

## **HIGH-PRECISION LONG-RANGE CONVENTIONAL SYSTEMS AND THEIR IMPACT ON STRATEGIC STABILITY**

Strategic stability in its classical sense – understood as a state of US-Russian relations under which neither side has incentives to launch a first nuclear strike – was developed during the Cold War. Such stability is achieved by “seeking agreements that improve survivability, remove incentives for a nuclear first strike and implement an appropriate relationship between strategic offenses and defenses”.<sup>1</sup> Development of new types (and improvement in existing ones) of conventional systems (including high-precision long-range missiles, hypersonic systems and space based missile defense) directly influences the strategic stability. Significant shift in the balance of power between Moscow and Washington could undermine the stability, making nuclear conflict more likely.

### **High-precision long-range conventional and dual-capable missiles**

US currently possesses the following high-precision long-range systems: BGM-109 Tomahawk sea launched cruise missiles (after 2013 – conventional only<sup>2</sup>), AGM-86 ALCM air launched cruise missiles (both nuclear and conventional), AGM-158 JASSM ER (extended range) air launched cruise missiles – conventional only. The work continues on a new LRSO (Long-Range Standoff Missile) air launched cruise missile, with the aim to substitute AGM-86 by 2030<sup>3</sup>, JASSM XR (extreme range) air launched cruise missile, LRASM (Long Range Anti-Ship Missile) cruise missile based on JASSM ER. US 2018 NPR put forward plans to develop a nuclear SLCM instead of nuclear version Tomahawk. Development of conventional ICBMs and SLBMs was considered under the George W. Bush administration as a part of the Prompt Global Strike (PGS) program but was decided too provocative and shelved in 2008.<sup>4</sup> Currently PGS program mainly focuses on boost glide vehicles.

Russian long-range systems include “Kalibr” SLCM (nuclear and conventional), Kh-55/Kh-555 ALCM (conventional and nuclear versions) and Kh-101/102 ALCM

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<sup>1</sup> Soviet-United States Joint Statement on Future Negotiations on Nuclear and Space Arms and Further Enhancing Strategic Stability. July 1, 1990. <https://bush41library.tamu.edu/archives/public-papers/1938>

<sup>2</sup> Hans M. Kristensen. US Navy Instruction Confirms Retirement of Nuclear Tomahawk Cruise Missile. Federation of American Scientists. 18.03.13 <https://fas.org/blogs/security/2013/03/tomahawk/>

<sup>3</sup> Hans M. Kristensen. Matt Corda. United States nuclear forces, 2019. Bulletin of the Atomic Scientists. 2019 <https://www.tandfonline.com/doi/full/10.1080/00963402.2019.1606503>

<sup>4</sup> Amy F. Woolf. Conventional Prompt Global Strike and Long-Range Ballistic Missiles: Background and Issues. Congressional Research Service. 08.01.19 <https://www.hsdl.org/?abstract&did=820227>

(conventional and nuclear versions),<sup>5</sup> Kh-32 ALCM.<sup>6</sup> “Tsirkon” hypersonic cruise missile is under development.

Some Russian experts raise the possibility of a successful US counterforce attack against Russian strategic forces with its high-precision conventional systems.<sup>7</sup> The feasibility of such approach was noted by US researches like Keir Liber and Daryll Press.<sup>8</sup> However the majority of Russian experts believe that successful conventional attack against Russian nuclear forces is impossible because of low yield, reconnaissance difficulties, insufficient numbers<sup>9</sup> and impossibility to launch a surprise attack. However, even existing US systems could be used as a part of counterforce strike alongside nuclear weapons. At the same time a hypothetical conventional-only attack against Russia will probably target dual-capable infrastructure, which could escalate the conflict to the nuclear level.

After withdrawal from the INF treaty US is free to pursue INF range ground-based missiles. Spring 2019 report by the Center for Strategic and Budgetary Assessments (SCBA)<sup>10</sup> named the following possible candidates: PrSM ground-launched ballistic missile (scheduled to be developed by 2023-25), LRASM anti-ship ALCM, which was tested from the surface ships, and (most notably) Tomahawk SLCM, which had a ground-launched version (BGM-109G Gryphon). Tomahawk missile was successfully tested from a mobile launcher on August 18, 2019. SCBA report also provided a range of options for US ground launched IRBMs for the medium term (above 5 years), those included new version of Pershing II – Pershing III, lighter shorter range IRBM and a heavy missile analogue to Chinese DF-26.

All US statements indicate that new missiles will be conventional only,<sup>11</sup> however at least part of their parent systems were or will be dual-capable, which would create additional ambiguity.

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<sup>5</sup> Hans M. Kristensen, Matt Korda. Russian nuclear forces, 2019. Bulletin of the Atomic Scientists. <https://www.tandfonline.com/doi/pdf/10.1080/00963402.2019.1580891>

<sup>6</sup> Россия вооружится неуязвимым «убийцей авианосцев». Лента.ру. 15.05.18 <https://lenta.ru/news/2018/05/15/tu22/>

<sup>7</sup> См. например, Константин Сивков. Разоружен и очень опасен. Военно-промышленный курьер. 20.03.17 <https://vpk-news.ru/articles/35718>

<sup>8</sup> Keir Lieber, Daryl Press. The New Era of Counterforce: Technological Change and the Future of Nuclear Deterrence. International Security. 2017. [https://www.mitpressjournals.org/doi/10.1162/ISEC\\_a\\_00273](https://www.mitpressjournals.org/doi/10.1162/ISEC_a_00273)

<sup>9</sup> См. выступление Владимира Дворкина и Алексея Арбатова на семинаре ПИР-Центра «Прорывные технологии, будущее сдерживания и вызовы стратегической стабильности», 14.06.17 <http://www.pircenter.org/articles/2120-5234221>

<sup>10</sup> Leveling the Playing Field. Reintroducing U.S. Theater-Range Missiles in a Post-INF World. The Center for Strategic and Budgetary Assessments. 2019. P. 34. <https://csbaonline.org/research/publications/leveling-the-playing-field-reintroducing-us-theater-range-missiles-in-a-post-inf-world>

<sup>11</sup> См. например заявление министра обороны США Марка Эспера. Statement From Secretary of Defense Mark T. Esper on the INF Treaty. Department of Defense. 02.08.19. <https://www.defense.gov/Newsroom/Releases/Release/Article/1924386/statement-from-secretary-of-defense-mark-t-esper-on-the-inf-treaty/>

Deployment of US ground-launched cruise and particularly ballistic INF range missiles, which will put Russian territory within their range, would add to the threat to Russian strategic forces and negatively impact strategic stability. On February 2, 2019 Russian President Vladimir Putin announced a moratorium on INF range deployments conditioned on US non-deployment.<sup>12</sup> United States and NATO declined to discuss Russian initiative citing their believe that 9m729 GLCM of “Iskander” system is a medium range missile, which would had already violated Russian proposal. In the end of November – early December Moscow’s initiative was publicly raised by French President Emmanuel Macron as a possible starting point for further discussions.

### **Hypersonic systems**

Hypersonic speed (higher than Max 5) has been present in the weapons’ systems for decades – ICBM reentry vehicles enter atmosphere with a hypersonic speed. However, the ability to combine both the speed and the maneuverability laid the foundation for a new class of weapons, which includes hypersonic cruise missiles and hypersonic boost glide vehicles (BGVs).<sup>13</sup> Of these, hypersonic BGVs offer most new capabilities: they escape exoatmospheric intercept, their flight path is impossible to predict, and their trajectory could help them to evade regular early warning radars.<sup>14</sup> This makes BGVs a weapon of choice to defeat missile defense systems.

US BGV program finds its roots in the PGS concept and was initially aimed at striking targets in any part of the globe.<sup>15</sup> Under the Barak Obama administration BGV was assigned a role of an additional ladder between the conventional and nuclear weapons and a regional focus.<sup>16</sup> Donald Trump’s administration has not yet specified the role for BGV in doctrinal documents.<sup>17</sup>

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<sup>12</sup> Meeting with Sergei Lavrov and Sergei Shoigu. President of Russia. 02.02.19 <http://kremlin.ru/events/president/news/59763>

<sup>13</sup> Richard H. Speier, George Nacouzi and others. Hypersonic Missile Nonproliferation. Hindering the Spread of a New Class of Weapons. RAND Corporation. 2017. [https://www.rand.org/pubs/research\\_reports/RR2137.html](https://www.rand.org/pubs/research_reports/RR2137.html)

<sup>14</sup> John Borrie, Amy Dowler, Pavel Podvig. Hypersonic. A Challenge and Opportunity for Strategic Arms Control Weapons. UNODA. UNIDIR. 2019. P. 6. <https://s3.amazonaws.com/unoda-web/wp-content/uploads/2019/02/hypersonic-weapons-study.pdf>

<sup>15</sup> Amy F. Woolf. Conventional Prompt Global Strike and Long-Range Ballistic Missiles: Background and Issues. Congressional Research Service. P.4. 08.01.19 <https://www.hsdl.org/?abstract&did=820227>

<sup>16</sup> Влияние технологических факторов на параметры угроз национальной и международной безопасности, военных конфликтов и стратегической стабильности. Под редакцией А.А. Кокошина. 2017. стр. 229. [https://www.rfbr.ru/rffi/ru/books/o\\_2061783#1](https://www.rfbr.ru/rffi/ru/books/o_2061783#1)

<sup>17</sup> Amy F. Woolf. Conventional Prompt Global Strike and Long-Range Ballistic Missiles: Background and Issues. Congressional Research Service. P.5. 08.01.19 <https://www.hsdl.org/?abstract&did=820227>

Currently the Pentagon doesn't have a program of record for the production of hypersonic BGVs. The services have separate R&D programs based on the Army's concept.<sup>18</sup> The Navy works on the Intermediate Range Conventional Prompt Strike Weapon (IR CPS), the Army – on the Long-Range Hypersonic Weapon (LRHW), and the Airforce has two programs: Hypersonic Conventional Strike Weapon (HCSW) and AGM-183A Air-launched Rapid Response Weapon (ARRW). DARPA works at least on four other hypersonic programs: Tactical Boost Glide (TBG), Advanced Full-Range Engine (ARFE), Operational Fires (OpFires) and Hypersonic Air-breathing Weapon Concept (HAWC).<sup>19</sup>

According to the Congressional Research Service, US will not be able to field an operational system before 2022.<sup>20</sup> US budgetary process is also slowing down the programs.<sup>21</sup> Conventional focus of US programs will also add more requirements, including higher precision, achieving these would be technologically challenging.

Russian BGV program "Avangard" is based on 1980s "Albatros" project initiated as a response to the US global missile defense system.<sup>22</sup> Deliveries of "Avangard" to the Russian military started in 2019,<sup>23</sup> first missile regiment will become operational by the end of 2019. According to the official statements, "Avangard" will carry a nuclear warhead.

Currently mass deployment of BGVs is limited by the New START treaty, capping the number of available ICBMs. Russian side declared that "Avangard" would count against the NST ceilings and exhibited it to US inspectors.<sup>24</sup> However, this limitation may end with the expiration of the NST in 2021 or deployment of IRBMs. But even so, their numbers would be likely limited by their price and narrow set of missions. We can't exclude the possibility that hypersonic BGVs will become a niche capability with limited effects on the strategic stability.

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<sup>18</sup> Sydney J. Freedberg Jr. Army Warhead Is Key to Joint Hypersonics. Breaking Defense. 22.08.19 <https://breakingdefense.com/2018/08/army-warhead-is-key-to-joint-hypersonics/>

<sup>19</sup> Kelley M. Saylor. Hypersonic Weapons: Background and Issues for Congress. Congressional Research Service. P.4-8 <https://www.hsdl.org/?view&did=827149>

<sup>20</sup> Kelley M. Saylor. Hypersonic Weapons: Background and Issues for Congress. Congressional Research Service. P.1 <https://www.hsdl.org/?view&did=827149>

<sup>21</sup> Gillian Rich. Hypersonic Weapons Program at Risk Due to Budget Fight. Investor's Business Daily. 20.09.19 <https://www.investors.com/news/hypersonic-weapons-continuing-resolution-congress-budget/>

<sup>22</sup> Pavel Podvig. Russian hypersonic vehicle - more dots added to Project 4202. Russian strategic nuclear forces. 26.08.14 [http://russianforces.org/blog/2014/08/russian\\_hypersonic\\_vehicle\\_-\\_m.shtml](http://russianforces.org/blog/2014/08/russian_hypersonic_vehicle_-_m.shtml)

<sup>23</sup> РВСН начали получать ракетные комплексы "Авангард". РИА Новости. 22.05.19 <https://ria.ru/20190522/1554802212.html>

<sup>24</sup> В Генштабе заявили, что комплекс "Авангард" не нарушит договоренности по СНВ. Интерфакс. 24.07.19 <https://www.interfax.ru/russia/670264>

## Space based missile defense

There are no legally binding limitations for placing conventional weapons (including the missile defense systems) into the Earth's orbit. However, neither Russia, nor the US currently deploy space-based missile defense systems.

US planned to base interceptors in space as a part of the Strategic Defense Initiative, however the R&D on the program ended in 1993. At the same time, the idea is regularly raised in state funded research, legal and doctrinal documents. Russia doesn't have plans which would require placing weapons into the outer space.<sup>25</sup>

Two US high-level reports<sup>26 27</sup> on the feasibility of space interceptors in 2011 and 2012 concluded that the project is possible but would have limited effectiveness and would require large amount of satellites. Director of Missile Defense Agency stated in 2011 that a global system would require 960 satellites and would cost 282 billion dollars with the time frame of ten years.<sup>28</sup>

At least some of the US officials believe that such a system could also be used to protect the country from Russian and Chinese nuclear forces, if the priorities and resources were in place.<sup>29</sup> The most radical ideas did not find their way into the US 2019 Missile Defense Review (MDR). According to the MDR and 2018 NPR, US will rely on deterrence to deal with Russian and Chinese arsenals.<sup>30</sup> However, the document also says that "as rogue state missile arsenals develop, the space-basing of interceptors may provide the opportunity to engage offensive missiles in their most vulnerable initial boost phase of flight [...] DoD will undertake a new and near-term examination of the concepts and technology for space-based defenses to assess the technological and operational potential of space-basing".<sup>31</sup>

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<sup>25</sup> Комментарий Департамента информации и печати МИД России по космическим аспектам «Обзора политики США в сфере ПРО». МИД России. 25.01.19  
[http://www.mid.ru/web/guest/foreign\\_policy/news/-/asset\\_publisher/cKNonkJE02Bw/content/id/3483332](http://www.mid.ru/web/guest/foreign_policy/news/-/asset_publisher/cKNonkJE02Bw/content/id/3483332)

<sup>26</sup> David Wright. 24 Space-Based Missile Defense Satellites Cannot Defend Against ICBMs. Union of Concerned Scientists. 10.08.18 <https://allthingsnuclear.org/dwright/24-space-based-interceptors>

<sup>27</sup> Making Sense of Ballistic Missile Defense. An Assessment of Concepts and Systems for U.S. Boost-Phase Missile Defense in Comparison to Other Alternatives. National Research Council of the National Academies. 2012. <https://www.nap.edu/catalog/13189/making-sense-of-ballistic-missile-defense-an-assessment-of-concepts>

<sup>28</sup> Patric O'Reilly. Letter to Senator Kyl. 22.06.11 <https://s3.amazonaws.com/ucs-documents/global-security/2011-DOD-Response-Space-Based-Missile-Defense.pdf>

<sup>29</sup> Ensuring U.S. Technological Superiority: An Update from Under Secretary Michael D. Griffin. Hudson Institute 13.08.19 <https://www.hudson.org/research/15273-transcript-ensuring-u-s-technological-superiority-an-update-from-under-secretary-michael-d-griffin>

<sup>30</sup> 2019 Missile Defense Review. Department of Defense.  
[https://www.defense.gov/Portals/1/Interactive/2018/11-2019-Missile-Defense-Review/The%202019%20MDR\\_Executive%20Summary.pdf](https://www.defense.gov/Portals/1/Interactive/2018/11-2019-Missile-Defense-Review/The%202019%20MDR_Executive%20Summary.pdf) стр. VII

<sup>31</sup> 2019 Missile Defense Review. Department of Defense.  
[https://www.defense.gov/Portals/1/Interactive/2018/11-2019-Missile-Defense-Review/The%202019%20MDR\\_Executive%20Summary.pdf](https://www.defense.gov/Portals/1/Interactive/2018/11-2019-Missile-Defense-Review/The%202019%20MDR_Executive%20Summary.pdf) стр. IX

Despite the original plans that such studies will take six months<sup>32</sup> they were not produced as of December 2019, which can point to internal disagreements over the issue inside the Department of Defense. Space based weapons did not appear in Pentagon's budget request for FY2020.<sup>33</sup>

DoD decision on the placement of interceptors in space would have to take into account the vulnerability of satellites to the ASAT weapons. 2019 MDR has already noted increased risk to US satellites on the part of Russia.<sup>34</sup> One of the possible responses could involve moving to a smaller and more numerous satellites. In April of 2019, Director of Space Development Agency suggested deploying "hundreds, perhaps even a thousand or more small satellites exhibiting a host of capabilities."<sup>35</sup> Agency will start testing the concept in the wargames in 2022. Despite its price and questionable effectiveness such experiments could develop new technologies and approaches that could affect Russian strategic arsenal. In 2017 a book edited by Andrey Kokoshin suggested that US could return to the concept of "Brilliant Pebbles", which envisioned placing autonomous interceptors in orbit.<sup>36</sup>

## Conclusions

Existing arsenal of US high-precision long-range conventional systems doesn't give Washington the capability for a successful counterforce strike against Russian strategic nuclear forces. At the same time, US withdrawal from the INF treaty and probable deployment of intermediate range ground-launched cruise and ballistic missiles in the proximity of Russian borders (primarily in Europe but also in Asia) adds additional threat to Russian strategic forces. The scope of the threat will depend on the types, quantity and deployment areas of US missiles, but in any case, it will result in weakening of strategic stability, which in turn would produce Russian countermeasures further heightening the tensions. With this in mind, a moratorium for deployment of all ground launched INF range missiles seems like the best of the existing options.

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<sup>32</sup> <https://www.defense.gov/Newsroom/Transcripts/Transcript/Article/1734967/department-of-defense-off-camera-press-briefing-on-the-2019-missile-defense-rev/>

<sup>33</sup> Jen Judson. Where are the laser-armed drones? Missile Defense Review wish list missing from MDA's budget. Defense News. 12.03.19 <https://www.defensenews.com/smr/federal-budget/2019/03/13/missile-defense-review-ambitions-not-reflected-in-mdas-94b-fy20-budget/>

<sup>34</sup> 2019 Missile Defense Review. Department of Defense. [https://www.defense.gov/Portals/1/Interactive/2018/11-2019-Missile-Defense-Review/The%202019%20MDR\\_Executive%20Summary.pdf](https://www.defense.gov/Portals/1/Interactive/2018/11-2019-Missile-Defense-Review/The%202019%20MDR_Executive%20Summary.pdf) стр. IV

<sup>35</sup> David Axe. Pentagon Admits Plan to Launch 1,300 Satellites Might Not Prevent Chinese or Russian Attacks. The Daily Beast. 10.04.19 <https://www.thedailybeast.com/pentagons-space-development-agency-admits-satellite-plan-might-not-prevent-chinese-or-russian-attacks>

<sup>36</sup> Влияние технологических факторов на параметры угроз национальной и международной безопасности, военных конфликтов и стратегической стабильности. Под редакцией А.А. Кокошина. 2017. стр. 197. [https://www.rfbr.ru/rffi/ru/books/o\\_2061783#1](https://www.rfbr.ru/rffi/ru/books/o_2061783#1)

“Hypersonic” technologies will have mixed impact on the strategic stability. Russian boost glide vehicles (BGVs) are intended to be used as a new type of ICBM warheads with the goal to deliver the nuclear payload to enemy’s territory evading existing and perspective missiles defenses. To the extent this nullifies effects of defensive weapons it could be seen beneficial to the strategic stability. Moscow also doesn’t aim at creating global missile defense system to protect the country from a nuclear strike, so Washington’s development of similar capabilities shouldn’t affect security of Russia.

However, the development of Russian “hypersonics” is used to justify investments to speed up development of similar systems in the US. There is no certainty which systems US ends up with, but as far as we can tell those will have shorter range, higher precision and conventional payload, which will make them similar to other US high-precision long-range conventional missiles systems. Unlike Russian systems, their US “cousins” will be meant to be used in conventional conflicts bringing with them uncertainty about their payload and trajectory. Depending on their numbers and area of deployment they could be used against Russian nuclear forces and infrastructure, which will decrease strategic stability.

US attempts to create a hypersonic missile defense could lead to deployment of a new generation of space sensors, which will also increase the potential of US missile defense to intercept classic ICMBs.

Deployment of missile defense interceptors in space still isn’t widely supported by both US expert community and political elites. This can result in slowing down or completely ending the development of such systems even though the current administration is generally supportive of placing weapons in outer space. If the development continues, the price of such programs would (at least initially) push Washington towards development of a smaller satellite constellation with limited capabilities for exoatmospheric interception of ICBMs, which wouldn’t be much different from existing US missile defense systems. Boost phase intercept of ICBMs doesn’t look feasible in the medium term. Space based missile defense assets will be vulnerable for anti-satellite weapons, which will speed up development of ASAT technologies. With the growing awareness about the debris that a kinetic attack against satellites would create and the catastrophic impact this could have on the peaceful uses of space, we should expect additional resources allocated to the development of laser, cyber and electromagnetic ASAT weapons.

As the recent volume edited by Andrey Kokoshin notes “the capabilities of US global missile defense system shouldn’t be judged separately, rather it should be seen in the context of US strategic offensive forces, which currently include nuclear triad and conventional long-range high-precision systems of so called prompt global strike”.<sup>37</sup> Based on the existing trends, abovementioned new types of weapons will not be able to

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<sup>37</sup> Влияние технологических факторов на параметры угроз национальной и международной безопасности, военных конфликтов и стратегической стабильности. Под редакцией А.А. Кокошина. 2017. стр. 153. [https://www.rfbr.ru/rffi/ru/books/o\\_2061783#1](https://www.rfbr.ru/rffi/ru/books/o_2061783#1)

significantly influence the strategic stability in the short and medium term. However, Russia will continue to have a holistic approach to US capabilities and will continue to follow closely US military developments.

However, the fact that the development of new technologies would not be able to threaten Russian second-strike capability, will not be enough to sustain the strategic stability if the potential adversary has the illusion that it has such a capability. President Trump's 2017 statement that US missile defense system has a 97% effectiveness,<sup>38</sup> was met with an understandable concern about the decisions that commander-in-chief can make based on flawed estimates. This highlights the importance of high-quality analysis regarding the strategic stability as well as public awareness campaigns.

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<sup>38</sup> Laura Grego. No, Missile Defense Will Not Work 97% of the Time. Union of Concerned Scientists. 13.10.17 <https://allthingsnuclear.org/lgrego/missile-defense-will-not-work-97-percent>