanham, University Press of America, 1997, pp. 251-252.

Republic and Poland and the installation of surveillance cameras for around-the-clock surveillance.[91]

Assuaging Russian Concerns over American Conventional Superiority

This area is perhaps the most intractable, not least because of the Russian tendency to exaggerate U.S. military capabilities. There is little doubt that America possesses greatly superior conventional military forces capable of being projected anywhere around the globe. Russia is today investing in its conventional forces and plans, by 2020, to be in a much better state than it is today. But even the most optimistic estimates suggest that Russia will remain significantly inferior across the board vis-à-vis the United States. From this vantage point Russia is less concerned about the reasons why current U.S. conventional capabilities, such as conventionally-armed Trident missiles or hundreds of highly accurate Tomahawk cruise missiles launched from Trident submarines, are incapable of threatening Russia's strategic deterrent. They are concerned about future possibilities, however "fanciful".[92]

If there is a solution to the conventional superiority issue, it lies less in trying to convince Russia that current or prospective U.S. advanced conventional strike systems are incapable of achieving what they fear, and more in conceiving of options that might allay those concerns over the longer run. That said, as much transparency as is possible should nonetheless take place. But so too should the United States evaluate the possibility of constraining the patrol areas when Ohio-class Trident submarines bearing Tomahawks go. Russian analysts are concerned that they will operate sufficiently close to Russian territory to permit them to target their fixed and mobile strategic forces. Indeed, such an operational pattern is not fanciful in light of the speed and quietness of the Ohio-class family of submarines. They could quite conceivably, though not without some risk, operate with impunity not only inside a state's 200nm exclusive economic zone but also within its 12nm territorial waters.

To evaluate what the United States would have to do to allay Russian concerns, I examined what constraining Ohio-class submarines to a patrol area just outside the 200nm economic exclusive zone might accomplish to reduce the perceived threat of striking all Russian strategic nuclear forces (fixed and mobile forces together with submarines bases), comprised of 14 large-area targets.

---

[91] Victor Yesin, "Action and Counteraction", *Global Affairs*, Vol. 7, No. 1, January/March 2009, at http://eng.globalaffairs.ru/numbers/26/1262.html. Yesin is a Colonel General in the Russian military and a professor at the Russian Academy of Military Sciences.

[92] A word used by Ambassador Linton Brooks to describe a practice employed by Soviet-era arms control negotiators, and apparently no less today. Brooks notes that a senior Russian official once noted that Russia was concerned over the possibility of U.S. use of special forces to blow up strategic missile silos. See his comments at an Arms Control Association meeting in Washington, D.C. on April 27, 2009, at http://www.armscontrol.org/node/3632.

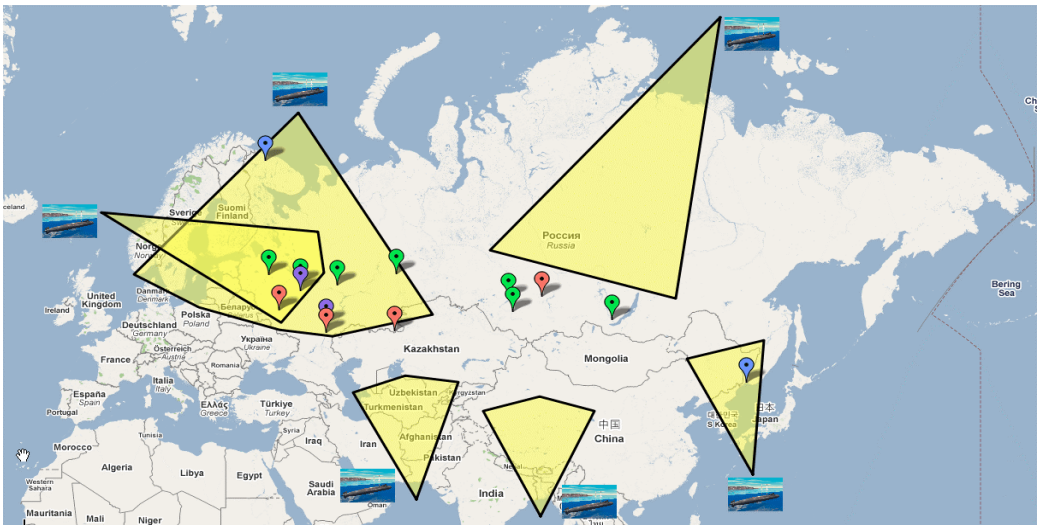

Figure 1. Red markers = silo fields, green markers = mobile missile garrisons, blue markers = submarine bases. The yellow bans depict the reach of Tomahawk cruise missiles launched from Ohio-class submarines positioned 200nm off the coast of any state. Six submarine launch areas are shown here, but currently the U.S. Navy possesses only four such submarines.

Assuming that Tomahawks have a maximum operational range of 2,500km, Ohio-class submarines would be able to reach nine of the 14 target areas. Importantly, however, three mobile divisional bases (housing today 99 Topol mobile missiles), and two fixed strategic missile groups (with 68 SS-18 missile silos, each missile armed with 10 independently targetable warheads) – together representing 57 percent of Russia's land-based Strategic Rocket Forces – would not be within reach of Tomahawk missiles. Although such an approach seems unnecessary based purely on the highly dubious nature of the Tomahawk threat to such strategic targets, U.S. planners should examine in much greater detail the merits and pitfalls of employing such an operational constraint in order to allay Russian fears.[93]

On possible constraints in regard to future U.S. ambitions to restart the conventional arming of Trident for a prompt global strike task, or a broader mission to engage significantly in regional military campaigns, the only solution may lie in counting such strategic conventional delivery vehicles as if they were nuclear armed. The same may hold for future hypersonic cruise and glide vehicles, not least because in fact they would be theoretically capable of delivering nuclear payloads.[94]

[93] My Monterey Institute colleague, Johan Bergenas, designed and constructed figure 1. Even were these submarines to operate from within territorial waters, there would be little fuel remaining for advanced Tomahawks to employ their loiter and search capability against mobile missiles.

[94] This is the approach taken by former arms control negotiator, Linton Brooks, but it is by no means the likely approach that will be taken by U.S. negotiators. The latter may well submit to such counting rules for Trident, and even future hypersonic delivery means, but it is more doubtful that Ohio-class submarines would be counted as nuclear delivery systems. The preference there is for them to be grandfathered in as conventional-only systems.

Conclusion

As U.S. and Russian planners look toward the challenges and pitfalls of achieving deep reductions in nuclear arsenals, they should begin systematically to appraise additional novel ways of achieving stability as arsenals drop to less than 500 warheads and then fall further. The recent turn by many states toward adopting preemptive strike doctrines employing advanced conventional weapons does not augur well for achieving a stable world. However difficult it surely will be for states to shed this predilection toward preemption – or prevention – through prompt action, if history tells us anything, it is that while such practices may succeed in achieving some initial battlefield success, they do so at the grave cost of war and its inevitable political and financial consequences. Witness America's eight-year tragedy in Iraq. Preemptive strike doctrines employing conventional weapons are clearly unacceptably dangerous in a nuclear-armed world. But they will also be dangerous in a world devoid of all nuclear weapons, particularly as they may be destabilizing during regional or international crises. One way is to tone down, if not entirely eliminate, the preemption option now. It is needlessly reckless to elevate such a military choice – assessed as absolutely critical under dangerously threatening circumstances – to a national doctrine, as the Bush administration did after 9/11.

Another is to undertake a fresh examination of Ronald Reagan's dream of eliminating offensive ballistic missiles, attempted unsuccessfully at the Reykjavik summit with Mikhail Gorbachev, in 1986.[95] However fanciful such an endeavor may appear today, it may begin to become far more meritorious as the world sheds its nuclear allergy. Land-attack cruise missiles, which today have already become the conventional weapon of choice around which preemptive strike doctrines are being wrapped, also merit much more attention than they have received to date. Besides more effective controls within supply-side mechanisms like the Missile Technology Control Regime, and incorporation of cruise missiles into the Hague Code of Conduct's normative treatment of missile proliferation,[96] all advanced conventional system transfers will merit much closer attention than ever before, perhaps along the lines of global arms trade treaty, a concept that has already been examined closely at the UN. Common international standards, accompanied by greatly improved transparency

[95] For a recent appraisal, see Steve Andreasen, "Reagan Was Right: Let's Ban Ballistic Missiles", *Survival*, Vol. 46, No. 1, Spring 2004, pp. 117-130.

[96] For reasons why adopting changes in the Hague Code of Conduct make sense, see Dennis M. Gormley, "Making the Hague Code of Conduct Relevant", Issue Brief, July 20, 2009, at http://nti.org/e_research/e3_hague_conduct_relevant.html.

and verification procedures attending the transfer of all advanced conventional systems, are matters that cannot await the outcome of contemporary efforts to achieve nuclear abolition. They deserve attention on their own merits no matter the outcome of the quest to achieve the abolition of nuclear weapons.

Information

All published issues of the Proliferation Papers series can be downloaded from the Ifri website :

www.ifri.org

The latest contributions include :

- Michael Moodie, *Dangerous Weapons in Dangerous Hands Responding to the Challenges of Chemical and Biological Terrorism*, Proliferation Papers n° 28, Ifri, Summer 2009.

  http://www.ifri.org/files/Securite_defense/PP28_Moodie_Summer2009.pdf

- Mark Fitzpatrick, *The World After. Proliferation, Deterrence and Disarmament if the Nuclear Taboo is Broken*, Proliferation Papers n° 27, Ifri, Spring 2009.

  http://www.ifri.org/files/Securite_defense/PP27_Fitzpatrick_Spring2009.pdf

- James A. Russell, *Strategic Stability Reconsidered: Prospects for Escalation and Nuclear War in the Middle East*, Proliferation Papers n° 26, Ifri, Spring 2009.

  http://www.ifri.org/files/Securite_defense/PP26_Russell_2009.pdf

- Chung-Min Lee, *The Evolution of the North Korean Nuclear Crisis: Implications for Iran*, Proliferation Papers n° 25, Ifri, Winter 2009.

  http://www.ifri.org/files/Securite_defense/Prolif_Chung_Min_Lee_NK.pdf

- Ariel E. Levite, *Heading for the Fourth Nuclear Age,* Proliferation Papers n° 24, Ifri, Winter 2009.

  http://www.ifri.org/files/Securite_defense/Levite_Fourth_Nuclear_Age.pdf

- William Walker, *President-elect Obama and Nuclear Disarmament,* Proliferation Papers n° 23, Ifri, Winter 2009.

  http://www.ifri.org/files/Securite_defense/Walker_Obama_nuclear_disarmament.pdf

For further information on the *Proliferation Papers* collection, please feel free to contact Ifri's Security Studies Center : thomas@ifri.org