SPACE FORCE 101

UNITED STATES
SPACE FORCE

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INTRODUCTION

Established on December 20, 2019, the United States Space Force is the sixth military branch in the U.S. Armed Forces. Military and civilian members of the Space Force are called Guardians, a term that traces back to "Guardians of the High Frontier." This was the command motto of Air Force Space Command, the organization that evolved into what we know today as the U.S. Space Force.

The formative purpose of the Space Force is to achieve Space Superiority, ensuring freedom of action in space for our forces while denying the same to our adversaries.

Space Force capabilities are critical to the Joint Force and the American way of life. They underpin both our national security and our prosperity, and they enable more than half of our nation's infrastructure including communications, emergency services, energy, financial, agriculture and food, and transportation. Collectively, space-enabled applications account for hundreds of billions of dollars in U.S. economic activity. Moreover, the modern U.S. military is built around the assumption that spacepower will be there when needed. Military forces on land, in the air, and at sea rely on space capabilities to include global communication, command and control, navigation, precision targeting, missile defense, and persistent battlespace awareness. **Space is the backbone of the Joint Force—National Security depends on military spacepower.**

Therefore, it is the responsibility of the Space Force to defend those capabilities. Over the last two decades, adversaries and competitors have fielded an increasingly sophisticated arsenal of weapons that can attack space-based and space-enabled platforms. These threats operate both from Earth and in outer space, and they can disrupt, degrade, or destroy U.S. space assets. As such, they pose a tremendous risk not only to national security but also to the prosperity and safety of the American people. Additionally, our adversaries are launching and operating a myriad of space-based capabilities, spanning multiple mission areas and orbits, to leverage the strategic advantage of space. So, it is also the Space Force's responsibility to **protect the Joint and Combined Force from space-enabled targeting.**

In the face of these threats, it is not enough for the Space Force to simply be a support element. **Space is a warfighting domain**, and it is our job to contest and control our environment through application of military force. That is what it means to be a military service. For this reason, the Space Force organizes, trains, and equips critical space capabilities, **and it conducts combat operations as an integral part of the Joint Force to gain and maintain Space Superiority**. Because of this, **Guardians are *the* service members uniquely trained, educated, and experienced** for warfighting in, from, and to the space domain.

WHY SPACE?

There's no such thing as a day without space. From the GPS receivers on cars and phones, to modern telecommunications, finance, agriculture, and more, space technology has completely permeated the modern way of life. Whether through use of satellites for services, derived technologies, or scientific research, everyone has benefitted from space.

A GROWING INDUSTRY

Just as the Navy maintains freedom of the seas, the Space Force maintains freedom of space for U.S. activities, both governmental and commercial. Commercial industry is booming, with industries such as low-cost launch, satellite internet, telecommunications, imagery, and even space tourism. In 2024, the "space economy" was valued at $546 billion. With the space domain providing a new engine to the global economy, safe and reliable access to space will impact everyone.

INNOVATION AND SCIENCE

Space technology has likely woven its way into your everyday life more than you think. Many of the products and tools we use routinely find their origins in space. A few examples are cell phone cameras, solar panels, memory foam, cordless vacuums and power tools, global food safety standards, grooved roadways to reduce accidents, wireless headphones, air purifiers, baby formula, laptops, and much more.

NAVIGATION

In 2022, a poll identified 93% of American drivers are dependent on GPS to navigate. GPS satellites are operated by the Space Force and instantly triangulate position to give users their pinpoint location anywhere on Earth. This technology has gone on to underpin entire industries including transportation, finance, security, safety, and much more. Without GPS, ATM transactions, self-driving cars, automated agricultural equipment, and many ocean-based operations would come to a screeching halt. Space Force Guardians keep the existing GPS satellite constellation running smoothly and teams of engineers are building the next generation of GPS technology.

COMMUNICATION

Have you ever used the WIFI while flying on a commercial aircraft? Or perhaps you subscribe to or use satellite radio or TV for constant connection. Every day space is making it easier to connect with friends and family, conduct business, dial 911 in an emergency, and connect to the internet in under-developed or rural areas. The Space Force works with commercial industry to protect those satellites and America's access to them.

SPACE FORCE FACTS

ESTABLISHED:
December 20, 2019

HEADQUARTERS:
Pentagon,
Washington, DC

MISSION STATEMENT:
Secure our Nation's interests in, from, and to space.

MOTTO:
Semper Supra, which is Latin for "Always Above."

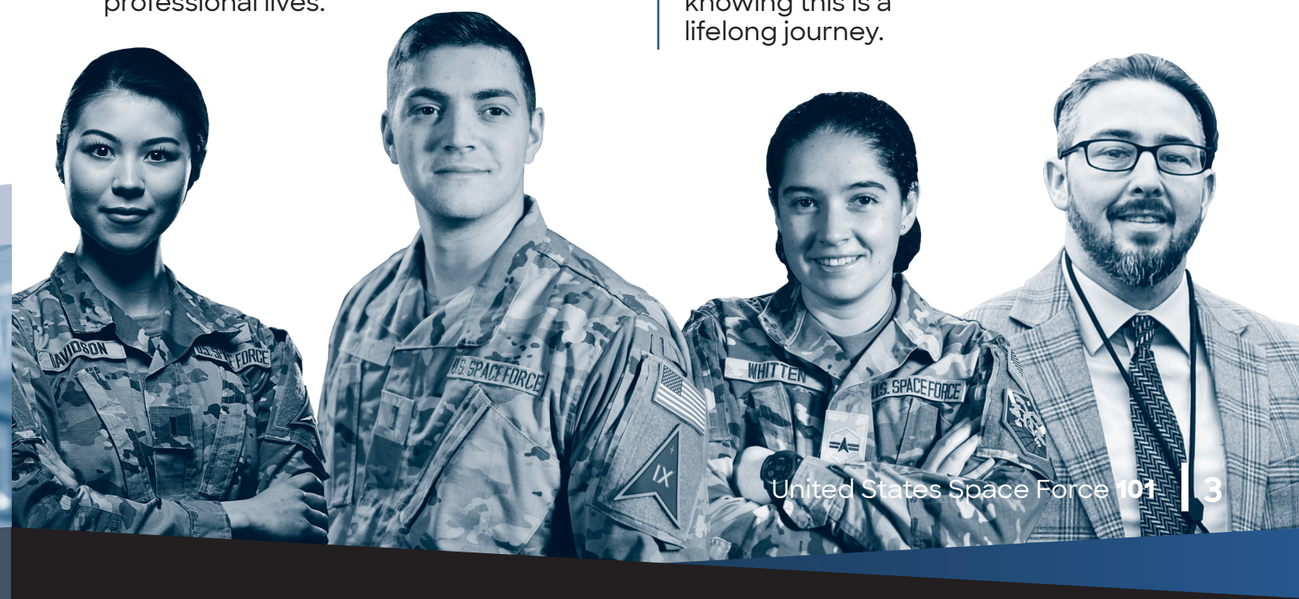
CORE VALUES:

CHARACTER:
High moral character and ethical standards are the foundation of our Guardians' personal and professional lives.

CONNECTION:
Guardians are connected by a common purpose greater than themselves.

COMMITMENT:
Guardians are committed to the pursuit of mastery of themselves, their profession, and their domain, knowing this is a lifelong journey.

COURAGE:
Guardians do what needs to be done and say what needs to be said because it is right.



GUARDIANS

Space Force Guardians are highly skilled experts across various career fields.

The Space Force was designed from its inception to be lean and agile. As such, the service has a relatively low number of personnel compared to other military services. Space Force Guardians are highly skilled experts across various career fields. Upon its founding, the Space Force accepted members from all military services, as well as new Guardians who commissioned directly into the Space Force. To stay lean and agile, the Space Force relies on the United States Air Force for mission support functions such as civil engineering, base support, security forces, IT, medical, and other critical services needed to operate.

ENLISTED
These uniformed Guardians are our Service's primary warfighters; they are technical specialists that execute orders while serving as leaders, weapon system experts, and advisors to their officer and civilian counterparts.

CAREER FIELDS: Space Operations, Space Intelligence, Space Cyber Operations

RANK: The six-sided border of the insignia honors the U.S. Space Force as the sixth U.S. military service. For E-2 - E-4, the stripes represent 'terra firma' or a solid foundation of skills. For noncommissioned officers, the chevrons honor the traditional enlisted insignias across all U.S. military services. Senior noncommissioned officers add orbits above the globe and delta. These represent the three major orbits around our Earth that the Space Force operates in: Low Earth Orbit (LEO), Medium Earth Orbit (MEO) and Geosynchronous Earth Orbit (GEO). The Delta is placed at the uppermost orbit to signify these senior leaders' higher level of responsibility. Finally, the Chief Master Sergeant of the U.S. Space Force's rank insignia adds additional heritage through the pair of stars and braid.

E-4 / Specialist 4

E-9 / Chief Master Sergeant

OFFICER
These uniformed Guardians are our Service's principal leaders and planners; they possess breadth of knowledge across mission areas and are trained and educated in space disciplines, command, staff, and Joint warfare.

CAREER FIELDS: Space Operations, Space Intelligence, Space Cyber Operations, Engineering, Acquisition

RANK: U.S. Space Force officer ranks honor and mirror the military tradition of the U.S. Air Force, U.S. Army, and U.S. Marine Corps. Company grade officers, O1-3, are distinguished through a series of gold and silver bars. Field grade officers, O4-6, are distinguished by a gold or silver oak leaf, or the traditional Colonel silver eagle which is a representation of the eagle on the United States' Great Seal. Finally, general officers, O7-10, wear a collection of silver stars depending on rank.

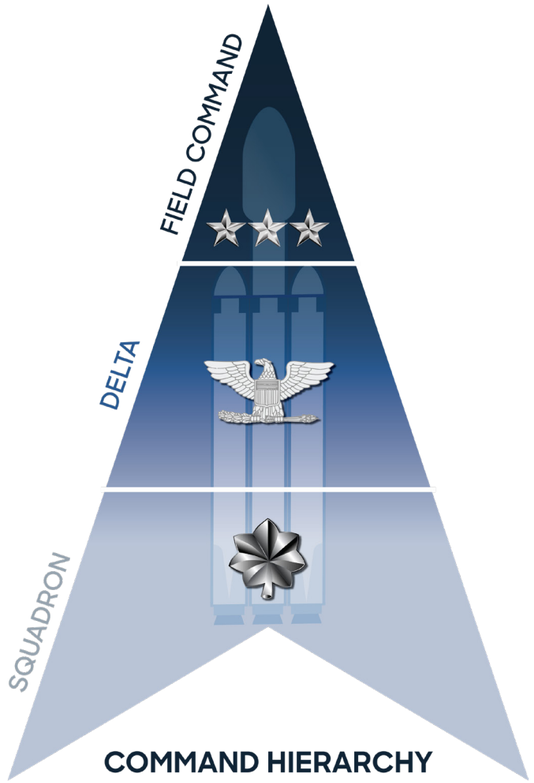
CIVILIANS
These non-uniformed Guardians bring specializations, operational stability, unit continuity, and depth of expertise critical to every Joint Warfighting Function. They provide continuity of technical expertise, corporate knowledge, supervision, and management at the tactical, operational, and strategic levels.

CAREER FIELDS: While civilian Guardians don't wear a rank, they are professionals who serve at any point in their careers, from entry-level to senior leaders. Civilians provide essential expertise and leadership across the Space Force in more than 120 occupations.

ORGANIZATION

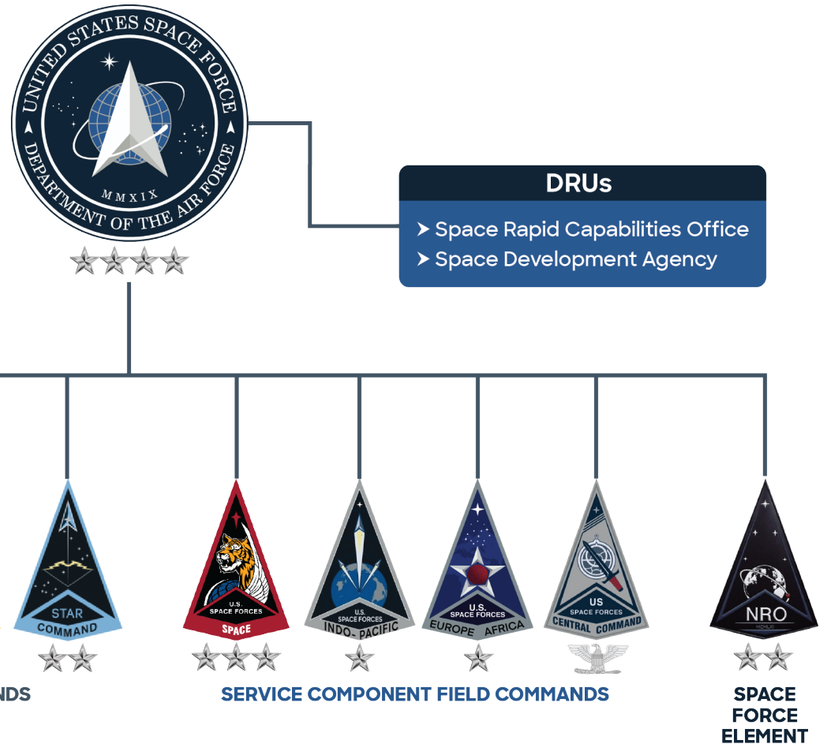
The Space Force is organized into a headquarters staff that provides leadership and guidance for the force; field commands that are responsible for organizing, training, and equipping thousands of Guardians around the world; deltas that support field commands and are specialized by mission area; and squadrons, which specialize in acquisition, cyberspace operations, engineering, intelligence, and space operations.

At the headquarters level, the Space Force is led by the Chief of Space Operations, a four-star general who reports to the Secretary of the Air Force and provides military advice to civilian leadership of the U.S. Department of Defense and White House. Alongside our sister service, the U.S. Air Force, the two services (Space Force and Air Force) combine to form the Department of the Air Force – much like the Marine Corps and Navy combine to form the Department of the Navy.



COMMAND HIERARCHY

The Space Force also has several direct reporting units (DRUs) that pursue advanced science, technology, intelligence, research, and engineering work to support space operations. These DRUs are the Space Development Agency (SDA) and the Space Rapid Capabilities Office (SpRCO). These hubs of innovation and intelligence work with the rest of the Space Force to provide new ideas or deep knowledge about highly specialized issues.



FIELD COMMANDS

The U.S. Space Force's four Field Commands (FLDCOMs) are purpose-built for specific activities, aligning to the various institutional responsibilities to organize, train, and equip Guardians.

Space Operations Command (SpOC) – Generates, presents, and sustains space warfighting capability for Combatant Commanders.

Space Systems Command (SSC) – Develops, acquires, equips, fields, and sustains lethal and resilient space capabilities.

Space Training and Readiness Command (STARCOM) – Increases Guardians' readiness to prevail in competition and conflict through education, training, doctrine, and test.

SERVICE COMPONENT FIELD COMMANDS
Through component field commands, the U.S. Space Force coordinates and integrates space forces into planning and current operations within geographic and functional combatant commands.

Space Forces Central Command (SPACEFOR-CENT) – As the U.S. Space Force component to U.S. Central Command (CENTCOM) at MacDill AFB, Florida, SPACEFOR-CENT is responsible for providing and integrating space forces across an area of responsibility that spans 21 countries across Northeast Africa, the Middle East, and to Central and South Asia.

Space Forces European and Africa Commands (SPACEFOREUR-AF) – The U.S. Space Force component to both U.S. European Command (EUCOM) and U.S. Africa Command (AFRICOM) is located at Ramstein AB in Germany. EUCOM is responsible for 21 million square miles, including 51 countries and territories across Europe, large portions of Asia, the Middle East, and the Arctic and Atlantic Oceans. AFRICOM is similarly responsible for 53 African states, a land mass of 11.2 million square miles (three-and-a-half times the size of the United States), and nearly 19,000 miles of coastland.

Space Forces Indo-Pacific Command (SPACEFOR-INDOPAC) – The U.S. Space Force component to U.S. Indo-Pacific Command (INDOPACOM) at Joint Base Pearl Harbor - Hickam, Hawaii is responsible for planning, executing, and integrating military spacepower to the U.S. Armed Forces oldest and largest unified combatant command. INDOPACOM's area of responsibility includes the Asia-Pacific region including 38 nations and over 100 million square miles.

Space Forces Space Command (SPACEFOR-SPACE) – The U.S. Space Force component to U.S. Space Command (SPACECOM) which plans, executes, and integrates military spacepower into multi-domain global operations for all U.S. military operations beginning at the Kármán Line, 62 miles, or 100 km, above mean sea-level.

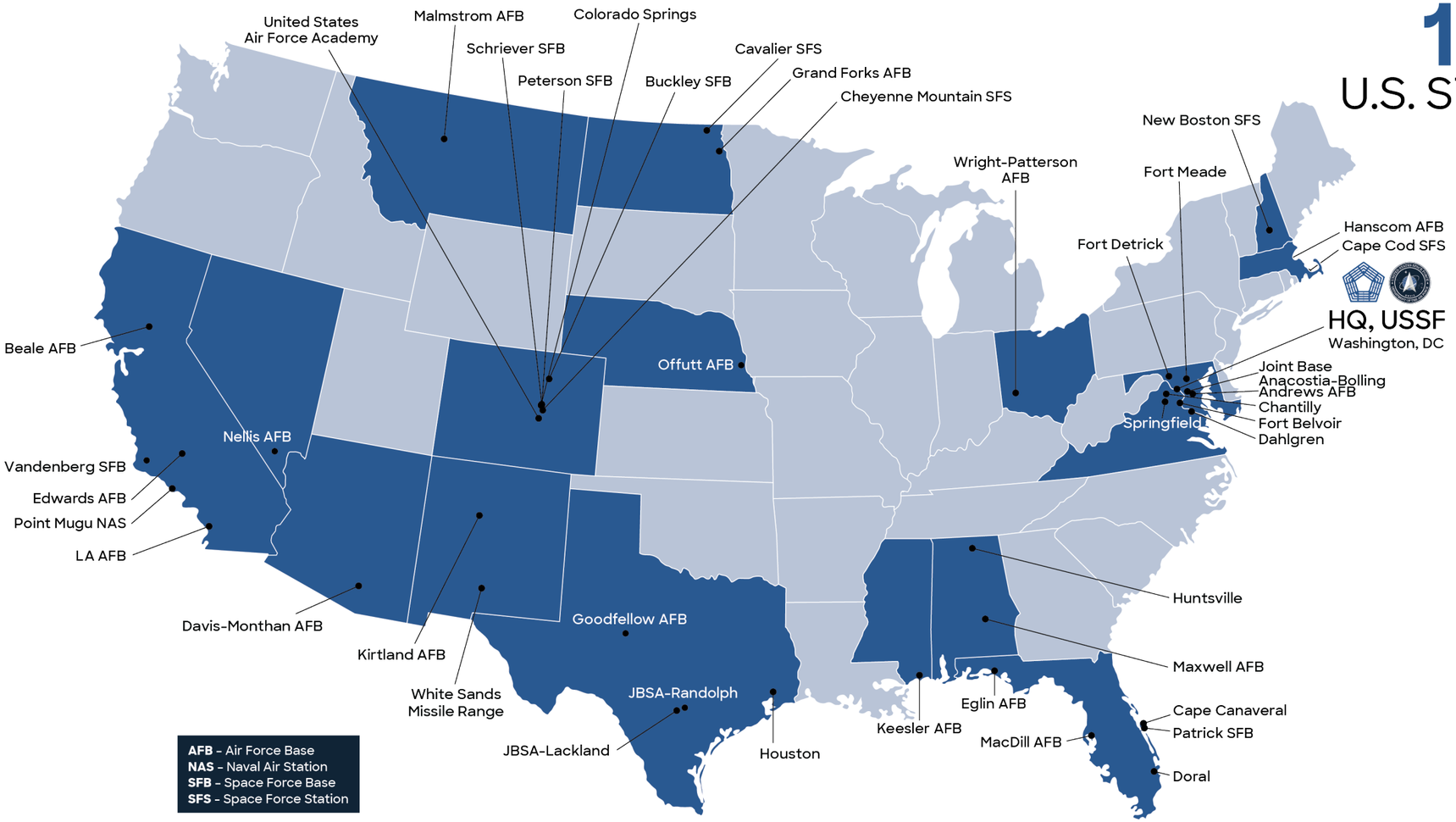
U.S. SPACE FORCE ELEMENT TO THE NATIONAL RECONNAISSANCE OFFICE (NRO) supports the design, development, launch, and maintenance of America's intelligence satellites.

DIRECT REPORTING UNITS
The U.S. Space Force's Direct Reporting Units (DRUs) are hubs of innovation and intelligence expertise within the Space Force, which provide new ideas or deep knowledge about highly specialized issues:

- **Space Development Agency (SDA)** Develops, demonstrates, and transitions resilient military space-based sensing, tracking, and data transport capabilities into a proliferated multi-orbit architecture, encompassing government, commercial, and rapid acquisition architectures.
- **Space Rapid Capabilities Office (SpRCO)** – Specializes in the expedited development and rapid production and deployment of space capabilities to fulfill short-term critical needs.

LOCATIONS

While the Space Force's headquarters are in Washington, D.C., the rest of the service is spread across the United States and abroad.

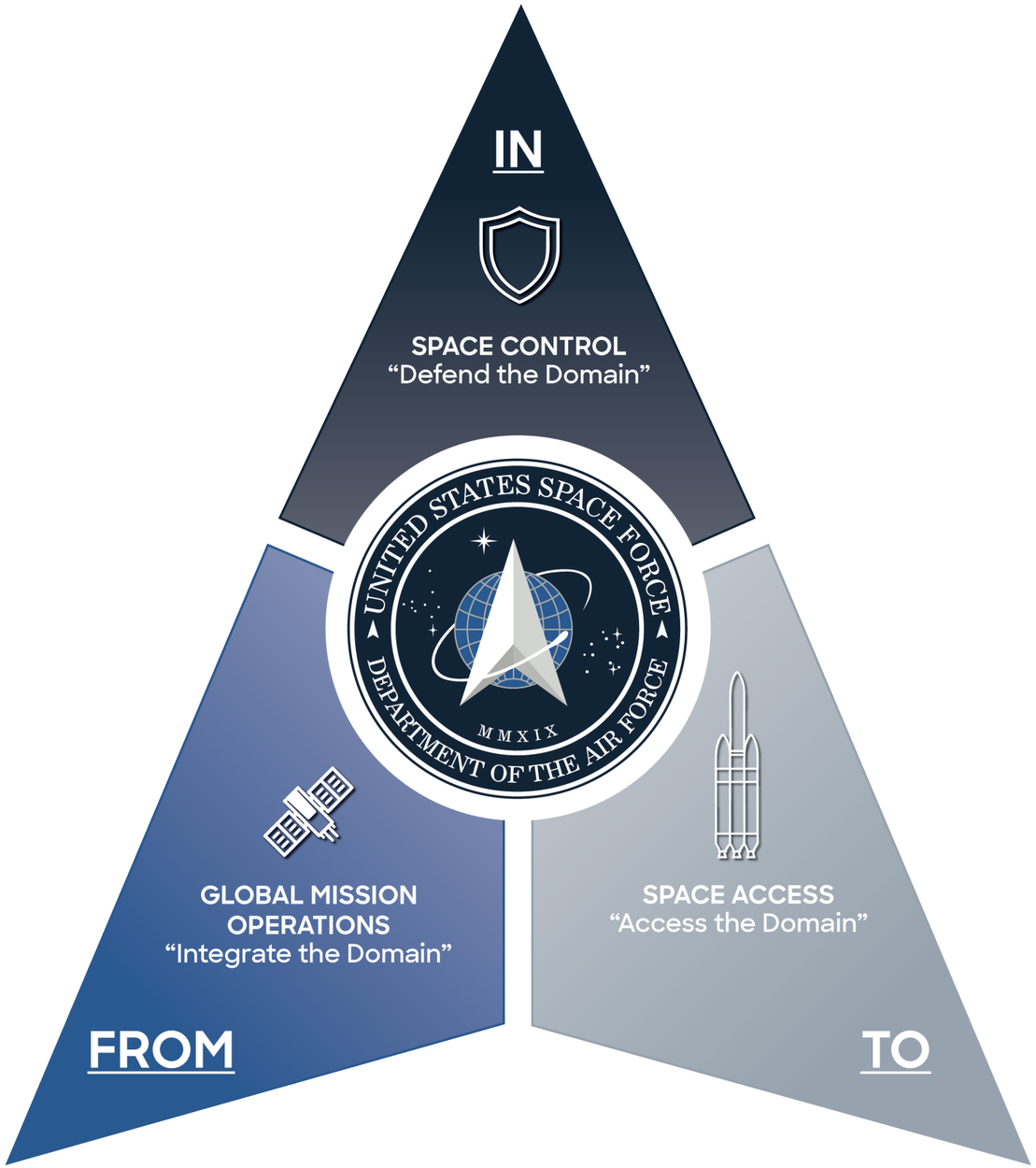


19
U.S. STATES

11+
OVERSEAS SITES

OCONUS locations not drawn to scale.

CORE FUNCTIONS



SPACE CONTROL	GLOBAL MISSION OPERATIONS	SPACE ACCESS
Contest and control the space domain.	**Deliver space capabilities to the Joint Force and the nation.**	**Deploy and sustain equipment in space.**
MISSIONS: Orbital Warfare; Electromagnetic Warfare; and Cyberspace Warfare	**MISSIONS:** Satellite Communications; Navigation Warfare; Missile Warning and Tracking; Space-Based Sensing and Targeting; Theater Electromagnetic Warfare	**MISSIONS:** Satellite Control; Space Lift; Range Control

The Space Force’s core functions of Space Control, Global Mission Operations, and Space Access align directly to the mission statement to “secure our Nation’s interests in, from, and to space.”

SPACE CONTROL comprises the activities required to contest and control the space domain. The desired outcome of Space Control operations is Space Superiority, a degree of control that allows forces to operate at a time and place of their choosing without prohibitive interference from space or counterspace threats, while also denying the same to an adversary. Space Control consists of offensive and defensive actions, referred to as counterspace operations. Counterspace operations are conducted across the space, electromagnetic spectrum, and ground segments of the space architecture.

GLOBAL MISSION OPERATIONS integrates joint functions across all domains on a global scale. Through space, the U.S. military and its allies can see, communicate, and navigate. Global mission operations also protect American forces on Earth through early warning of incoming missiles and other types of attacks. Global mission operations enable the Joint Force to project power and defend the air, land, and sea.

SPACE ACCESS ensures that the Space Force can move and sustain equipment in, from, and to the space domain. This includes some of the most visible space operations, rocket launches, as well as less visible operations, such as controlling and steering satellites on-orbit to avoid collision with oncoming space debris.

ENTERPRISE FUNCTIONS are cross-cutting activities that ensure successful execution of the Service’s three core functions outlined above. These activities include intelligence, networks, command and control, and space domain awareness.

A CONGESTED & CONTESTED DOMAIN

Objects that are in orbit around the Earth can move at tremendous speeds. For example, in LEO, a satellite may move upwards of 17,000 miles per hour, which allows it to make one complete orbit around the Earth every 90 minutes. At such speeds, collisions with small objects can have huge impacts. A fleck of paint or screw as small as 1 centimeter in diameter can damage or destroy a satellite.

Each year, the number of objects in space grows as new nations and companies launch satellites into orbit.

The resulting congestion threatens the flight safety of satellites. Compounding this challenge is the increasing number of space debris from dead, inactive, or broken satellites on orbit. Guardians are tasked with tracking, cataloging, and reporting on objects in space, keeping tabs on objects that vary from the size of a school bus down to about 10 centimeters. This totals to around 25,000 pieces of large debris in Earth orbit.

Not only is space more congested than ever before, but it is also competitive and contested. Counterspace weapons that can target and attack U.S. space capabilities continue to grow in number and sophistication. The proliferation of these weapons, by adversaries and non-state actors alike, is making space an increasingly dangerous place for civil, commercial, and military spacecraft to operate. Guardians are responsible for monitoring potential threats and defending U.S. space capabilities in danger.

Satellites not drawn to scale.

SPACE THREATS TO U.S. FORCES

China is the **PACING CHALLENGE**, improving space capabilities to **TRACK** and **TARGET** U.S. military forces. Russia remains an **ACUTE THREAT**.

- Modernizing infrastructure with capable satellites at scale that are a definite threat
- Aging infrastructure with some capable satellites in limited numbers; still an acute threat
- **2015:** Creation of PLA Strategic Support Force
- **2015:** Space units integrated into Aerospace Forces
- **2020:** Completion of BeiDou PNT Constellation
- **2021:** Fractional Orbital Hypersonic Vehicle Test
- **2022:** 62 Launches putting over 200 satellites into orbit, of which over 100 were intelligence platforms
- **2024:** Elevates military space capabilities under the PLA Aerospace Force

COUNTERSPACE THREATS TO U.S. SATELLITES

China and Russia are pursuing a wide range of counterspace capabilities to **DENY**, **DEGRADE**, or **DESTROY** U.S. space capabilities.

- Both have active direct-ascent anti-satellite (ASAT) missiles, are testing orbital ASAT systems, and currently employ lasers, jammers, and cyber capabilities
- Both consider space a warfighting domain through which to deny U.S. information advantage
- **2007:** Destructive Anti-Satellite Missile Test
- **2019:** Orbital ASAT Test/ Shadowed U.S. Satellites
- **2021:** Destructive Anti-Satellite Missile Test
- **2022:** Orbital Repair System Test/Moved Chinese Satellite to Different Orbit
- **2024:** Intelligence points to space nuclear weapon development

ORBITOLOGY

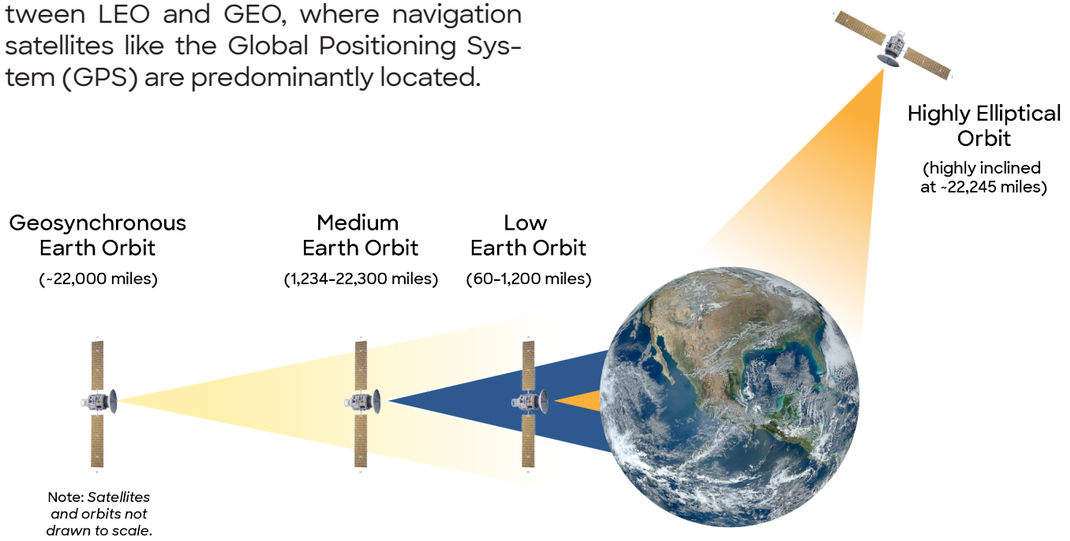
An orbit is a regular, repeating path that an object takes in space, and is only possible thanks to the Earth's gravity. Anything in space is in an orbit - satellites, planets, and asteroids are all in orbit. Near the Earth, there are four popular orbits that are commonly used by the Space Force.

Low Earth Orbit (LEO): Beginning at about 60 miles above the Earth's surface extending out to about 1,200 miles, LEO is the closest orbit to Earth. Due to their proximity, satellites here have a limited field of view and while they can observe in close detail, this limits their vantage point compared to higher orbits. Missions conducted from LEO include intelligence, surveillance, and reconnaissance, low-latency communications, and space-to-space surveillance.

Medium Earth Orbit (MEO): MEO is the volume of space (1,243 to 22,300 miles) between LEO and GEO, where navigation satellites like the Global Positioning System (GPS) are predominantly located.

Geosynchronous Earth Orbit (GEO): Approximately 22,000 miles above the Earth's surface, GEO is home to large and exquisite satellites. A special feature within GEO is the geostationary belt, which is parallel to the Earth's equator. Here, satellites orbit around the Earth at nearly the same rate that the Earth rotates on its axis. This means that they are almost 'parked' in space above the equator. GEO is ideal for missions such as weather, high-bandwidth communications, and missile warning.

Highly Elliptical Orbit (HEO): These orbits are both elliptical and eccentric, which makes them more ovular than circular in shape. Additionally, these orbits are often highly inclined which means satellites spend most of their time over one swath of the Earth's surface, usually near the North or South Poles. By using HEO, the Space Force enables communications in the most remote areas of our planet.

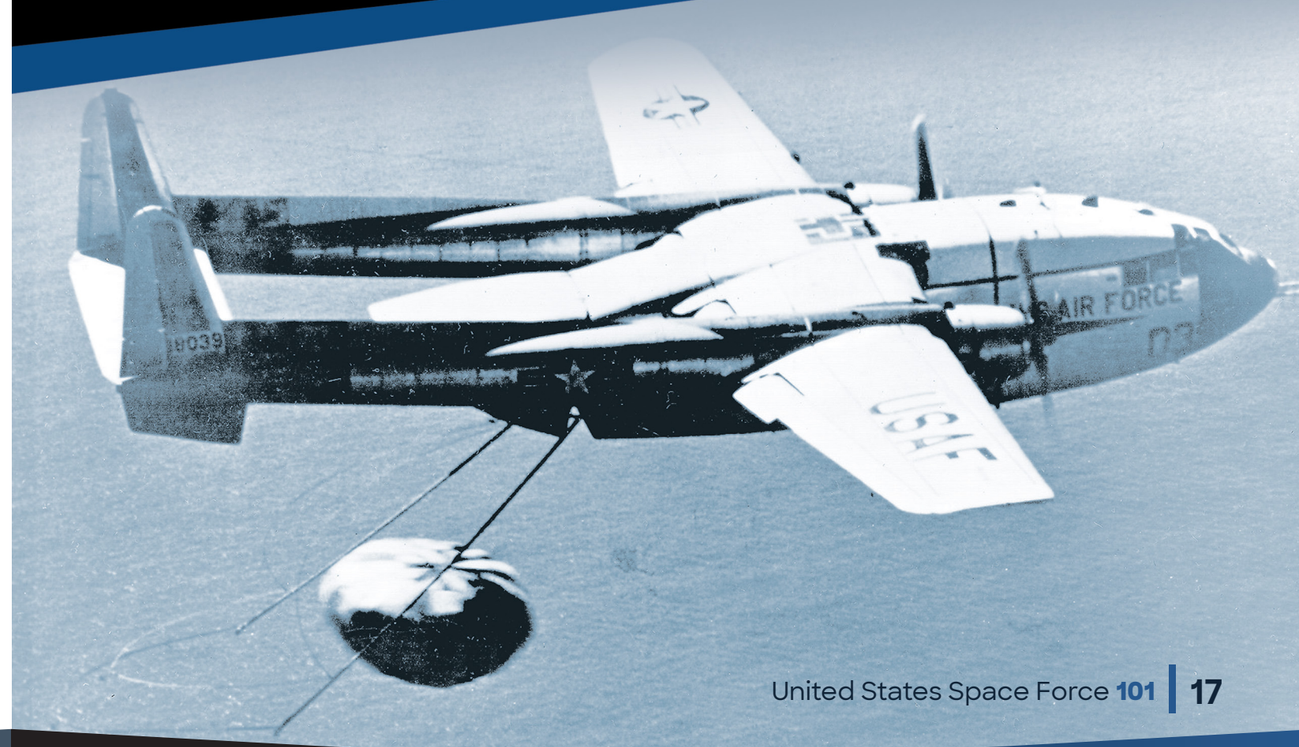


Note: *Satellites and orbits not drawn to scale.*

HISTORY OF THE MILITARY IN SPACE

While many Americans learn about the Space Race of the Cold War and the Apollo Era in schools, the military involvement in space both pre-dates these events and underpins both. The history of U.S. military space operations can be traced back to the birth of the Air Force in 1947, during the post-World War II era. Following World War II, General Henry "Hap" Arnold - then commander of Army Air Forces - tasked General Bernard Schriever to integrate and liaise with the scientific community to advance critical technologies that could be instrumental to the Air Force in the next global conflict. From the late 1950s on, the Department of Defense focused on developing space capabilities to support national military objectives, such as weather, surveillance and reconnaissance, communications, and navigation. On January 31st, 1958, the first U.S. satellite was launched and put on orbit, Explorer 1. Explorer 1 was designed, built, and operated by the Jet Propulsion Laboratory. Launched by the U.S. Army

CORONA program recovery of Discovery 14 capsule



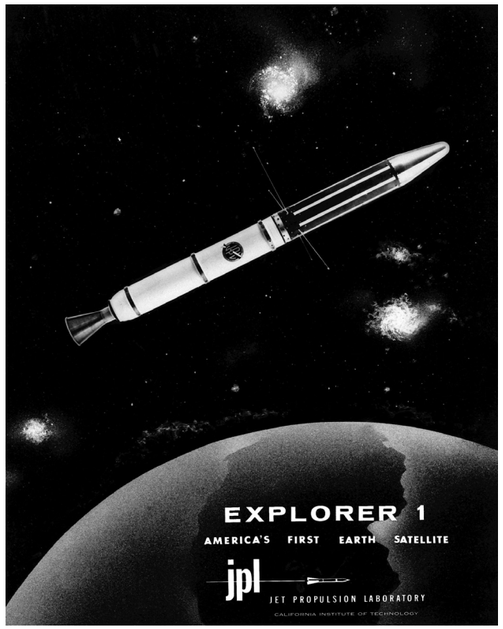
> Space capabilities came to play a significant role in supporting military operations and humanitarian relief operations.

Ballistic Missile Agency on a Jupiter C rocket, Explorer 1's primary scientific instrument was a cosmic ray detector designed to measure the radiation environment in Earth orbit. Two years later, on August 18, 1960, the National Reconnaissance Office (NRO), the United States' intelligence agency responsible for overhead intelligence, surveillance, and reconnaissance, launched its first successful CORONA Mission. CORONA was a space program which took images of the Soviet Union's territory from space and returned cannisters of film to be analyzed. The first cannister return contained 3,000 feet of film, imaging 1.65 million square miles of the Soviet Union. The NRO continued the CORONA program for the next twelve years and conducted 145 missions.

At the same time, the Air Force also supported the famed NASA Mercury, Gemini, and Apollo missions. By the mid-1970s, the U.S. Air Force managed the preponderance of space systems for the Defense Department, but these were still organizationally fragmented. By 1982 it became evident that the Air Force needed an organization solely dedicated to space. Thus, Air Force Space Command was activated within the Air Force on September 1, 1982, to execute space operations. Air Force Space Command existed until the activation of the Space Force in 2019.

As space capabilities matured, they proved their value during the 1990-1991 Gulf War in Operation DESERT SHIELD and DESERT STORM. This was the first time that space capabilities were leveraged to their fullest extent in support of American forces through the use of the Global Positioning Service (GPS) and satellite communications. Later, DESERT STORM also became known as "the first space war." Over the ensuing decades, space capabilities came to play a significant role in supporting military operations and humanitarian relief operations. The integration and reliance on space capabilities only continued to grow after the devastating attacks on September 11, 2001. Advancements in space capabilities, coupled with deep integration across the U.S. military, were critical to the Global War on Terror. It was during these operations that adversaries realized the benefits gleaned from space, as well as the incredible reliance the United States put on space capabilities.

The seal of the Air Force Space Command, activated on September 1, 1982.



Artist's rendering of EXPLORER 1

Throughout the 2000s, Russian and Chinese space and counterspace capabilities began to increase, as the space domain itself became more congested and contested. As these competitors increased their capabilities in space, it became clear that space was no longer a benign environment, and the U.S. military could no longer count on freedom of operations in space.

In 2018, an idea that had been debated in academic and policy communities since 2001 was finally considered at the highest echelons of government: Did the United States need its own military service for space? Through a bipartisan effort in Congress, sentiments to create a dedicated service for space capabilities and professionals gained momentum. In June 2018, President Donald J. Trump directed the Department of Defense to begin planning for such a force. On December 20, 2019, he signed the Fiscal Year 2020 National Defense Authorization Act, which called for the creation of a new military service focused on space operations. The United States Space Force was born.

The Space Force was established to protect the Joint Force in space and from adversarial space and counterspace capabilities. Guardians also secure space superiority for the nation, which ensures that the United States always has access to the benefits of outer space for security, commerce, and exploration.

SEAL & SYMBOL

Approved shortly after the establishment of the U.S. Space Force, the colors, symbolism, and design of both the seal and delta symbols harken back to the history of space within the Department of Defense.

The Space Force Delta Symbol's origin reflects the letter delta from the Greek alphabet. The delta's evolution is traced from those ancient beginnings to the 20th century space race where it was core to the "rocket equation" which makes space launch possible.

$$\Delta v = v_e \ln \frac{m_0}{m_f}$$

Scan the QR code below to learn more about the history of the Space Force.

NOTES

SPACE IS A WARFIGHTING DOMAIN:

- The American way of life depends on space for its prosperity and its security.
- Our adversaries are ready and able to deny U.S. spacepower.
- The Space Force will not let that happen—we will secure our nation's interests in, from, and to space.

UNITED STATES
SPACE FORCE

Version 2.1