

IMUN 22



UNCSTD

The Deployment of Nuclear Weapons in Space and How it Affects the Safety of the World.

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Introduction

President Truman authorized the deployment of atomic bombs in an effort to force Japan's surrender during World War II. Japan surrendered in the days following the attacks. During World War II, the United States government's Manhattan Project created and manufactured the first atomic weapons. This is when nuclear weapons became a thing. Starting with atomic bombs and now nuclear weapons that can be deployed in space. Science has evolved since the creation of nuclear weapons.

What exactly does the term "space weaponization" mean? Weaponizing space implies placing weapons in space or on celestial bodies, as well as designing armament capable of traveling through space and from Earth to kill targets in the outer spectrum.

According to The Week, while developing a system capable of preventing a nuclear assault is not impossible, it is highly challenging. The tiny size of missiles is one barrier for engineers attempting to design these systems. Missiles are also incredibly rapid, therefore there is only a short window for interception.

If a nuclear device exploded in space, gamma and X-rays would be released and expand to light up the sky. Within minutes of the bombardment, auroras of light would be visible for thousands of kilometers on the planet's surface. The explosion would also generate a magnetic field, potentially interfering with electrical transmission.

When a nuclear weapon is detonated near to the Earth's surface, the density of the air is high enough to attenuate nuclear radiation (neutrons and gamma rays) to the point where the impacts of these radiations are typically less severe than the effects of explosion and thermal radiation.

Nuclear detonations in space expose other satellites to more radiation and can severely reduce their lifespan. Which leads to an increase in satellites deployment in space, and it is pricy and takes a long time. Satellites take 10 years or more to develop and launch and cost between \$10 Million and \$400 Million.

Nuclear weapons can also be used to explode asteroids in space by shifting the path of the asteroids so that they remain in space and face away from Earth. This might be accomplished by the use of nuclear weapons.

The explosion, if carried out at the right distance, would cause the asteroid's surface to rip away into space and force it firmly off of its present course, according to specialists.

Definition of Key Terms

Deployment: "The movement of troops or equipment to a place or position for military action, placement or arrangement (as of military personnel or equipment) in position for a particular use or purpose"

Atomic Bomb: "A bomb which derives its destructive power from the rapid release of nuclear energy by fission of heavy atomic nuclei, causing damage through heat, blast, and radioactivity."

Nuclear weapons: "A nuclear weapon is a device that uses a nuclear reaction to create an explosion. This explosion is much more powerful than that of conventional explosives (like TNT). When a

nuclear weapon explodes, it gives off four types of energy: a blast wave, intense light, heat, and radiation.”

Radiation: “The emission of energy as electromagnetic waves or as moving subatomic particles, especially high-energy particles which cause ionization.”

Electrical transmission: “Electrical transmission is the process of delivering generated electricity usually over long distances - to the distribution grid located in populated areas”

Explosion: “A violent shattering or blowing a part of something, as is caused by a bomb.”

General Information

Satellites

A satellite is a very complex source of weaponry and when it is created it won't be easy to detonate the explosion. While developing a system capable of preventing a nuclear assault is not impossible, it is highly challenging. The tiny size of missiles is one barrier for engineers attempting to design these systems.

Missiles are also incredibly rapid, therefore there is only a short window for interception. Any nuclear weapon carried into space will almost certainly spoil it, either by reducing the peacefulness of space travel, as space is yet not entirely explored or by destroying satellites and emitting harmful rays into space.

Nuclear weapons, in particular, may pose a major threat to manned military space activities. When nuclear weapon effects in space are combined with effects within the Earth's atmosphere, the solitary appearance of man as the most vulnerable component of a space-weapon system becomes startlingly obvious.

Even a single high-altitude nuclear blast is capable of destroying satellites. Satellites not just in the line of sight were destroyed, but satellites on the opposite side of the planet were also damaged and made useless.

Nuclear detonations in orbit expose other satellites to additional radiation, reducing their lifespan significantly. This leads to an increase in satellite deployment in orbit, which is costly and time-consuming. Satellites require at least ten years to construct and launch, and they cost anywhere from \$10 million to \$400 million.

Radiation

If a nuclear bomb exploded in space, gamma and X-rays would be produced and spread throughout the sky, lighting it up. Light auroras would be visible for thousands of kilometers on the planet's surface within minutes after the assault. The explosion would also create a magnetic field, which might disrupt electricity transmission.

The area destroyed varies with the square of the distance, whereas the volume into which the weapon's energy spreads varies with the cube of the distance. As a result, a single bomb with a yield of one megaton would destroy 80 square miles. In comparison, 8 bombs with a total yield of 125 kilotons would destroy 160 square miles.

Nobody can hear an explosion in space... Many celestial events, such as novae, supernovae, and black hole mergers, are known to 'explode' in a disastrous way. This implies they either annihilate themselves energetically or fundamentally alter, releasing matter and energy into the cosmos.

The amount of energy released by fission bombs can range from less than a ton to more than 500,000 tons (500 kilotons) of TNT (4.2 to 2.1106 GJ). All fission processes produce fission products, which are the fragments of the split atomic nuclei.

The early expansion of the cosmos was powered by energy from the Big Bang. Since that time, a cosmic tug of war has been going on between gravity and dark energy. Dark energy drives galaxies away while gravity draws them together. Which force—gravity or dark energy—dominates determines whether the cosmos is expanding or shrinking.

The radiation environment of deep space differs from that of the Earth's surface or low Earth orbit due to the significantly larger flow of high-energy galactic cosmic rays (GCRs), radiation from solar proton events (SPEs), and radiation from the radiation belts.

Asteroids

Nuclear weapons can also be used to explode asteroids in space by shifting the path of the asteroids so that they remain in space and face away from Earth. This might be accomplished by the use of nuclear weapons. The explosion, if carried out at the right distance, would cause the asteroid's surface to rip away into space and force it firmly off of its present course, according to specialists.

Scientists stated in research published earlier this month that a stealthy asteroid as long as 330 feet might be killed by a one-megaton nuclear warhead, with 99.9 percent of its mass blasted out of the path of Earth, if the asteroid is struck at least two months before impact.

If the uranium is further refined to make it weapons-grade — a process that may take about two to three months — it is enough to manufacture the Atomic bomb, according to David Albright, a nuclear-policy specialist at the Institute for Science and International Security in Washington DC.

Each nuclear weapon, or up to 20 conventional air-launched cruise missiles, costs \$8.4 million. Each Advanced Cruise Missile costs \$3.8 million, and there are only 20 of them available. Each nuclear gravity bomb costs \$16.3 million, or \$4.9 million per device.

As a consequence, each land-based nuclear weapon deployed would cost roughly \$85 million. The Pentagon is also updating Trident submarine-based missiles, which initially cost more than \$100 million apiece, to extend their lifespan at a cost of almost \$140 million each.

Because there would be no atmosphere, everyone staring at the nuclear weapon detonation would perish. 'Kurzgesagt' observes that the Earth's atmosphere is ultimately responsible for preventing the spread of radiation from nuclear weapon blasts. On the Moon, however, it would freely spread, even killing humans in orbiting spaceships.

Nuclear weapons, in general, might be employed for good, such as destroying an asteroid on its way to Earth. This might raise the question of whether it is worthwhile to fire a weapon into space and kill an asteroid.

On the one hand, the argument may be that these weapons should not be deployed in space because of the time, effort, and money required to create them, and since space is unpredictable and nothing can be guaranteed. For example, an asteroid may appear to be traveling towards Earth when it is not.

Asteroid haven't hit Earth in a long time, thus damaging and polluting space for something that is unlikely to happen isn't appropriate.

However, some may agree that asteroids are incredibly huge and may inflict major harm to a region; an asteroid impact can wipe out an entire population owing to the asteroid's size. Deploying these weapons into orbit at a time when an asteroid is likely to strike is the best choice since they feel the effect of a nuclear weapon in space is minimal.

This is demonstrated by the countries that signed and did not sign the Outer Space Treaty, which prohibits the deployment of nuclear weapons in space. Despite signing up to the pact, several governments have ignored it. Some countries did not sign it and hence did not deploy.

People who have signed it feel that it is best for the universe as a whole, and that the radiation and effects of nuclear weapons are significant enough that they should not be risked. Asteroids haven't hit Earth in a long time, and we shouldn't wreck the planet for a safety net.

People who signed but still deployed nuclear weapons may have had a second change of heart. This might be due to science or a general shift in thinking in which they saw how beneficial it would be for their country and society to have nuclear weapons in space in case something goes wrong.

People who did not sign the treaty but did not deploy nuclear weapons may be employing it because they do not want to be bound by this pledge and face the repercussions if they must use nuclear weapons for whatever reason. There are several instances in which nuclear weapons should or should not be used.

Major Parties Involved

1- Countries who have nuclear weapons

the United States, Russia, France, China, the United Kingdom, Pakistan, India, Israel, and North Korea.

2- United nations

Since its inception, the United Nations has worked to remove such weapons. The first resolution passed by the UN General Assembly in 1946 created a Commission to address issues such as the discovery of atomic energy.

3- The National Nuclear Security Administration

The National Nuclear Security Administration strives to keep the nation's nuclear arsenal safe and secure. It also works to assure the safety of naval nuclear reactors, is the first responder in the event of a nuclear emergency, and is involved in global nuclear nonproliferation problems.

4- Militarization of space

The militarization of space entails the deployment and development of armaments and military technologies in space. The militarization and weaponization of space are fundamentally opposed to productive commercial and scientific endeavors. Space conflict would disrupt the inherent trust and collaboration required to sustain the equipment deployed in space for peaceful reasons.

5- NASA

NASA is a United States federal organization in charge of air and space research and technology. With the launch of the Soviet satellite Sputnik in 1957, the Space Age began. NASA was established in 1958. The agency was established to manage space exploration and aeronautics research in the United States.

Timeline of Events

2010 – February – Russia issues a revision of its military doctrine limiting the use of nuclear weapons to strictly defensive purposes.

2010 – April 8 – U.S. President Barack Obama and Russian President Dimitri Medvedev sign the New START Treaty reducing strategic warheads.

2010 – November 2 – The United Kingdom and France agree to closer cooperation regarding nuclear forces in the Lancaster House Treaties.

2012 – Russia announces that it will resume regular patrols with its SSBN fleet in international waters.

2012 – October – The Ministry of Foreign Affairs states that Russia will not renew the framework for cooperation with the United States on nuclear dismantlement after the expiration of the Nunn-Lugar Act.

2013 – After negotiations between Iran and the P5+1, the Joint Plan of Action is adopted.

2013 – June – President Obama proposes reducing American strategic nuclear weapons to their lowest point since 1953 in a speech at the Brandenburg Gate in Berlin.

2014 – December – After increasing tensions in Russia–United States diplomatic relations following the Russian annexation of Crimea and the Russian military intervention in Ukraine, cooperation with the United States on securing Russian nuclear stockpiles ends.

2015 – Under the Joint Comprehensive Plan of Action, Iran agrees to limit its uranium-enrichment operations in exchange for submitting to IAEA inspections and reduced sanctions.

2015 – Reports about Russia's Status-6 Oceanic Multipurpose System, a system of unmanned underwater vehicles capable of delivering a thermonuclear cobalt bomb, leak.

2015 – November – The Strategic Defence and Security Review 2015 announces the Dreadnought-class submarines a replacement for Britain's aging Vanguard-class submarines and Trident missiles, but is eventually delayed due to "Brexit".

2016 – January – North Korea Hydrogen bomb is 'tested' and confirmed by North Korea leader Kim Jong-Un.

2016 – May 27 – President Obama becomes the first American head of state to visit Hiroshima, expressing sympathy for victims but not issuing a public apology for the bombings as many expected.

2017 – July 7- The Treaty on the Prohibition of nuclear weapons, the first legally-binding international nuclear weapons ban, is ratified by 90 countries. The International Campaign to Abolish nuclear weapons wins the Nobel Peace Prize for its campaigning for the Treaty.

2017 – December 12 – The National Defense Authorization Act for Fiscal Year 2018 is ratified, declaring Russia to be in violation of the INF Treaty.

2018 – February – Under President Trump, the U.S. Department of Defense's Nuclear Posture Review announces the first expansion of the United States' nuclear arsenal since the end of the Cold War, citing violations of non-proliferation treaties by China and Russia as well as the Russian military intervention in Ukraine and the South China Sea territorial disputes.

2018 – March 15 – Crown Prince Mohammad bin Salman announces on a 60 Minutes interview that the Kingdom of Saudi Arabia will pursue nuclear weapons in the event of a successful Iranian nuclear test.

2018 – April 27 – Kim Jong-un meets South Korean President Moon Jae-in in Panmunjom for a summit and pledges a denuclearized Korean Peninsula.

2018 – May 8 – President Trump announces the United States withdrawal from the Joint Comprehensive Plan of Action.

2018 – June 12 – Trump and Kim meet at the 2018 North Korea–United States Singapore Summit, the first American and North Korean heads of state to meet and issue a joint declaration pledging a denuclearized Korea.

2019 – February – The United States and Russia withdraw from the INF Treaty.

2019 – February 28 – The 2019 North Korea–United States Hanoi Summit ends prematurely without a deal, but both parties' express commitment to a better relationship.

Previous Attempts to solve the issue

Regional nuclear weapon free zone (NWFZ) has been established to strengthen global nuclear non-proliferation and disarmament norms and consolidate international efforts towards peace and security.

The United Nations has sought to eliminate such weapons ever since its establishment. The first resolution adopted by the UN General Assembly in 1946 established a Commission to deal with problems related to the discovery of atomic energy among others.

The treaty on the Non-Proliferation of nuclear weapons (NPT)

The Treaty Banning Nuclear Weapon Tests in the Atmosphere, Outer Space, and Underwater, also known as the Partial Test Ban Treaty (PTBT)

The Comprehensive Nuclear-Test-Ban Treaty (CTBT), which was signed in 1996 but has yet to enter into force,

The Treaty on the Prohibition of nuclear weapons (TPNW)

The Missile Technology Control Regime

The Hague Code of Conduct against Ballistic Missile Proliferation

The Wassenaar Arrangement.

Useful Resources

- <https://www.un.org/disarmament/wmd/nuclear/>
- <https://www.nasa.gov/feature/positive-negative-or-neutral-it-all-matters-nasa-explains-space-radiation>
- <https://warontherocks.com/2022/09/getting-serious-about-the-threat-of-high-altitude-nuclear-detonations/>
- <https://www.space.com/anti-satellite-weapons-asats>
- <https://www.thespacereview.com/article/4422/1>
- <https://www.scienceabc.com/eyeopeners/happen-nuke-exploded-space.html>
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- <https://indianarmy.nic.in/WriteReadData/Documents/Weaponisation.pdf>
- <https://history.nasa.gov/conghand/nuclear.htm>
- <https://www.sciencefocus.com/space/how-can-something-explode-in-the-vacuum-of-space/>
- <https://www.energy.gov/science/articles/our-expanding-universe-delving-dark-energy>
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