

The Air Staff College Research Memo

1. “The INF Treaty and the CPGS”

- Impact on Deterrence in the Asian Region -

The Strategic Research Group

Abstract

This paper analyzes the following documents and provides an additional point of view.

- 1. Mr. Jim Thomas (CSBA Deputy Director) pre-testimony comments on the future of the INF treaty, prepared for the US House of Representatives Armed Services Committee hearings on the issue.**
- 2. Ms. Saalman (Visiting Professor at the Asia-Pacific Center for Security Studies) paper “Prompt Global Strike: China and the Spear” written about China’s developments and reactions to the Conventional Prompt Global Strike (CPGS) system.**

Main Points

- 1. The INF Treaty was originally a bilateral agreement between the United States and Russia, extending it to a multilateral setting has proven difficult.**

In the wake of Russia’s INF Treaty violations, there has been a debate within the United States between a “Treaty Withdrawal” faction and a “Treaty Compliance” faction, and the realization of the “multilateralization,” which both factions seek, is very difficult.

2. The trends created by the INF Treaty have had a 1 impact on deterrence in the Asian theater.

If the United States decides to leave the INF Treaty and deploys conventional and nuclear missiles to the Asian region, it will have a major impact on regional deterrence.

3. China is developing its own CPGS system, similar to the system currently in development in the US.

In the wake of the US "New Triad" concept, the US has focused on the readiness of its conventional forces. To counter this, China has been pursuing the development of a similar system to the US CPGS.

4. The trend of CPGS may have an impact on strategic deterrence

The United States, Russia and China are competing on the developments of CPGS, as next generation deterrence weapons. The trends in the development of future technologies and the operational concept may have an impact on deterrence on the strategic level.

1. Overview

This memo analyzes the current trends in the US Conventional Prompt Global Strike (CPGS) system and in its INF Treaty discussion, both of which will have a major influence on deterrence in the Asian region.

(1) INF Treaty-related documents¹

A. The options concerning INF Treaty

(A) Multilateralization

(B) Modification

(C) Withdrawal

B. The important "Military Measures" following a withdrawal

(A) Forward Deployment of the Military was particularly noted

(B) Increasing the capability of BMD systems and promoting the development of the CPGS.

(2) Prompt Global Strike (PGS) Paper²

A. China was concerned about a pre-emptive attack from the United States via the CPGS, and is conducting research and development to ensure superi-

ority against the latest United States CPGS-related technologies.

B. Proposed US-China dialogues on Strategic Conventional Weapons

2. Analysis

(1) The “Multilateralization” of the INF Treaty

A. According to both the “Treaty Compliance” Faction and the “Treaty Withdrawal” Faction (See Figure 1, concerning the typical opinions of the two factions), it is ultimately a good thing if the INF Treaty’s terms are adhered to by all nations. This is termed the “multilateralization” of the INF Treaty.³

B. We think it will be difficult to achieve the realization of this goal, of “multilateralization”, under the current circumstances in the Asian region, given the current status of the relationships between states. However, the talks for “multilateralization” might be a trigger to place China at the negotiating table on arms control. ”

(A) The backgrounds of Russia’s INF treaty violation contain the conditions for other states, like China, to develop conventional missiles and deploy them to the field (See Figure 2). Therefore, Russia is likely in agreement with the United States proposal to make the INF a multilateral treaty.

(B) In regards to China, it is seen as unlikely that they will agree to the “multilateralization” of the INF Treaty, because:

a. The United States and the Soviet Union (Russia) signed the INF Treaty at the same time that China was beginning its development of the medium-ranged ballistic missile (DF-21) program⁴ and its military expansion program.

b. Since it owns a large number of medium-ranged ballistic missiles, there is no incentive to participate in a program that would require a quantitative reduction, as would be the case under a multilateral INF Treaty.⁵

c. It relies on its medium-range ballistic missile systems as a pillar of its Anti-Access/Area Denial (A2/AD) asymmetric warfare strategy against the United States.

(C) “Multilateralization” involves including Russia, China, India, Pakistan and other established nations into account, making the situation very diffi-

cult. Given the different strategic environments and circumstances that these different countries are within, we consider it very difficult for these countries to abide by the INF Treaty.

(2) Rationale behind emphasizing the forward deployment of the military

A. In the Thomas' paper on the US military rebalance,⁶ he proposes forward deploying military forces as a countermeasure to the A2/AD strategy and to support a deep strike capability. The idea of forward deploying Army missile units per the INF Treaty-related documents is based on this idea.

B. Reason for emphasizing the forward deployment of US Army missile units⁷

(A) In light of the A2/AD concept, and how Expeditionary Forces are organized for a foreign campaign, it would be difficult to move large forces into the theater. Due to this, the army in particular should focus on pre-deploying its forces to critical areas rather than relying on the traditional concept of deploying to an overseas campaign.

(B) Pre-deploying US Army missile units to the Pacific theater can be expected to have a deterrent effect by suppressing the Chinese Navy's freedom of maneuver surrounding the second island chain.

(C) In the future, the US is considering introducing directed energy weapons and electro-magnetic pulse (EMP) weapons into its air defense scheme, increasing the advantages of deploying these land-based systems over their seaborne counterparts, since these systems require large cooling systems and power sources.

(3) Conventional Prompt Global Strike (CPGS) Overview and the situation in Russia and China

A. Definition

The ability to attack any target on earth with a conventional warhead within one hour.⁸

B. Background

(A) During the 2001 Nuclear Posture Review (NPR) the Bush administration took a fresh look at the offensive and defensive systems, both nuclear and non-nuclear, and announced a "three new pillars" (new triad).⁹ It was later clarified that conventional warheads would use precision guidance for

long-range attack operations.

(B) The current Obama administration has emphasized the importance of long-range, non-nuclear systems during the 2010 NPR, supporting the regional deterrence and reassurance goals of the United States.¹⁰

An overview of the 2001NPR, 2010 NPR and the CPGS related programs are shown in Figure 3 and 4.

C. Russia and China's response to the US CPGS

(A) Both countries situations

a. There are concerns that the CPGS system could trigger a nuclear retaliation. This is due to the fact that when a country detects a missile launch, it cannot identify whether that missile is carrying a nuclear or conventional warhead.¹¹

b. The US government has denied Russia and China's claims that the proposal is intended to affect the strategic balance of power with Russia and China.¹²

c. They have been in competition with the United States in developing a next-generation deterrent capability. (See Figure 5)

(B) Russia's Situation

President Vladimir Putin has expressed the need to develop advanced weapons to counter the US CPGS program.¹³ Recently, the President declared that the CPGS was a new threat and to counter it Deputy Prime Minister Rogozin stated that they are discussing increasing their land and naval nuclear forces as well as increasing their air defense capability in space.¹⁴ Additionally, there are some of the opinion that there is a concern about a CPGS surprise attack.¹⁵

(C) China's Situation

In China, the command and control of conventional and nuclear weapons is contained within the same facility, so an attack on the command and control of conventional weapons will lead to the destruction of the command and control of its nuclear weapons as well. For this reason, particularly in a pre-emptive attack on China by the CPGS system, there is a concern that such an attack would be considered as an attack on their nuclear weapons capability.¹⁶ There is also the opinion that the system would destabilize the

strategic balance of power between China, Russia, and the United States.¹⁷ Especially if the command and control systems are in the same facility, it is considered to be a reasonable fear that the US CPGS system could take it out in a pre-emptive attack, as the PGS paper points out.

(4) Current Status of the CPGS

A. Capabilities¹⁸

As compared to conventional guided weapons, the ability of CPGS systems to penetrate enemy defenses is excellent. However, their warheads are miniaturized resulting in less destructive potential. (See Figure 6). Moreover, it is an increased requirement for precise information on a target than traditional weapon systems.

B. Risks in fielding CPGS

(A) There are several difficult political issues and risks along with command, control, and operational dilemmas with implementing the CPGS system due to its hypersonic, precision, and boosted glide phase technologies (See Figure 7).¹⁹

(B) Taking into account the large amount of risk involved with these technologies, it is possible it will take quite a long time to develop them. Accordingly, alternative systems that have been previously developed, such as the X-51 (see Figure 8), which don't carry the same high level of risk as the CPGS programs could also be considered to be valid concepts by the US (See Figure 9).²⁰

(C) The PGS paper discusses Chinese superiority over the US in PGS-related fields. However, if you take into account several considerations in the operation of CPGS, as shown in Figure 7, there are several areas where the US is dominant: A. If the US does not stick to boosted glide-phase technology, the development risk to the Conventional Trident Modification (CTM) program is not high and B. In regards to terminal-phase guidance, the US is considered to be dominant in its targeting network and its control surfaces. Furthermore, taking in account that the United States is considering developing alternative systems, such as the X-51, as the PGS paper points out, while China enjoys superiority in some technical areas, it is hard to say that China has an overall technical ad-

vantage over the US CPGS. In addition, within the same paper, there is proposed US-China dialogue in light of China's technical superiority in some fields. We do not deny the need for a US-China dialogue, but there is a need for calm judgement in light of the above-mentioned issues.

(5) Impact on Deterrence

A. The deterrent effect if the United States decides to leave the INF Treaty and deploys missiles to the Asian region.

(A) Nuclear Deterrence

a. An evaluation of nuclear deterrence depends on which nuclear strategy you are looking at, whether it is "nuclear victory" or "minimum deterrence." (See Figure 10). In other words, the former theory views nuclear weapons as an extension of its conventional arsenal and pursues a rationale military strategy to achieve superiority on the battlefield. On the other hand, the latter theory views nuclear weapons as a "political weapon that cannot be used in non-nuclear deterrence" and therefore nuclear forces cannot be used to deter the threat posed by conventional forces.²¹

b. After announcing "New Triad" in 2001 NPR, the United States indicated a desire to migrate to a "Tailored Deterrence"²² or optimized deterrence, using both nuclear and conventional forces in response to a threat.²³ In this optimized deterrence strategy, the nuclear umbrella extended to allies is reduced or replaced with conventional forces. For this reason, as shown in Figure 3, regional deterrence comes in the form of ballistic missile defense and a reactive, conventional attack capability.²⁴

c. The United States is still considered to have an advantage over China in nuclear weapons, such as ICBMs and SLBMs. On the other hand, China has introduced its first sea-based nuclear deterrent force with the JIN class submarines carrying JL-2 SLBM (an estimated range of 7,400km) and the Dong Feng missiles (DF-41) equipped with Multiple Independently-Targeted Re-Entry Vehicles (MIRV).²⁵ This is particularly significant because this is China's first sea-based nuclear deterrent. This provides a new capability to their nuclear forces, providing them a Mutually Assured Destruction (MAD) capability with these "second strike" SLBMs.

d. As can be seen in their development of a second strike capability, the

security environment in the Northeast Asian region is unstable, and it is hard to believe that the normal deterrence can completely replace the nuclear deterrence against the threat of Weapons of Mass Destruction (WMD), such as nuclear weapons.²⁶ In addition, if the nuclear weapons are thought of in terms of minimum deterrence, or "unusable political weapons," then there is the possibility that deterrence itself has become a bankrupt concept when conventional superiority over an enemy is lost.²⁷ Optimal deterrence is thus a tailored approach, assessing the abilities, goals and restraints of one's adversary in order to determine the appropriate conventional or nuclear weapons, or mix of weapons, to successfully deter an adversary.

e. From the viewpoint of "Victory through Nuclear War" proponents, extended nuclear deterrence and reliability in the Asian region will be improved. In other words, by deploying missiles that are currently banned by the INF treaty to the Asian region, it becomes possible to complement the intermittency of INF in the region and have a "Victory through Nuclear War" in this theater. In addition, the deployment of these missiles would increase the reliability of deterrence in theater, from the viewpoint of adding another rung to the escalation ladder of "nuclear weapons use in the region" before reaching an all-out war.

f. This is the same situation that existed in Europe during the 1980s. On the eastern side the SS-20 was deployed, and on the western side the Pershing II was deployed. This is considered to be an analogous situation. The INF Treaty was written and signed with this particular European situation as context.²⁸ For this reason, it is possible that the United States and Russia will break from the treaty, and China will strikingly increase its INF in Asia, where the situation with the Chinese will be naturally analogous to the situation in Europe during the 1980s.

(B) Conventional Deterrence

a. Even under a MAD environment, if one country gains overwhelming dominance in the conventional forces balance of power, it can also serve as a deterrent against conflict. Currently, while China has successfully created an enhanced missile capability, typified by the DF-21 medi-

um-range ballistic missile, the United States cannot carry such missiles in inventory due to the restrictions in the INF Treaty. Therefore, deployment of a conventional warhead-equipped missile, equivalent to those banned by the INF, would improve the balance of power in the region, which normally acts as a deterrent, and would thus lead to the eventual improvement in theater deterrence.

b. The forward deployment of conventional warhead-equipped missiles to Asia could be a CPGS alternative, known as Forward-Based Global Strike (FBGS), as shown in Figure 9. In other words, the forward deployment of the missile, if based on the concept of Tailored Deterrence, can be a cornerstone of deterrence in the region as it increases the readiness of the conventional strike capability in theater.

c. If the US improves the capabilities of its existing systems, and can forward deploy them at low cost, they will still complicate China's strategic calculations by requiring their defeat. This in effect increases China's costs in carrying out a first strike attack in the Western Pacific and is also effective as a cost-imposing strategy.²⁹

B. The influence of CPGS on Deterrence

(A) If the US CPGS was dominant:

Under a MAD environment, if a limited war erupted and the US had forward deployed INF-equivalent missiles to the Asian region (FBGS) as a counter to China's A2/AD strategy,³⁰ it can be expected that they will offset China's A2/AD capabilities. Furthermore, by possessing a CPGS capability that can attack the Chinese mainland with hypersonic or other such weapons, it will result in a corresponding improvement in the US's extended deterrence in the Asian region. In particular, when taking into consideration the limited damage that CPGS weapons will do when compared to nuclear weapons, it improves the reliability of their deterrence by strengthening the "strategic denial" capability of the US.³¹

(B) If China's CPGS was dominant:

The survivability of Chinese missiles against the US Ballistic Missile Defense (BMD), including the Ground-Based Interceptor (GBI), can be improved. For this reason, even if the United States deployed a FBGS ca-

pability to Asia, and it offsets Chinese A2/AD capability, China will still decrease the Reliability of US extended deterrence through its ability to directly attack the US mainland. Furthermore, through the ability to conduct a pre-emptive attack via their CPGS system prior to an overall nuclear attack, they can also reduce US deterrence. Moreover, as the PGS paper points out, if China equips its CPGS weapons with nuclear warheads instead of conventional warheads, there is a possibility of a fluctuation in the balance of nuclear power. Thomas proposed in his INF treaty-related presentation to improve the US BMD capability and promote the development of CPGS in recognition of this potential scenario.

3. Assessment

(1) Trends in the INF Treaty and CPGS

Our assessment on US INF Treaty trends has been largely limited to the discussion occurring within the US. However, if the US leaves the INF treaty and deploys INF-equivalent missiles to the Asian region, it will improve the reliability of extended nuclear deterrence and its regional deterrence. In particular, the deployment of such FBGS type missiles can be expected as a counter to China's A2/AD capabilities and will lead to an improvement in theater deterrence. On the other hand, the HTV (including the X-51 as an alternative system) and the WU-14, the core of the CPGS, are strategic conventional weapons (also referred to as next generation deterrence weapons) and the trends in the development of these future technologies will influence and affect operational concepts not only for the extended deterrence strategy, but also for the overall strategic deterrence strategy. These trends in the INF Treaty compliance and the development of the CPGS concept will have a large impact on deterrence in the security environment surrounding Japan. For this reason, it is to be desired that Japan should pay close attention to the arguments within the United States.

(2) Impact on Japan

If the United States withdrew from the INF Treaty, developed INF-equivalent missiles, and deployed them in support of its Asian allies, it would improve deterrence in the Asian region. Having said that, if deploying missiles of this class is proposed for the sake of defending Japan, it is conceiv-

able that not only military rationality but also highly political decision is required. In such a case, it is predicted more likely that the FBGS would be proposed. In addition, as part of the “public opinion warfare” listed in China’s “Three Warfares” concept, a de-coupling campaign, similar to that of the former Soviet Union, would be waged against the possibility of such a deployment, an “opposition to the missile deployment” campaign.³²

(3) Impact on the Air Self-Defense Force

A. If the United States may not be able to forward deploy a ground-launched missile capability, as proposed by Mr. Thomas, it would be necessary to close the gap in medium-range missile capabilities between the US and China by air and naval forces. Along with this, the US Air Force is focusing on integrating the Long-Range Strike Bomber (LRS-B) as a manned/unmanned system at the center of a network-centric, long-range strike capability focusing on long-range ISR/attack aircraft. With this effort, it is possible to migrate operations to an advanced integrated system (such as the Combat Cloud) with forces performing ISR/attack missions across a wide area.³³ If the US Air Force is emphasizing this capability, to advance long-range ISR/attack aircraft, while also developing the standard type of tactical fighter, it will take time to come to fruition. In addition, changes in the operational art and in the equipment and systems of the US Air Force tied to this concept are also expected to affect the operational art, equipment and systems of the Air Self-Defense Force.

B. From here forward, if conventional weapons become the basis of extended deterrence, based on the “Tailored Deterrence” strategy, the importance of ballistic missile defenses and the readiness of strike forces will increase and become the cornerstone of deterrence in this theater. For this reason, it will become important for the Air Self-Defense Force to maintain and improve its BMD system. Also, in the future, it will be necessary to consider whether BMD systems should incorporate directed energy and EMP weapons as a response to CPGS.

C. Due to the nature of CPGS operations, the importance of ISR activities will increase since there is a need for accurate information.³⁴ In respect of ISR operations, the Joint ISR with the USAF utilizing the F-35s, airborne

early warning (and control) aircraft, and long-endurance unmanned aerial vehicles will be conducted, preparing for a national emergency of Japan. In addition, the increasing cooperation with the USAF, through joint ISR, can be expected to lead to improved deterrence for our country, by suppressing the potential for our competitors to conduct provocative actions during peacetime.

	“Treaty Compliance” Faction (Mr. Pifer, senior researcher of Brookings Institution)	“Treaty Withdrawal” Faction (Mr. Thomas, CSBA deputy director)
Major Opinions	<p>For the following reasons, it is considered strategically proper to call for Russia to comply with INF Treaty;</p> <p>a. Unless the US can present the proof of Russia’s violation of the Treaty, the US will have to assume responsibility for the treaty’s demise.</p> <p>b. As Russia can test, develop and deploy INF without restriction, the US allies will get concerned.</p> <p>c. Currently the US has no plan to develop INF-class missiles, and it would be difficult to develop some due to the restriction of the defense budget.</p> <p>d. Even if the development is possible, it would be difficult to coordinate with the allied countries where the missiles are deployed.</p>	<p>For the following reasons, the US should consider withdrawing from the treaty and developing and deploying INF equivalent missiles in order to counterbalance the threat of similar missiles of other countries.</p> <p>a. It would be best to extend the treaty to a multinational setting and regulate other countries in all, but it would be difficult because the other countries’ incentives are low to participate in the framework which only the US and Russia comply with.</p> <p>b. There might be an option to modify the bilateral treaty and permit the limited possession of missiles in specified areas but the problems in other areas still remain unsolved and this option is also considered difficult.</p> <p>c. The fact that the US has the option of withdrawal may strengthen the incentives for other countries to admit the multilateralization or modification of the treaty.</p>
Common Points	<p>Multilateral observance of INF Treaty</p> <p>Both factions agree that it would be preferable to result in the multilateral observance of INF Treaty but they differ in the courses to reach the goal. While the “Treaty Compliance” faction insists the US call for other countries to comply with (or participate in) the existing treaty to the end, the “Treaty Withdrawal” faction insists the US seriously consider withdrawing from INF Treaty paradoxically in order to reach the goal.</p>	
Measures Following a Withdrawal	<p>In case INF Treaty gets virtually meaningless, DoD should commence the research for the possibility of developing new INF equivalent missiles.</p>	<p>“Military Measures”</p> <ul style="list-style-type: none"> ➤ Propose the forward deployment of the army ➤ Increasing the capability of BMD systems and promoting the development of the CPGS

Source: 1 Steven Pifer, “Don’t Scrap the INF Treaty,” Brookings Institution.

2 Jim Thomas, “Statement before the House Armed Services Subcommittee on Strategic Forces of The INF Treaty,” July 17, 2014.

3 福田潤一、「アジアの地政学を一変させるロシアの INF 条約違反」－米国も中距離ミサイル配備で中国に対応か－、JB Press August 18, 2014.

Figure 1 Strategic debate concerning INF Treaty

Division	Content
State of Violation	a. They have deployed ground-launched cruise missiles (R-500: 500-2,000km of range). b. Their intercontinental ballistic missiles (RS-26 Rubezh) were suspected to be, in fact, INF. However, the US has seen only the case of R-500 as a problem.
Backgrounds of Violation	Changes of strategic environment a. Nuclear weapons and missiles to carry them are developed by multiple states (including North Korea). b. A nation conspicuously deploying missiles with INF equivalent conventional warheads has emerged. (China) c. Unlike the US, Russia has all the missile-developing countries close by (within the range of INF). At the same time, it doesn't have effective missile defense capability.
Remarks of Russian Senior Officials Concerning INF Treaty	a. Minister of Defense Ivanov mentioned the potentiality of withdrawal from INF Treaty in 2005. b. President Putin proposed in 2007 that the US and Russia should reconsider the whole concept of the treaty with missile development of the other nations in mind.

Source: 1 Steven Pifer, "Don't Scrap the INF Treaty," Brookings Institution.

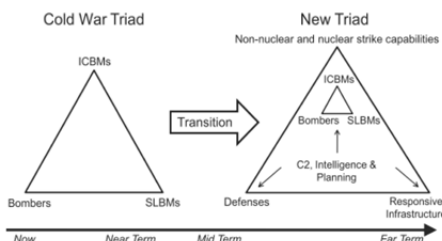
2 福田潤一、「アジアの地政学を一変させるロシアの INF 条約違反」－米国も中距離ミサイル配備で中国に対応カー、JB Press August 18, 2014.

Figure 2 Overview of Russia's INF Treaty Violation

1 2001NPR

"New Triad" consisting of strike capabilities (non-nuclear and nuclear), defenses and responsive infrastructure was announced. (See the right chart.)

- ⇒ Responding a wide spectrum of operations from nuclear wars to anti-terrorism.
- ⇒ Increasing the weight on non-nuclear (conventional) weapons in precise and long-range attack operations.



2 "Regional Security Architecture" Of 2001 NPR

- a Missile defense, non-nuclear prompt global strike capabilities, counter-WMD capabilities, conventional power projection capabilities, unified command and control etc. and US nuclear forward deployment capabilities (tactical strike bomber, strategic bomber).
 - b Key initiatives with allied and friendly nations: Supporting to build partner capacity, conducting trainings and exercises, maintaining the forward presence; deepening and expansion of discussion/consultation.
- ⇒ Long-range non-nuclear systems play a role in supporting US regional deterrence and reassurance goals.

Source: 1 Jonathan M. Owens, "Precision Global Strike: Is There a Role for the Navy Conventional Trident Modification or the Air Force Conventional Strike Missile?," The Counterproliferation Papers Future Warfare Series No. 44 USAF Counterproliferation Center, Air University, September, 2008.

2 戸崎洋史、「核兵器の役割の縮小と拡大抑止 ―日本への合意―」、日本国際問題研究所、August. 28, 2010

Figure 3 Overview of 2001NPR and 2010NPR

Service	Plan	Programs	FY
Navy	Reentry Vehicle Research	Improvement of Trident II (D-5) (E2:Enhanced Effectiveness)	2003
		Life Extension Test Bed(LETB-2)	2009
	Submarine-Launched Intermediate-Range Global Strike	SLIRBM:Submarine-Launched Intermediate-Range Ballistic Missile	2005
	Conventional Trident Modification	CTM:Conventional Trident Modification	2006
Air Force & DARPA	Falcon Study	CAV:Common Aero Vehicle	2003
	Reentry Vehicle Research and Warhead Options	Minuteman II missiles, Peacekeeper missiles	2004
	Hypersonic Test Vehicle	HTV:Hypersonic Test Vehicle (Falcon Project)	2012
Air Force	Defense-Wide Conventional PGS	CSM:Conventional Strike Missile	2008
Army	Army Advanced Hypersonic Weapon	AHW:Advanced Hypersonic Weapon	2010

Source: Amy E. Woolf, “Conventional Prompt Global Strike and Long-Range Ballistic Missiles: Background and Issues,” Congressional Research Service, May 5, 2014.

Figure 4 CPGS Programs in the US

- 1 The United States, Russia and China are recently competing in the development of hypersonic weapons.
 - a Hypersonic weapons can change their courses (boost-glide) upon reentry into stratosphere and enable precision attacks.
 - b They could be threats to the current US BMD in the viewpoint of their survivability.
 - c In the future, hypersonic weapons will be launched from ICBMs, SLBMs and strategic bombers.

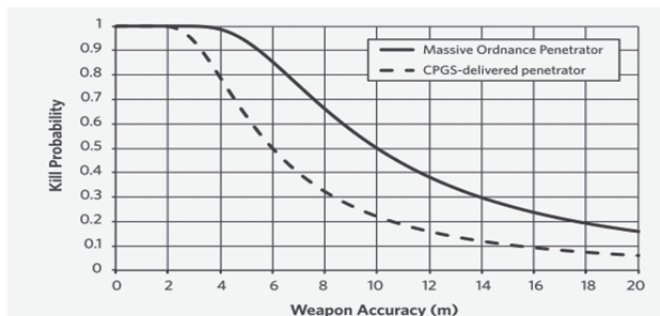


2 Situation of each nation

- a US: Developing various programs under the Falcon Project including missile-launched HTV-2 unmanned vehicle (M20 class).
- b China: succeeded in the test flight of WU-14 in Jan 2014. Wu-14 is supposed to be carried by ICBM and to boost-glide on reentry into stratosphere. Additionally, hypersonic weapons with scram jet engines are under development.
- c Russia: Developing the technologies for offensive hypersonic weapons and countermeasures of hypersonic weapons. S-500 air and space defense system is under development.

Source: 1 Lora Saalman, “Prompt Global Strike: China and the Spear,” Asia-Pacific Center for Security Studies, April, 2014.
 2 Gertz, Bill, “China Conducts First Test of New Ultra-High Speed Missile Vehicle,” The Washington Free Beacon, January 13, 2014.

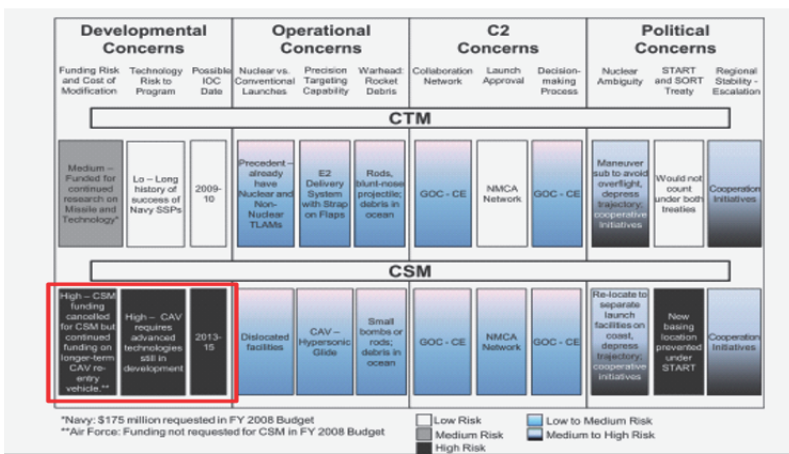
Figure 5 Overview of each nation’s CPGS



- 1 Comparison between CPGS and GBU-57 (Massive Ordnance Penetrator: Bunker Buster)
 - a Depth of penetration (in concrete) CPGS (30~40m) > GBU-57 (20m)
 - b Capacity of explosives CPGS (less than 1) < GBU-57 (10) (Taking 10 for GBU-57)
 - c Crater radius (in hard rock) CPGS (less than 4m) < GBU-57 (8m) (Due to capacity of explosives)
- 2 Thus, if the weapons had equal accuracy, GBU-57 would probably be more effective than a CPGS-delivered weapon (as illustrated in the above graph of the kill probability of the weapons used against a silo).

Source: James M. Acton, "Silver Bullet? Asking the Right Questions About Conventional Prompt Global Strike," Carnegie Endowment for International Peace, 2013.

Figure 6 Capacity of CPGS (Example)



- 1 The above chart shows concerns about and risks accompanying the achievement of Conventional Trident Modification (CTM) and Conventional Strike Missile (CSM).
- 2 The developmental risks are designated High Risk on CSM because it contains boost-glide technology.

Source: Jonathan M. Owens, "Precision Global Strike: Is There a Role for the Navy Conventional Trident Modification or the Air Force Conventional Strike Missile?," The Counterproliferation Papers Future Warfare Series No. 44 USAF Counterproliferation Center, Air University, September, 2008.

Figure 7 Concerns and Risks on CPGS Systems



- 1 The X-51A is a scramjet demonstrator, aiming at hypersonic flight over M 5, and the test results will be reflected in the development of hypersonic aircraft.
- 2 The first flight in May 2010 achieved M 4.88 and the flight test conducted on 1 May 2013 marked the hypersonic flight over M 5.

Source: “X-51A Waverider Achieves Goal On Final Flight,” Aviation week, May 2, 2013.

Figure 8 X-51A (Wave Rider)

No	Alternative for CPGS	FB*	ROM**
1	Land-Based Ballistic Missiles	○	×
2	Submarine-Launched Ballistic Missile	○	×
3	Submarine-Launched Intermediate-Range Ballistic Missile	○	×
4	Long-Range Bombers (may not be suited to PGS missions)	—	—
5	Tomahawk Cruise Missiles	△	—
6	Hypersonic Cruise Missiles	△	—
7	Scramjet Technologies (Ex:X-51)	—	△
8	Forward-based Global Strike (FBGS) (with/without AHW)	△	○

* FB: Forward Base ○: Unnecessary △: Necessary

** ROM: Risk of Misunderstanding for Nuclear Weapon ○: Low Risk △: Medium Risk ×: High Risk

Source: Amy E. Woolf, “Conventional Prompt Global Strike and Long-Range Ballistic Missiles: Background and Issues,” Congressional Research Service, May 5, 2014.

Figure 9 CPGS Alternative Projects

	Minimum Deterrence	Nuclear Victory
Views on Nuclear weapons	Nuclear weapons are essentially different from conventional weapons. ⇒ “Political weapon that cannot be used” (Nuclear Revolution)	Nuclear weapons are an extension of conventional weapons. ⇒ Denies Nuclear Revolution
Views on Deterrence	With “Mutual Deterrence” as a given condition, the role of nuclear weapons is limited to the usage to restrain enemy’s use of nuclear weapons. ⇒ Counters the provocation by conventional weapons, using only conventional weapons ⇒ Practically renounces “Extended Deterrence” by nuclear weapons against the threat posed by conventional weapons	The possibility of military usage of nuclear weapons is taken into consideration. ⇒ Pursues military rationality and superiority
Similar Deterrence Strategies	As taking the viewpoint of “Nuclear Revolution,” ➢ Mutual Deterrence ➢ Flexible Response	➢ Strategic Defense Initiatives (SDI)

Source: 平原莞, 「オバマの新核削減提案—核最小限抑止へ向かう米国の同盟保証戦略は機能するか?」, *Global Vision*, September Issue, 2013.

Figure 10 “Minimum Deterrence” and “Nuclear Victory” Comparison

Footnotes

- 1 Jim Thomas, “Statement Before The House Armed Services Subcommittee on Strategic Forces of The INF Treaty,” July 17, 2014.
- 2 Lora Saalman, “Prompt Global Strike: China and the Spear,” Asia-Pacific Center for Security Studies, April, 2014.
- 3 福田潤一 「アジアの地政学を一変させるロシアの INF 条約違反 米国も中距離ミサイル配備で中国に対抗か?」 『JB PRESS』, August 18, 2014.
- 4 Jim Thomas, “Statement Before The House Armed Services Subcommittee on Strategic Forces of The INF Treaty.”
- 5 Evan Braden Montgomery, “China’s Missile Forces Are Growing: Is It Time to Scrap the INF Treaty?,” *The National Interest*, July 2, 2014.
- 6 Bryan Clark, Chris Dougherty, Mark Gunzinger, Todd Harrison, Erick Lindsey, Evan Montgomery, Jim Thomas, “Rebalancing America’s Military for A New Era,” CSBA, February 5, 2014.
- 7 Jim Thomas, “Why the U.S. Army Needs Missiles,” *Foreign Affairs*, May/June, 2013.
- 8 Amy E. Woolf, “Conventional Prompt Global Strike and Long-Range Ballistic Missiles: Background and Issues,” Congressional Research Service, May 5, 2014.
- 9 戸崎洋史 「核兵器の役割の縮小と拡大抑止：日本への含意」、日本国際問題研究所、August 28, 2010.
- 10 *Nuclear Posture Review Report*, Department of Defense, April 2010.
- 11 Amy E. Woolf, “Conventional Prompt Global Strike and Long-Range Ballistic Missiles: Background and Issues.”
- 12 James M. Acton, Lora Saalman, “Conventional Prompt Global Strike and Strategic Stability,” Carnegie Endowment For International Peace, February 21, 2012.
- 13 James M. Acton, “The Arms Race Goes Hypersonic,” *Foreign Policy*, January 30, 2014.

- 14 “Russia Announces Plans To Upgrade Nuclear, Air Defense Forces,” Defense News, September 10, 2014.
- 15 James M. Acton, Lora Saalman, “Conventional Prompt Global Strike and Strategic Stability.”
- 16 James M. Acton, “The Arms Race Goes Hypersonic,” *Foreign Policy*.
- 17 James M. Acton, Lora Saalman, “Conventional Prompt Global Strike and Strategic Stability.”
- 18 James M. Acton, “Silver Bullet? Asking the Right Questions About Conventional Prompt Global Strike,” Carnegie Endowment for International Peace, 2013.
- 19 Jonathan M. Owens, “Precision Global Strike: Is There a Role for the Navy Conventional Trident Modification or the Air Force Conventional Strike Missile?,” The Counterproliferation Papers Future Warfare Series No. 44, Air University, September, 2008.
- 20 Amy E. Woolf, “Conventional Prompt Global Strike and Long-Range Ballistic Missiles: Background and Issues.”
- 21 平原莞「地政戦略 オバマの新核削減提案 核最小限抑止へ向かう米国の同盟再保証戦略は機能するか?」、GLOBAL VISION、September Issue, 2013.
- 22 “Quadrennial Defense Review 2006,” Department of Defense, February 6, 2006.
- 23 平原莞「地政戦略 オバマの新核削減提案 核最小限抑止へ向かう米国の同盟再保証戦略は機能するか?」
- 24 Ibid. The Obama administration adapted the policy to reduce the extended nuclear deterrence and replace it with conventional forces, specifying the growing role of conventional weapons. In other words, it expressed the opinion that regional deterrence will come in the form of ballistic missile defense and a reactive conventional attack capability and the US can provide security (reassurance) to its allies by maintaining these postures.
- 25 Annual Report to Congress, Military and Security Developments involving the People’s Republic of China 2014.
- 26 戸崎洋史「核兵器の役割の縮小と拡大抑止：日本への含意」、日本国際問題研究所、August 28, 2010.
This document states that in a “Tailored Deterrence,” even if the necessity of nuclear weapons were reduced in some regions, there might remain the necessity in others, and the US will not be able to reduce the role of nuclear weapons in its whole nuclear strategy.
- 27 平原莞「地政戦略 オバマの新核削減提案 核最小限抑止へ向かう米国の同盟再保証戦略は機能するか?」
- 28 福田潤一「アジアの地政学を一変させるロシアの INF 条約違反 米国も中距離ミサイル配備で中国に対抗か?」
- 29 Ibid.
- 30 Daniel Goure, “U.S. Air Dominance in a Fiscally Constrained Environment: Defining Paths to the Future, Global Precision Strike,” Lexington Institute, September 2013. This paper points out that CPGS is a “Silver Bullet” to A2/AD.
- 31 戸崎洋史「核兵器の役割の縮小と拡大抑止：日本への含意」 This document states that conventional forces, which have a superior damage limitation capability, will lead the building of deterrence-by-denial posture. Carl D. Rehberg, Christopher Wrenn, “Air and Sea Power Shaped for the Asia-Pacific Rebalance,” *Strategy Studies Quarterly* Summer 2014, August, 2014. This paper points out the importance of increasing the reliability of “deterrence” at the level of conventional forces through the maintenance of “Strategic Denial” forces that can counter China’s A2/AD capability.
- 32 平原莞「地政戦略 オバマの新核削減提案 核最小限抑止へ向かう米国の同盟再保証戦略は機能するか?」
- 33 Mark A. Gunzinger, David A. Deptula, “Toward A Balanced Combat Air Force,” CSBA, April 11, 2014.
- 34 James M. Acton, “Silver Bullet? Asking the Right Questions About onventional Prompt Global Strike.”