Viewpoint

Conventional Prompt Global Strike: Enhancing Deterrence?

By Dr Mark Hilborne

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Abstract: The desire in the US to increase the role of conventional weapons in providing strategic deterrence has existed for some time. Maturing technologies enabled the process of developing a long-range hypersonic precision strike weapon - termed Conventional Prompt Global Strike – to begin fifteen years ago. While not conceived to contend with peer competitors, these weapons have produced fierce debate over the impact on the nuclear balance with Russia and China. While advocates maintain that these weapons will enhance deterrence by offering escalatory flexibility, critics argue they will instead undermine deterrence and stability by introducing the possibility of 'disarming' non-nuclear strikes, thereby unsettling the equilibrium of mutually assured destruction. The potential impact of these weapons on deterrence requires careful consideration before their introduction.

Introduction

The concept of nuclear deterrence is firmly rooted in strategic thinking. Though there exists no way of testing or validating the theory, it remains the cornerstone of the security policy of nuclear weapons states. Nonetheless, despite the contribution that nuclear deterrence was perceived to have made, throughout the Cold War (and particularly at its end) there was a desire, most notably in the US, to increase the role of conventional weapons in providing strategic deterrence. The origins of these efforts have profound and manifold origins, though more recently they were driven by the increasingly important regional crises that were unfolding, alongside the concern that more states may acquire nuclear weapons, and conflicts may need to be fought against states with limited or nascent nuclear arsenals. With this in mind, the US began the process of developing and building a long-range precision strike weapon - termed Prompt Global Strike - fifteen years ago.

While not conceived to contend with peer competitors, it is the ramifications of the nuclear balance with Russia and China that has emerged as the focus of debate over these weapons. While advocates maintain that these weapons will enhance deterrence by offering further escalatory steps, and an option between inaction and a nuclear response, critics argue that they will instead undermine deterrence and stability as they introduce the possibility of a 'disarming' non-nuclear strike, which may serve to unsettle the equilibrium intrinsic to the concept of nuclear deterrence: mutually assured destruction. China, and particularly Russia, consistently state their concerns publicly and through their own doctrine about the development and implications of these weapons.

An extended debate is needed on the strategic consequence of Conventional Prompt Global Strike (CPGS), and this should cover the full range of risks and advantages that these weapons may bring. How valid are the concerns from states such as Russia and China, or are they based on political motivations, or perhaps perceptions and strategic sensitivities? If the latter, will that impact on the prospects for further nuclear reductions? Do these weapons serve to eliminate vulnerability, an element that is considered vital in establishing trusting relationships? The impact that CPGS have on general, extended and immediate deterrence, against nuclear and non-nuclear opponents, as well as their impact in crisis situations are all factors that need to be carefully considered.

Rationale

Within the nuclear era, the objective of developing conventional capabilities for deterrence is not new. The evolution of this thinking began early in the Cold War, with the US rethinking a deterrent policy based exclusively on nuclear weapons. The concept of nuclear deterrence sat awkwardly within US military and policy circles, due to the difficulty in reconciling moral virtue with the use of force, while it also rendered the notion of victory a moot point. The doctrine of Massive Retaliation in the 1950s was inflexible and unsuitable for the wide range of threats that faced the US. Thus began the search for a more nuanced form of deterrence.

In the post-9/11 period, while some of the drivers and dynamics had changed, the desire for a conventional deterrent was further amplified. The notion of nuclear deterrence was deemed inadequate to deal with the threats emanating from non-state actors and rogue states, and the maturation of precision strike capabilities made the prospect increasingly compelling. After the demise of the Soviet Union, the financial and political cost of forward basing also encouraged an investigation to long-range force projection. Thus, in 2003, the mission of Prompt Global Strike (PGS) was established, describing a precision conventional capability with global reach, capable of striking independently within a very short timeframe – within an hour.[1] The missions and targets for such a weapon could include elements of a potential nuclear proliferator's programme, an armed missile or an anti-satellite weapon being readied for launch, overcoming anti-access/area denial (A2/AD) capabilities through to eliminating key terrorist figures – targets that are of strategic value and time sensitive, but for which even a limited nuclear strike would be inappropriate.

The majority of scenarios for which these weapons are conceived are not against peer competitors, but rather smaller states or non-state actors, although their potential against A2/AD capabilities could have utility against more sophisticated threats. Nonetheless, it is Russia that has been most outspoken against the US programme, due to the perception that such precision global strike capabilities would allow Washington to deliver a crippling non-nuclear blow to Russia's nuclear forces. These concerns are shared by others who predominantly consider that the benefits of CPGS are outweighed by their potential to undermine global nuclear stability and thereby the basis of nuclear deterrence.

Though the basic logic behind CPGS weapons is straightforward, the arguments supporting them strengthened further under the last US Administration. The 1991 START agreement expired in 2009, and with it went certain limitations that would apply to CPGS weapons. Furthermore, CPGS capabilities were viewed as supporting the central objectives of the 2010 Nuclear Posture Review.[2]

While not seen as a replacement for nuclear weapons (as they lack the psychological component of a nuclear strike), it was held that CPGS could support these objectives in a number of ways. CPGS could support the deterrent posture while reducing the emphasis on nuclear forces, and providing decision-makers with a strategic weapon that offers a far less problematic response in terms of ethics and escalation. From a regional perspective, CPGS may provide a response to defend allies against a nuclear-armed regional state, where the nuclear option would risk immediate escalation. This would then increase the reliability of Washington's extended deterrence and its commitment to it allies. CPGS would not preclude the use of nuclear weapons subsequently, but they offer a significant offensive capability in their own right and an escalatory step to the use of nuclear forces.

Such a vision sees CPGS as increasing the US deterrence hand overall. They would also have the indirect benefit of revitalizing research, technical and industrial capability in a number

of areas that are also crucial to the country's nuclear arsenal, therefore supporting the final objective of the 2010 NPR. Areas such as guidance and delivery systems are central to the ongoing development of nuclear missiles as well as CPGS, and the CPGS programme can therefore bolster the industrial base and skills common to both, aspects that are at risk of decline otherwise. Thus, under the Obama Administration, CPGS seemed to support its broader policy objectives and those set out in the 2010 NPR very effectively. As President Obama stated to the *New York Times* in 2010, the focus on such weapons was part of an effort "to move towards less emphasis on nuclear weapons" while ensuring "that our conventional weapons capability is an effective deterrent in all but the most extreme circumstances."[3]

Programmes

The confidence expressed by the last Administration on CPGS contrasts with some early controversy in the development of these weapons, controversy which provides an indication of an intrinsic issue with CPGS: ambiguity. Many early conceptions centred around the use of existing ICBM and SLBM designs, with the nuclear warheads swapped for a conventional one.[4] Such designs could meet the requirements, and would need very little modification for their re-role. The leading candidate for the mission was a conventionally armed Trident – the Conventional Trident Modification (CTM). However, Congress shut off its funding in 2008 primarily due to concerns about the potential for misunderstanding in a crisis or conflict regarding the payload. A conventionally armed ICBM or SLBM would be difficult, or impossible, to distinguish from a nuclear armed version, whether in terms of its basing or segments of its flight path. Russia is the state with the most sophisticated missile detection and warning, and thus this is the scenario where ambiguity had the most significant consequences.

In response to these concerns, the US began investigating boost-glide designs. These follow trajectories that are distinct from ballistic designs, and reduce the level of ambiguity significantly. The booster rocket would take a hypersonic glide vehicle to its altitude, and the glide vehicle would then travel at hypersonic speeds towards its target at high altitude in the atmosphere, with the ability for aggressive manoeuvre. Such vehicles have characteristics distinct from ballistic missiles, and so address the concerns raised about CTM. The booster flight would be at a different angle, and the glide vehicle would follow a non-ballistic trajectory. The latter of course makes them harder to track and intercept, raising concerns again with other states, but it would clearly offer a military advantage.

To date, the US has tested three different designs – two of the boost-glide variety, and one of a scramjet powered hypersonic cruise missile design. Of the boost-glide designs, the USAF and DARPA fielded the Lockheed Martin Hypersonic Technology Vehicle (HTV), which became the HTV-2, and the Army tested a shorter-range Advanced Hypersonic Weapon (AHW).[5] The scramjet design was the USAF X-51 Waverider. The achievements and obstacles will not be examined here, but the most successful and thus preferred option at this time is the AHW.

It is notable that since the last tests (2011 for the AHW, 2013 for the X-51) there has been little progress. The financial constraints that came to pass have slowed progress, and limited the ambition. The policy of the new Trump Administration remains unclear to date – statements have been made of improving the US nuclear deterrent, though some technologically advanced programmes have been questioned.

Undermining stability and deterrence

While past US Administrations have viewed CPGS as enhancing deterrence, these weapons have provoked intense debate, in particular how they will impact crisis stability. One of the most significant concerns is that Russia will view such weapons as a direct threat to its Strategic Nuclear Forces. Indeed, this outlook appears in Russian doctrine, and in policy statements in various international fora. For instance, at the 2015 Nuclear Non-proliferation Treaty Review Conference, the head of the Russian delegation stated that US policy hinders further nuclear reductions through its 'intransigent course', undermining strategic stability by pursuing, among other things, a missile defence system and the "prompt global strike" concept.[6] This is a consistent mantra. However, some argue that Russia overstates the danger to its forces. Russia is the only state beyond the US with a warning system that is capable of detecting a missile launch. Its over-the-horizon and space-based capabilities should be easily capable of discerning the difference between an ICBM and a CPGS weapon. And while a greater proportion of its deterrent is land-based than that of the US (and clearly that of Britain or France), Russia maintains a significant second-strike capability with its SLBM force. Russia's willingness to introduce nuclear weapons at a lower threshold than other powers is also clearly established. Therefore, a disarming strike by the US against the Russian ICBM force, or perhaps even its command and control structure, would seem highly risky, and therefore unlikely. Nonetheless, Russia's sensitivity over their nuclear deterrent cannot be underestimated. The nuclear deterrent is seen as integral to Russia's claim to be a great power. In addition to this, Russian policy makers are keenly aware of the inferiority of their conventional forces to the US, which acts to magnify both the symbolic and strategic value of nuclear weapons to the Kremlin. Any perceived threat, real or otherwise, will serve to create significant concerns in Moscow.

The perceived threat from these weapons is further amplified when CPGS is allied to missile defence systems. There are numerous statements by Russian and Chinese officials as to the combined effect of these conventional systems, and their capability of a disarming first strike. Such fears have driven Russia to increase its reliance on tactical nuclear weapons, and to upgrade the robustness of its nuclear systems, while also hastening aerospace defence capabilities. The reliance on tactical nuclear weapons in particular brings negative consequence in terms of security and control. They are widely held to highly destabilizing, and change the metrics of deterrence.

Further concerns are created by the ambiguities that are inherent in CPGS designs. These relate to the type of warhead, the country targeted, and the type of target. The points relating to the

ambiguity of whether a weapon carried a nuclear or conventional warhead has been discussed above. The withdrawal of funding for the CTM has probably eradicated this as an uncertainty, at least as far as the US programme is concerned. Basing options and inspections would serve to eliminate the vestiges of any further doubt. However, the latter two concerns are more persistent. The ability of CPGS platforms to manoeuvre means that their destination cannot be determined until late in the flight envelope – perhaps not until the final moments. Thus a strike on a third party could be interpreted by Russia (and perhaps China in the future if it builds a missile warning system) as a strike on itself, and trigger a response. The likelihood of such a scenario is slim, but cannot be discounted entirely. Similarly, a state detecting an incoming strike (again, only Russia currently) may incorrectly assume that the strike is targeting its nuclear capabilities, rather than conventional forces. The fear would be that it would result in a serious escalation of tension, or even a nuclear retaliation. However, it is worth noting that the current costs of CPGS technologies would mean that such strikes would involve very limited number of weapons. Such numbers may not be considered sufficient for Russia to retaliate, though they might present a greater concern for China and its smaller nuclear force. Thus it is unlikely that a CPGS strike would be overwhelming. Once more, however, it may be perceptions that matter most. The cost and complexity of US CPGS systems make it hard to persuade Moscow or Beijing that they are designed for much less capable states, and there appears an assumption that 'orthodox' nuclear deterrence may be ineffective against conventional counterforce threats.

Thus there is concern that CPGS could have significant impact on the global nuclear order, and perhaps also nuclear proliferation. Even though the US ties these to nuclear reductions, the increased emphasis on conventional weaponry may do very little to allay security concerns in other states. In a scenario of decreased nuclear weapons numbers, conventional weapons will only increase in salience. The consequences could reduce the prospects for future nuclear reductions, and possibly increase tendencies towards proliferation.

Beyond the potential effects on escalation dynamics, questions remain as to how well these weapons would perform their mission. As CPGS rely on precision for their effect, an important consideration is exactly how precise such a weapon would be, given range and manoeuvring, particularly in environments where navigational signals are degraded or denied. Related to this, the timeliness of information is critical. How the requisite ISTAR assets can be brought to bear in non-permissive environments to provide this information, and indeed if they can, whether they wouldn't be a more effective delivery platform themselves, are further issues that need resolving. Stealth platforms, or future armed reconnaissance Remotely Piloted Air Systems (RPAS) could be more effective in this role.[7]

Competing programmes

While the focus here is on the US programme, primarily because most is known about their development and rationale, it is important to note that both China and Russia also have active

hypersonic design programmes. With these programmes, parallels to the US programme cannot be assumed.

Of the two, China seems to have the most momentum behind their programme. In January 2014 came the first public news of a Chinese hypersonic weapon test. In April 2016, they carried their 7th test of the WU-14 boost-glide vehicle, now termed the DF-ZF. This equals the number of tests of the three different US designs over a much longer period. China is also reported to be developing a hypersonic, scramjet powered vehicle that can take off independently or be launched from a bomber. Details are scarce, and it is unclear if the intended payload for these is conventional, or, as some translated scientific papers suggest, nuclear. Even without the development of a boost-glide vehicle, China has a number of intermediate range missiles and the most active ballistic missile development programme of any country, one that is unconstrained by the Intermediate-Range Nuclear Forces Treaty (INF) unlike the US and Russia. Many of these designs are nuclear capable, and these missiles could serve as a prompt global (or regional) strike option.

Less is known about the equivalent Russian programme. Referred to variously as Yu-72 or Project 4202, it is a glide vehicle designed to be deployed by the latest RS-28 Sarmat heavy ICBM. It is considered highly likely that these will be nuclear delivery devices, or at least nuclear capable. Further down the scale (for instance in the anti-shipping role) a number of hypersonic missile designs are under development, illuminating Russia's significant investment in these designs. Indeed, the pace and scope of both the Chinese and Russian programmes is such that the US National Academies of Science warned this year that America was falling behind in the hypersonic weapons race.[8]

With the development of these weapons systems gathering pace, driven by prospective military potential and, no doubt, national symbolic pride, the full spectrum of implications, both positive and negative, must be clearly understood. Certainly, from the singular perspective of warfighting, CPGS would provide a useful addition to current US long-range strike options. However, given the costs of development, and the likely limited number of platforms that would result, counterpoised with the potential limitations these weapons may have against capable adversaries, CPGS may not prove to be anything other than of minimal benefit. Weighed against the more serious problems related to crisis stability, their value in enhancing the robustness of American deterrent capabilities is questionable.

Increased tension and reduced trust marks the political context in which CPGS programmes are being pursued. Besides the deep divisions in how the US, Russia and China view strategic stability and the role of nuclear weapons within that, are the political fissures over Ukraine, the Korean peninsula and the South China Sea. There is minimal military dialogue between the US and China generally, while dialogue between the US and Russia has been ruptured by Ukraine and Syria. All three states are at various stages of a broad increase in the whole spectrum of their nuclear capabilities. In such an environment, advanced conventional

technologies, such as CPGS amplify the divisions. As Robert Legvold noted, this renewed phase of nuclear modernization is marked by a renewal of a "potential competition between offensive and defensive systems" which include "new destabilizing technologies, such as conventionally armed strategic missiles theoretically capable of striking the other side's nuclear weapons, thus blurring the firebreak between conventional and nuclear warfare."[9] Any advantages that CPGS might provide must be considered in this wider context; failure to understand their impact on these strategic relationships risks further nuclear competition.

Notes

[1] General John Jumper, U.S. Air Force, Final Mission Need Statement, "Prompt Global Strike," 02 May, 2003.

[2] The Review's objectives were: preventing nuclear proliferation and nuclear terrorism; reducing the role of U.S. nuclear weapons in U.S. national security strategy; maintaining strategic deterrence and stability at reduced nuclear force levels; strengthening regional deterrence and reassuring U.S. allies and partners; and sustaining a safe, secure, and effective nuclear arsenal. Department of Defense, *Nuclear Posture Review Report*, (Washington, DC: Department of Defense), April 2010.

[3] David E. Sanger and Thom Shanker, "U.S. Faces Choice on New Weapons for Fast Strikes," New York Times, April 22, 2010.

[4] See for example the 2008 study released by the US National Research Council on Conventional Prompt Global Strike. Much of the analysis is centred on conventional version of the Trident – the Conventional Trident Modification (CTM). See National Research Council, *U.S. Conventional Prompt Global Strike: Issues for 2008 and Beyond*, The National Academies Press, Washington DC, 2008.

[5] The range of the HTV-2 was projected at 11,000kms, and the AHW 8,000km.

[6] Statement by Mikhail I. Uliyanov, Acting Head of the Delegation of the Russian Federation at the 2015 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (General debate), New York, April 27, 2015.

[7] Some of these aspects are analysed in depth by James Action in *Silver Bullet? Asking the Right Questions about Conventional Prompt Global Strike*, Carnegie Endowment for Peace, 2013. See Chapter 3, 'Doing the Job: Can CPGS Weapons Meet the Mission Requirements?'

[8] Guy Norris, 'Classified Report On Hypersonics Says U.S. Lacking Urgency', *Aviation Week & Space Technology*, 14 Feb 2014 http://aviationweek.com/defense/classified-report-hypersonics-says-us- This At the 21st International Space Plane and Hypersonic Systems and Technology Conference (March 2017), held in China for the first time, China revealed a number of aspects about its hypersonic programme, cautiously avoiding discussion of the most sensitive defence-related aspects. These revealed developments that surprised Western analysts. A very high number of papers were presented there compared to previous conferences, almost 80% of which were Chinese. See Guy Norris, 'China Takes Wraps Off National Hypersonic Plan: Major investments, test facilities and swift achievements underpin China's rapid rise in hypersonics', 'Classified Report on Hypersonics Says U.S. Lacking Urgency', *Aviation Week & Space Technology*, Apr 10, 2017. http://aviationweek.com/defense/classified-report-hypersonics-says-us-

lacking-urgency.

[9] Robert Legvold, *Return to Cold War* (Cambridge, UK: Polity, 2016), p. 132.