Arms Control Association

Threat Assessment Brief

Analysis on Effective Policy Responses to Weapons-Related Security Threats

Nuclear Cruise Missiles: Asset or Liability?

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The future of U.S. and Russian nuclear cruise missiles is at an inflection point. Russia's alleged testing of a ground-launched cruise missile has jeopardized not only the 1987 Intermediate-Range Nuclear Forces Treaty, but other bilateral nuclear agreements as well, adding further strain to the U.S.-Russian relationship. The U.S. allegation and Moscow's three countercharges should be resolved with the help of the treaty's Special Verification Commission, which was explicitly designed to deal with compliance issues. But the two countries need to take a broader look at nuclear cruise missiles. New strategic cruise missiles are part of an unaffordable drive by Washington and Moscow to simultaneously modernize all three legs of their strategic arsenals. Given the increasingly marginal role that nuclear cruise missiles play in ensuring a U.S.-Russian balance and their destabilizing impact when deployed by emerging nuclear powers such as Pakistan, it is time to consider doing away with them entirely.

HIGHLIGHTS

- Nuclear-armed cruise missiles played an important, although subordinate, role in strategic deterrence during the latter years of the Cold War, compensating for the increasing vulnerability of nuclear-armed bombers trying to penetrate enemy air defenses.

- The deterrent role of these nuclear systems in the post-Cold War order has been steadily declining.

  - The 1987 Intermediate-Range Nuclear Forces (INF) Treaty eliminated all ground-launched cruise missiles (GLCMs) in U.S. and Russian arsenals.

  - Both countries committed to removing all nuclear sea-launched cruise missiles (SLCMs) from ships and submarines under the 1991-1992 Presidential Nuclear Initiatives.

  - The bomber leg of the nuclear triad, relying heavily on air-launched cruise missiles (ALCMs) for penetrating hostile air space, has been declining in importance relative to the ballistic missile legs.

  - The role of nuclear weapons in U.S. military doctrine has also been shrinking.

- Three of four INF Treaty compliance issues involve concerns about nuclear cruise missiles.

- The budgetary demands of U.S. nuclear modernization programs argue for pruning expensive niche capabilities.

  - The Pentagon seeks to spend up to $30 billion on a new nuclear ALCM, a largely redundant weapon in light of plans for new bomber and ballistic missile legs of the triad.

- The GLCM ban on systems of INF Treaty-range should be extended to nuclear-tipped ACLMs and SLCMs.

  - U.S. advantages in nuclear-tipped ALCMs would be exchanged for Russia giving up its remaining nuclear SLCMs and its apparent interest in redeploying GLCMs, improving prospects for lowering aggregate nuclear warhead levels.

  - A U.S.-Russian ban would increase prospects for halting the destabilizing growth of nuclear cruise missile arsenals among other nuclear-weapon states.

Background

Nuclear-tipped cruise missiles played a very minor role in the first decades of the nuclear era, squeezed between the era of overwhelming reliance on bomber weapons and that of principal reliance on strategic ballistic missiles. Five U.S. Navy surface ships and submarines, armed with SSM-N-8/9 Regulus sea-launched cruise missiles (SLCMs), conducted 41 deterrence patrols over a nine-year period (1955-1964). Thirty SM-62 Snark ground-launched cruise missiles (GLCMs) were briefly operational at an Air Force base in northern Maine during 1960-1961 but never overcame their reputation for unreliability. (Test ranges off the Florida coast became known as "Snark-infested waters," and one errant Snark missile was found in Brazil in 1983.)

Nuclear-tipped cruise missiles did not escape from the fringes of U.S. strategic posture until the end of the 1970s when a new generation of cruise missiles were developed, taking advantage of dramatic technological breakthroughs in propulsion (small turbofan engines), miniaturization of nuclear warheads (the W-80 and W-84), and autonomous guidance (terrain contour-matching). Three types of U.S. long-range cruise missiles were created and deployed in the 1980s to deliver nuclear warheads against land targets:

- the BGM-109A "Tomahawk," a SLCM;
- the BGM-109G "Gryphon," a GLCM; and
- the AGM-86B, an air-launched cruise missile (ALCM).

The cruise missile thereby came of age as a viable, if still subordinate, delivery vehicle for nuclear warheads. The U.S. Air Force was able to counteract the increasing vulnerability to Soviet and Warsaw Pact air defenses of its B-52 strategic bombers and of its tactical fighter-bombers based in Europe that were assigned theater nuclear roles. With the ubiquitous Tomahawk SLCMs, the U.S. Navy was accordingly able to increase the number of sea-based platforms capable of launching nuclear strikes against targets ashore. The new generation of cruise missiles thus narrowed enemy pre-emption possibilities while providing U.S. nuclear targeteers with a wider range of strike options.

The high-water mark for such systems came as the United States began implementing NATO's Dual-Track Decision of 1979 to deploy 464 GLCMs on the territories of five European allies. With ranges of 2,500 kilometers, these cruise missiles could reach targets deep into the European portion of the Soviet Union.

The 1987 Intermediate-Range Nuclear Forces (INF) Treaty banned U.S. and Soviet ground-launched missiles with ranges greater than 500 kilometers and less than 5,500 kilometers. Within three years, more than 500 such cruise missiles belonging to the two countries were eliminated under the terms of the treaty.

Although the INF Treaty did not limit ALCMs and SLCMs with INF Treaty-range capabilities, the United States and Russia agreed on further reductions in these systems a few years later under the 1991-1992 U.S.-Russian Presidential Nuclear Initiatives. Accordingly, most U.S. and Russian naval nuclear weapons, including nuclear-armed cruise missiles, were removed from surface ships and (non-SSBN) submarines.

Although the United States completed its withdrawals of deployed nuclear-tipped cruise missiles from its warships in 1992 and eliminated the missiles entirely by 2003, Russia's claimed implementation of the nonbinding PNI political commitments has never been verified. Indeed, Russia's defense minister admitted in 2006 that three "multipurpose" Russian submarines were armed with tactical nuclear weapons.[1] It is not clear whether these weapons are anti-shipping cruise missiles or torpedoes, rather than land-attack cruise missiles like the ground-launched variants eliminated under the INF Treaty.

The United States and Russia continue to deploy nuclear cruise missiles on heavy bombers. Although neither country relies on the bomber leg of its nuclear triad for prompt strike or for insurance against a "bolt from the blue" attack, it is valued by political leaders for signaling intentions and conspicuously demonstrating capabilities. Moreover, an alerted and dispersed bomber force with cruise missiles is capable of retaliating for an attack by delivering very large numbers of highly accurate nuclear warheads with relatively good penetrability.

Accordingly, the United States has announced plans to invest heavily in the future of strategic bombers. These plans include 80 to 100 new nuclear-capable stealth bombers, the long-range strike bomber,and a refurbished B-61 gravity bomb.

Even though the strike bomber would be designed to penetrate enemy airspace, modernization plans also include refurbishing the W-80 nuclear warheads of the current inventory of ALCMs now carried now by B-52s through a life extension program costing $8-9 billion. In addition to carrying updated B-61 gravity bombs, the strike bomber is intended to carry the long-range standoff weapon, armed with a refurbished W-80 warhead. The total standoff-weapon program cost, including the warhead, is estimated to be $20-30 billion.

Although Moscow's future cruise missile intentions are less transparent, it has shown no interest in curtailing its ALCM and SLCM capabilities. Moreover, flight tests in

recent years suggest a revived interest in GLCMs. Elements of the Russian military have complained for some time about the disproportionate impact of INF Treaty limits on Russia, given the absence of related limits on potential adversaries along its periphery, such as China. Moreover, Russian defense officials cite U.S. advantages in conventional forces, including cruise missiles, armed drones, and future hypersonic global prompt-strike systems, as additional obstacles to lowering limits on U.S.-Russian nuclear offensive arsenals.

Nuclear cruise missiles probably play a more significant role in U.S. contingency planning regarding China than Russia, because of a variety of factors. The distances between accessible launch points and potential targets are less than in the case of Russia. Air defenses in China are less sophisticated than in Russia. Cruise missiles would be less likely to trigger an immediate response as they were inbound when employed against China – a country postured for and doctrinally committed to riding out a first strike.

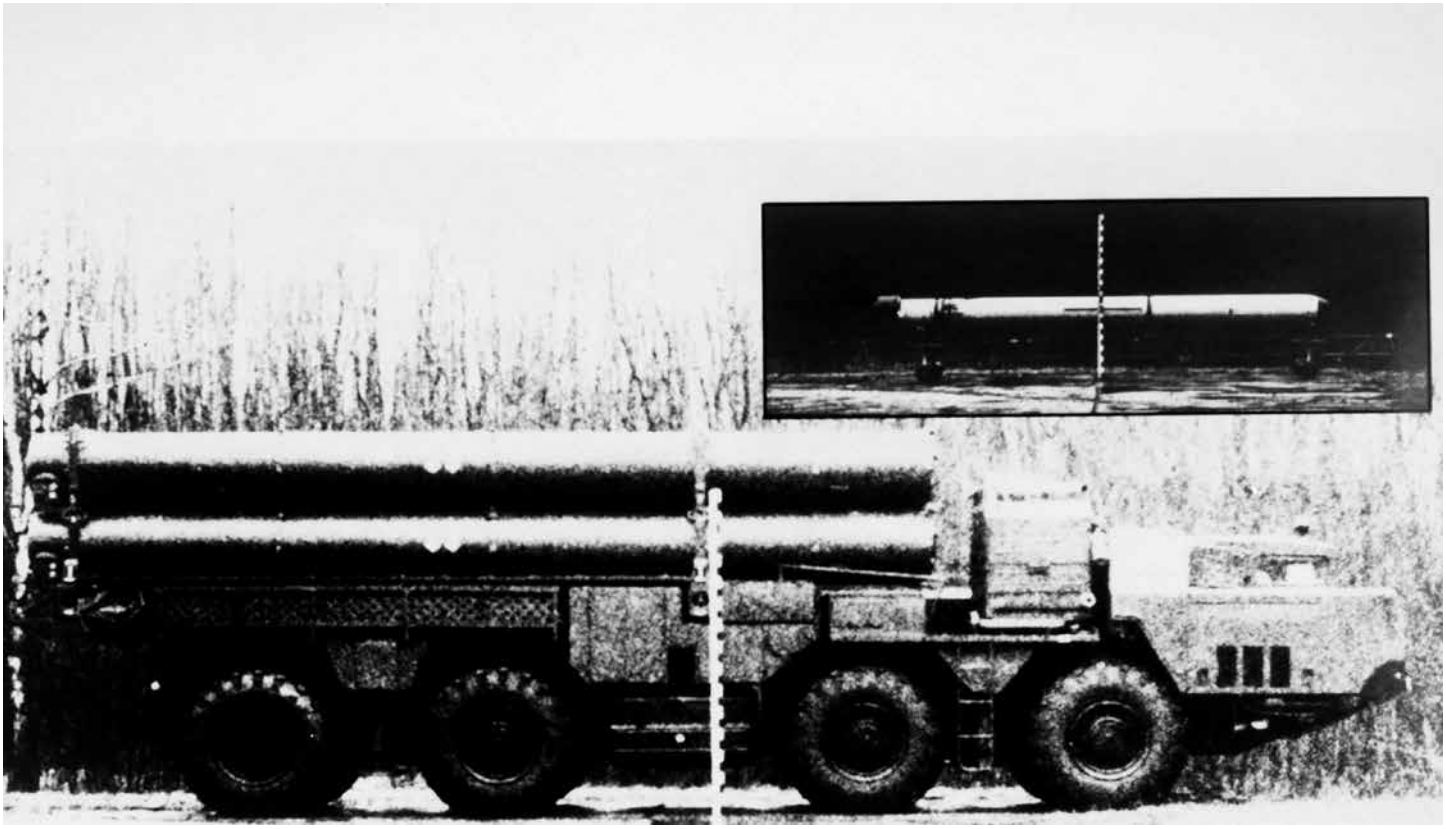
Even against China, however, there are few targets for which nuclear cruise missiles would be uniquely suited. Intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs), gravity bombs from stealthy bombers, or conventionally armed cruise missiles would be ready substitutes for most missions.

China itself deploys a second-generation, land-attack cruise missile designated the DH-10, which can be launched from air-, ground-, or sea-based platforms. They are assessed as being able to carry conventional or nuclear warheads to an operational range in excess of 4,000 kilometers, sufficient to threaten all key U.S. allies on China's periphery. China has demonstrated greater interest in expanding conventionally-armed rather than nuclear-armed missiles for theater use.

Russia's Alleged Testing of Banned GLCMs

The U.S. Department of State's annual compliance report on arms control, nonproliferation, and disarmament alleged for the first time in July 2014 that Russia had tested GLCMs in violation of the INF Treaty. Shortly thereafter, the Russian Foreign Ministry levied three INF Treaty noncompliance countercharges.[2] Two were related to putative U.S. GLCM capabilities: U.S. use of armed drones "covered by the definition" of GLCMs under the treaty and the U.S. intention to deploy Mk-41 launch systems, which "can be used to launch intermediate-range cruise missiles," in Poland and Romania.

No progress is evident in resolving any of the INF Treaty noncompliance disputes, even after several high-



U.S. Department of Defense

Official photos of the Soviet RK-55 *Granat* (SS-C-4) ground-launched cruise missile and its transporter-erector-launcher, a system eliminated under the 1987 INF Treaty. A sea-launched version of the RK-55, the SS-N-10, is armed with either nuclear or conventional warheads and may still be deployed on some Russian submarines.

level meetings were held to address them. Russia not only denies that it has tested any INF Treaty-range GLCMs, but it has repeatedly defended the legality of another system that U.S. officials have explained was not under suspicion.

The United States has dismissed the charge that its use of armed drones is in violation of the treaty by arguing that they are outside the treaty's definition of cruise missiles and it contends that the Mk-41 multipurpose launcher being deployed to Romania had not been tested with GLCMs and would be technically incapable of launching them.

There has been no effort by either side to convene the Special Verification Commission (SVC), the INF Treaty's consultative mechanism created to resolve compliance disputes, and no invitation extended to technical experts to examine the alleged violations firsthand. It is therefore difficult to credit Washington or Moscow with due diligence in seeking to preserve one of the most successful treaties of the nuclear era.

With so few details available to the public, it is not yet possible to judge definitively the merits or military implications of the U.S. compliance charge. It is also difficult to ascertain how much the Russian charges reflect genuine concerns and how much they merely reflect convenient talking points.

Although Moscow may be actively reconsidering Russia's previous adherence to the treaty's ban on GLCMs, there is still time to effectively address the issues that have been raised. U.S. officials do not claim having seen evidence that a new GLCM has been deployed by Russia. Likewise, Russia's stated concerns about the potential cruise missile capabilities of Mk-41 launch systems and the cruise missile-like capabilities of armed drones appear related to systems that have not yet been fielded.

Turning a Crisis Into an Opportunity

The INF Treaty compliance dispute threatens to spill over into other areas of arms control and further burden bilateral U.S.-Russian relations. For example, Moscow recently discontinued most nuclear cooperation with the United States and senior Russian officials have twice warned that the INF Treaty dispute could affect implementation of the New Strategic Arms Reduction Treaty (New START). Staunching the bleed-over into other areas of cooperation requires that both sides make a serious effort to open talks on strengthening the INF Treaty.

Successfully resolving cruise missile challenges to the INF Treaty could also provide a positive impetus for reconsideration of the currently defined requirement for nuclear-tipped cruise missiles in strategic doctrine.

Convening the INF Treaty's SVC would be the first step. The commission would be able to engage technical experts on the ground, permitting firsthand observation of items and procedures in dispute.

Discussions in the SVC would need to include all issues of concern to either side. If Moscow is concerned about the evolution of drone technology such that it creates disproportionate risks to Russia, it should advocate explicitly defining unmanned combat aerial vehicles and consider making them unambiguously subject to INF Treaty limits, perhaps in a protocol to the treaty.

The United States is contending that the Mk-41 multipurpose launchers to be deployed in Romania and Poland cannot launch a GLCM, even though its manufacturer has previously boasted of the system's capacity to launch a variety of missiles (air defense interceptors, missile defense interceptors, and Tomahawk SLCMs). If Washington genuinely wishes to persuade Moscow on this issue, then it should be willing to make an extra effort, allowing Russian inspections and on-site technical discussions.

If Russia is concerned about the risk posed by Chinese systems of the type Moscow has foresworn under the INF Treaty and if the six countries negotiating with Tehran over Iran's nuclear program are concerned about future long-range ballistic missiles from the Middle East, they should think creatively about how to apply at least some of the constraints contained in the INF Treaty to third parties. This would serve the security interests of the five nuclear Nonproliferation Treaty (NPT) nuclear-weapon states, reducing potential threats to them and burnishing

U.S. Air Force

A transporter-erector-launcher of the U.S. BGM-109G *Gryphon* ground-launched cruise missile is displayed in 1983. After being deployed to five NATO countries, this system was eliminated under the 1987 INF Treaty.

their bona fides with regard to implementation of the NPT's Article VI disarmament obligations.

Removing Nuclear Warheads From All Cruise Missiles

Successfully resolving cruise missile challenges to the INF Treaty could also provide a positive impetus for reconsideration of the currently defined requirement for nuclear-tipped cruise missiles in strategic doctrine. Although the treaty only addressed ground-launched ballistic and cruise missiles in the 500 to 5,500 kilometer-range category, within a few years, all nuclear-tipped cruise missiles had also been removed from U.S. sea-based platforms. Current circumstances suggest it is time to eliminate all remaining Russian nuclear SLCMs and the nuclear ALCMs of both sides as well.

The United States and Russia do not need nuclear-armed cruise missiles. Both countries possess huge arsenals of ICBMs and SLBMs, posing an enormous barrier for any other country wishing to pose a disarming first strike against them or to counter a retaliatory strike by them. Likewise, with both countries facing the enormous future costs of simultaneously modernizing all legs of their Cold War nuclear deterrents, they cannot afford to overlook any available means of downsizing in a way that does not compromise deterrence or stability.

Instead of being an asset in strengthening deterrence, nuclear-armed cruise missiles can be destabilizing in a crisis because the warning of their launch is more likely to be ambiguous than the launch of strategic ballistic missiles, posing a potential threat to stability for nuclear forces on hair-trigger alert, such as those of Russia and the United States, or countries with relatively unreliable or vulnerable warning systems, such as China.

Constituting the "poor man's nuke," such systems are likely to become more attractive in the future for non-NPT nuclear-weapon states (India, Israel, North Korea, and Pakistan) and less attractive to the more mature nuclear arsenals of the five NPT nuclear-weapon states.[3] Furthermore, the smaller size and more-mobile deployment modes of cruise missiles aggravate nuclear security concerns about theft and subsequent use by nonstate actors.

Pakistan, a country engaged in an arms race with India and confronting serious nuclear security problems domestically, has deployed nuclear-capable GLCMs and

AAMIR QURESHI/AFP/Getty Images

Pakistan's Hatf VII *Babur* ground-launched cruise missile is displayed in a 2007 military parade. The system is assessed to be able to deliver a conventional or nuclear warhead 700 kilometers. Pakistan also deploys a shorter-range nuclear-capable air-launched cruise missile, the Hatf VIII *Ra'ad*.

ALCMs, underscoring the potential stability concerns these systems may generate.

Distinguishing Nuclear From Non-Nuclear Cruise Missiles

The role of unmanned weapons whose flight is based on aerodynamic lift, whether cruise missiles or armed drones, will continue to grow in the arsenals of many countries, not just those of the United States and Russia. This is all the more reason to ensure that nuclear warheads are decoupled from this category of weapons.

The difficulty three decades ago of distinguishing nuclear-armed from conventional cruise missiles was one of the reasons that all INF Treaty-range GLCMs were banned by the treaty. During the intervening years, however, the monitoring of deployed missiles and warheads in the implementation of the INF Treaty and New START has provided valuable practical experience in meeting the warhead differentiation challenge.

Similarly, considerable progress has been made in improving nuclear detection and verification techniques through a number of bilateral and multilateral undertakings, including U.S.-Russian work in the early 1990s to make reductions transparent and irreversible, the trilateral (U.S.-Russian-IAEA) verification initiative,[4] verification work by the United Kingdom and Norway,[5] and transparency discussions among the five NPT nuclear-weapon states.[6]

Even prior to making active efforts to negotiate a follow-on agreement to New START, cooperation between U.S. and Russian labs can be reinvigorated to develop new verification techniques. Based on past and ongoing efforts, it is realistic to expect that high-confidence monitoring to determine the presence or absence of nuclear warheads is attainable. Thus, the overall security benefits of further limiting nuclear arsenals can be achieved without foregoing the military benefits from exploiting cruise missile and armed drone technology for conventional missions.

The Next Step

Proliferation of strategic systems that are difficult to detect is clearly contrary to the long-term interests of Russia, the United States, and indeed all other nuclear powers. Washington and Moscow should set an example by

abolishing nuclear-armed cruise missiles, allowing the two governments to advance nonproliferation objectives from a higher moral ground than they would otherwise occupy and with greater efficacy.

The United States should abjure its ability to exploit its technological lead in nuclear cruise missile warhead design and guidance systems and foreswear the kind of forward-basing schemes that alarmed the Soviet Union during the Cold War. The Russians should avoid the trap of deploying nuclear cruise missiles as a means of addressing fears of conventional inferiority, which will only lead ultimately to a countervailing response from the United States and its allies.

Under current political circumstances, no additional step toward nuclear arms control will be easy. Yet even now, denuclearizing cruise missiles would help lower tensions in the U.S.-Russia relationship and would ameliorate the growing shortfalls both countries face in funding critical defense efforts.

Auxiliary measures can lead the way in setting the stage for formal negotiations. Discussions within the INF Treaty's SVC to more clearly define armed drones and resolve other compliance concerns can provide a basis for expanded bilateral dialogue on cruise missile arming. Efforts within the ongoing dialogue among the five NPT nuclear-weapon states to achieve greater transparency in

The Past Ironies of Intermediate-Range Nuclear Forces

NATO's 1979 Dual-Track Decision, pursuing deployments of intermediate-range nuclear forces as leverage for arms control limits on them, was adopted in response to European fears arising from the U.S.-Soviet strategic equality established in the Strategic Arms Limitation Talks (SALT) process. West European security experts perceived that the ongoing Soviet deployment of mobile, multiple-warhead SS-20 intermediate-range ballistic missiles and the increasing vulnerability of NATO's intermediate-range nuclear-armed aircraft would leave an imbalance because the United States no longer enjoyed superiority in strategic forces following SALT. Hence, the nuclear deterrence continuum linking U.S. tactical nuclear weapons with U.S. strategic systems based outside the continent was fraying.

Nevertheless, it would be nearly four years before the first new U.S. intermediate-range nuclear missiles arrived in Europe, and Moscow made every effort in the interim to undermine support for the deployments. In 1981, Reagan administration officials designed the "Zero Solution" to win over European and American publics fearful of new nuclear weapons in Europe, but they actually hoped the Soviet Union would spurn the offer, permitting full deployment of new NATO ballistic and cruise missiles.

When the new General Secretary of the Soviet Communist Party, Mikhail Gorbachev, unexpectedly accepted NATO's proposal and doubled down with a "Zero-Zero" counterproposal that included shorter-range systems as well, it was politically impossible to reject. This led to the elimination of all missiles in the continuum between tactical battlefield weapons and U.S.-based strategic systems, creating the very situation NATO had tried to avoid. But the Soviet Union also suffered a huge political-military defeat by failing to lock in its monopoly in 5,000 kilometer range nuclear missiles and large numerical advantage in operationally deployed intermediate-range missile warheads.

Moreover, the Intermediate-Range Nuclear Forces (INF) Treaty constituted a tectonic shift in Soviet verification policies and practices. Moscow had always refused in strategic arms limitation negotiations to consider on-site inspections, because of their intrusiveness. It had been so secretive about its SS-20s that no public photographs of the system even existed when it began to be deployed in the late 1970s. Yet Moscow ended up agreeing to the establishment of new arms control verification and monitoring procedures of unprecedented transparency.

The arms control thinking of President Ronald Reagan also underwent a major change. Previously, a vocal skeptic of any arms control agreement negotiated with the Soviet Union, Reagan not only signed the INF Treaty, but did so while the Soviet Union was still in conspicuous violation of the 1972 Anti-Ballistic Missile Treaty through its construction of the Krasnoyarsk radar.

By demonstrating that it had the will and capacity to deploy a new generation of nuclear weapons in five countries in the heart of Europe, the United States ended up eliminating the very systems it had built and deployed at such great financial and political cost. More importantly, the INF missile crisis led to significant progress in reducing U.S. and Soviet nuclear weapons arsenals while increasing stability.

nuclear arsenals can be intensified.

Getting Ready for Another Ironic Outcome

Implementation of the INF Treaty was a huge achievement in unwinding tensions and reducing nuclear armaments during the late Cold War. It was also an ironic outcome to a crisis that started with the modernization of Soviet intermediate-range nuclear forces in the late 1970s and was elevated by NATO's counterdeployments of intermediate-range nuclear forces in the mid-1980s (see box).

The current crisis over Ukraine is raising political tensions to dangerous levels and is threatening to reawaken bilateral nuclear competition in Europe, which has long been dormant. To make things worse, INF Treaty compliance issues are now exacerbating the overall deterioration in U.S.-Russian political relations.

Yet history cautions against assuming that further deterioration is inevitable over the long term. With persistence and creativity, the door could be opened to a seemingly improbable outcome as ironic as the treaty that first eliminated 2,700 nuclear-tipped missiles from Eurasia a quarter century ago. The next strange twist of fate could lead to the elimination of all U.S. and Russian nuclear cruise missiles—another giant stride along the path toward a smaller worldwide nuclear weapons aggregate.

ENDNOTES

1. Jeffrey Lewis, "Led Zeppelin Comes to Washington," Foreign Policy, January 5, 2015.

2. Russian Foreign Ministry, "Comment by the Russian Ministry of Foreign Affairs Regarding the American Accusations That Russia Violates the INF Treaty," July 30, 2014, http://mid.ru/brp_4.nsf/0/A46210AFCF9BBF3D44257D27005C8FC5.

3. Of the three other nuclear-weapon states under the nuclear Nonproliferation Treaty, only China currently deploys Intermediate-Range Nuclear Forces Treaty-range land-attack cruise missiles, the DH-10 series.

4. Vienna Center for Disarmament and Non-Proliferation, "Results and Lessons From the Trilateral Initiative on the IAEA Verification of Weapon-Origin Fissile Material," February 25, 2014, http://vcdnp.org/140225_trilateral_initiative_iaea_verification_report.htm.

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6. Office of the Spokesperson, U.S. Department of State, "Joint Statement on the P5 Beijing Conference: Enhancing Strategic Confidence and Working Together to Implement the Nuclear Non-Proliferation Review Outcomes," April 15, 2014.