

Forum: Disarmament and International Security Committee

Issue # 2: Measures to address the use and production of Hypersonic aircrafts and weapons

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Introduction

In recent years, nations across the world have spent time and resources in hypersonic engineering and technology for military purposes. By reaching speeds of more than 5 times faster than the speed of sound (Mach 5), hypersonic flight has shown dangerous potential in bringing a new breed of military aircrafts and long range missiles. With China, Russia, and the United States in particular pursuing the development of hypersonic weapons and aircrafts for over a decade, the tensions between the three superpowers have escalated into a modern arms race regarding hypersonic performance, accuracy, and it's military implementation. Furthermore, the construction of hypersonic weapons represents the possibility of a scenario where the global balance of power is threatened and upset. Such a scenario presents a serious global threat and with constant improvements being developed frequently, it raises the question regarding the extent to which such weapons should be regulated.



Definition of Key Terms

Production:

The process of making things out of raw materials.

Hypersonic Aircrafts:

Aircrafts are any vehicle that is able to fly in the sky. Hypersonic aircrafts specifically are aircrafts that are faster than the speed of sound, normally above 300 mph.

Weapon:

An object that is made to to either harm others by inflicting physical harm to an opponent or an object that used to defend yourself against your opponent.

Mass destruction weapon:

A weapon that could be nuclear, chemical, radiological, biological; a device used to harm a great amount of people.

Nuclear Weapon:

A device that is made to release energy in an explosive way because of a clear nuclear fission or fusion or both.

Chemical Weapon:

A certain munition that utilizes chemicals that are made to harm humans and could inflict death.

Biological Weapon:

Microorganisms such as bacteria, virus... toxins that are made and released with the purpose of harming and killing living beings.

Radiological Weapon:

May kill or hurt people when exposed to materials that are radioactive; cesium-137, cobalt-60, iridium-92.

Boost Glide:

Is a type of spacecraft guidance trajectory that utilizes aerodynamic lift within the high upper atmosphere.

General Overview

Hypersonic weapons and aircrafts travel at least 5 times as fast as sound, also known as Mach 5 (Government Accountability Office). Because of this rapid velocity, they may become very useful to transport the public. However, creating hypersonic weapons or weaponizing hypersonic aircrafts could unleash chaos and fear worldwide just as it has occurred in the past with some countries' nuclear arsenals.

History

Over the past century, nations such as the United States and Russia have invested into exploring long-range strike options. In fact, during the Cold War, U.S. citizens were afraid that the USSR would surprise them with a sudden long-range strike and vice versa. Due to the existing technology at this time, the only long-range strike option available was using intercontinental ballistic missiles (ICBMs). This, eventually, led to the so-called “Race for Space” where both countries were constantly afraid of an imminent air strike done by using their artificial satellites (History.com).

In the present day, technology has advanced to the point at which countries can easily defend themselves from ICBMs. This has caused nuclear weaponized countries to seek alternatives that will allow them to attack their opponents in a more effective and efficient manner.

At the same time, at the beginning of the 21st century, militaries began to invest in the research and development of hypersonic aircrafts and weapons. With the goal of making their military more powerful and efficient.

Actions from the “Big Powers”

There are two main types of hypersonic weapons that have been developed: hypersonic glide vehicles and hypersonic cruise missiles. According to Michael T. Klare from the Arms Control Association, “Hypersonic glide vehicles, also called boost-glide weapons, employ a booster rocket to carry the glide vehicle into the outer atmosphere. Once reaching that altitude, between 40 and 100 miles above the earth’s surface, the vehicle separates from the booster and, propelled solely by its momentum and kept aloft by its aerodynamic shape, skims along the atmosphere’s outer boundary for great distances. Although unpowered, the vehicle can maneuver in flight, using satellite guidance to strike with high precision.” At the same time, according to Mr. Klare, “Hypersonic cruise missiles, unlike glide vehicles, fly within the atmosphere and can be

launched by ships or planes or from land. To attain Mach 5 and above, they employ advanced, air-breathing jet engines, such as scramjets (supersonic combustion ramjets).”

The United States, for example, has been working on hypersonic glide vehicles. However, their program was discontinued for a period of time. This was due to the Pentagon feeling alarmed by the idea that other countries may confuse the U.S.’s experiments with nuclear missiles and trigger a response that would unleash a nuclear war. At the same time, the United States Air Force is working on its hypersonic cruise missile program, a hypersonic projectile they call the “Air-Launched Rapid Response Weapon”, a maneuverable hypersonic delivery vehicle which would be launched by several booster systems, and a booster rocket that can be fired from submarines or other ships to carry hypersonic vehicles.

On the other hand, the Russian and Chinese militaries have invested in hypersonic glide vehicles such as the Russian Avangard and the Chinese DF-ZF. Russia has also been testing the Tsirkon, an air-launched hypersonic cruise missile which can be launched from both ships and submarines (Klare).

Chinese DF-ZF Hypersonic Glide Vehicle (left) and Russian Tsirkon Hypersonic Cruise Missile (right)



Regardless of how the militaries of the United States, Russia and China have acted, it is also worth noting that the United States withdrew from the Anti-Ballistic Missile Treaty in 2002. This encouraged other powers such as Russia and China to invest resources into the development of more and better missiles,

eventually leading to hypersonic cruise missiles (United Nations Office for Disarmament Affairs and United Nations Institute for Disarmament Research, 15-16).

Other Actions

In 2008, the First Committee of the United Nations General Assembly passed a resolution regarding missiles. These have been part of the First Committee's agenda ever since the 55th session of the UN General Assembly in the year 2000. However, the committee has never really addressed hypersonic aircrafts and weapons (United Nations Office for Disarmament Affairs and United Nations Institute for Disarmament Research, 27).

At the same time, it is worth noting that in 1987 the Missile Technology Control Regime (MTCR) was founded. This regime was founded by a group of seven industrialized nations: Canada, France, Germany, Italy, Japan, the United Kingdom and the United States. Currently, this group consists of 35 member states that are concerned with the development and delivery of weapons of mass destruction. This is done by having the regime control exports regarding resources related to weapons of mass destruction and by meeting with member states (also known as "partners") and non-partners (Missile Technology Control Regime).

Finally, in 2004, resolution 1540 from the Security Council was passed. This resolution "decided that all States shall adopt and enforce laws prohibiting non-State actors from the manufacture, acquisition, possession, development, transport, transfer or use of weapons of mass destruction or their means of delivery." (United Nations Office for Disarmament Affairs and United Nations Institute for Disarmament Research, 29).

Major Parties Involved and Their Views

China

Beijing is investing heavily in hypersonic missiles due to the fact that this technology is crucial to China's military leadership as part of its regional warfare strategy along with it being a strategic threat. China has one operating hypersonic missile, has been testing numerous others, and continues to conduct research and development. China appears to be concentrating its efforts on creating and fielding conventionally armed hypersonic vehicles to aid regional warfighting. While China's basic approach to essential warfighting duties will not change as a result of the development of hypersonic systems, these capabilities will provide greater choices for rapidly striking US air, land, and naval forces in the Indo-Pacific.

United States

Since the 2000s, the United States has been aggressively seeking the manufacturing of hypersonic weapons as part of its rapid global strike (CPGS) program. It has concentrated its work on hypersonic glide vehicles and hypersonic cruise missiles with shorter & intermediate ranges for employment in regional wars in recent times. Although financing for these initiatives has been limited, the Pentagon and Congress have expressed increasing plans to pursue the development and implementation of hypersonic devices throughout the near future. This is owing in part to developments in these technologies in Russia and China, which has resulted in a greater focus on the strategic danger presented by hypersonic flight in the United States.

Japan

The intention of Japan's Ministry of Defense to build homegrown hypersonic weapons was first revealed in late 2018. Just when Sino-Japanese relations appeared to be improving and both sides pledged to deepen economic cooperation, the Japanese government released its annual White Paper on Defense, which directly addressed one of the most lingering unresolved

concerns in their relationship. Despite the fact that the report did not mention Beijing by name, the Abe administration took a shot at the Chinese government's increasingly tenacious geopolitical goals by emphatically linking the use of hypersonic missiles to the protection of Japan's islands.

India

According to authorities participating in the launch, India has successfully tested an indigenously made hypersonic weapon that will serve as the foundation for a nuclear-capable cruise missile. The Sept. 7 test, according to Indian Defense Minister Rajnath Singh, was a success and a "landmark achievement" that helps to Prime Minister Narendra Modi's aim of India becoming self-sufficient. In collaboration with Russia, India is developing a hypersonic missile system. The Brahmos II missile system is based on a supersonic cruise missile. The system that was tested in September, on the other hand, was conceived and produced entirely in the United States.

Timeline of Events

Date	Description of event
1929	Rober Goddard, the father of modern rocket propulsion, launched the very first liquid-fuelled rocket.
1956	Aircraft Lockheed F-104 starfighter was launched for the first time. It was the fastest aircraft at the time.
1959	X-15's first flight took place. This aircraft belonged to the US AirForce and was supposed to fly to the edge of space

- 1969** First supersonic jet, Concorde, took its first flight. This aircraft could cross the Atlantic ocean in a lapse of four hours.
- 2004** Russia started testing its first supersonic vehicle.
- 2008** The Pentagon used money from their global strike program to fund a vehicle which they were going to attach to a ballistic missile to then achieve a hypersonic speed
- 2013** Boeing 's X-51 waverider was flown for the first time
- 2016** Russia started testing the Avangard Missile. (hypersonic weapon).
China successfully finished testing a hypersonic missile called DZ-ZF with a potential speed of Mach 10.
- 2018** Russia released a video testing a hypersonic missile called the Khinzal Dagger Missile.
- 2019** Russia finally deployed The Avangard. This missile could travel at speeds of Mach 27 and hit targets that were 6,000km away.
- 2020** High-speed strike weapons were cancelled because the United States switched focus to the ARRW. (Air Launched rapid response weapons.)

UN involvement, Relevant Resolutions, Treaties and Events

The United Nations has clearly expressed its concerns regarding hypersonic weapons yet also considered its high potential for security and peacekeeping. Still, it is clear that a form of arms control is fundamental and necessary, as it can reduce risks, and prevent escalatory actions between countries. Furthermore, the United Nations has described the use and development of hypersonic weapons as , "a challenge and opportunity for Strategic Arms Control."

As hypersonic technology has been developing for almost a decade, the United Nations Office for Disarmament Affairs United Nations Institute for Disarmament Research carried out a study in such technology whether it is conventional or nuclear armed. Aiming to bring awareness to the negative implications that hypersonic weapons and hypersonic glide vehicles may bring for international peace, arms control, and discernment. Essentially, the study demonstrated that a motivating factor for the development of hypersonic technology was due to the similar pursuit by their rivals, thus motivating the arms race dynamic that hypersonic weaponry has created.

As hypersonic technology is placed in military weapons, the study also reported that this new breed of weapon is not currently part of several treaties. The New START treaty is an essential arms limitation treaty that reduced the quantity of missiles with ballistic trajectories. Hypersonic weapons are not included within this treaty because it lacks that key detail. Hypersonic weapons being introduced to nuclear weaponry is a serious matter when it comes to nuclear arms control and it will be crucial for a regulation of such weapons for the future.

Past action

Intermediate-Range Nuclear Forces Treaty

The US has many strategic missiles to deliver nuclear warheads at intercontinental ranges of 3,400 miles or even more. The land-based forces within Asia use shorter-range missiles which evolved throughout the Cold War. The Intermediate-Range Nuclear Forces Treaty prohibited the US from creating, utilizing, or flight-testing ground-launched ballistic and cruise missiles within a range of 500-5,000 km; believed to be destabilizing.

Treaty on the Prohibition of Nuclear Weapons

The use or threat of hypersonic weapons that have a nuclear warhead are usually at the opposite of the rules of international law relevant in armed conflict, specifically the rules and principles of humanitarian law. The 2017 treaty on the prohibition of Nuclear Weapons which is not yet in force and is confined because of the Nuclear Non-Proliferation Treaty (NPT). This treaty would prohibit nuclear weapons, nuclear weapons free zone treaties, also other nuclear disarmament and arms control instruments. It is illegal distribution.

The New Strategic Arms Reduction Treaty (New START)

A suggestion that hypersonic weapons should be considered within arrangements limiting strategic arms was made by Zhao. This suggestion was cited in the structure of the heir of the New Strategic Arms Reduction Treaty (New START) terminated between Russia and the United States. It would address the risks of confusion of conventional and nuclear features, but two-sided agreements do not tie together related states, it seems to be limited to a cooperative extent between Russia and the US.

Targeting Ban

A suggestion for a targeting ban has been introduced, as a one-sided risk decreasing measure that way a state would abstain from evolving strategies that relate to the use of hypersonic missiles opposing nuclear targets, control,

communications and command centres. Or as multilaterally approved restrictions on missions or targets set to hypersonic weapons. Likewise Podvig proposes banning nuclear boost-glide systems or nuclear launched cruise missiles in order to abolish nuclear ambiguity. Taking into account that it may also have other benefits like helping improve nuclear stability and lower the threat of Inadvertent escalation and mistakes, it doesn't stop the emergence, use and popularity of hypersonic weapons. This course of action may also be mistaken as being aimed for those states that recognize a nuclear role for hypersonic weapons, letting others with their freedom.

Possible Solutions

A way to directly solve this issue could be through the implementation of a multilateral international legally binding regime that would create a ban for armed hypersonic vehicles and hypersonic weapons of any sort. This regime would be initially created by the states most interested in banning/regulating these weapons. Then, a proposal would be forwarded to the rest of the UN to pass this regime as UN-recognized. At the same time, this regime would verify that such weapons remain banned through the use of constant surveillance and inspections as well as country declarations to the UN regarding its facilities and weapons. The treaty created for this regime to be formed in the first place would be similar to the Treaty on the prohibition of nuclear weapons (UN Treaty on the prohibition of nuclear weapons), only that it would be adapted to the production and usage of hypersonic weapons and vehicles.

Another possible solution to this issue could be to have it be fully banned to research and develop hypersonic vehicles and weapons unless the state is granted a special permit on behalf of the United Nations. This would be, once more, if an emergency came up where a specific country explicitly and swiftly requested to use a hypersonic weapon or vehicle against a threat. Delegations

would finally vote for or against the use of the hypersonic device and would give the final decision.

Sustainable Development Goal (SDG)

Sustainable Development Goal number 16 is “**Peace, Justice and Strong Institutions**”. This goal directly connects to the topic in discussion because we are trying to create solutions in which all parties involved agree on peaceful terms to stop the development of weapons that are created to intentionally attack each other. The purpose of this debate is to reduce all sources of violence that are produced due to hypersonic weapons and bring back peace of mind to the citizens in which countries are highly involved in the development of these weapons.

Appendix

I. Hypersonic aircrafts

<https://www.grc.nasa.gov/www/k-12/BGP/lowhyper.html>



Speed Regimes
Low Hypersonic

Glenn
Research
Center



$V < 6000 \text{ mph}$ $5 < M < 10$

X – Planes

Scramjet or Rocket Engine
Cooled Titanium – Nickel Skin
Short Wings

II. Information on Radiological weapons

https://csis-website-prod.s3.amazonaws.com/s3fs-public/legacy_files/files/media/csis/pubs/radiological%5B1%5D.pdf

III. Information on Biological weapons

<https://www.who.int/health-topics/biological-weapons#:~:text=Biological%20weapons%20are%20microorganisms%20like,in%20humans%2C%20animals%20or%20plants.>

IV. Information on Chemical weapons

<https://www.armscontrol.org/factsheets/Chemical-Weapons-Frequently-Asked-Questions#:~:text=A%20chemical%20weapon%20is%20any,%2C%20rocket%2C%20or%20ballistic%20missile.&text=Primary%20forms%20of%20chemical%20weapons,choking%20agents%2C%20and%20blood%20agents.>

V. Information on Nuclear weapons

<https://www.britannica.com/technology/nuclear-weapon>

VI. Short history on Space Race

[The Space Race: Timeline, Cold War & Facts - HISTORY](#)

VII. Technical information on Hypersonic weapons

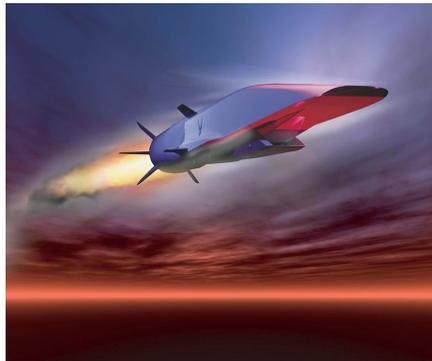
[Hypersonic Weapons: DOD Should Clarify Roles and Responsibilities to Ensure Coordination across Development Efforts \(gao.gov\)](#)

VIII. Detailed study on disarmament matters

<https://www.un.org/disarmament/wp-content/uploads/2019/02/hypersonic-weapons-study.pdf>

IX. Study on how to protect the U.S from Hypersonic weapons

<https://www.armscontrol.org/act/2019-06/features/arms-race-speed-hypersonic-weapons-changing-calculus-battle#endnote02>



- X. Tactical Uses and Strategic Goals for Hypersonic weapons

<https://warontherocks.com/2019/11/hypersonic-weapons-tactical-uses-and-strategic-goals/>

- XI. Overview of the Treaty on the Prohibition of Nuclear weapons

<https://www.un.org/disarmament/wmd/nuclear/tpnw/>

- XII. Capacity of Hypersonic weapons

<https://www.defensenews.com/training-sim/2021/05/27/us-navy-conducts-first-live-fire-test-of-hypersonic-missile-motor/>

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