Biden Administration U.S. Space Force Policy Literature

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Abstract

The U.S. Space Force (USSF) was established during the Trump Administration. With the 2021 transfer of power to the Biden Administration, there was some debate as to whether the newest U.S. armed service branch would continue in the new administration. Policy pronouncements from the Biden Administration and ongoing congressional oversight and appropriations demonstrate that USSF will remain a key part of the U.S. national security architecture. This work examines U.S. Government literature on USSF produced by the Biden Administration, other U.S. government agencies, and congressional oversight entities during the first three quarters of 2021. It demonstrates there is sufficient bipartisan support to financially and politically sustain USSF for the foreseeable future. How long this support is sustained remains to be determined based on managerial developments with USSF and the extent the international security environment places increasing emphasis on USSF using its evolving capabilities to address emerging threats to U.S. and allied national security requirements.

Keywords: United States Space Force, Biden Administration, U.S. congress, congressional oversight, China military space power, Russia military space power, space force education, and space force defense contracting

Literatura de política de la Fuerza Espacial de EE. UU. de la Administración Biden

Resumen

La Fuerza Espacial de los Estados Unidos (USSF) se estableció durante la Administración Trump. Con la transferencia de poder de 2021 a la Administración Biden, hubo cierto debate sobre si la nueva rama del servicio armado de EE. UU. continuaría en la nueva administración. Los pronunciamientos de política de la Adminis-

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tración Biden y la supervisión y asignaciones continuas del Congreso demuestran que la USSF seguirá siendo una parte clave de la arquitectura de seguridad nacional de EE. UU. Este trabajo examina la literatura del gobierno de los EE. UU. sobre el USSF producida por la Administración Biden, otras agencias gubernamentales de los EE. UU. y entidades de supervisión del Congreso durante los primeros tres trimestres de 2021. Demuestra que existe suficiente apoyo bipartidista para sostener financiera y políticamente al USSF en el futuro previsible. Queda por determinar cuánto tiempo se sostendrá este apoyo en función de los desarrollos gerenciales con USSF y la medida en que el entorno de seguridad internacional pone un énfasis cada vez mayor en USSF utilizando sus capacidades en evolución para abordar las amenazas emergentes a los requisitos de seguridad nacional de EE. UU. y aliados.

Palabras clave: Fuerza Espacial de los Estados Unidos, Administración Biden, Congreso de los Estados Unidos, Supervisión del Congreso, Poder espacial militar de China, Poder espacial militar de Rusia, Educación de la fuerza espacial y Contratación de defensa de la fuerza espacial

拜登政府下的美国太空军政策文献

摘要

美国太空军（USSF）成立于特朗普政府时期。随着 2021 年权力移交给拜登政府，关于这一最新的美国武装部队是否会在新政府中继续存在一事出现了争论。拜登政府的政策声明以及正在进行的国会监督与拨款表明，USSF 仍将是美国国家安全架构的关键部分。本文分析了2021 年前三个季度中拜登政府、其他美国政府机构以及国会监督实体所制定的关于 USSF 的政府文献。分析表明，在可预见的未来，两党会提供充足的支持，以在财政和政治上维持 USSF。这种支持的持续时间仍取决于 USSF 的管理发展以及国际安全环境在多大程度上越来越重视 USSF，使用其不断发展的能力来应对美国与盟国国家安全要求所面临的新威胁。

关键词：美国太空军，拜登政府，美国国会，国会监督，中国太空军事力量，俄罗斯太空军事力量，太空军教育，太空军国防承包

Introduction

Legally established during the Trump Administration by the Fiscal Year 2020 National Defense Authorization Act on December 1, 2020 (Public Law 116-92), the United States Space Force (USSF) has overcome temporarily brief hyper-partisan opposition from some elements of the Biden Administration's political base to become a regular part of the U.S. military as documented in U.S. Government and military information resources. Groups such as Greenpeace, Code Pink, the Union of Concerned Scientists, Win Without War, and Physicians for Social Responsibility argued:

> The proposed Space Force will create an unnecessary bureaucracy that will cost taxpayers over $16 billion in fiscal year 2021 alone, and tens of billions more in the coming years, while focusing U.S. efforts on militarization rather than cooperation in space, increasing the risks to U.S. military and civilian space assets. (Wolfgang, B., 2020).

Hopes for USSF abolition were destroyed early in the Biden Administration. On February 2, 2021, White House press secretary Jen Psaki announced: "We look forward to continuing the work of the Space Force and invite the members of the team to come visit us in the briefing room and share an update on their important work." USSF's continuance was also demonstrated by its strong support within the military and bipartisan congressional support including March 2, 2021 announcements by House and Senate Armed Services Committee chair Representative Adam Smith (D-WA) and Senator Jack Reed (D-RI), with Smith spokesperson Monica Matoush and Reed spokesperson Chip Unruh publicly verifying their support for USSF as a standalone service. Congressional Republican support for USSF was by Representative Mo Brooks (R-AL), who said "I will fight any effort to minimize or eliminate the Space Force as a separate branch of America's military" (Halaschak, 2021; Perano, 2021).

Early Biden Administration Policymaker Statements

Early indication of possible Biden Administration thinking on USSF was reflected in answers to Advance Policy Questions (APQ) submitted by the Senate Armed Services Committee to eventual Secretary of Defense Lloyd Austin, Deputy Secretary of Defense Kathleen Hicks, and Undersecretary of Defense for Policy Colin Kahl as part of their confirmation process. During his January 19 confirmation hearing, Austin did not refer to USSF in his opening statement (Austin, 2021). Responding to the committee's question about whether USSF's creation was warranted and whether he recommended changes in its structure, authorities, or missions, Austin contended that creating USSF reflected recommendations and advice from multiple independent commissions, Congress, and multiple presidential administrations while ac-

knowledging establishing USSF as the armed forces sixth branch represented significant organizational changes within the Defense Department (DOD). He also stressed that DOD's space enterprise was not well-integrated with service and other terrestrial commands.

He went on to note that the 2020 *Defense Space Strategy* provides substantive detail on space and counterspace threats posed by China and Russia and the importance of working with allies and partners to ensure unfettered access and freedom for operating in space. Responding to a question about whether he supported developing offensive and defensive space systems to counter threats in the space warfighting domain, Austin contended: "A balance of offensive and defensive capabilities, as well as resilient architectures, are essential to any credible strategy to deter hostile action and protect vital U.S. interests should conflict extend to space" (U.S. Congress, Senate Armed Services Committee, 2021(a)).

Nascent Biden Administration USSF stances were further reflected in APQ's Hicks answered on February 2, 2011. Hicks asserted that the Trump Administration's 2018 *National Defense Strategy* (NDS) presented a broadly accurate assessment of the increasingly complex and volatile national security environment produced by China and Russia. She went on to assert that growing Chinese and Russian counterspace arsenals are the most immediate security threats to U.S. and allied space activities, and emphasized that Chinese and Russian military space doctrines consider space as critical to modern warfare, reducing military effectiveness, and winning future wars. Hicks went on to stress that the U.S. should not expect its adversaries to discriminate between commercial and military satellites in peacetime competition or military conflict; that the U.S.' technological edge is continually eroding by aggressive and on-going efforts by foreign nations to illicitly gather and adopt advanced proprietary system designs and processes the U.S. space industrial base. She also concluded by stressing that she is open to the National Reconnaissance Office (NRO) needing to work with U.S. Space Command to integrate and synchronize operations (U.S. Congress, Senate Armed Services Committee, 2021(b)).

During his March 4, 2021 response to a Senate Armed Service Committee hearing (APQ), Kahl announced he would assess (DOD) readiness to implement NDS and the 2020 *Defense Space Strategy* by determining personnel readiness and space-based system resilience to address current and emerging challenges. Noting the leading counterspace threats posed by China and Russia, Kahl also noted Iran and North Korea possess some counterspace capabilities capable of threatening U.S. and allied satellites. Kahl proceeded to maintain that developing both offensive and defensive space capabilities is essential for an effective U.S. strategy for deterring and countering hostile use of space along with freedom of operation in, from, and to this domain. He went on to stress he would review whether existing armed service space capabilities should be retained subsequent to

USSF's creation; is open to working to determine how commercial technology in launch and space applications can be used for mission assurance and warfighting requirements; and favored the recommendation contained in the FY 2020 *National Defense Authorization Act* to select a nominee as Assistant Secretary of Defense for Space Policy (U.S. Congress, Senate Armed Services Committee, 2021(c)).

March-May 2021 Developments

In March 2021 the Biden Administration released its *Interim National Security Strategic Guidance*. This document can be viewed as a potential forerunner to the congressionally-mandated *National Security Strategy of the United States*, which was published in October 2022. References to USSF in *Interim Strategic Guidance* were very cryptic and confined to this sentence: "We will explore and use outer space to the benefit of humanity, and ensure the safety, stability, and security of outer space activities" (Biden, Joseph R., 2021).

Further explanation of emerging Biden Administration USSF policy was provided during March 13, 2021 congressional testimony. Acting Under Secretary of Defense for Research and Engineering Barbara McQuiston told the Senate Appropriations Committee's Defense Subcommittee that DOD was investing in technologies and studying capabilities to defeat regional hypersonic weapons with a key first element of this involving detecting and tracking incoming missile threats. She mentioned that the Missile Defense Agency (MDA) has delivered a real-time sensing and hypersonic vehicle tracks for the Indo-Pacific Region with this capability being achieved in collaboration with industry partner and other U.S. geographic military and functional commands. This capability will be a critical component in hypersonic missile defense by providing a persistent and layered capability to detect and track dim boosting ballistic missiles, hypersonic glide vehicles, and raids in all flight phases. MDA has made two awards to industry to build an on-orbit prototype space vehicle for a planned 2023 launch while DOD's Space Development Agency (SDA) will transition to USSF during Fiscal Year 2023 as this armed service's acquisition agency (U.S. Congress, Senate Committee on Appropriations, Subcommittee on Defense, 2021).

Recommendations for USSF deployment have been produced by multiple think-tanks representing divergent policy perspectives. In May 2021 the conservative Center for Security Policy made the following five recommendations for the Biden Administration:

- Approach the issue of space weapons with the understanding that the space weapons debate is a straw man argument that implicates space control and involves legal, political, and psychological aspects.

- Before enacting policy to address space security take into consideration that the concept of Western deterrence is not comparable to de-

terrence recognized by geopolitical rivals, which does not preclude the use of counter-space capabilities.

- Take into account the dual-use nature of space technology creates the potential for gray zone operations in outer space that could form customary international law/norms unfavorable to U.S. interests.

- Proactively support the use of innovative outer space technologies and activities by non-governmental operators and resist attempts by geopolitical competitors to conflate these activities with space weapons.

- Exercise caution towards any proposed agreements banning or limiting the use of so-called space weapons that could be ignored in the event of hostilities (Listner, 2021).

On May 20, 2021, the Senate Armed Services Committee held a hearing on U.S. Strategic and Space Command's FY 2022 congressional budget request and its implications for USSF. Space Command Commander General John Dickinson testified that space is a warfighting domain and that both China and Russia have expanded their capabilities from direct-assent Anti-Satellite (ASAT) weaponry and direct energy efforts in electronic warfare arenas including jamming and laser technology. He stressed that the U.S. military space assets are well integrated in space and cyber operations and responded to a question from Senator Mike Rounds (R-SD) on whether the U.S. had the ability to defend against new threats and maintain unrestricted access to space by stressing the importance of having satellites and terrestrial assets to understand Chinese and Russian orbital activities. Dickinson also told Senator Rick Scott (R-FL) his belief that the U.S. was on a "glide path" to being able to protect and defend orbital capabilities and capacities (U.S. Congress, Senate Armed Services Committee, 2021(d)).

Later, in May 2020, the USSF released *U.S. Space Force Vision for a Digital Space Service*. This vision document stressed that becoming a digital service was a warfighting imperative for USSF driven by the nature of the military threat and USSF's size. In this document's introduction, USSF Chief of Space Operations (CSO) General John W. Raymond argued: "We know potential adversaries are developing a spectrum of threats at an alarming pace, directly challenging stability in space and the many benefits we enjoy as a space-faring nation. To counter these threats, we must change the paradigm. We must act far more swiftly and decisively across all aspects of leadership, acquisition, engineering, intelligence, and operations in order to take up permanent residence inside the adversary's observe, orient, decide, and act (OODA) loop. In addition, given the relatively small size of the USSF, accomplishing this goal will require us to amass a technologically adept, 'digitally fluent' space cadre more proficient, efficient, and agile than any other force in history" (U.S. Space Force, 2021(a)).

Figure 1. General John W. Raymond-Source: U.S. Department of Defense.

This document went on to stress that USSF must have three key tenets, including:

1) An interconnected force effectively and efficiently sharing relevant information with multiple stakeholders supporting the mission with data centricity and pervasive connective being hallmark characteristics of Guardians (as USSF personnel are called).

2) Innovation is a second USSF tenet characterized by embracing new approaches and eagerly challenging the status quo stemming from a deliberate commitment to continuously evolve, improve, and adapt. This also involves equipping Guardians with correct toolsets to harness their skills and adaptively respond to adversary threats by being aggressive and early adopters of cutting-edge, user-driven technologies representing the best industry capabilities.

Figure 2. *U.S. Space Force Vision for A Digital Service*. Source: U.S. Space Force.

3) A third tenet is being digitally dominant by translating cumulative technical prowess into powerful force-multiplying effects for developing, fielding, and operating capabilities more quickly and quickly than potential adversaries. Achieving such lasting dominance requires instilling and synthesizing preexisting interconnected and innovative elements to all aspects of how USSF executes its mission of supporting the joint warfighting force (U.S. Space Force, 2021(a)).

Additional supplements of this vision include a digital workforce prioritizing data-centric solutions over product-centric processes; making optimum use of artificial intelligence routines or robotic process automation to free Guardians from allocating monotonous staffing activities and allow them to engage in training, educating, and wargaming to become a world-class fighting force; and using digital operations collectively to create a lethal space warfighting force ensuring digital dominance translating to space superiority maintenance. This

document concludes with a scenario of how the USSF would respond to adversary counterspace threat scenarios with immediately identifying an emergent threat at T-0 minutes; establishing contingency responses at T+5 minutes including convening a virtual threat conference; initiating a virtual threat conference enabling real-time interaction within the data space and T+2 hours; Guardians being empowered to take collective action at T+12 hours; exploring and taking short-term countermeasures and long-term responses including updating software within T+36 hours; rapidly developing and testing digital solutions including high-fidelity emulations of target platforms within T+5 days; and placing enduring responses into place including ripple effects across the enterprise affecting concerning equipment, cost, schedule, and risk within T+6 to T+28 days (U.S. Space Force, 2021).

Business Contracting Developments

Business contracting can also produce high stakes legal and commercial implications for agencies aspiring to obtain lucrative government contracts from USSF and other government agencies. Inmarsat Government protested terms of Request for Proposals (RFP) to obtain a worldwide commercial broadband satellite services for the Navy's Military Sealift Command. It filed a protest against the Defense Information Systems Agency (DISA) with the Government Accountability Office (GAO) maintaining that DISA mailed to reduce competitive harm maintained by Inmarsat for inadvertently releasing its existing pricing for non-bandwidth commercial solution, and also protested that DISA failed to include Inmarsat's past performance as an evaluation factor for its contract application. GAO determined that DISA caused competitive harm by releasing Inmarsat's non-bandwith commercial pricing, but rejected their contention that had failed to prove that its past contract performance was an unreasonable factor in DISA's RFP (U.S. Government Accountability Office, 2021).

Opportunities for aspiring contractors to do business with USSF are provided by U.S. Federal Contractor (USFCR). Examples of grant opportunities and grant awards from USSF during the first three quarters of 2021 include DOD's Space Test Program, posted on August 26, 2021, providing access for science and technology experiments including military branches, interagency cooperation, universities, and international partners based in Albuquerque (U.S. Federal Contractor (USCFR), 2021(a)). On September 10, 2021, USSF's Space Warfighting Analysis Center (SWAC) announced a classified level business fair in Washington, D.C., on October 27, 2021, to communicate force design objectives to potential industry partners, which will be grounded in peer-review analysis using contemporary digital modeling tools and simulation environments (USCFR, 2021(b). A September 20, 2021 solicitation from Colorado's Peterson Space Force Base for ballistic and tempered glass panel fabrication and installation

requirements is another example of a USSF contract opportunity (USCFR, 2021(c)).

According to an October 1, 2021 search of "space force" on USASpending.gov, there were 188 historic and ongoing contracts involving USSF awarded to companies as varied as Space Exploration Technologies, United Launch Services, Lockheed Martin, Silicon Mountain Technologies, Northrup Grumman, Parsons Government Services, and many others (USAspending.gov, 2021).

Biden Administration Congressional Budget Request and Congressional Reaction

In its May 2021 USSF congressional budget proposal, the Biden Administration requested the following totals for carry out USSF missions for Fiscal Year (FY 2022):

Operations and Maintenance	FY 2021 $2.569 billion	FY 2022 $3.441 billion
Procurement	FY 2021 $1.512 billion	FY 2022 $2.409 billion
Research, Development, Test, and Evaluation	FY 2021 $9.987 billion	FY 2022 $12.803 billion (U.S. Office of Management and Budget, 2021).

This submission began the annual congressional budget process, which over the following months saw congressional armed services and appropriations committees scrutinize and revise the administration's budget request and include additional provisions they require USSF to follow in the Fiscal Year 2022 *National Defense Authorization Act* (NDAA). This process sees witnesses from government agencies and non-government organizations invited to testify before congressional oversight committees and provide varying perspectives on funding and other expectations of government programs. This testimony and congressional questioning will result in appropriations bills for the Defense Department and other agencies which they are required to follow for federal fiscal years running from October 1-September 30 (McNellis, 2021).

During May 24, 2021 testimony before the House Armed Services Committee's Subcommittee on Strategic Forces Government GAO Director of Contracting and National Security Acquisitions Jon Ludwigson noted historic and ongoing DOD space weapons acquisition problems. Such difficulties have produced schedule delays exceeding five years, cost increases of hundreds of millions or billions of dollars, and program cancellations due to development problems. Ludwigson noted the DOD's 2019 establishment of a Space Development Agency (SDA) to unify and integrate department wide efforts to produce innovative satellite solutions, congressional and DOD efforts to increase the efficiency and deployment space capabilities, delays and cost increases in space acquisition programs as varied as the Space-Based In-

frared System, Space Fence, Next Generation Overhead Persistent Radar, and insufficient information on investing in commercial cybersecurity technologies (Ludwigson, 2021).

Culminating challenges these extant problems will produce for the USSF include significant funding requirements for existing and emerging programs as the USSF assumes responsibility for existing defense space programs; the need to strike a right balance between new development methods and working within an existing knowledge-based acquisition framework to ensure cost, schedule, and performance goals are met (Ludwigson, 2021).

Testifying at this same hearing, USSF Vice-CSO General David Thompson noted that following the October 2020 establishment of Space Operations Command (SOC), two remaining field commands would be established during 2021 including Space Systems Command (SSC) with responsibility for developing, acquiring, and fielding operationally relevant capabilities in resilient and defendable architectures, and Space Training and Readiness Command (STARCOM) with responsibility for developing tactics, a testing enterprise, doctrine, and advanced operational training using warfighting professionals. SSC and STARCOM will be established after presidentially-nominated USSF officers are confirmed by the Senate. Thompson also announced planning had begun for a National Space Intelligence Center (NSIC) for providing foundational scientific and technical intelligence and operational space intelligence to USSF, military combatant commands and the intelligence community along with (SWAC), currently with SOC leads analysis, modeling, wargaming, and experimentation to produce new operational concepts and USSF force design options while integrating these activities across DOD and the intelligence community (Thompson, 2021).

Testifying before the House Appropriations Committee's Defense Subcommittee on May 27, 2021, Joint Chiefs of Staff Chair General Mark Milley asserted:

> The Space Force investments accelerate modernization of the entire Joint Force. Space Force capabilities underwrite, enhance, and enable Joint Force operations. The Space Force protects U.S. capabilities and freedom of operation outpacing actions of our competitors. Ongoing actions to fully resource [USSF] include including transfer of the Space Development Agency (SDA) and unit transfers from the Army and Navy, will enhance the USSF's ability to organize, train, equip, and present forces who can compete, deter, and if necessary prevail should war initiate in, or extend to space. (U.S.Congress, House Committee on Appropriations, Defense Subcommittee, 2021)

An example of congressional support for the USSF was expressed by Rep. Mike Garcia (R-CA) during June 16, 2021 House floor debate. Stressing

quickly evolving technological advances and geopolitical efforts by China and Russia to enhance their military space force capacities, Garcia stressed:

> …space is a domain where we, as a nation, can thrive, but it is also a domain where we can be vulnerable and susceptible to the malicious intent of foes such as China, Russia, and Iran. There are existential threats right now in space.
>
> Any decision on our part to divest from this adventure will not dissuade our foes from advancing their own space programs. It will only serve to highlight a massive strategic vulnerability and potentially create credibility gaps that will be impossible to fill in the future.
>
> A path of divestment is an unforgiving one and the damages irreparable. While we as a nation currently hold an advantage in space, our lead, like the nearly 118 years that separates today from the Wright Brother's first flight in 1903 can vanish in the blink of an eye. (Garcia, M., 2021)

Presenting the Air Force's posture statement during June 17, 2021 congressional testimony, Acting Air Force Secretary John Roth, Air Force Chief of Staff Charles Q. Brown, Jr., and USSF CSO Raymond noted that the U.S. is a space faring nation at its strongest when it has access to and freedom to operate in space. They went on to stress that potential adversaries are aware of this U.S. reliance on space and are engaging in efforts to reduce this freedom of operation. Examples of such Chinese and Russian measures include aggressively developing weapons to deny or destroy U.S. space capabilities in conflict; using mobile and ground-based laser and electronic warfare systems capable of jamming and blinding U.S. satellite systems; China investing in satellite grappling technologies such as the Shijian-17 satellite's robotic arm; and Russian testing of an on-orbit system which has released a projectile designed to destroy low-earth orbit U.S. satellites (Roth, Brown, and Raymond, 2021).

These policymakers went on to stress how the USSF's first year involved establishing a headquarters and Field Command structure aligning complimentary functions and streamlining command authority to pursue speed and agility. SOC the first field command, was stood up in October 2020 as the primary provider to the combatant commands. Two additional commands were installed during 2021 including Space Systems Command which will develop, acquire, and field operationally relevant and resilient space capabilities within resilient and defendable architectures, and Space Training and Readiness Command whose responsibilities involve developing tactics, a testing enterprise, doctrine, advanced warfare training, and a dedicated cadre of warfighting professionals. Space missions, billets, and financial resources have been transferred from 23 Air Force units to USSF, and preparations to merge operations, acquisition, and

sustainment for some space systems distributed in existing military branches and the Office of the Secretary of Defense beginning in 2022. Additional USSF collaborations within DOD, interagency, commercial industry, and national allies is also occurring (Roth, Brown, and Raymond, 2021).

Efforts to increase digital capabilities, accelerating capability design, decision, and delivery are ongoing including missile warning and tracking capabilities; position, navigation, and timing; command and control including a Unified Data Laboratory which is a cloud-based, cyber-accredited, multi-classification data store facilitating universal data access in a data architecture partnership with the Air Force; and enhancing National Security Space Launch (NSSL) capabilities. Enhancements in training and doctrine are occurring through redesign across space operations competencies including elevating from basic space systems operation to threat and target-based advanced training and education. Areas encompassed within these advanced characteristics include: orbital warfare, space electromagnetic warfare, space battle management, space access and sustainment, military intelligence, cyber operations, and engineering and acquisition with ultimate aims of supporting tactics, strategies, and theories of victory (Roth, Brown, and Raymond, 2021).

On July 13, 2021, the House Appropriations Committee approved its version of the FY 2022 National Defense Authorization Act by a 33–23 vote. It recommended cutting funding from various Biden Administration USSF areas, including:

Operations and Maintenance

FY 2022 Budget Request	$3,440,712 billion
Committee Recommendation	$3,372,212 billion
Change from Budget Request	-$68,500,000

Procurement

FY 2022 Budget Request	$2,766,854 billion
Committee Recommendation	$2,741,708 billion
Change from Budget Request	-$25,146,000

Space Force, Research, Development, Test and Evaluation

FY 2022 Budget Request	$11,266,387 billion
Committee Recommendation	$10,774,318 billion
Change from Budget Request	-$492,069,000 (U.S. Congress, House Committee on Appropriations, 2021(b).

Congressional committee reports on agency funding requests also include written directions and reporting requirements for agencies to follow in executing congressional intent for their operations and programs. This is reflected in several sections of the House Appropriations Committee *FY 2022 NDAA* report. This committee expressed concern that the Air Force has not taken aggressive action to address space acquisition problems and made little progress in defining what the USSF will do differently than the Air Force. Additional concerns expressed by this committee's report include:

- Plans for the new Space Systems Command acquisition unit not resolving fundamental problems of overlap and role duplication, responsibilities, and authorities within existing Air Force space acquisition units.
- USSF needing a clear and concrete vision for future system architectures which are not philosophically based but grounded in rigorous technical analysis with executable plans and realistic budgets.
- DOD lacking a comprehensive system to measure the readiness and extent of satellite communications terminals, Global Positioning System receivers, and other terminals and user equipment have actually been fielded into platforms and systems designed to use such capabilities. The committee directed various DOD entities to prepare a space integration readiness report to congressional defense committees within 120 days after the 2022 NDAA is enacted.
- Expressed concern about the Next Generation Overhead Persistent Infrared Missile Warning Program having an unrealistic 2025 first geosynchronous satellite launch capability and emphasizing USSF providing unrealistic cost and schedule estimates undermines the credibility of its management of this and other programs.
- Continued supporting integrating commercial satellite communications capabilities into national security space communications architecture while wanting greater clarity from USSF on goals and strategy for its $23.4 million funding for this program and refusing to fund this program until the Air Force submits a report to congressional defense committees within 90 days of NDAA's 2022 enactment.
- Requiring DOD and the Director of National Intelligence to provide a plan to collect, consolidate, and characterize potential adversaries' laser threat activity data along with strategies to mitigate these threats within 120 days of NDAA's 2022 enactment.
- An earmark of $1.665 million to develop a core manipulator joint at the Texas A&M University Experiment Station inserted by Rep. Pete Sessions (R-TX) (U.S. Congress, House Committee on Appropriations, 2021(b)).

The House Armed Services Committee approved its version of the FY 2022 NDAA on September 10, 2021 on a 57–2 vote sending it for consideration to the full House (Key provisions of this committee's report included increasing USSF personnel from 6,434–8,400; increasing USSF's procurement budget from $2,766,854 billion to $2,773,54 billion; increasing the USSF's Research, Development, Testing, and Evaluation Budget from $11,266,387 billion to $11,594,787 billion; and increasing the USSF's Operations and Maintenance Budget from $3,440,712 billion to $3,751,412 billion (U.S. Congress. House Committee on Armed Services, 2021).

Provisions of this committee's report covering USSF include:

- Requiring the CSO to brief the House Armed Services Committee by January 31, 2022, on the effectiveness of USSF's higher education strategy in creating long-term strategic relationships, developing talent, and providing access to expertise, engineering, research, and development capability.

- Requiring USSF's Chief Technology and Innovation Officer to brief the House Armed Services Committee by December 31, 2021, on how USSF's Chief Information Officer will work with their DOD and Air Force counterparts to leverage cloud computing technologies for space programs.

- Requiring the U.S. Comptroller General to report to congressional defense committees by February 1, 2022, on U.S. space situational and domain awareness capabilities including analyzing the number and size of low-Earth orbit, geosynchronous earth orbit, and cislunar orbit tracked objects; review planned systems development and procurement of commercial space situational and domain awareness across the Future Years Defense Program including cost and schedule estimates; overview of the USSF's Unified Data Library including current volume, access to new observational data, U.S. Space Command usage; and recommendations to improve use of commercial space situational and domain awareness data services.

- Directing DOD to report to the House Armed Services Committee by February 1, 2022, on executing experimental spaceflight activities for next-generation launch vehicle systems and technologies relating to national security space launch applications pertinent to maintaining U.S. space technology superiority over China.

- A sense of Congress resolution requiring CSO to report to congressional defense committees on the USSF's "Range of the Future," identifying legal authorities which must be changed to address long-term infrastructure challenges to physical launch ranges and proposals to enhance infrastructure improvements at these sites including

congressional action to implement these proposals.

- Requiring the CSO to report to congressional defense committees by February 25, 2022, on the most likely and dangerous threats to American space dominance within the next three to ten years, options to maintain this U.S. dominance, and actions required to support such dominance. Emphasis on maintaining U.S. freedom of movement on the Moon and in lunar and cislunar space was also stressed by the committee (U.S. Congress, House Committee on Armed Services, 2021).

Despite wide levels of support for the USSF in the House, some segments of opposition remain. This was demonstrated by the September 22, 2021 introduction of H.R. 5335, the *No Militarization of Space Act*, which proposed abolishing the USSF. Introduced by Rep. Jared Huffman (D-CA) and four other House members, this legislation was referred to the House Armed Services Committee where it is likely to die given current significant bipartisan support for the USSF (*H.R. 5335*, 2021).

On September 22, 2021, the Senate Armed Services Committee approved its version of the 2022 NDAA. It directed USSF to spend an additional $3 million on battery life cycle improvements and an additional $5 million increase to develop microelectronics to withstand space radiation. This committee also maintained the House Committee's FY 2022 USSF personnel authorization at 8,400, while recommending legislative language giving the Secretary of the Air Force greater authority to establish USSF personnel levels than permitted for other armed service branches (U.S. Congress, Senate Committee on Armed Services, 2021(e)).

Additional Senate USSF provisions for FY 2022 NDAA include:

- Directing the Chief of Space Operations to brief congressional defense committees by February 28, 2022, on the possibility of using prize authority authorized under 10 *USC* 2374(a) for launch responsiveness to replace key national security satellites during a conflict with particular emphasis on pushing launch capabilities to technological limits in payload size, payload numbers, and launch sites.

- Encouraging USSF to consider developing and deploying small flexible communication satellites capable of meeting connectivity and reconstitution objectives.

- Directing DOD, the Chairman of the Joint Chiefs of Staff, and USSF to give a detailed briefing to congressional defense committees by March 31, 2022, on the commercial space-based Intelligence, Surveillance, and Reconnaissance (ISR) needs of combatant commands through varying weather conditions. This briefing should include descriptions of existing space-based ISR combatant commands and a subset of requirements that can be

met with commercial assets; analysis of how DOD is or will be leveraging commercial space-based solutions to meet combatant commanders requirements in the next five years; determining DOD's strategy to address these needs for the purchase of commercial satellite communications; assessing risks of over-reliance on commercial space-based ISR during conflict in space and other domains; assessing combatant commands ability to directly task space-based ISR for individual interest areas; and determining whether military space leaders can economically and competitively make bulk purchases of commercial space-based ISR for combatant commands comparable to bulk purchases of commercial satellite communications.

- DOD and other applicable executive branch entities reporting to congressional defense committees by April 30, 2022, to ensure adequate and timely communications occur between the U.S., China, and Russia on avoiding space debris collisions (U.S. Congress, Senate Committee on Armed Services, 2021(e)).

The Senate Committee authorized $768 billion in defense spending with USSF procurement of $2,799,354 billion; $3,751,912 billion for USSF operation and maintenance, and $11,795,166 billion for USSF research, development, testing, and evaluation (U.S. Congress, Senate Committee on Armed Services, 2021(e)).

Continuing congressional debate on the USSF will occur in floor debate and in committee deliberations. The September 22, 2021 House debate language mentions USSF seven times (*Congressional Record*, 2021(a)). On September 23, 2021, the House approved the FY 2022 NDAA with a bipartisan vote of 316–113 increasing defense authorizing spending $23 billion from the Biden Administration's request of $741 billion, and increasing overall USSF spending to $18,119,353 billion representing a 3.53% increase over the Administration's initial budget request (*Congressional Record*, 2021(b)). Differences between House and Senate versions of the FY 2022 NDAA will need to be resolved and may take several weeks or months before the final version of this legislation is submitted to and receives presidential approval. Evidence for this protracted period is provided by the FY 2021 NDAA, which was not signed until December 21, 2020, as part of a consolidated multiagency appropriations bill (Public Law 116-260). FY 2022 USSF space funding was not finalized until Public Law 117-103 was signed on March 15, 2022, with operations and maintenance receiving $3,435,212 billion; procurement receiving $3,023,408 billion; and research and development receiving $11,597,405 billion for a cumulative total of $18,455,625 billion (Public Law 117-103).

2022 Defense Intelligence Agency Report

The trajectory of USSF funding and missions will be acutely influenced by the military space developments of other countries. These have been documented in a 2022 Defense Intelligence Agency (DIA) report on emerging space security challenges confronting the U.S. and its allies. This assessment noted that between 2019–2021, the number of Chinese and Russian satellites in orbit had increased by nearly 70% with these satellites including those covering satellite communications, remote sensing, navigation-related, and science and technology development and other purposes including geolocation and tracking of friendly and adversary activities, target identification, and the ability to conceal sensitive tests, evaluation activities, and military exercises and operations (U.S. Defense Intelligence Agency, 2022).

DIA noted that China is likely developing weapons to use against orbiting satellites to degrade and deny adversary space capabilities; considers space superiority as critical to conducting informationized warfare; actively seeks overt and covert acquisition of foreign space and counterspace technologies including through exploitation of overseas scholars; and increased its satellite intelligence, surveillance, and reconnaissance fleet to over 250 systems, making it second to the U.S. as of January 2022. Russian military doctrine also views space as a warfighting domain and believes achieving space supremacy is a decisive factor in winning future wars. While rhetorically promoting international space arms agreements, DIA also asserts that Russia is developing counterspace capabilities to attack U.S. and allied space assets; created an Aerospace Forces military branch in 2015; sees space as an American Achilles heel while striving to develop counterspace

systems to neutralize U.S. space-based military and commercial systems to offset perceived U.S. advantages in these areas; Moscow actively seeks to acquire foreign space and counterspace technologies despite international sanctions; and seeks to use Directed Energy Weapons to blind satellite sensors. DIA also assesses that Iran and North Korea are also seeking to develop space and counterspace capabilities to enhance its security objectives and interfere with U.S. space operations (U.S. Defense Intelligence Agency, 2022).

University Partnerships

USSF has sought to increase its impact by collaborating with universities with strong science and technology backgrounds and reputations. USSF's University Partnership Program strives to accomplish the following:

- Establish opportunities for world-class research, advanced degrees, and workforce and leadership development.
- Identify and pursue research areas of mutual interest.
- Establish scholarship, internship, and mentorship opportunities for university students and Reserve Officer Training Corps (ROTC) cadets.
- Recruit and develop multifaceted officer, enlisted, and civilian Guardians emphasizing Science, Technology, Engineering, and Mathematics.

Universities signing Memorandums of Understanding (MOU) with USSF during FY 2021 include: Georgia Institute of Technology, Howard University, Massachusetts Institute of Technology North Carolina Agricultural and Technical State University, Purdue University, University of Colorado System (beginning with Boulder and Colorado Springs), University of North Dakota, University of Texas System (beginning with Austin and El Paso), and University of Southern California (U.S. Space Force, 2021(b)).

Conclusion

USSF receives continuing support from Congress and the Biden Administration which continues from its establishment during the Trump Administration. Its ongoing support is testimony to increasing recognition of the growing importance of space as an arena of international security competition, which has surpassed the partisan and ideological differences between the Trump and Biden Administrations. The USSF is also responsible for guiding and working with the commercial space industry, piloting orbital test vehicles, training for orbital warfare, and remaining aware of and competitive with Chinese and Russian space activities (Weires, 2021). Army and Navy satellite communication (SATCOM) missions have now shifted to Space Force. USSF personnel are already involved and will continue being involved in contributing written analyses of their service programs (Garamone, 2021; Poole, Bettinger, and Reith, 2021).

USSF, DOD, and congressional oversight entities, and other entities will continually scrutinize military space programs and their collaborations with the commercial space industry. Addressing managerial dispersion and acquisition effectively will be key USSF challenges. Topics such as national security space launch, the electromagnetic spectrum, remote sensing, Chinese, Russian, and other national responses to USSF activities will keep DOD, USSF, and congressional overseers and appropriators busy in the next several years and produce voluminous documentation with significant quantities of this being publicly accessible for U.S. taxpayers to evaluate (McCall, 2020; McCall, 2021; Hoehn, Gallagher, Saylor, 2021; Townsend, 2021; Bjørkum, 2021).

Despite its young age, USSF contracts have been dispersed to companies in states as varied as California, Colorado, Florida, Maryland, Nebraska, New Jersey, Ohio, and Virginia. This is likely to continue increasing and give these areas congressional Representatives and Senators additional motivation to enhance their re-election prospects by ensuring these contracts are sustained for their constituents employed in these businesses and for their overall economic impact although the significance of defense spending on electoral prospects and economic impact is disputed (USASpending, 2021; Thadalikit, 2001; Barro & de Rugy, 2013).

USSF receives continuing support from Congress and Biden Administration. It remains to be seen how long this support will last as the U.S. and its allies strive to recover from the COVID-19 pandemic and respond to increasing Chinese and Russian aerospace threats in light of the debacle of Afghanistan. Russian military aggression against Ukraine will likely increase U.S. financial and political support for USSF. Public support for USSF will also depend on program performance and progress in subsequent years and whether concern over the continually upward spiraling national debt and federal budget deficit will eventually produce public support for governmental austerity that may adversely impact national security space programs.

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