

# Missiles for Asia?

## The Need for Operational Analysis of U.S. Theater Ballistic Missiles in the Pacific

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### Key findings

- The durability of the Intermediate-Range Nuclear Forces Treaty is in doubt.
- China's rapid military modernization could threaten U.S. forces.
- Theater ballistic missiles offer some potential benefits.
- But the benefits must be weighed against the potential stability risks.

**SUMMARY** ■ The U.S. Department of State concluded in 2014 that Russia is in violation of its obligations under the Intermediate-Range Nuclear Forces (INF) Treaty, raising doubts about the treaty's durability and questions about how the United States should respond. At the moment, U.S. policy remains committed to the treaty and seeks to encourage Russia to return to compliance by eliminating prohibited systems. The process of attempting to revive the treaty could take several years. Russia could continue denying that it violated the treaty or simply refuse to comply with it, in which case U.S. policy would have to adjust.

In the meantime, the U.S. Army can start a rigorous operational analysis of the potential military value that conventional land-based theater ballistic missiles (TBMs) could add to the U.S. portfolio of strike capabilities. In particular, the U.S. Army should analyze the potential military value of TBMs in the Pacific and whether they might plausibly help the U.S. offset China's military modernization.

TBMs could offer a range of benefits. They might provide negotiating leverage to bring China into new arms-control negotiations, and they might add a new capability to the suite of long-range strike systems that the United States currently fields. In particular, TBMs can be survivable, can quickly strike time-sensitive targets, can penetrate many defenses, would likely have a lower development risk than other candidate strike technologies, and can have deep magazines.

These potential benefits must be weighed against the range of potential risks that adding TBMs to U.S. force structure would pose. Deploying land-based TBMs would depend on negotiating new regional access agreements, raising questions about the plausibility of finding any nations willing to host them. They are also more expensive than some alternative strike systems, such as cruise missiles, and would be slow to deploy into rapidly evolving crises. Finally, the characteristics of TBMs make it

difficult to reassure adversaries that they will not be used in surprise attacks on leadership or other sensitive targets, potentially undermining structural stability and crisis management.

This report argues that, despite Russian violation of the INF Treaty, it is too soon for the United States to decide to withdraw from the treaty. In particular, it is premature to argue that the United States should withdraw or attempt to amend the treaty to allow fielding of conventional intermediate-range TBMs in the Pacific. No rigorous analysis has been done of how land-based TBMs could contribute to solving key operational challenges in relevant scenarios. If a strong, evidence-based case can be made for the military value of conventional TBMs in the Pacific, an ensuing strategic assessment could weigh whether the military benefits plausibly exceed the risks to structural stability, crisis management, regional access, and proliferation. By beginning to analyze these questions now, the Army will be prepared if current U.S. policy fails to revive the INF Treaty.

## INTRODUCTION

### Background

The U.S. Department of State concluded in 2014 that Russia has violated the Intermediate-Range Nuclear Forces (INF) Treaty, raising doubts about the treaty's durability and questions about how the United States should respond.<sup>1</sup> Stepping back from the immediate concerns of how to hold Russia accountable for its violation of a landmark arms-control agreement leads to larger questions about regional security, the rise of China, crisis stability, and the operational utility of land-based missiles. Has the time come for the United States to discard the constraints of the INF Treaty? Does the United States need land-based intermediate-range missiles to respond to the rising military challenge of China? Would fielding such missiles help or harm stability in Europe and East Asia? One argument that has been advanced is that leaving the INF Treaty would free the United States to develop and deploy conventional theater ballistic missiles (TBMs) to the Pacific region as a counterweight to burgeoning Chinese power. This report probes that argument.

The INF Treaty prohibits conventional and nuclear-armed land-based ballistic and cruise missiles with ranges between 500 and 5,500 km (United States of America and Union of Soviet Socialist Republics, 1987). The treaty represented three major firsts for U.S.-Russian arms control: It was the first agreement between the two powers to reduce their nuclear arsenals, the first time the two agreed to eliminate an entire category of nuclear weapons, and the first agreement to include intrusive on-site inspections as part of the verification procedure. Within four years of signing the treaty, the two powers had destroyed 2,692 intermediate-range ballistic- and cruise-missile systems.<sup>2</sup> For more than two decades, neither the United States nor the Russian Federation has fielded nuclear or conventional land-based ballistic or cruise missiles with ranges between 500 and 5,500 km.<sup>3</sup>

The treaty benefited the United States in several ways. It prevented Russia, a major land power, from deploying a wide variety of land-based ballistic and cruise missiles. It led to the elimination of 1,846 Russian INF missile systems in exchange for the United States eliminating 846 systems. It assuaged Russian concerns about the threat of short-warning decapitation attacks from Pershing II MRBMs, reducing the incentive for destabilizing strategies, such as launch on warning, and reduced the number of nuclear weapons in Europe. Finally, for more than 20 years, it prevented Russia from fielding conven-

tionally armed, land-based intermediate-range missile systems, which removed a potential source of proliferation.

### Purpose

The present policy of the United States is to bring “Russia back into compliance with the treaty” (Gottemoeller, 2014).<sup>4</sup> That is a prudent course of action. As mentioned above, the treaty has provided a number of benefits to both countries and should not be scrapped lightly. Indeed, to withdraw from the treaty, the United States would have to explicitly identify “extraordinary events” related to the treaty that jeopardize the “supreme interests” of the nation.<sup>5</sup> Such a decision would be made at the highest levels.

In any case, dealing with the treaty issues will take time, likely years. In the interim, the United States should rigorously analyze a number of possible courses of action to follow in the event that negotiations fail.<sup>6</sup> One area for analyses would be the development and deployment of conventional TBMs to the Pacific region as a possible counterweight to growing Chinese power in the region.

This call for analysis should not be interpreted as an argument for withdrawing from the treaty if a military benefit can be found. The U.S. commitment to arms-control treaties must rest on more than whether it can identify a military benefit from leaving. Furthermore, the fate of the treaty is not up to the U.S. Army. The U.S. Army can and should, however, have a fully developed analysis of how conventional TBMs could contribute to the Pacific in case conditions change and the National Command Authorities request options.

### Why the Pacific?

In the more than two decades since the signing of the INF Treaty, the international security environment has changed. Of particular concern to the United States has been the rapid military modernization of the People's Republic of China (PRC). While the People's Liberation Army (PLA) does not have the global power-projection capabilities of the U.S. military, it can contest U.S. power in areas close to China's borders. The annual report on Chinese military power from the Office of the Secretary of Defense summarized:

The People's Republic of China . . . continues to pursue a long-term, comprehensive military modernization program designed to improve the capacity of its armed forces to fight and win short-duration, high-intensity regional contingencies. Preparing for potential conflict in the Taiwan Strait, which includes

detering or defeating third-party intervention, remains the focus and primary driver of China's military investment. (Office of the Secretary of Defense, 2014, p. i)

China's "counterintervention" doctrine and capabilities could pose a particular threat to U.S. forces in a range of potential conflicts, including a Taiwan Strait scenario (Shlapak et al., 2009).<sup>7</sup> Western defense analysts have used the framework of antiaccess, area denial (A2/AD) strategies to understand the implications of these developments in the PLA.<sup>8</sup> Land-based, conventionally armed precision ballistic- and cruise-missile systems have been a key area of emphasis for the modernization of the PLA and could play a key enabling role in Chinese counter-intervention campaigns (Hagen, 2010; Vick, 2011).<sup>9</sup>

The topic holds particular importance for the Army as it plans for missions in the post-Operation Enduring Freedom security environment.

## Scope

In a post-INF Treaty environment, the United States would be free to develop and field a range of land-based missiles, including land-based TBMs, GLCMs, and land-based anti-ship cruise missiles with ranges between 500 and 5,500 km. The potential of adding conventional land-based TBMs would represent the largest change to U.S. capabilities.<sup>10</sup> Other types of land-based missiles might offer benefits, but arguments in favor of fielding them are less developed.<sup>11</sup> Fielding long-range conventional GLCMs would be a more modest change to U.S. capabilities, since the United States already has air, sea, and subsurface launched long-range cruise missiles, and perhaps for this reason, there have not been any vocal calls for the United States to consider fielding GLCMs in Asia. One could theoretically consider nuclear-armed TBMs, but U.S. policy has been to reduce the role of nuclear weapons in U.S. national security strategy (U.S. Department of Defense [DoD], 2010). Furthermore, there have not been proposals to develop and deploy nuclear TBMs. Therefore, this report focuses on the potential impact of conventional TBMs.

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## DEPLOYING THEATER BALLISTIC MISSILES TO THE PACIFIC REGION

Fielding conventional land-based TBMs in the Pacific region would offer many potential benefits. The arguments for fielding land-based TBMs can be organized around two main themes,

the second of which includes four proposals for how the United States could use TBMs:

- gaining leverage over China to expand arms-control agreements
- gaining an important new military capability to prevail in high-intensity conflict against advanced adversaries, such as China, which could include using TBMs
  - to impose costs on China
  - to suppress Chinese air bases
  - to make extensive attacks on Chinese transporter-erector-launchers (TELS)
  - as long-range "snipers" to disrupt targets of opportunity.

This section examines each argument in turn, summarizes challenges to each, and wraps up with some concluding observations.

## Gaining Leverage over China to Expand Arms-Control Agreements

Some have argued that, by leaving the INF Treaty, the United States could develop its own conventional TBMs to threaten China, thereby motivating it to negotiate limits on INF missiles (Montgomery, 2014b). At their core, these arguments recognize that it would be difficult to convince China to give up a military capability if the United States does not give something up in return, hence the need to build its own missiles (if only to bargain them away). These arguments can also have some similarity to a strategy of competitive risk taking: Increase the risk of escalation by deploying offensive strike weapons in the hopes that the adversary will blink first and come to the negotiating table.<sup>12</sup> There is some precedent for this; during the 1980s, Russian fear of the Pershing II's ability to strike Soviet leadership targets with very little warning played a role in Russian willingness to negotiate the INF Treaty.

While this threat may have worked against the Russians in the 1980s, it might not necessarily work in the contemporary security environment. In Northeast Asia, the threat of U.S. conventional TBMs might cause China to rethink its reluctance to consider any arms-control limits on TBMs, but other reactions are at least equally plausible. While the threat the Pershing II MRBM and the BGM-109G GLCM posed helped bring the Soviet Union to the negotiating table, it is debatable whether a similar threat would bring China to negotiations. First, China has demonstrated little interest in engaging in arms-control negotiations and could react in many different ways. Second, regional security dynamics complicate

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any potential arms-control negotiations. A major complication stems from the nested security dilemma of Pakistan, India, and China. China could argue that it would be unreasonable to expect it to reduce its MRBM and IRBM forces when other regional powers—notably India—possess a growing inventory of IRBMs that can threaten China.<sup>13</sup> India, for its part, could argue that it could not sacrifice the strategic depth that its MRBM and IRBM forces offer unless Pakistan agreed to limits on its TBM inventories.

Without parity in military power, Chinese leaders might react to U.S. TBMs in East Asia by redoubling efforts to expand and modernize the PLA’s capabilities, instead of bargaining away a key capability that they developed to counter the superior military power of the United States. Alternatively, China could argue that any arms-control agreement would have to include limits on other U.S. long-range strike systems, including penetrating bombers, air-launched cruise missiles (ALCMs), and submarine-launched cruise missiles. In short, China could have many reactions to a U.S. attempt to bring China to the bargaining table by threatening to deploy U.S. TBMs.

These hypothetical reactions illustrate a broader point about the unique historical, geographic, and military context of the INF Treaty. By circa 1980, the United States and the Soviet Union had reached parity in their strategic nuclear forces. Each side already had multiple means of holding its opponent’s homeland at risk before both sides started fielding large numbers of MRBMs and IRBMs in Europe. The fact that the Soviet Union and United States were so far apart geographically enabled a distinction between “strategic” intercontinental-range weapons and shorter-range “theater” weapons. This distinction meant that eliminating INF missiles from their inventories did not alter the larger strategic balance, since each retained a robust capability to annihilate the other’s homeland.

In other parts of the world, the distinction is not so neat. India does not need ICBMs to annihilate Pakistan, and China does not need them to annihilate India. For these countries, “theater” weapons can be the same as “strategic” weapons, and INF missiles cannot neatly be separated from the rest of the force structures without fundamentally changing the overall regional military balance. For this reason, attempting to make the INF Treaty multilateral is actually more akin to making the New Strategic Arms Reduction Treaty multilateral, which would be exceptionally challenging.<sup>14</sup> Furthermore, the rise of conventionally armed TBMs has made them more useful war-fighting tools, making them highly valuable and harder to give up. In short, bilateral arms control faces many challenges in an increasingly multipolar world.

For all these reasons, attempts to craft new multilateral arms-control agreements concerning TBMs face serious challenges, even if the United States fields its own INF missiles as a bargaining chip.

### **Adding Land-Based Theater Ballistic Missile Capabilities to the U.S. Arsenal**

Ballistic missiles have many desirable characteristics as strike weapons. Ballistic missiles can be survivable (based in silos or loaded on mobile launchers); their high speed makes them very responsive; they are difficult to intercept; their technology development risk is lower than for other technologies for high-speed precision strike; and a potentially large number can be based on land.

Land-based missiles have multiple basing modes to ensure their survivability. Modern silos can be very hard, requiring very accurate and destructive weapons to attack them successfully.<sup>15</sup> Attacking silos with conventional weapons requires

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exceptional accuracy. Another way to ensure the survivability of land-based missiles is to make them mobile. The U.S. Pershing II MRBM and the Russian SS-25 (RS-12M Topol) ICBM are examples of nuclear-armed missiles deployed using mobile TELs. Even with air superiority and support from special operations forces on the ground, it can be very difficult to find and attack a skilled TEL force. During the Gulf War, Iraqi TELs were able to continue firing TBMs at Israel, Saudi Arabia, and Bahrain despite a concerted allied effort to locate and destroy them (Keaney and Cohen, 1993, p. 88). While the Iraqi rate of fire initially fell in the face of allied attacks, it rebounded during the final weeks of the conflict, and the Iraqis were still able to fire several missiles a day during some of the final days of the war (Keaney and Cohen, 1993, p. 84). A postwar assessment concluded that “there is no indisputable proof that Scud mobile launchers—as opposed to high-fidelity decoys, trucks, or other objects with Scud-like signatures—were destroyed by fixed-wing aircraft” (Keaney and Cohen, 1993, pp. 89–90).

Ballistic missiles travel at high speeds and can cover intercontinental distances in roughly 30 minutes. Furthermore, with solid fuel or storable liquid propellants, they can be maintained on alert for extended periods (assuming proper maintenance and support). These characteristics mean that ballistic missiles can respond quickly to attack urgent or time-sensitive targets.

The high speed of ballistic missiles also makes them difficult to intercept. When attempting midcourse interception of a missile, a defender must contend with a wide range of potential countermeasures, including decoys, chaff, and electronic countermeasures (Speier, McMahon, and Nacouzi, 2014). During the terminal phase of flight, the high speed of even a nonmaneuvering reentry vehicle makes it a challenging target for an endoatmospheric interceptor. Maneuvering reentry vehicles

capable of making very high g maneuvers would be even more challenging (Yengst, 2010).

Given the experience of the U.S. defense industrial base, building a new ballistic missile would involve less technical risk than building some alternative high-speed strike systems. The United States developed and fielded the mobile and highly accurate Pershing II in the early 1980s (Polmar and Norris, 2009, p. 177).<sup>16</sup> In contrast, other technologies for high-speed strike systems have still not completed development. Boost-glide vehicles have been explored to provide prompt global strike capabilities (see Woolf, 2014), and the U.S. Air Force has been developing a hypersonic scramjet engine that could power a Mach 5+ cruise missile (Warwick, 2007), but these technologies still have more development risk than a conventional ballistic missile does.

Land-based missiles can have quite large magazines. Land-based missile forces do not have the size and weight restrictions that a submarine hull or a bomber airframe imposes and can have numerous reloads at hand.<sup>17</sup>

Analysts have proposed several concepts of operation for how the United States could leverage the capabilities of ballistic missiles in a potential future conflict with an advanced and highly capable adversary, such as China. These concepts fall into four general types. The first focuses on deploying land-based TBMs to hold a broad range of targets at risk and impose costs on adversaries. The next three focus on narrower missions: suppressing air bases, extensive counterforce attacks on mobile missile launchers, and long-range “sniping” attacks on fleeting targets of opportunity.

### Cost-Imposing Nature of Land-Based Theater Ballistic Missiles

Some analysts have argued that the Army needs to regain some of the long-range strike capabilities it lost with the elimination of the Pershing II to be prepared to counter the growing threat of adversaries with advanced A2/AD capabilities. This concept would involve creating a constellation of forward-deployed, mobile land-based ballistic missiles on the territory of U.S. allies and partners (Thomas, 2013).<sup>18</sup> These mobile missiles would be supported by a robust network of communications links (including underground fiber optics), dispersed weapon caches, and concealed launch sites. These mobile missile batteries would be deployed for long periods in key regions; potential locations include the arc from Japan through the South China Sea and the Persian Gulf. These systems would have to practice dispersing regularly to hide sites so that they did not become

a tempting target for preemption during a crisis. Proponents argue that the latent threat of these long-range land-attack missiles would drive rivals to spend resources on expensive missile defense systems.

While ballistic missile defenses can be quite expensive,<sup>19</sup> that is not the only way China could react to a TBM threat. It could decide to focus more on an offense-dominated strategy to blunt the ability of the TBM force to attack China. This might be quite difficult, given how difficult it is to target mobile ballistic missile launchers, but it has some precedent in the PLA's concept of the Joint Anti-Air Raid Campaign, in which attacks on an enemy's air bases are a key part of preventing air attacks on the Chinese mainland.<sup>20</sup> China might also react by focusing even more on dispersing and duplicating critical resources and by hiding and hardening key assets.<sup>21</sup> The PLA has already taken major steps in these directions, given its concerns about the strength of precision-guided munition capabilities the United States displayed in the two Iraq wars, as well as in Kosovo, Bosnia, and Afghanistan. China is already concerned about the offensive power of the U.S. military, so adding another offensive capability could redouble Chinese hardening and dispersal efforts.<sup>22</sup> Alternatively, China might judge that its existing extensive portfolio of survivability measures and its nuclear deterrent provide adequate protection against the new U.S. TBM capability. In this case, China might not react at all to a TBM threat. Predicting the PLA's likely reaction is difficult, especially without a detailed understanding of its assessments, the standard operating procedures of its constituent organizations, and the proclivities of key decisionmakers.

While mobile missiles can be quite survivable, that survivability depends on dispersal, which places a premium on pre-crisis access. If U.S. TBMs are not already in a survivable posture when a crisis erupts, they could present China with a window of opportunity that it might feel compelled to exploit before it closed, lest the TBMs survive to later be used against China. If the United States needed to deploy its land-based TBMs into the region during a crisis, air and sea ports of debarkation would be key vulnerabilities for China's A2/AD capabilities to target. These considerations would make it important for U.S. TBMs to already be based in the region before a crisis developed, making permanent peacetime access a critical component of this concept. As of 2015, it is difficult to identify any countries in East Asia that would be willing to host new U.S. offensive forces aimed at China. However, if China continues to act assertively on its periphery, some of its neighbors might

be motivated to take more decisive balancing actions.<sup>23</sup> The next section discusses the political access issue further.

## Counterair Mission

One of the challenges the United States faces in a potential conflict with China over Taiwan is the imbalance between the number of aircraft that China and the United States could each bring to bear. By way of illustration, China has about 30 air bases within 1,000 km of the center of the Taiwan Strait that it could use during a contingency, while the United States operates only a single U.S. Air Force base (Kadena) and a single Marine Corps air station (Futenma) within that range. The United States can augment these locations by projecting airpower from aircraft carriers and from more-distant air bases, but U.S. aircraft could still find themselves fighting outnumbered, especially if the PLA uses precision ballistic- and cruise- missile attacks to disrupt sorties from U.S. carriers and air bases. One proposed response is for the United States to use ballistic missiles to damage runways and destroy PLA Air Force aircraft on the ground to suppress their sorties and reduce the number of times that U.S. pilots would have to fight outnumbered (Shlapak et al., 2009, pp. 131–133). Such a mission would require a substantial number of ballistic missiles; a single salvo to attack the runways and parking ramps at each of the 40 Chinese air bases in the Nanjing and Guangzhou military regions would require approximately 600 conventional TBMs (Shlapak et al., 2009, p. 132). This alone is more than twice the number of Pershing II MRBMs the United States fielded in the 1980s. If it were to follow this path, the United States would likely want substantially more than 600 TBMs so that it could reattack Chinese air bases (runways and damaged aircraft can be repaired, and destroyed aircraft replaced) and other key targets. These missiles, based on dispersed mobile launchers for survivability, would require significant areas to operate in, as well as security forces, communications infrastructure, and logistics support. These deployment areas could be restricted to U.S. territory (e.g., such Western Pacific islands as Guam and the Northern Marianas), which would require longer-range and more-expensive TBMs, or could include partners and allies (such as Japan and the Philippines), which would require shorter-range TBMs but make the force dependent on political access.<sup>24</sup>

While ballistic missiles have many attractive features, cruise missiles could also carry out the counter-air base mission. The AGM-158B extended range variant of the low-observable Joint Air-to-Surface Standoff Munition (JASSM-ER) could

be launched by bombers without having to penetrate Chinese air defenses and could range many of the Chinese air bases. To attack air bases located deeper inside China with cruise missiles, the United States could use BGM-109 Tomahawk cruise missiles launched from submarines operating close to China.<sup>25</sup> The U.S. Navy could also integrate a lower-observable cruise missile, such as the JASSM-ER, with its submarines, if necessary, to penetrate China's integrated air defense system. While the JASSM-ER may be more vulnerable to intercept than a ballistic missile, it is also likely significantly less expensive than a ballistic missile. The current cost of a single JASSM-ER is around \$1.75 million, which is expected to fall to around \$1.25 million ("AGM-158 JASSM: . . .," 2014). A Pershing II MRBM would cost roughly \$10 million in current dollars,<sup>26</sup> meaning that roughly five to eight JASSM-ERs could be bought for the cost of a single TBM. This discussion illustrates that there is no *prima facie* case that TBMs are the best weapon system available for the United States to suppress Chinese air bases. DoD needs a detailed operational analysis of the relative effectiveness of various precision strike systems' ability to suppress the sorties of an advanced A2/AD adversary.

### Early and Extensive Counterforce Attacks on Chinese Ballistic Missile Launchers

A subset of those who advocate developing land-based ballistic missiles do so for the explicit purpose of suppressing China's ability to launch ballistic missiles (Ryan, 2007; Stokes and Blumenthal, 2011). They argue that "the only real defense [against precision TBMs] is offense," so the United States needs conventional TBMs to attack infrastructure supporting Chinese missiles and to responsively attack Chinese TELs after they have fired but before they can relocate (Stokes and Blumenthal, 2011). Logically, these attacks would need to come early in a conflict to improve the survivability of U.S. forces and would need to be extensive to significantly affect China's large ballistic missile inventory. The proposals for this mission came in short opinion pieces, so there are no further operational details about how its proponents envision implementing this concept.

These brief discussions do not show an appreciation for how difficult it can be to find and destroy elusive targets, such as TELs. The difficulty can be illustrated through analytic examples and historical analogy.

Successfully attacking a TEL—even when possible to detect where it was when it launched a missile—heavily

depends on strong intelligence, surveillance, and reconnaissance (ISR) capabilities (Vick et al., 2001, pp. 57–81). A TEL can begin moving soon after it has launched a missile, meaning that the target location error around a detected missile launch increases as a square of the TEL's speed. For example, if a TEL can start moving at 20 kph the moment that the United States detects a missile launch, it could be anywhere within a 35-km<sup>2</sup> circle after 10 minutes (Vick et al., 2001, p. 73). Even if the TEL has to wait for 5 minutes after launch before it begins to move, it could be anywhere within a 9-km<sup>2</sup> circle after 10 minutes. Given this target location error, one concept for TEL hunting from stand-off proposed employing a hypersonic air-launched missile to deliver small loitering subsonic submunitions with sensors that could search the area for the TEL (Vick et al., 2001, p. 68). A TBM could be an alternative way to deliver such submunitions, but the success of the mission would still depend heavily on the quality and timeliness of the ISR cue and on the command and control latency involved in transmitting that cue to the TBM battery. The success of this concept would also depend on the difficult task of developing and procuring significant numbers of autonomous loitering submunitions. An operational analysis of this concept would need to account for the technical risk, the cost, and the realistic sensor capabilities of such submunitions.

A highly motivated and competent adversary can do a great deal to complicate the challenge of finding elusive ground targets. Advanced integrated air defense systems can make it very difficult for ISR aircraft to loiter over TEL operating areas. Counterspace weapons, whether nonkinetic dazzlers and jammers or kinetic antisatellite weapons, can challenge space-based ISR systems. Employing decoys, camouflage, concealment, and deception can increase the number of false targets that the searcher has to track and investigate. An advanced nation, such as China, has the capability to employ all these methods to protect its mobile ballistic missiles.<sup>27</sup>

The example discussed earlier in this section regarding the poor performance of the United States and its allies in the 1991 Scud hunt serves as a reminder of how difficult it can be to destroy elusive ground targets. Postwar analysis could not indisputably prove that—even with air superiority, support from special operations forces on the ground, and a comparatively simple desert environment—aircraft were able to destroy even a single TEL (Keaney and Cohen, 1993, pp. 89–90). In the event of a war with China, the potential operating areas would be larger;<sup>28</sup> the ability to operate ISR aircraft over China would be much more contested than it was over Iraq; the ability of China



to degrade the effectiveness of U.S. space-based sensors would be more than Iraq's; the terrain could be much more complex (including valleys and urban areas); and the number of potential targets would be significantly greater. In short, China represents a greater challenge in every dimension than Iraq posed in 1991. It is incumbent on proponents of extensive counterforce attacks on mobile TELs to confront this history and explain how they expect the United States to succeed where it failed in the past. Adding TBMs to the U.S. arsenal is not sufficient to overcome the challenge of successfully engaging elusive ground targets.<sup>29</sup> In fact, TBMs address the comparatively straightforward part of the mission (prompt delivery of a weapon) and do not address the most challenging part of the mission (finding fleeting targets in a contested battle space with numerous false targets and complex terrain).

So far, this discussion has treated the choice between TBMs and ALCMs as an either-or decision. The final concept (long-range sniping attacks) discussed below explores the potential utility of adding a limited number of TBMs in the larger U.S. portfolio of strike systems.

### Niche Capability: Long-Range Sniping Attacks

The final operational concept for employing land-based TBMs examined here differs from the preceding three concepts. It envisions basing Pershing II-class conventional MRBMs in the First Island Chain (e.g., Luzon and Kyushu) to exploit fleeting targets of opportunity and help enable joint strikes on heavily defended targets. Because they are survivable, are ready to launch on short notice, can arrive quickly at their targets, and can penetrate many defenses, TBMs are very attractive for these sorts of missions. With timely ISR cuing and a mix of payloads, a land-based TBM force could potentially engage a range of targets: large strike packages forming on air bases, airborne units assembling for assault, regional command posts coordinating maneuvers, integrated air defenses, or IRBMs preparing for launch.<sup>30</sup> Note that this concept does not envision large volleys but rather focuses on small salvos to attack and disrupt enemy operations at key times. In the case of attacking Chinese air defenses, this concept could complement the existing U.S. portfolio of strike systems, with the land-based TBMs providing a prompt means of suppressing or destroying air defenses to improve the probability that other systems (such as cruise missiles) will arrive at their targets.

## Adding TBMs to the U.S. arsenal is not sufficient to overcome the challenge of successfully engaging elusive ground targets.

This concept does not envision requiring the missiles to necessarily be used in the opening phase of the conflict. Neither would it necessarily require large numbers of missiles. This creates the possibility that the TBMs could be introduced into the theater in small numbers as the conflict progresses, minimizing their signature, making them a less-tempting target, and complicating attempts to attack them as they arrive in the theater.

The concept could alternatively be carried out by hypersonic ALCMs that used their high speeds to attack fleeting targets quickly. This alternative would require the U.S. Air Force to keep a bomber or arsenal plane on orbit outside China's air defenses, waiting for a cue. That creates an opportunity cost (the bomber would spend a great deal of its time simply waiting for a call and could have been conducting another mission), but the marginal cost of even a high-performance long-range cruise missile is likely to be less than that of a land-based MRBM (the ALCM concept would also avoid the need for additional infrastructure and support equipment). Some key metrics to use in evaluating the utility of this capability would be how many U.S. Navy-launched Tomahawk cruise missile or U.S. Air Force bomber sorties carrying JASSM-ERs could be replaced by a given force of land-based conventional MRBMs. Another key parameter would be how many and what types of fleeting opportunities might develop during a given scenario.

If attacking fleeting targets is a joint capability gap, then an analysis of alternatives could determine what mix of new capabilities could best fill the gap. Land-based TBMs would be a promising candidate, but they would have to be assessed relative to other approaches, including hypersonic air-launched missiles and sea-launched high-speed missiles. The latter two capabilities might be roughly comparable, would not be subject to existing arms-control limitations, would not generate new

manpower and infrastructure costs, and would not require new access agreements.

### Concluding Observations

A number of arguments have been advanced in favor of the United States fielding its own conventional TBMs, including potentially gaining leverage over other countries to expand arms control and adding a new capability to the U.S. force structure. While each argument has strengths, they all face enduring questions that they must answer before they can be judged as truly compelling. It is not clear at present that fielding new strike systems will necessarily bring other countries into arms-control negotiations rather than provoke other reactions, such as an intensification of the emerging arms race. While land-based ballistic missiles have some attractive capabilities (including speed, lethality, and responsiveness), no compelling analytic demonstration has yet shown that they are the best way to add a new operational capability to U.S. force structure. In particular, arguments to use land-based TBMs to attack elusive ground targets must address the serious ISR challenge of finding and tracking such targets.

Ballistic missiles are a fundamentally expensive way to deliver high explosives. When fighting extended high-intensity wars, it is cost-prohibitive to rely exclusively on expendable delivery vehicles rather than on reusable aircraft.<sup>31</sup> But if a few hundred fixed targets need to be attacked once in a short time, ballistic missiles can be an effective choice, particularly if armed with very potent payloads. Nuclear-armed ICBMs are an example of such a case. It is noteworthy that, as of this writing, the countries that have fielded significant TBM forces are the ones concerned about contingencies in their immediate peripheries or near abroad.

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### POTENTIAL NEGATIVE CONSEQUENCES OF THEATER BALLISTIC MISSILE DEPLOYMENT

The preceding section discussed the potential benefits of deploying TBMs to the Pacific region and identified some unanswered questions about their utility. This section considers two other issues, each of which captures potential downsides of deploying TBMs. First, there is the issue of depending on countries in the region to host the TBMs. Second, TBMs might aggravate U.S.-China tensions and undermine crisis stability.

The United States would ideally like a force posture that can credibly deny adversary objectives without providing any incentives for preemption while reassuring the adversary that the United States will not launch its own preemptive attack.

### Dependency on Regional Access

Given the range of land-based MRBMs and IRBMs, the United States would have to base them in theater, which would likely require access permission from another country. In some regions, such as the Middle East, sensitivities about the presence of large numbers of U.S. forces could constrain the number of countries that would be willing to allow the United States to deploy land-based missiles during peacetime. In the Western Pacific, hosting U.S. missiles would likely be viewed as signaling membership in an anti-Chinese coalition, something for which no Asian states have demonstrated an appetite so far.<sup>32</sup> One reason for this reluctance is that all states in East Asia have valuable economic ties to China that they would like to maintain, if possible, even as some of them would like to balance with the United States against Chinese military assertiveness. Another reason for East Asian nations to be wary of hosting U.S. missiles would be that the host nation would likely be exposing itself to serious Chinese retaliation in the event the missiles are fired at China during a war.

The Western Pacific offers a potential advantage because it is the only theater in which the United States owns territory. The United States could conceivably base conventional IRBMs on Guam and the Northern Mariana Islands, but the comparatively small area of these islands (together they total approximately 1,000 km<sup>2</sup>, less than 1 percent of the operating area

of Iraqi Scuds in 1991) would make it challenging to ensure survivability through mobility alone. Silos or hardened shelters would be alternatives, but they would be more expensive.

While regional politics make it difficult to identify any country that would be willing to host U.S. TBMs today, that might change if China's behavior continues to threaten its neighbors. These and other uncertainties imply that access challenges are not necessarily impossible to surmount, but any analysis of the potential operational benefit of fielding land-based TBMs must account for this dependency and the potential limits it creates.

### Contribution to Structural Stability and Crisis Management

A framework Forrest Morgan developed suggests that TBMs would have, at best, a mixed influence on crisis stability (Morgan, 2013). Mining the literature on deterrence, escalation, and crisis stability, as well as series of historical cases, he identified three key attributes for a weapon system to contribute to structural stability and three key attributes for a weapon system to productively contribute to crisis management. *Structural stability* refers to the degree to which the geostrategic environment (including geography, disposition of military forces, and the technology and doctrine of the forces) fosters or impedes crisis stability when a crisis develops (Morgan, 2013, p. 24).<sup>33</sup>

### Do Theater Ballistic Missiles Contribute to Structural Stability?

To bolster structural stability, a weapon system would ideally be sufficiently potent to deter conventional attack, minimize U.S. vulnerability to surprise attack, and mitigate the adversary's perceived risk of the United States mounting a surprise attack (Morgan, 2013). These three attributes are natural results of deterrence theory: The United States would like a force posture that can credibly deny adversary objectives without providing any incentives for preemption while reassuring the adversary that the United States will not launch its own preemptive attack.

To deter attack, the United States could rely on nuclear deterrence, which primarily involves threats of punishment, or conventional deterrence, which primarily relies on persuading a challenger that the United States could deny it the benefits of aggression (Morgan, 2013, pp. 27–30). As discussed earlier, arguments for conventional TBMs state that they would contribute to conventional deterrence. Conventional deterrence

tends to be more dynamic than nuclear deterrence because the potency of conventional weapons is so much less than that of nuclear weapons. Morgan concluded that a small force of roughly 100 conventional ICBMs and SLBMs alone was not powerful enough to pose a credible conventional deterrent (Morgan, 2013, pp. 46–49, 117–123). He did not, however, consider the contribution land-based TBMs could make in improving the overall potency of U.S. conventional forces. He thus did not assess the effects of the interaction between a conventional ballistic missile force and the rest of the U.S. conventional strike portfolio.<sup>34</sup> The strengths of TBMs as conventional strike systems were summarized earlier, with a discussion of how they could be used to make other conventional strike systems more effective. For example, they could potentially suppress enemy air defenses to enable penetrating bombers or cruise missiles to reach their targets. A sufficiently large inventory of land-based conventional TBMs, perhaps being operated according to the sniping concept described earlier, could improve the potency of U.S. conventional strike capabilities. Therefore, while land-based conventional TBMs are not a credible conventional deterrent by themselves, they have the potential to contribute a useful capability to a conventional strike campaign and so satisfy the first criterion.

If the TBMs were already deployed in theater and dispersed or hardened, they would not be vulnerable to a surprise attack. If, however, the TBMs were not routinely dispersed or if they had to deploy into the region during a crisis, they might be vulnerable to a surprise attack. A very destabilizing scenario would be one in which the TBMs were rushed into the theater and were temporarily vulnerable at their air and sea ports of debarkation.<sup>35</sup> Therefore, whether a TBM force can satisfy the second criterion depends heavily on its posture.

The final criterion poses the largest structural stability challenge to the notional land-based TBM force. TBMs present a classic security dilemma: To hedge against a surprise attack during a crisis, the TBM force must be kept at a high state of readiness.<sup>36</sup> If the force is mobile, a portion of it will routinely disperse; during a crisis, all of it will disperse for survivability. These measures, taken for purely defensive reasons, are also what the United States would do if it were preparing to launch a surprise attack of its own. Dispersing TBMs for survival thus looks identical to preparing for a surprise attack. Furthermore, the speed and accuracy of conventional TBMs could make adversaries fear that they would be used in surprise attacks on key command and control facilities. Thus, fielding and deploying a large arsenal of land-based TBMs could unproductively

stoke potential adversaries' fears that the United States could decapitate or otherwise seek to disarm them. A particularly destabilizing concern comes from Chinese fears that U.S. conventional strike systems could threaten Chinese nuclear forces.<sup>37</sup> If TBMs need to be used at the outset of the war, as in the counterair and counter-TEL concepts, there is no clear way out of this dilemma. In the long-range sniping concept, the United States could choose not to deploy the TBMs into the theater during a crisis to reassure the adversary that they would not be used in a surprise attack, but this case would require a concept for how to deploy the TBMs into the theater after a war has already begun.<sup>38</sup> The fundamental issue is that TBMs, while powerful, have a limited vocabulary when it comes to reassurance.

This framework suggests that the contribution of land-based TBMs to structural stability is, at best, mixed. They could bolster the potency of the U.S. conventional strike portfolio by adding a complementary capability and, if appropriately postured, can minimize vulnerability to a surprise attack. Their major shortcoming lies in their poor ability to reassure rivals that they will not themselves be used to wage a surprise attack; in fact, they could stoke destabilizing fears of surprise attacks.<sup>39</sup>

## Do Theater Ballistic Missiles Contribute to Crisis Management?

To facilitate control of a crisis, a weapon system would ideally be flexible, responsive, and capable of signaling (Morgan, 2013). These attributes flow from the desire to be able to defuse a crisis on terms favorable to the United States. Flexibility is desirable so that the weapon can be used in a wide range of scenarios and provide leaders with a broad range of options. Given uncertainty over where a crisis will erupt and the need to moderate the operational tempo during a crisis, weapons need to be responsive. Finally, weapons ought to be able to communicate capability, resolve, and restraint.

The flexibility of TBMs is constrained by the types of payloads that they carry. It is possible to design a range of TBM warheads for a variety of missions. Area-effect munitions, unitary penetrators, and even maneuvering reentry vehicles capable of homing on moving targets are all possible.<sup>40</sup> These payloads could be designed so that they could be changed in the field as the mission demands, which could add some flexibility, but it would likely still be less than the diversity of payloads that an aircraft could carry.

Land-based TBMs have poor responsiveness if they are not already in a theater; it would likely take a significant amount of time to deploy a substantial land-based TBM force.<sup>41</sup> This implies that land-based TBMs might be less responsive across different theaters than air or naval strike forces could be. Once in a theater, however, they can be maintained at a high level of readiness and can launch very quickly. Therefore, land-based TBMs are likely unresponsive across theaters but very responsive once deployed in a theater.

Deploying TBMs could send a strong signal of capability and resolve. However, as discussed above, it is more difficult to signal restraint with TBMs without making them vulnerable. For example, one could unload a number of TELs and park them in an open area to attempt to signal restraint, but an adversary could interpret that in many ways other than what the United States would intend. At one extreme, an adversary could view a small number of displayed TELs as a bluff using a trivial amount of the total U.S. force. At the other, displaying a larger proportion of the total force might present an adversary with a window of opportunity too rare and valuable to ignore.<sup>42</sup> The signaling vocabulary of land-based TBMs is quite limited.

In summary, land-based TBMs have some desirable capabilities for crisis management. They can offer a somewhat flexible and responsive military capability if deployed in theater while also signaling U.S. resolve. However, TBMs are weaker in responding to rapidly emerging contingencies in theaters where they are not deployed and in being able to signal restraint during a crisis. Restraint becomes particularly important during limited wars between nuclear-armed powers (Morgan, 2012). It would be necessary to approach weapon systems that perform poorly on the signaling-restraint criterion very carefully when considering them for use in a crisis involving the United States and China.

## Concluding Observations

The concerns raised in this section all involve hypothetical negative consequences; it is difficult to say with certainty what the actual consequences would be of the United States fielding conventional TBMs in Asia. Given the severity of some consequences of the potential future pathways, however, prudence requires that defense policymakers frankly consider the range of possible futures to have as clear an understanding as possible of the risks of deploying these forces. Deploying new land-based ballistic missiles could start an action-reaction cycle between

the United States, Russia, China, and other states, the ultimate outcome of which would be very difficult to predict.

Part of a comprehensive assessment of the potential effect of fielding land-based ballistic missiles must include considering the stability and crisis management implications of these weapons. While they can deliver a great deal of combat power, they are fundamentally expensive, are slow to deploy into a region, and—given the potent threat they pose—make it difficult to reassure adversaries that they will not be used in decapitating surprise attacks. They also would likely require regional access, which would require negotiating new access agreements with U.S. allies. Fielding TBMs could aggravate the larger U.S.-China strategic and political relationship, perhaps provoking more Chinese spending on nuclear capabilities.

One of the benefits of arms-control agreements is that they can make defense planning simpler by taking certain options off the table and providing warning about the development of a potential adversary's capabilities. Ending arms-control agreements makes things fundamentally more complicated because more futures become possible. This is not to say that it can never make sense to discard an arms-control agreement; it does mean that it can be very difficult to see beyond the horizon of the agreement's end.

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## A WAY FORWARD

Despite Russian violation of the INF Treaty, this report has argued that it is too soon for the United States to decide to withdraw from the treaty. A reasonable way forward would be first to establish whether a strong case can be made for the operational value of conventional land-based ballistic missiles.<sup>43</sup> This analysis can take place while the United States attempts to salvage the INF Treaty by convincing Russia to reverse its violation. If a strong analytic case can be made for land-based TBMs, the military will be ready to provide well-developed options to senior leaders if U.S. policy changes.

Establishing the military value of land-based ballistic missiles will require a thorough operational analysis of the potential effectiveness of a land-based TBM force against a range of missions in a variety of scenarios. The operational analysis must also consider alternative means of accomplishing the missions (including sea-based ballistic missiles and sea-launched cruise missiles or ALCMs) and highlight key assumptions and dependencies that affect the effectiveness of the TBM force. The dependence of different strike capabilities on political access

uncertainties and ISR requirements are particularly important factors in this analysis. This analysis would also need to examine the manpower requirements for the postulated TBM force and how the Army could meet that demand given its coming manpower reductions (Tice, 2014). The cost of support facilities must also be included. If the analysis identifies a military requirement, the effort should also consider whether U.S. partners and allies in the Pacific would be capable of developing their own conventional TBMs or whether a U.S. capability would be essential.

If a strong analytic case can be made for the operational value of a land-based TBM force, the next step would be to conduct a strategic assessment to evaluate the stability implications of fielding TBMs.

Analysts should not blithely dismiss the potential negative consequences of leaving the INF Treaty.<sup>44</sup> The U.S. Army should focus on establishing whether there is a compelling, cost-informed operational and crisis stability argument for these systems. As the United States works to preserve the treaty, defense analysts can begin a detailed operational analysis of the potential value of conventional TBMs. This will prepare them to provide well-considered options should conditions change.

The characteristics of TBMs make it difficult to reassure adversaries that they will not be used in surprise attacks on leadership or other sensitive targets, potentially undermining structural stability and crisis management.

## Notes

<sup>1</sup>The 2014 Department of State compliance report states,

The United States has determined that the Russian Federation is in violation of its obligations under the INF Treaty not to possess, produce, or flight-test a ground-launched cruise missile (GLCM) with a range capability of 500 km to 5,500 km, or to possess or produce launchers of such missiles. (U.S. Department of State, 2014, p. 8)

The report goes on to state that “[i]n 2013, the United States raised these concerns with the Russian Federation on repeated occasions in an effort to resolve U.S. concerns. The United States will continue to pursue resolution of U.S. concerns with Russia” (U.S. Department of State, 2014, pp. 10).

<sup>2</sup>The United States eliminated its Pershing IA, IB, and II ballistic missiles and its BGM-109G GLCM. Russia eliminated its SS-20, SS-4, SS-5, SS-12, and SS-23 ballistic missiles and its SSC-X-4 GLCM.

<sup>3</sup>The standard categories for ballistic missiles are as follows: short-range ballistic missiles (SRBMs) have ranges up to 1,000 km; medium-range ballistic missiles (MRBMs) have ranges between 1,000 and 3,000 km; intermediate-range ballistic missiles (IRBMs) have ranges between 3,000 and 5,500 km; and intercontinental ballistic missiles (ICBMs) have ranges in excess of 5,500 km. Therefore, the INF Treaty prohibits the United States and Russia from fielding some SRBMs and all MRBMs and IRBMs. The definition of theater ballistic missile (TBM) is more elastic; for the purposes of this report, TBM will refer to any land-based missile with a range below 5,500 km, that is, to non-ICBMs.

<sup>4</sup>The United States has not publicly stated how it expects Russia to comply with the terms of the treaty after violating them, but a variety of options are possible. If Russia’s violation involved testing a missile, perhaps the United States could be satisfied with a renewed Russian commitment to not conducting any further tests and to means of verifying that commitment. If Russia’s violation included fielding a missile, perhaps the United States could be satisfied with an inspection and elimination process to ensure that Russia destroys the offending systems.

<sup>5</sup>Article XV of the INF Treaty provides for withdrawal if a nation’s supreme interests so dictate:

Each Party shall, in exercising its national sovereignty, have the right to withdraw from this Treaty if it decides that extraordinary events related to the subject matter of this Treaty have jeopardized its supreme interests. It shall give notice of its decision to withdraw to the other Party six months prior to withdrawal from this Treaty. Such notice shall include a statement of the extraordinary events the notifying Party regards as having jeopardized its supreme interests. (United States of America and the Union of Soviet Socialist Republics, 1987)

<sup>6</sup>The United States has already begun to study potential military options should Russia refuse to return to compliance. Brian McKeon,

principal Deputy Under Secretary of Defense for Policy, has stated that

Russia’s lack of meaningful engagement on this issue—if it persists—will ultimately require the United States to take actions to protect its interests and security along with those of its allies and partners. . . . Those actions will make Russia less secure. (Marshall, 2014)

<sup>7</sup>For in-depth discussion of Chinese views on counterintervention, see Cliff et al. (2006) and Cooper (2010).

<sup>8</sup>The term *antiaccess* emerged in American defense circles in the early 1990s to describe a potential way weaker adversaries might seek to blunt the advantage of U.S. forces. Cliff et al. (2006, pp. 3–6) offered a concise survey of this history. By 2001, the broader category of A2/AD capabilities had gained currency within DoD, as could be seen in that year’s Quadrennial Defense Review Report (DoD, 2001, pp. 30–32, 43–44). The A2/AD concept helped focus research on potential future challenges for U.S. forces (see, for example, Bowie, 2002, and Krepinevich, Watts, and Work, 2003). It bears emphasis that A2/AD is *not* a Chinese framework and that the A2/AD concept predates the emergence of Chinese counterintervention capabilities.

<sup>9</sup>Montgomery (2014a) argued that many U.S. strategists continue to underestimate the scale of the challenge Chinese A2/AD capabilities pose despite years of analysis and public discussion emphasizing the scale of the problem.

<sup>10</sup>While the INF Treaty was made with nuclear weapons in mind, its prohibition on both conventional and nuclear missiles created the added benefit of restricting conventional weapons.

<sup>11</sup>For example, Kelly et al. (2013) examined the potential value of land-based antiship cruise missiles in the Western Pacific with ranges up to 200 km. Such systems would not violate the INF Treaty. There are emerging (and, as of mid-2015, undocumented in the public debate) arguments that there might be value in fielding a land-based version of the Long-Range Anti-Ship Missile. With a range of roughly 1,000 km, this missile would violate the treaty if based on land (Jane’s Defence International, 2014). Given the nascent nature of these arguments, this report could not adequately represent or evaluate them. To be compelling, arguments for a land-based Long-Range Anti-Ship Missile will need to provide supporting operational analysis akin to that required by the arguments for land-based TBMs.

<sup>12</sup>To be clear, proponents (such as Montgomery 2014b) do not advocate provoking a crisis to gain an advantage.

<sup>13</sup>Alternatively, China could argue that it is entitled to more missiles because it lacks security commitments from other states and needs to maintain deterrence against the United States, Russia, and India (Ochmanek and Sulmeyer, 2014, p. 184).

<sup>14</sup>Alexi Arbatov provides an excellent overview of the challenge of multilateral arms control in Ochmanek and Sulmeyer (2014, pp. 175–186).

<sup>15</sup> For example, 1970s-era Russian SS-11 and SS-19 silos were strong enough that a 300 kt weapon would have to land within 137 m to inflict severe damage on the silo (McKinzie et al., 2001, p. 43), meaning that an attacker would need a system that had a circular error probable (CEP) less than or equal to 80 m to have more than a 0.85 chance of destroying the silo. This elementary calculation assumes a single reliable weapon with no targeting bias and equal variance in downrange and cross-range errors (see, for example, Wagner, Mylander, and Sanders, 1999, p. 285). CEP is a common measure of accuracy: A weapon with a 100 m CEP will land within 100 m of its aimpoint 50 percent of the time.

<sup>16</sup> Kelly et al. (2014, p. 96) pointed out the maturity of the technologies required for a conventional land-based TBM.

<sup>17</sup> While this discussion focuses on the potential benefits of land-based TBMs, sea-based TBMs would have many of these benefits, with the exception of inventory size because of the space constraints of submarine hull designs.

<sup>18</sup> Land-based ballistic missiles form one facet of Thomas's broader concept for the Army fielding mobile missile launchers that can carry out antiship, antiair, and long-range land-attack missions.

<sup>19</sup> For example, one SM-3 interceptor costs about \$10 million and a Terminal High Altitude Area Defense interceptor costs roughly \$11 million (Missile Defense Agency, 2010).

<sup>20</sup> For more background on the Chinese Joint Anti-Air Raid Campaign, see Chase and Erickson (2012) and Cooper (2010). The idea of including kinetic strikes in a portfolio of counters to a precision missile threat has parallels with how some U.S. analysts propose to deal with the Chinese TBM threat (for example, Ryan, 2007).

<sup>21</sup> Dispersal preparations, duplication, and hardening reactions might cost the Chinese more than the U.S. TBM capability that provoked them. However, some of the potential responses—such as dispersal preparations and duplication—can be comparatively inexpensive. For example, expanding dispersal parking areas that would cost on the order of millions of dollars could drive up a requirement to fire many more TBMs costing on the order of tens of millions of dollars.

<sup>22</sup> If China had this kind of defensive reaction, it could be exploited as part of a strategy to encourage the PLA to expend more resources on homeland defense and A2/AD capabilities, instead of on additional power-projection capabilities, such as aircraft carriers. Thomas and Montgomery (2012) offered a compelling examination of this type of strategy.

<sup>23</sup> Recent research on the factors affecting U.S. forces gaining access in foreign countries has concluded that “the most common reason that another nation has permitted the United States to establish a military presence on its territory is a shared perception of threat” (Pettyjohn, 2013).

<sup>24</sup> While there is U.S. territory in the Western Pacific, it offers very little land area. The combined areas of Guam and the Northern Mari-

ana Islands total just a little over 1,000 km<sup>2</sup>, which would offer very little space for mobile missile launchers to hide. In comparison, in 1991 a few dozen Iraqi TELs were operating over an area of roughly 120,000 km<sup>2</sup> (Rosenau, 2001, p. 36). Silos would be a more expensive alternative and would still require space. A U.S. missile complex for 150 Minuteman III ICBMs can extend over 35,000 km<sup>2</sup>. Smaller missiles that are not being protected against a nuclear threat can be placed closer together in smaller silos; at Fort Greely's Missile Field 3, 20 ground-based interceptor silos fit within roughly 0.08 km<sup>2</sup>.

<sup>25</sup> As mentioned earlier, the potential magazine of a submarine force is potentially more constrained than the magazine of a land-based force.

<sup>26</sup> RAND colleague Fred Timson estimated that the average unit procurement cost of the Pershing II MRBM was about \$9 million (in 2009 dollars), or about \$10 million in 2014 dollars. Analysis based on cost and quantity data from Nicholas (1981–1988).

<sup>27</sup> PLA writings on Second Artillery operations display great concern about protecting its missile forces from concerted attack by a highly capable adversary: “Owing to the important position and function of the Second Artillery conventional missile units in modern campaigns, it has thereby been decided that they will be targets for enemy key point strikes . . . resulting in an extremely harsh battlefield environment” (Yuliang, 2006, p. 725).

<sup>28</sup> The total operating area for Iraqi TELs in 1991 was less than 125,000 km<sup>2</sup> (Rosenau, 2001, p. 36), while the potential TBM operating area for SRBMs able to range Taiwan is over 320,000 km<sup>2</sup> (Vick et al., 2001, p. 58). Because of their longer range, potential MRBM operating areas could be even larger than those for the SRBM.

<sup>29</sup> A recent discussion of the issue came to similar conclusions: Attacking mobile targets requires “outstanding ISR,” and there are legitimate questions about the ability of high-speed conventional strike systems, such as land-based TBMs, to successfully attack mobile targets (Acton, 2013, pp. 83–84).

<sup>30</sup> RAND colleagues Joel Predd, James Bonomo, and David Frelinger are developing this concept and will explicate it in greater depth in a forthcoming document.

<sup>31</sup> Hamilton (2012) used historical data and a simple cost model to conclude that reusable aircraft delivering comparatively inexpensive weapons are more cost-effective than expendable delivery vehicles for conflicts lasting longer than ten days with an intensity of hundreds of strikes a day.

<sup>32</sup> Kearn (2012, p. 105) concluded that it was a “highly dubious assumption that U.S. missiles would be welcome in East Asian states, even if China's behavior increased threat perceptions over time.”

<sup>33</sup> To be clear, this section does not assess the overall degree of crisis stability between the United States and China. Vick (2011) made a compelling case that legacy U.S. approaches to conventional deterrence and war could provide a destabilizing incentive for China to make a first strike during a crisis. These concerns motivate the need

for a range of adaptations, such as improving the resiliency of theater air bases (Carlisle, undated, p. 10). This section focuses on the narrower question of whether TBMs would plausibly improve crisis stability.

<sup>34</sup> While Morgan (2013) did not assess the interaction effect between conventional TBMs and other U.S. strike capabilities, he did examine the potential effectiveness of ALCMs in conjunction with other capabilities. He concluded that ALCMs tend to magnify the stabilizing or destabilizing effects of other assets. That is, if the other U.S. strike capabilities were postured in a way that made them vulnerable to surprise attack, the additional threat of cruise missiles would tend to make stability even more fragile. Conversely, if the other U.S. strike capabilities were in a more stabilizing posture, cruise missiles could add potency to the threats that they project and would therefore strengthen deterrence.

<sup>35</sup> Kelly et al. (2014, p. 96), among others, pointed out the destabilizing consequences of both China and the United States having a strong incentive to strike first during a crisis.

<sup>36</sup> Jervis (1978, pp. 169–170) provided a concise summary of the security dilemma.

<sup>37</sup> Such concerns may sound implausible to some U.S. strategists, but both Russian and Chinese military officers have expressed such concerns in professional military journals (Morgan, 2012, p. 36; Cliff et al., 2006, pp. 25–26).

<sup>38</sup> As mentioned in the previous section, one idea for how to get the TBMs into theater involves slowly deploying small numbers of them to minimize their signature and not present large concentrations that could be easier to target.

<sup>39</sup> Reviewer Richard Betts made an important observation: In the case of China, there is particular concern that conventional TBMs could provoke undesirable reactions. China's nuclear policy has accepted a numerical imbalance between its nuclear forces and those of the United States, although Chinese concerns about U.S. ballistic missile defenses have been unsettling that. It is possible that fielding conven-

tional TBMs could exacerbate Chinese fears of counterforce attacks with conventional weapons, perhaps provoking China to expand its nuclear forces.

<sup>40</sup> For example, the Chinese have unitary and submunition payloads for their TBMs and have developed a maneuvering reentry vehicle as part of their DF-21D antiship ballistic missile (Scott, 2010).

<sup>41</sup> While a TBM TEL could be designed to fit on a strategic airlifter, the various support equipment and personnel that would need to accompany the deployment of a substantial TBM force would likely be significant. For example, a minimum engagement package for a Patriot surface-to-air missile system, which includes two launchers and various support equipment for 15 days of operations, requires five C-5 or seven C-17 sorties (U.S. Department of the Army, 2010). A substantial TBM force would require many more launchers, and airlifting it into a region on a tight schedule would create a significant demand for strategic airlift. To get a sense of scale, the United States had 108 Pershing II launchers deployed in Europe in the 1980s.

<sup>42</sup> Another potential complication for reassurance arises if the TBM force has both nuclear and conventional capabilities. In such a case, it may become very difficult to reassure an adversary that only conventional TBMs have been deployed during a crisis. Conversely, if a TBM force possesses only conventional payloads, has never demonstrated any nuclear capability, does not have personnel trained and authorized to handle nuclear weapons, and has none of the additional security measures that accompany nuclear weapons, it might be more possible to reassure adversaries that the force does not pose a nuclear threat.

<sup>43</sup> Colby (2014) and Lewis (2014a) have also made this point.

<sup>44</sup> Several arguments for developing land-based MRBMs have not acknowledged any potential downsides of leaving the treaty. For example, Thomas (2013) argued that leaving the treaty would help the United States counter Chinese military modernization and that it would not be difficult because Russian leaders have previously expressed reservations about the treaty.



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## About This Report

The Department of State's finding that Russia is in violation of its obligations under the Intermediate-Range Nuclear Forces Treaty has led some to call for the United States to withdraw from that treaty and, freed from its restrictions, to develop theater ballistic missiles as a counter to Chinese power in the Pacific. This report, based on research during 2014, argues that any such step is premature. The fate of the treaty is not up to the U.S. Army, but it can and should have a fully developed analysis of the potential operational benefits that conventionally armed theater ballistic missiles could offer in the Pacific, as well as the limitations.

This research should interest U.S. Army leaders, strategists, and policymakers concerned with force planning, force development, nonproliferation, and arms control. The findings and views expressed here are those of the author and do not necessarily reflect the views of the U.S. Army or the U.S. Department of Defense.

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