



ANALYSIS

PROTECTING AND ADVANCING U.S. NATIONAL INTERESTS IN OUTER SPACE¹

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Despite general interest in the heavens and periodic fascination with celestial events, the exploration and use of outer space tend to be considered esoteric matters unrelated to daily life in America or other nations. Yet the activities conducted in space have a profound impact on the United States, its foreign relations, and the world. Determining how space activities should serve U.S. national interests was an imperative for American policy makers during the 20th century. Today's imperative is determining how to protect and advance U.S. interests in space. America won the first space race with the Soviet Union and became the preeminent spacefaring nation when the Apollo 11 astronauts landed on the Moon in 1969. That contest was driven by the U.S.-Soviet geopolitical rivalry for the competitive advantages enabled by rocket and satellite technology.

The United States is again engaged in a geostrategic rivalry with an astropolitical dimension which extends to cislunar space, the region between geosynchronous Earth orbit and the Moon's surface. Despite entering the new space race with a considerable head start, America is at risk of losing its leadership position. Foreign powers are eroding U.S. strategic advantages in space as well as threatening freedom of access to and use of the domain. Near Earth space now reflects the complex, dynamic, and dangerous international security environment and the competition is spreading across the Earth-Moon system. The Peoples Republic of China seeks to supplant the United States as the preeminent space power by its centennial anniversary in 2049, if not sooner.²

Unfortunately, America has contributed to this situation through wavering political resolve, programmatic and fiscal instability, and risk averseness. This reflects either a fundamental lack of awareness, or insufficient appreciation, of U.S. national interests. Such interests are typically defined as the values, conditions, and factors of major importance to America's preservation and well-being. These include specific concerns such as territorial integrity, access to global markets and resources, and international order as well as broad ideals such as freedom, human rights, and economic prosperity. Vital interests are those of overriding importance to the United States' safety, integrity, and survival.

¹ This article is adapted from a National Security Space Association (NSSA) "Presidential Transition Issue Paper," entitled, "Winning the Competition for Space Leadership," and is printed here with permission. The views expressed herein are solely those of the author.

² See, for example, Marc Berkowitz and Chris Williams, "Strategic Implications of China's Cislunar Space Activities," Occasional Paper, National Security Space Association, August 21, 2023, available at <https://nssaspace.org/wp-content/uploads/2023/08/Strategic-Implications-of-Chinas-Cislunar-Space-Activities-8.21-final.pdf>.



For decades, successive presidential administrations of both political parties have declared that access to and use of space are U.S. vital national interests.³ This article examines why sustaining leadership in space exploration and use are of overriding importance to America. It discusses the competitive advantages the United States derives from space leadership, the imperative of protecting and advancing U.S. national interests in space, and how to sustain the America's preeminence in space activities.

Competitive Advantages

Space power is the total strength of a nation's capabilities to conduct and influence activities to, in, thru, and from outer space to achieve its national objectives.⁴ Prowess in space operations contributes to all elements (diplomatic, informational, military, and economic) of U.S. national power. America leverages its position as the world's leading spacefaring nation for a broad range of competitive advantages — political prestige, international influence, scientific knowledge, technological advancement, and economic prosperity, as well as U.S. and international security.

Prestige and Influence

The United States' leadership in space exploration and use enhances its political prestige and international influence. The domestic and international political benefits of America's mastery of space operations increases national pride and demonstrates the success of U.S. values, culture, and governance model to the world.⁵ Achievements in space activities generate respect and admiration at home and abroad. Regard for American scientific, technological, commercial, and national security space capabilities influence the policies and behaviors of other actors in the international system.

The three U.S. government (civil, defense, and intelligence) space sectors as well as the private or commercial space sector contribute to America's status. In addition to the Mercury, Gemini, and Apollo programs, the civil sector's human spaceflight accomplishments include extra vehicular activities, long duration habitation, and novel research and development on space shuttles and space stations. The United States excels at robotic space exploration, Earth observation and environmental monitoring, and myriad

³ *United States Space Priorities Framework* (Washington, D.C.: The White House, December 2021), available at <https://www.whitehouse.gov/wp-content/uploads/2021/12/united-states-space-priorities-framework--december-1-2021.pdf>.

⁴ *Spacepower Doctrine for Space Forces* (Washington, D.C.: Headquarters U.S. Space Forces, June 2020), available at https://www.spaceforce.mil/Portals/1/Space%20Capstone%20Publication_10%20Aug%202020.pdf.

⁵ Brian Kennedy and Alex Tyson, "Americans' Views of Space: U.S. Role, NASA Priorities and Impact of Private Companies," *Pew Research Center*, July 20, 2023, available at <https://www.pewresearch.org/science/2023/07/20/americans-views-of-space-u-s-role-nasa-priorities-and-impact-of-private-companies/>.

applications of satellite positioning, navigation, and timing as well as geospatial information services.

Similarly, activities conducted by the defense and intelligence space sectors contribute to America's prestige. In fact, the U.S. established the ability to access and use space for national security purposes as a *sine qua non* and symbol of great power status. Additionally, the commercial space sector enhances the nation's status through development and operation of reusable launch systems, dramatically lowering the cost of access to space, high quality geospatial imagery, telecommunications, satellite internet, and other space-related goods and services.

U.S. prestige and influence produce both tangible and intangible benefits in international relations, commerce, and trade. Cooperation in space activities is a valuable foreign policy tool. During the Cold War, such cooperation helped to manage the Soviet-American rivalry and served as a symbol of détente between the superpowers.⁶ Similarly, international space cooperation eased tensions as the Cold War ended, kept Russian rocket scientists and engineers employed, and helped to prevent the proliferation of ballistic missile technology and know-how.

Today, the Artemis Accords are an important instrument for reinforcing common values and interests involving international cooperation in the peaceful and sustainable uses of space.⁷ The international agreement, signed by forty nations, establishes a foundation for a new era of space exploration. Signatories commit to cooperation, transparency, and responsibility by working as partners in the exploration and use of space rather than as rivals. The worldwide diffusion of space technology and know-how as well as reduced launch costs, lowering the barriers to entry into the development and application of space capabilities, provide greater opportunities for such collaboration.

Other members of the international community seek to establish space-related political, economic, and security ties with America. Whether the mode of influence is private or public diplomacy, cultural exchanges, economic interactions, or latent U.S. power, this contributes to America's ability to shape decisions and actions by foreign governments, organizations, and individuals. This, in turn, helps to sustain the rules-based international order the United States and its allies established after World War II to enable peace and security.

Science and Technology

U.S. leadership in space activities greatly increases America's and the world's scientific knowledge about our planet, solar system, galaxy, and the universe. It also generates

⁶ "U.S.-Soviet Cooperation in Outer Space, Part 1: From Yuri Gagarin to Apollo-Soyuz," National Security Archive, April 12, 2021, available at <https://nsarchive.gwu.edu/briefing-book/russia-programs/2021-04-12/us-soviet-cooperation-in-outer-space-part-1-1961-1975>; and "U.S.-Soviet Cooperation in Outer Space, Part 2: From Shuttle-Mir to the International Space Station," National Security Archive, May 7, 2021, available at <https://nsarchive.gwu.edu/briefing-book/russia-programs/2021-05-07/us-soviet-cooperation-outer-space-part-2>.

⁷ "The Artemis Accords," National Aeronautics and Space Agency, 2020, available at <https://www.nasa.gov/artemis-accords/>.

advancements in a broad range of technologies and applications which improve the lives of Americans and peoples around the world. The scientific, technological, engineering, and mathematical knowledge and skills required to conduct space operations greatly contribute to the United States' status, well-being, and security.

America is the first nation to land humans on and explore the Moon as well as visit every planet in the solar system. When Japan, China, or another nation eventually accomplishes the feat in the coming decades, it will be more than half a century since Neil Armstrong took humankind's first step onto the lunar surface. U.S. spacecraft were also the first to investigate Mars, including with the Curiosity and Perseverance rovers as well as the Ingenuity helicopter, in addition to landing on and returning samples from the Bennu asteroid.

Moreover, science missions conducted with the Spitzer, Chandra, Compton, Hubble, and Webb space telescopes provide unprecedented views of celestial objects and events. These observatories, among other things, discovered thousands of new galaxies, helped to determine the age of the universe, and that nearly every major galaxy is anchored by a black hole at its center. Similarly, Earth observation and environmental monitoring missions improve knowledge of our planet, resource utilization, and weather forecasting. Indeed, the civil space program significantly increases understanding of the Sun's impact on Earth's weather and climate systems.

U.S. space activities have produced countless other scientific discoveries. These include determining that ancient Mars had the chemistry necessary to sustain microbial life, finding a vast ocean of liquid water below the ice on Jupiter's moon Europa, and detecting over 4,000 planets beyond our solar system just within the Milky Way galaxy.⁸ It also includes confirming the existence and obtaining the first image of a black hole as well as seeing back nearly to the beginning of the universe.⁹

The U.S. space program is responsible for a wide variety of technological advancements and spinoffs. These include, for example, advances in materials, propulsion, sensing, computing, robotics, and manufacturing. Notable byproducts of the space program include freeze dried food, aural thermometers, artificial limbs, computerized tomography scanners, water purification systems, and portable computers.¹⁰ The program has benefited the agriculture, transportation, energy, healthcare, consumer products, and information technology sectors. America is respected for the advanced technology exemplified by its government and commercial space capabilities.

Moreover, technological advancements from the space program strengthen U.S. and international security. Space capabilities provide global situational awareness, facilitate

⁸ "Europa Up Close," National Aeronautics and Space Agency, available at <https://exoplanets.nasa.gov/>.

⁹ "Black Holes," National Aeronautics and Space Agency, available at <https://science.nasa.gov/universe/black-holes/>; and "Early Universe," National Aeronautics and Space Agency, available at <https://science.nasa.gov/mission/webb/early-universe/>.

¹⁰ "Spinoff," National Aeronautics and Space Agency, available at <https://spinoff.nasa.gov/>.

diplomacy, collect intelligence on foreign intentions and capabilities, and enable national and collective self-defense. They underpin deterrence, support the planning and execution of military operations and intelligence activities across the conflict spectrum, and reinforce America's foreign policy and defense commitments to allies and international partners.

Prosperity and Security

U.S. preeminence in space activities also increases the nation's wealth. Public and private investments in space capabilities drive technological and economic development. The international commercial space marketplace is projected to grow from about to over \$1 trillion by 2030. America is the global leader in space investment, innovation, and invention.

U.S. private enterprises are catalysts of the commercial space economy's growth. Private investment in most areas of space research and development now exceeds the U.S. government's investment. According to the most recent federal government data, the U.S. space economy accounted for \$211.6 billion (B) of gross output, \$129.9B (0.6 percent) of gross domestic product, \$51.1B of private industry compensation, and 360,000 private industry jobs in 2021.¹¹ The U.S. commercial space sector is vibrant and innovative. It either leads or competes successfully in the mature market segments of launch services, telecommunications, Earth observation, and navigation. The U.S. commercial space sector is similarly positioned in emerging market segments such as space situational awareness, tourism, in-space servicing and manufacturing, and resource extraction and utilization.

American space systems are integral to the national and global information infrastructures. They collect, generate, and relay an extraordinary volume and variety of data and information around the world as well as help to control physical assets in all sixteen U.S. critical infrastructure sectors. U.S. satellite internet, telecommunications, geospatial, and positioning, navigation, and timing services effectively are now utilities. They enhance the reliability and efficiency, among other things, of power grids' transmission and distribution, all modes of transportation and logistics, processing and analytics of hundreds of millions of financial transactions a second, synchronization of cellular telephone networks, and delivery of emergency services and disaster relief. In today's global economy, space-derived data, information, and knowledge are engines of prosperity.

Additionally, as noted, space leadership contributes to U.S. and international security. Defense and intelligence space systems enable U.S. national security strategy as well as support foreign policy and security commitments to allies and international partners. They provide awareness of global trends, conditions, and events, access to contested and denied areas, and unobtrusive forward presence. Moreover, space capabilities are high technology force multipliers which enhance the efficiency and effectiveness of joint and combined military operations.

¹¹ Department of Commerce, "U.S. Space Economy Statistics 2012-2021," available at https://apps.bea.gov/scb/issues/2023/06-june/0623-space-economy.htm?_gl=1*m8uxgg*_ga*MTE1NzcyNjYwNy4xNzAxNDU2NDI5*_ga_J4698JNNFT*MTcwMTQ1NjQyOS4xLjEuMTcwMTQ1NjQ5My4wLjAuMA.

Space systems are central to America's way of deterrence and warfighting. U.S. nuclear deterrence operations, for example, rely on satellite systems for war planning, indications, warning, and attack assessment, missile launch detection, tracking, and defense, nuclear command, control, and communications, weapons targeting and delivery, nuclear detonation detection, and battle damage assessment. Space assets enable the top cover provided by U.S. strategic forces and extended deterrence to allies.

Indeed, space capabilities are the leading edge of U.S. information-age military power. Space operations enable U.S. global power projection with speed, precision, and lethality. They reduce the risk to U.S. and allied forces as well as help to minimize collateral damage. Satellite systems enable maneuver, synchronization, and massing of coercive effects from dispersed forces in non-linear, multi-domain, military operations. In particular, the command, control, communications, computing, intelligence, surveillance, and reconnaissance provided by space systems are critical to achieving information and decision superiority over adversaries. The ability to sense, comprehend, and make informed decisions faster than an adversary allows military forces to gain the initiative and dictate the timing and tempo of joint and combined operations.

Strategic Imperative

The conduct of activities in outer space, as highlighted above, enhance the prestige, influence, prosperity, and security of the United States. Space capabilities are woven into the socioeconomic fabric of the nation, embedded in critical infrastructures, enable national essential missions and functions, and contribute to America's way of life. The erosion of U.S. strategic advantages in space thus must be reversed to protect and advance America's national interests.

U.S. decision makers, opinion leaders, and the public must be aware of and appreciate America's interests in space. They must be well informed about the benefits the United States derives from its position as the world's leading spacefaring nation. Similarly, they must be knowledgeable about the risks of allowing the continued erosion of U.S. strategic advantages in space and consequences of conflict beginning in or extending to the domain. In short, clarity about America's national purpose in the exploration and use of space must be restored.

Concurrently, the United States must confront the challenge to its national interests in space posed by a new entente of rival Axis powers. U.S. national, homeland, and economic security are imperiled by foreign powers contesting the freedom of space. Russia, China, Iran, and North Korea are led by autocratic regimes with revisionist or irridentist political objectives seeking to change the international order at the expense of the security of the U.S., our allies, and friends. These nations act independently and collude to undermine international norms of responsible behavior as well as threaten or use armed force to achieve their political aspirations.

All four countries possess either anti-satellite (ASAT) or counterspace weapon systems which put U.S. vital interests in space at risk.¹² Russia and China operate cyber, electronic warfare, kinetic energy, directed energy, nuclear, and orbital anti-satellite or counterspace weapons. Iran and North Korea also have cyber, electronic warfare, and missile capabilities which could interfere with space assets and operations.¹³ Such space warfare capabilities could be employed to undermine U.S. and allied political resolve, societal cohesion and morale, economic vitality, intelligence gathering, and combat effectiveness.

Indeed, Russia and China see space a domain in which they can coerce the United States because of its dependence upon vulnerable space systems. They have conducted destructive tests of direct ascent anti-satellite missiles which generated large amounts of orbital debris, endangered space flight safety, and harmed the sustainability of the space environment. Russia has developed a nuclear-armed, space-based ASAT weapon and evidently is preparing to deploy it on-orbit in contravention of the 1967 Outer Space Treaty.¹⁴ Such an orbital “Sword of Damocles” would likely create a situation akin to the 1962 Cuban Missile crisis which brought the world to the brink of thermonuclear war.

Russia has attacked Viasat’s KA-SAT commercial communications satellite ground control system, Starlink’s satellite internet service, and the U.S. Global Positioning System’s positioning, navigation, and timing signals during its unlawful war of aggression against Ukraine.¹⁵ Indeed, U.S. government and commercial space systems reportedly are regularly being interfered with by non-kinetic weapons in grey zone operations.¹⁶ In addition, China has developed and tested a fractional orbital bombardment weapon on a hypersonic glide vehicle.¹⁷ Moreover, both Russia and China crossed the threshold and weaponized space by deploying, testing, and exercising orbital weapons involving rendezvous and proximity operations.

¹² Defense Intelligence Agency, *Challenges to Security in Space* (Washington, D.C.: Department of Defense, 2022), available at https://www.dia.mil/Portals/110/Documents/News/Military_Power_Publications/Challenges_Security_Space_2022.pdf; National Space Intelligence Center, *Competing in Space* (Wright Patterson, AFB, Ohio, 2018), available at <https://media.defense.gov/2019/Jan/16/2002080326/-1/-1/0/190115-F-NV711-0001.JPG>; National Space Intelligence Center, *Competing in Space*, 2nd ed., (Wright-Patterson AFB, Ohio, 2024), available at https://www.spoc.spaceforce.mil/Portals/4/Images/2_Space_Slicky_11x17_Web_View_reduced.pdf; *Space Threat Assessment 2023* (Washington, D.C.: Center for Strategic and International Studies, 2023), available at <https://www.csis.org/analysis/space-threat-assessment-2023>; and *Global Counterspace Capabilities: An Open Source Assessment* (Washington, D.C.: Secure World Foundation, 2024), available at https://swfound.org/media/207826/swf_global_counterspace_capabilities_2024.pdf.

¹³ Ibid.

¹⁴ See, for example, Marc J. Berkowitz and Chris Williams, “Russia’s Space-Based, Nuclear-Armed Anti-Satellite Weapon: Implications and Response Options,” Occasional Paper, National Security Space Association, May 16, 2024, available at <https://nssaspace.org/wp-content/uploads/2024/05/Russian-Nuclear-ASAT-5.16.24.pdf>.

¹⁵ See, for example, Marc J. Berkowitz, “America’s Asymmetric Vulnerability to Navigation Warfare,” Occasional Paper, National Security Space Association, July 18, 2024, available at <https://nssaspace.org/wp-content/uploads/2024/07/NAVWAR-FINAL.pdf>.

¹⁶ See, for example, Josh Rogin, “A Shadow War in Space is Heating Up Fast,” *The Washington Post*, November 30, 2021, available at <https://www.washingtonpost.com/opinions/2021/11/30/space-race-china-david-thompson/>.

¹⁷ See, for example, *Challenges to Security in Space*, *Space Threat Assessment 2022*, and *Global Counterspace Capabilities*, op. cit.

China recognizes that space is the ultimate high ground and “the commanding height of strategic competition.”¹⁸ The Chinese Communist Party aspires to accumulate power to dominate the ongoing geopolitical and astropolitical contests. It is executing a military-civil fusion strategy, vastly expanding its space posture and operations, and integrating space capabilities into military plans for “precision-strike” and “system destruction” warfare.

Furthermore, China continues to put the infrastructure in place and conduct operations at Lagrange points, lunar transfer orbits, lunar orbits, and the Moon. It aims to use such “strategic points, resources, and thoroughfares” in cislunar space—the region beyond geosynchronous Earth orbit and the Moon—to exert influence on or control over the Earth-Moon system.¹⁹ In particular, this includes the extraction of rare minerals and Helium-3 from the lunar surface estimated to be worth trillions of dollars to increase China’s international competitiveness, wealth, and power. In this regard, China plans to land taikonauts on the Moon by 2030 and operate an International Lunar Research Station with Russia by 2035.

Given the expansion of the intensifying international rivalry to space, the U.S government must ensure that the nation is prepared to deter or, if necessary, defeat the threat or use of armed force in the domain. An adversary may decide to begin or extend conflict to space because of U.S. dependence on space systems and their strategic significance to the nation. Hostilities in space could influence the course and outcome of war. If America were denied use of mission-critical space assets, it would be weakened and reduced to a second or third tier industrial-age power or worse.

Conflict in space will not be isolated to the domain since the information lines of communications through space are directly linked to the U.S. homeland. The secondary and tertiary effects of the disruption or loss of key space capabilities will directly impact America. Given U.S. dependence on space services, their integration into critical infrastructures, and associated interdependencies, the impact of a lengthy disruption of such services just to the power grid could have cascading effects and unravel America’s socioeconomic fabric. This would likely include casualties and fatalities from the interruption of water, food, and fuel supply and distribution, information technology and communications networks, transportation, financial transactions, and emergency services.

Hostile acts against space systems could influence perceptions, corrupt, disrupt, or usurp decision-making, and create deliberate or unintended effects on a cascading, global scale. Such effects may occur at an exponentially faster pace than previously experienced, endure for long periods of time, and generate large-scale collateral damage. In today’s interconnected world, an attack on one state’s space systems could adversely impact all nations.

¹⁸ The State Council Information Office of the People’s Republic of China, “China’s Military Strategy,” May 2015, available at http://eng.mod.gov.cn/Press/2015-05/26/content_4586805.htm.

¹⁹ Berkowitz and Williams, “Strategic Implications of China’s Cislunar Space Activities,” *op. cit.*

Sustaining U.S. Leadership

The United States has the wherewithal to sustain its position as the world's preeminent space power. It has the necessary human capital, scientific knowledge, financial resources, technological capability, and industrial capacity. Moreover, in comparison to its main rivals, America has the asymmetric advantages of individual liberty, free enterprise, and allies with common values and interests. The United States seemingly only lacks the political leadership and resolve to protect and advance its interests in space.

Education about the value of space activities to the nation in general and Americans' daily lives in particular is essential to increase awareness and appreciation of U.S. interests in space, the stakes of the ongoing geopolitical and associated astropolitical contests, the risks of further erosion of America's space advantages, and potential consequences of war in space. Instead of suffering a "Space Pearl Harbor" as the 2000 Space Commission warned,²⁰ informing the polity about the strategic significance of space and the value of U.S. leadership in the domain should provide a catalyst for leaders to demonstrate political will, stabilize space programs and budgets, manage risks, and undertake the preparations necessary to deter or, if necessary, defeat threats to U.S. interests in space.

Despite the deep political divisions in the country, space activities are neither a polarizing nor partisan issue. Aside from occasional debate about whether investment in certain space capabilities is worth the expected return and the desire to keep the heavens unsullied by weaponry or pollution, space policy matters mainly have been devoid of partisan politics. In fact, the national pride, scientific knowledge, economic growth, technological advancement, and national security derived from the exploration and use of space are part of the solution to many of the problems facing America.

Leadership from the President and Congress as well as competent stewardship and consistent execution by all space sectors are required to protect and advance U.S. interests in space. The federal government must establish a compelling vision, clear objectives, and policy guidance to restore America's national purpose in space.²¹ As President John F. Kennedy stated, "The exploration of space will go ahead, whether we join in it or not, and it is one of the great adventures of all time, and no nation which expects to be the leader of other nations can expect to stay behind in the race for space."²²

The U.S. government must also formulate and implement a comprehensive national strategy which links policy objectives (ends), courses of action (ways), and resources (means) to sustain U.S. leadership in the exploration and use of space. The strategy must be "whole of nations" to encompass and leverage the human, financial, and technical resources

²⁰ *Commission to Assess United States National Security Space Management and Organization* (Washington D.D.: January 11, 2001), available at <https://apps.dtic.mil/sti/pdfs/ADA404328.pdf>.

²¹ Marc J. Berkowitz, "Winning the Competition for Space Leadership," Presidential Transition Issue Paper Series, National Security Space Association, August 15, 2024, available at https://nssaspace.org/wp-content/uploads/2024/08/NSSA-Presidential-Transition-Paper-Series_1.pdf.

²² President John F. Kennedy, "Address at Rice University on the Nation's Space Effort," September 12, 1962, available at <https://www.jfklibrary.org/learn/about-jfk/historic-speeches/address-at-rice-university-on-the-nations-space-effort>.

of the U.S. public and private space sectors as well as allies and partners. While America does not necessarily have to lead in all aspects of space activities, it must do so in the missions essential to its preservation and well-being. Moreover, it must continue to be the first mover establishing the operational precedents for responsible spacefaring behavior.

America must take a leadership role in continuing to advocate for the peaceful uses of space, encourage other nations to adhere to the international space legal regime, and set appropriate precedents for norms of responsible spacefaring behavior. The United States must also continue to lead and orchestrate international cooperation in the exploration and use of space. Allies and partners now have significant space capabilities to contribute to space exploration, collective security, and mutual defense. Similarly, the U.S. government must continue to establish the statutory and regulatory framework necessary to sustain the commercial space sector's growth and take full advantage of its goods and services. It must align the government's roles as consumer, investor, and regulator of the commercial space sector to enable and harness the ingenuity and initiative of private enterprise.

In particular, the federal government must establish the proper incentives and partnerships with private enterprises to ensure that the United States wins the new space race. America must make winning the contest a priority to ensure it maintains its leadership role in space activities, shapes the operating environment across the Earth-Moon system, and is able to access and utilize lunar and other resources in the solar system. Indeed, the United States must provide the international leadership and power to extend the rules-based order to space and assure that no hostile nation or condominium of nations gains control over the freedom of passage through and operations in the Earth-Moon system.

Concurrently, America must directly confront the unprecedented buildup of space armaments by rivals, especially by China and Russia, and the challenge they pose to the freedom of operations in and passage through space. While it is preferable to counter the threat to the freedom of space in concert with allies and partners, the United States must act independently to protect its vital interests if it must. The U.S. armed forces must be structured and postured to deter or prevail in the event of a conflict that begins in or extends to space. Indeed, America must field and operate the defense and intelligence space capabilities required for national or collective self-defense. This includes capabilities to evade, withstand, operate through, suppress, and destroy threats to space systems, joint or combined forces, as well as U.S. and allies' homelands.

Consequently, the United States must prioritize the acquisition, deployment, and operation of a dynamic, layered, space defense-in-depth with passive and active countermeasures.²³ Critical space mission capabilities must have sufficient survivability, endurance, and operational continuity to assure U.S. national, homeland, and economic security, sustain national essential missions and functions, and support commitments to allies and partners even under the most stringent wartime scenarios. While proliferation,

²³ See, Marc J. Berkowitz, "Redesigning Space Forces for Deterrence and Warfighting," Occasional Paper, National Security Space Association, February 2, 2023, available at https://nssaspace.org/wp-content/uploads/2023/02/pub_2023-02-23.pdf, for a discussion on how to alter the structure, posture, and operating practices of U.S. space forces.

distribution, and diversification of space mission architectures will enhance mission assurance and resilience against some ASAT and counterspace threats, active defenses for suppression and destruction of other threats will be necessary for space deterrence and warfighting as they are in all other domains. Moreover, offensive capabilities are essential to counter an enemy's hostile uses of space for targeting, command and control, and weapons delivery and provide force protection and operations security. A range of such capabilities and effects are critical to pre-war and intra-war deterrence, escalation control, and warfighting.

Conclusion

If America is to continue to realize the strategic advantages it has derived from being the world's leader in the exploration and use of outer space, national decision makers, opinion leaders, and the public must be aware of and appreciate U.S. national interests in the domain. Space systems are essential to the nation's preservation and well-being. Although transparent to most Americans, space capabilities contribute to the nation's prestige, influence, knowledge, wealth, and power. Indeed, space activities are not esoteric pursuits disconnected from the daily lives of Americans. They directly impact their welfare and security.

Sustaining the United States position as the leading spacefaring nation in the world and mitigating its vulnerability to the threat or use of armed force in space should not be a polarizing or partisan political issue. U.S. leaders must comprehend and be able to explain to the public why access and use of space are a vital national interest. To win the ongoing geopolitical and astropolitical contests, America must restore clarity about its national purpose in the exploration and use of space, reverse the erosion of its competitive advantages in space, and sustain its preeminence in space activities. Bold leadership and decisive action, utilizing all elements of national power and instruments of statecraft, are needed to protect and advance U.S. national interests in space.

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