

REACTING TO FUTURE MAJOR SPACE EVENTS

—After Action Report—



Space Horizons 2030: Navigating Future Frontiers

*Developing U.S. Strategy
for Emerging Space
Challenges*

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**AMERICAN FOREIGN
POLICY COUNCIL**

REACTING TO FUTURE MAJOR SPACE EVENTS

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The views, opinions, and recommendations expressed in this report are those of the authors and do not necessarily reflect the official policy or position of any government agency or individual participant. Participants' involvement does not imply endorsement of all contents.

EXECUTIVE SUMMARY

This report details the outcomes of a series of high-stakes, seminar-style wargames conducted by a simulated National Space Council (NSpC) to address potential near-term space-related scenarios that could significantly impact U.S. public perception, resourcing, and policy.

Designed to prepare U.S. leaders for possible space occurrences over the next two to three decades, this workshop engaged an assembled team of players representing various U.S. governmental and strategic positions. Participants, drawn from a cross-section of U.S. space leadership including military, civilian, private, and academic sectors, engaged in robust discussions to anticipate potential concerns, tensions, and cross-sector impacts of future developments in space.

The simulations focused on scenarios that might plausibly confront the United States within the next two administrations. The first scenario demonstrated that, despite a strong safety record, accidents in space can, and will, happen—as a space tourism mission went amiss. The second concerned the potential proliferation of heavy reusable launch to China and potentially losing leadership in launch. Next, the report shows how to react to public concerns about an asteroid close approach and media disinformation. Then we highlight what happens if China begins constructing a large solar power station in space, followed by a scenario focused on China’s ambitions to return an asteroid to Earth. The sixth and final scenario concerned proliferation of anti-satellite capabilities to middle powers perceived as rogue actors. All took place in an assumed context of great power competition between the U.S. and China.

The workshop was geared toward developing strategic responses that balanced defense, diplomacy, and public communication while considering the long-term geopolitical landscape and the fast-evolving arena of space technology and exploration. Below is a summary of the scenarios, a real-world rationale for their selection, and NSpC participants’ recommendations:

(Please note that the recommendations were developed during a high-pressure, time-constrained simulation designed to emphasize the challenges of developing real-time responses to an actual crisis. These recommendations represent the consensus of the expert participants under these conditions. However, a more thorough analysis that benefits from additional time and consideration of these and other potential crises will appear in a forthcoming book.)

Scenario / Selection Rationale	NSpC Participants’ Recommendations
<p><i>Scenario 1: Tragedy in Orbit: Call for Tighter Regulations After Fatal Commercial Spaceflight Incident</i> <u>Orbital tourism mission refueling failure results in loss of human life.</u> <i>Selection Rationale:</i> <i>Spaceflight is a dangerous activity. Sooner or later there will be an accident and a call for regulation.</i></p>	<ol style="list-style-type: none"> 1. Press conference: Acknowledge responsibility, express condolences, outline actions, reassure allies, and highlight Japan cooperation. 2. Debris task force: Form a Defense Department, NASA, and intelligence task force to map and mitigate debris risks. 3. Debris removal: Partner with GalaxyZ to launch a debris removal mission, demonstrating U.S. capability.

Scenario / Selection Rationale	NSpC Participants' Recommendations
	<p>4. Space safety summit: Direct the Commerce Department to convene a global summit on debris mitigation and space norms.</p>
<p>Scenario 2: China's Game-Changer: Long March 9's Stunning Debut Signals New Era in Space Race <u>PRC launches Long March 9 Super Heavy Lift.</u> <i>Selection Rationale: China is already developing its Long March 9 to be ready circa 2030 and has recently shifted its design toward full reusability.</i></p>	<p>1. Long-term strategy: Create a unified space strategy with Defense-led funding and a focus on space-based solar power. 2. Industrial base: Boost U.S. industrial capacity via workforce, immigration, and export reforms to compete with China. 3. China capabilities: Task agencies to assess China's Long March 9 capabilities and set firm regulatory deadlines. 4. Commercial sector: Remove barriers to commercial space enterprises to leverage U.S. space leadership.</p>
<p>Scenario 3: Global Anxiety Swells as Apophis Prepares for Close Earth Approach in 2029 <u>Asteroid slated to make a close approach (Apophis ~GEO projected April 2029).</u> <i>Selection Rationale: Apophis is a real asteroid that will pass inside geostationary orbit in April 2029.</i></p>	<p>1. Press conference and education: Hold a press conference on safety and planetary defense, followed by a public asteroid threat education campaign. 2. Global defense strategy: Promote a global planetary defense strategy with an international task force to share resources and expertise. 3. Risk and funding study: Study near-Earth object risks and adjust funding to enhance detection and mitigation. 4. Space Guard agency: Consider a Space Guard agency under the Department of Homeland Security, transitioning to Defense during crises and integrated with existing agencies.</p>
<p>Scenario 4: PRC Begins Construction of Megawatt-Class Solar Power Satellite in Geosynchronous Orbit <u>China takes the first major step toward a Space-based Solar Power constellation.</u> <i>Selection Rationale: The PRC has articulated plans to build a megawatt-class prototype in the 2030 time frame.</i></p>	<p>1. Space-based solar power partnerships and investment: Form international SBSP partnerships, increase investment, and push fast timelines. Promote clean energy and nuclear options. 2. Diplomatic stance on China: Take a firmer stance on China's SBSP project, addressing weaponization concerns and reassuring allies. 3. Laser technology monitoring: Monitor 1-megawatt laser developments for security risks. 4. Lunar power beaming: Develop Lunar power beaming in Artemis, including energy rovers and laser-based asteroid deflection.</p>

Scenario / Selection Rationale	NSpC Participants' Recommendations
<p>Scenario 5: China's Asteroid Return: A Scientific Triumph or Public Safety Nightmare? <u>The PRC returns a small asteroid to Earth, launched 2029, return 2034.</u> Selection Rationale: Chinese scientists have outlined a plan to return a small asteroid to Earth's surface.</p>	<ol style="list-style-type: none"> 1. Communication campaign: Frame China's asteroid mission as overreach to inspire U.S. innovation and leadership. 2. U.N. COPUOS meeting: Convene COPUOS to set asteroid return guidelines and demand China's transparency. 3. Contingency plans and space czar: Develop asteroid contingency plans with allies, appoint a space czar, and enhance space tracking. 4. NASA program expansion: Expand NASA's resource programs and accelerate space extraction and processing tech.
<p>Scenario 6: Global Tension Escalates as North Korea and Iran Showcase Anti-Satellite Might <u>KE-ASAT test among middle tier powers (Pakistan, North Korea, Iran) heightens tensions.</u> Selection Rationale: North Korea and Iran are already capable of ballistic missiles and launch vehicles that can reach low-Earth orbit. What if they repeat what the U.S., Russia, China, and India have all demonstrated?</p>	<ol style="list-style-type: none"> 1. Positioning, navigation, and timing (PNT) alternatives: Invest in non-space PNT systems to reduce satellite reliance. 2. Rapid space asset replacement: Develop tactical responsive space (TACRS) and private partnerships for quick satellite replacement. Create debris mitigation for ASAT events. 3. Deterrence strategies: Use diplomacy and economics to deter North Korea and Iran from ASAT tests. 4. ASAT ban and diplomacy: Acknowledge past ASAT use, work with allies, engage adversaries, and push for a U.N.-backed ASAT ban.

Strategic recommendations drawn from the entire scenario set:

1. **The U.S. must enable its private sector to maintain the lead in reusable launch technology.**
 - The U.S. must recognize that China is trying hard to eclipse the U.S. in reusable launch and must provide a regulatory environment that enables rapid learning.
 - The U.S. must be ready for potential accidents and must not overreact in such a way as to lose its advantage.
2. **The U.S. must develop space debris contingency plans.**
 - Multiple scenarios could cause a hazard to navigation at such a scale that immediate action is required to prevent a much larger disaster.
 - Thinking through such contingencies early and building them into mobilization and Commercial Augmentation Space Reserve (CASR) is a necessary step.
3. **U.S. Space Command and U.S. Space Force should develop contingency plans for asteroid deflection and planetary defense.**
 - U.S. Space Command should develop contingency plans in advance of Apophis to give the nation confidence that it has a plan and tools.
4. **Posture the U.S. for space rescue.**

- Develop a forward-looking White House strategy and implementation guidance similar to the National Preparedness Strategy and Action Plan for Near-Earth Object Hazards and Planetary Defense.
 - Assign responsibilities for space rescue in the Unified Command Plan (UCP).
5. **The U.S. needs a national space-based solar power program.**
- The People’s Republic of China’s plans for a large prototype are likely to have a significant psychological impact on the U.S. and the world.
 - Waiting to respond until 2030 will be late-to-need.
6. **The U.S. needs to anticipate and develop responses for anti-satellite proliferation.**
- The technology for direct ascent anti-satellite technology appears within reach of multiple second-tier states, which could start a domino effect.
 - The U.S. should anticipate this development and examine response options.

This report concludes a three-part workshop series examining near-term space scenarios that could significantly influence public perceptions, thereby affecting policy decisions and resource allocation in the space sector. Previous reports in this series can be accessed through the American Foreign Policy Council website under Publications and Special Reports, or via the links below:

[Reacting to Major Space Events at or Below Geostationary Orbit - After Action Report 1](#)
[Reacting to Major Space Events on the Moon and in Cislunar Space - After Action Report 2](#)

PROJECT OVERVIEW

The AFPC Space Policy Initiative co-directors have designed a series of workshops to examine near-term scenarios that could have a significant *psychological impact on public perceptions* of space, and thus on resourcing and policy. The aim of the project is to offer options, add context, and prepare U.S. leaders for space occurrences over the next two to three decades. For these workshops, the project authors have assembled teams of players who represent surrogates of a National Space Council (NSpC) and are presenting them with a set of scenarios that might simultaneously appear in the media, forcing players to shape a U.S. government response. This process will allow the project authors to anticipate concerns, tensions, and cross-sector impacts of future developments in space. During the workshops, each space scenario is discussed, with a focus on addressing two primary questions:

1. How do we anticipate the situation being framed in the public media, and what sort of action is likely to be demanded from public officials?
2. What options exist for the United States, and which option is selected and why?

Our aim is for these discussions to help policymakers make better decisions. By *anticipating what political pressures will be felt by U.S. government policymakers*—including how the public, the press, Congress, allies, and adversaries may respond—and *examining potential responses* for the U.S. (in new policies, executive orders, dedicated strategies, and national-level guidance), we hope this series of workshops will help prepare U.S. policymakers for a number of foreseeable scenarios they may encounter—before those events occur—and arm them with the foresight and policy options needed to steer the wisest course.

Methodology

Given the timeline of the scenarios that the workshop encompassed and the nature of the objectives, a seminar-style wargame was chosen. Six scenarios with the People’s Republic of China (PRC) as the first mover were created and given to the players in advance of the workshop. The players, collectively forming the National Space Council, were given an hour to formulate and brainstorm different ideas and appropriate reactions to the scenario. No barriers to communication were implemented, though the wargame’s inherent speed challenges the players to remain as concise as possible. Additionally, injections with headlines and various new incidents were interspersed throughout discussion time. At the end of the hour, participants were asked to present and reason out their chosen course of action.

To mitigate groupthink among the participants, one “External Press Agitator” was placed into the group and directed to challenge or question the group’s decision-making. Without a red team to react to the players’ actions, the press agitator was the next best option to encourage discussion of the possible consequences of their actions. To adjust for political bias during the recommendations, the administration for the NSpC assumed a Democratic administration for the first three scenarios and a Republican administration for the following three scenarios, each with a divided U.S. House of Representatives.

Participants for the workshop were selected for their deep substantive knowledge on U.S. space activities or policy along with their likelihood to serve at a senior level in future administrations. The participant list includes senior space leaders across the military, civilian,

private, and academic sectors (see participant list for names and affiliations). The workshop follows Chatham House rules, so as to encourage brainstorming and experimentation.

The following participants formed the simulated NSpC for this workshop:

- | | |
|---|--|
| 1. Vice President | 9. Director of the Office of Science and Technology Policy |
| 2. Secretary of Defense | 10. Chinese Communist Party Subject Matter Expert |
| 3. Director of National Intelligence | 11. White House Press Secretary/ External Press Agitator |
| 4. Secretary of Commerce | 12. Presidential Policy Advisor |
| 5. Secretary of State | |
| 6. NASA Administrator | |
| 7. Heavy Reusable Lift Expert | |
| 8. Assistant to the President for Domestic Policy | |

Workshop 3 Introduction

For the third workshop, we exposed players to a diversity of plausible scenarios that would challenge U.S. leadership. Some continued to expose participants to the PRC’s grand vision for space, such as its plans for super-heavy reusable launch, or its plans for an asteroid return mission, or its plans for a massive solar power station prototype. Other scenarios considered the public reaction to a spacecraft tragedy in orbit or an asteroid close approach. Yet another considered a rapid proliferation of anti-satellite missiles to second-tier powers. Each of these scenarios presents novel challenges for U.S. policymakers, and this workshop provided an opportunity to consider them.

The six scenarios contained herein were constructed as a result of recent news headlines that have demonstrated an adversary capability or development toward a capability that could be destabilizing and elicit a reaction from the U.S. government. After the first workshop, participants universally agreed that the U.S. is currently “behind the eight ball” with regard to advancements in space—despite holding a massive head start and benefitting from the advent of reusable rockets. In comparison to China, participants were emphatic that *there is a clear and decisive disparity between the two nations’ visions and strategies for space*. After walking through each scenario and realizing that certain near-term developments could provide China with a decided strategic advantage, it became imperative that the U.S. should invest in certain areas to avoid having to face the daunting headlines experienced in the six scenarios. The results of the second and third workshops were along the same lines.

The report contains a description of each scenario, the rationale for the specific scenarios’ selection, a summary of the participant discussion, and the recommendations from the NSpC players, followed by a summary of the key takeaways and recommendations from the whole exercise. Finally, an appendix is attached containing the assessment, concerns, and recommendations of each NSpC participant along with the discussion highlighting the group’s tensions and options considered for each scenario.

Scenario 1: Tragedy in Orbit: Call for Tighter Regulations After Fatal Commercial Spaceflight Incident

The Daily Astronomer | Front Page

January 27, 2029

In a harrowing event that has sent shockwaves through the global community, a commercial spaceflight operated by GalaxyZ ended in catastrophe, resulting in the loss of 30 lives, including prominent citizens from Japan, Korea, Norway, Brazil, and Nigeria. The MarsShip, which



had embarked on an orbital tourism mission, encountered a fatal thruster malfunction during a live-streamed refueling operation just prior to reentry, leading to a collision with the refueling tanker. The incident, broadcast live, resulted in a devastating explosion and the creation of a massive debris field in space, witnessed by millions around the world.

This tragedy marks the first significant loss of human life in the era of commercial space tourism, a sector that had seen over 500 safe flights under the oversight of the Federal Aviation Administration Office of Commercial Spaceflight. Until now, the FAA and Congress have maintained a relatively hands-off approach to spaceflight regulation, focusing on public safety rather than the spaceworthiness of the spacecraft or the safety of the astronauts, who are considered adventurers providing informed consent. The debris—including large fragments of the MarsShip and its tanker, both exceptionally large—further draws condemnation for the hazard to navigation it presents to all actors in low-Earth orbit, with some space sustainability thought leaders, such as Kwame Nkrumah of the African Space Agency, stating that “as a would-be responsible spacefaring state, the U.S. should hasten to clear the hazard.”

The public outcry following the incident has been swift and loud, with many calling for the U.S. government and the FAA to implement stricter regulations on commercial spaceflight. Critics argue that the current regulatory framework, which prioritizes innovation and market growth over stringent safety measures, may have contributed to the tragedy. The call for action comes at a critical juncture, as GalaxyZ's ambitious plans for orbital tourism, including flying up to 100 tourists per MarsShip mission and conducting a crewed Lunar flyby, now hang in the balance.

The timing of the disaster could not be more inopportune for the United States, as GalaxyZ was gearing up to begin refueling operations for the Human Landing System (HLS) in preparation for the first human landing on the Moon in decades. The return, already delayed from 2024 to 2025, then 2026, and now 2029, means that any further delay or setback now not only threatens the future of U.S. Lunar exploration but also provides a window of opportunity for the People's Republic of China to surge ahead in the new space race with its planned human landing in 2030.

As the nation grapples with the aftermath of this unprecedented tragedy, the debate intensifies over the balance between fostering innovation in the burgeoning space tourism industry and ensuring the safety of its passengers. With the PRC's space program hot on its heels, the U.S. faces a delicate dilemma: how to respond to public demand for greater safety without stifling the competitive edge that has positioned it as a leader in commercial spaceflight. The decisions made in the wake of this incident could reshape the future of space exploration and commercialization for years to come. The president will be meeting with the families later this week.

NOTE: The President saw this article and is concerned. He has asked the Vice President to convene a National Space Council to provide the President with options and recommendations for immediate response and long-term programmatic response options.

Scenario Selection Rationale

Even though a small orbital tourism market has developed with a laudable (at least at the time of writing) safety record, rockets are dangerous and spaceflight is still experimental. So far, the FAA Office of Commercial Spaceflight has overseen some 500 safe flights,¹ including recent orbital tourism spaceflights. More are on the horizon. SpaceX hopes to fly eight crew around the Moon² and eventually perhaps as many as 100 tourists per Starship.³ To date, Congress has asked the FAA to take a hands-off approach to regulation⁴ of spaceworthiness for the astronauts themselves (who are treated as adventurers with informed consent) and to protect only the public. But a significant in-space accident with loss of life is likely to shock the public and demand some sort of action—and potentially an over-reaction which might reduce U.S. advantage, competitiveness, and ability to meet national goals. Such an accident might also create a serious hazard to navigation as well as a public spectacle.

Discussion Summary

1. **Balancing Innovation and Safety Regulation:** The council debated how to respond to the tragedy without over-regulating the commercial space industry, recognizing the need for increased safety measures while maintaining U.S. leadership in space innovation. An investigation into the root cause and potential regulatory reviews were proposed, with caution against stifling progress.
2. **Diplomatic and Security Concerns:** Managing relationships with affected nations and countering adversarial propaganda were key issues. The council emphasized transparent

¹ Federal Aviation Administration, “Report to Congress: U.S. Department of Transportation Evaluation of Commercial Human Space Flight Activities Most Appropriate for New Safety Framework,” September 29, 2023, https://www.faa.gov/sites/faa.gov/files/2023_10_06%20PL_114-90_Sec_111_7_Commercial_Human_Spaceflight_Activities.pdf.

² dearMoon Project, <https://dearmoon.earth/>.

³ Micheal Sheetz, “Elon Musk Says SpaceX’s Starship Rocket Will Launch ‘Hundreds of Missions’ Before Flying People,” CNBC, September 1, 2020, <https://www.cnbc.com/2020/09/01/elon-musk-spacex-starship-to-fly-hundreds-of-missions-before-people.html>.

⁴ Marcia Smith, “FAA Reauthorization Clears Congress, Extends Learning Period,” SpacePolicyOnline.com, May 16, 2024, <https://spacepolicyonline.com/news/faa-reauthorization-clears-congress-extends-learning-period/>.

communication with allies while enhancing vigilance over potential adversary movements, advocating for U.S. leadership in debris mitigation efforts to prevent further space hazards.

3. **Political and Public Messaging:** The council highlighted the need for coordinated messaging to reassure both domestic and international audiences, particularly given the potential impacts on the Human Landing System (HLS) program. Swift, clear communication and proactive leadership in addressing the debris field were recommended to manage political fallout and public perception.

NSpC Participants' Recommendations

Recommendation 1: Hold a Presidential/Vice Presidential-level press conference that acknowledges U.S. responsibility for the incident, expresses condolences to the families, and outlines swift decisive measures to address the situation. Clearly communicate the risks posed by debris and let allies and adversaries know “we’ve got this.” Highlight cooperation with Japan to prevent further incidents.

Recommendation 2: Form a specialized task force that includes experts from the Department of Defense, NASA, and the intelligence community. The task force will be responsible for conducting a comprehensive debris field analysis, building a map, and projecting risks to U.S. space assets so that they can be mitigated.

Recommendation 3: Work with GalaxyZ to immediately launch a debris removal effort that demonstrates U.S. ability to effectively manage space debris.

Recommendation 4: Task the Department of Commerce with convening a global space safety summit that brings together international stakeholders to discuss debris mitigation strategies and establishes responsible norms for space behavior.

Scenario 2: China's Game-Changer: Long March 9's Stunning Debut Signals New Era in Space Race

The Daily Astronomer | Front Page

February 13, 2029

On the first day of Chinese New Year, China has spectacularly launched the Long March 9, a super heavy-lift rocket, one year ahead of schedule, marking a monumental achievement with its first-time success of the entire reusable stack. This groundbreaking event not only demonstrates China's growing prowess in space technology but also directly challenges U.S. dominance in the sector, particularly at a time when American companies face regulatory hurdles that slow down commercial launch activities.



The successful deployment of the Long March 9 is a clear indication of China's ambitions to become a leader in space exploration and commercialization. With plans for mass production, the Long March 9 is set to play a crucial role in supporting China's Lunar base initiatives and constructing an ambitious solar power satellite program. This launch vehicle's capabilities mirror those of SpaceX's Starship, setting the stage for a competitive edge in heavy lift and reusability that the U.S. once undisputedly held.

Amidst increasing environmental and safety regulation that has beleaguered U.S. companies like SpaceX, Blue Origin, Relativity, and Stoke, China's strategic advance in space launch capabilities comes at an opportune moment. The Long March 9's debut and its implications for rapid deployment of space systems have raised concerns over the speed at which China could not only catch up but potentially outpace U.S. advancements in space technology.

Furthermore, China has articulated clear plans to commercialize the Long March 9, with a state-backed champion poised to recapture and expand its share in the global launch market. This move signifies China's intent not only to leverage its technological achievements for economic gain but also to assert its presence as a dominant force in the international space community.

In a stark warning that reverberates through the corridors of power and industry, leading U.S. rocket companies, including SpaceX, Blue Origin, Relativity, and Stoke, are sounding the alarm over the imminent threat posed by China's rapid advancements in space technology, notably the Long March 9's successful launch and reusability. These firms caution that without significant intervention from the U.S. government, they are on a precarious path toward financial instability that could lead to bailouts, bankruptcy, and the forfeiture of a critical market segment to Chinese dominance. U.S. firms argue that the American government has not provided a comparable market drive or facilitation, leaving them at a competitive disadvantage. The stark warning outlines a grim future in which, without prompt and decisive government

action, the U.S. risks not only losing its commercial space edge but also jeopardizing the Space Force's secure access to space—a critical component of national security.

As the Long March 9 prepares for mass production and subsequent missions critical to China's space infrastructure, the global space race enters a new phase of heightened competition and strategic positioning. The United States, now facing a formidable challenge, must navigate its regulatory landscape carefully to maintain its leadership role in an increasingly contested outer space environment. Many analysts are looking to hear what the new administration will say in the State of the Union and the president's budget request.

NOTE: The President saw this article and is concerned. He has asked the Vice President to convene a National Space Council to provide the President with options and recommendations for immediate response and long-term programmatic response options.

Scenario Selection Rationale

The United States has enjoyed an advantage in space launch in both heavy lift and reusability. As of the time of writing, the Space Launch System (SLS) has demonstrated one successful mission. SpaceX Starship is making rapid progress, with its spectacular fifth developmental launch completed.⁵ Once completed, it will be game-changing.⁶ But the PRC has plans to develop a super-heavy lift Long March 9⁷ capable of lifting 150 metric tons to low-Earth orbit, and targeting its first launch in the early 2030s. Recently the PRC has shifted the design to embrace Starship-like full reusability.⁸ Should the PRC show itself equally capable with a SpaceX Starship-equivalent system, the U.S. would have to worry about losing global market share for launch, as well as the speed at which China could deploy space systems, including military systems.

Discussion Summary

1. **Regulatory Barriers and Competitive Disadvantage:** Several council members identified U.S. export controls (e.g., International Traffic in Arms Regulations, or ITAR) as a major obstacle, stifling innovation and competitiveness. The Vice President and the Secretary of Commerce stressed the need for regulatory reform to help U.S. companies compete, warning of the risk of losing technological and strategic military advantages to China.

⁵ Mike Wall, “SpaceX catches giant Starship booster with ‘Chopsticks’ on historic Flight 5 rocket launch and landing (video),” Space.com, October 13, 2024, <https://www.space.com/spacex-starship-flight-5-launch-super-heavy-booster-catch-success-video>.

⁶ Peter Garretson and Samuel Havard, “The Starship Singularity,” *Space Policy Review*, American Foreign Policy Council, February 2023, no. 2, [https://www.afpc.org/uploads/documents/Starship_\(SPR\)_-2.22.23.pdf](https://www.afpc.org/uploads/documents/Starship_(SPR)_-2.22.23.pdf).

⁷ Namrata Goswami, “Long March 9 Rocket Will Be a Game-changer for China’s Space Program,” *The Diplomat*, October 3, 2023, <https://thediplomat.com/2023/10/long-march-9-rocket-will-be-a-game-changer-for-chinas-space-program/>.

⁸ Andrew Jones, “China Plans Full Reusability for Its Super Heavy Long March 9 Rocket,” *SpaceNews*, April 27, 2023, <https://spacenews.com/china-plans-full-reusability-for-its-super-heavy-long-march-9-rocket/>.

2. **Workforce Development and STEM Challenges:** Concerns were raised about the aging U.S. space workforce and the country’s lower STEM graduate numbers compared to China. Council members emphasized the need for bolstering STEM education, attracting global talent, and incentivizing young professionals to enter the space sector to sustain U.S. leadership.
3. **Strategic and Military Implications:** China’s reusable rocket capabilities were seen as a threat to U.S. military dominance in Cislunar space. Recommendations included adopting a whole-of-government approach to space security and prioritizing interagency collaboration to counter China’s advancements, while also balancing diplomatic efforts to engage China through international norms and partnerships.

NSpC Participants’ Recommendations

Recommendation 1: Develop a cohesive long-term space strategy that is aligned across numerous federal agencies and modeled after the National Maritime Strategy. Funding will need to be centralized through the Department of Defense to avoid fragmented efforts from many agencies (like NOAA and NASA). The executive branch should provide clear communication and incorporate a long-term plan for space-based solar power.

Recommendation 2: The U.S. industrial base needs to be augmented to compete with China’s advancements, and this growth can occur through revised workforce development, immigration, and export policies.

Recommendation 3: In the short term, Defense, State, Commerce, and the intelligence agencies must quickly analyze both the capabilities of China’s Long March 9 in terms of range and mass and the implications for the U.S. The analysis should provide firm deadlines that prevent any regulatory delays.

Recommendation 4: Exploit the U.S. commercial sector’s advantage in space. Remove barriers to commercial space enterprises, allowing the U.S. to leverage its strength in civil, commercial, defense, and intelligence space sectors.

Scenario 3: Global Anxiety Swells as Apophis Prepares for Close Earth Approach in 2029

The Daily Astronomer | Front Page
April 7, 2029

As the asteroid Apophis edges closer to its highly anticipated close encounter with Earth in 2029, global anxiety is surging over the potential consequences of its proximity. Apophis, a 370-meter-wide asteroid, has been a subject of intense scrutiny since its discovery, due to its size and the nearness of its approach, sparking fears reminiscent of the Chelyabinsk meteor that exploded over Russia in 2013.



Communities around the globe are concerned about the possibility of similar events occurring, given the extensive damage and injuries caused in Chelyabinsk, where over 1,500 people were injured by the blast. Leading the public awareness campaign is CosmoGuard, an international advocacy group. CosmoGuard spokesperson Dr. Irina Volkova, a planetary scientist who herself was injured in the Chelyabinsk event, stated, "The thought of something even larger looming so close to Earth is a sobering reminder of our vulnerability."

Further compounding the anxiety are worries about Apophis disrupting satellites as it crosses inside geostationary orbit, a band where many critical satellites reside. The potential for collisions is considered low but could have serious implications for global communication and weather forecasting services. "Even a small piece of debris traveling at such high speeds can disable a satellite, and the cascade effect from one collision could lead to more, crippling our orbital infrastructure," explained Dr. Mei Ling Tan of Singapore University's Orbital Sustainability Center.

These fears have intensified calls for enhanced planetary defense capabilities. Nations around the world are responding, with major powers like China, Russia, and India taking significant steps. The China Planetary Defense Program has recently announced the expansion of its space surveillance network, aiming to track Apophis's trajectory with unprecedented precision. Meanwhile, Russia has been conducting simulations to assess the asteroid's potential impact on its satellite systems and exploring strategies (including the use of a "peaceful nuclear explosion") for deflection should the need arise. India is not far behind, having launched its own asteroid tracking system and collaborating internationally to research potential defense technologies. "The approach of Apophis must be a wake-up call for all of us," said Dr. Rajiv Desai, head of India's Planetary Defense Coordination Office. "It underscores the urgent need for a comprehensive global strategy to address these celestial threats."

The increased focus on planetary defense has also led to calls for a united international response. Experts argue that a collaborative approach would pool resources and expertise, increasing the chances of successfully averting a catastrophic event. "This is a global challenge that knows no borders. Only by working together can we hope to protect our planet," Dr. Desai emphasized.

As the April 13, 2029, close approach draws nearer, the world watches, waits, and prepares, hoping that when Apophis finally makes its close pass, Earth will be ready to face it head-on. The efforts made today could well determine our planet's resilience to the celestial dangers of tomorrow.

This week, America's newly reelected President heads to give a speech at the United Nations. Sources have confirmed the U.N. Secretary General has asked him to speak on planetary defense, and even if he chooses not to, he's likely to be confronted by reporters who will greet him with several questions on the subject.

NOTE: The President saw this article and is concerned. He has asked the Vice President to convene a National Space Council to provide the President with options and recommendations for immediate response and long-term programmatic response options.

Scenario Selection Rationale

Recently we have had several close approaches of asteroids⁹ that were detected quite late, as well as several bolide events,¹⁰ one of which (Chelyabinsk 2013)¹¹ caused damage and injuries. However, as yet, we have not had a large potentially hazardous asteroid pass both close enough to see with the naked eye and close enough to be of concern for space traffic management. A sizable object such as Apophis,¹² which will pass very close to Earth—inside the geostationary orbit—on April 13, 2029, and be visible to the naked eye, is likely to raise concerns with the public and bring attention to whether the United States, NASA, or Space Force can deflect an asteroid for homeland defense or planetary defense.

Discussion Summary

1. **Public Messaging and Panic Prevention:** The council emphasized the need for calm, transparent communication to prevent public panic and market disruptions, stressing that Apophis poses no direct threat to Earth but could impact satellites.

⁹ Near-Earth Objects Coordination Centre, "Close Approaches," European Space Agency, <https://neo.ssa.esa.int/close-approaches>.

¹⁰ Peter Garretson, "Clarifying the Planetary Defense Mission," *Defense Technology Program Brief No. 24*, American Foreign Policy Council, June 2021, https://www.afpc.org/uploads/documents/Defense_Technology_Briefing_-_Issue_24.pdf.

¹¹ Tricia Talbert, "Five Years After the Chelyabinsk Meteor: NASA Leads Efforts in Planetary Defense," NASA, February 15, 2018, <https://www.nasa.gov/solar-system/five-years-after-the-chelyabinsk-meteor-nasa-leads-efforts-in-planetary-defense/>.

¹² "Apophis," NASA, <https://science.nasa.gov/solar-system/asteroids/apophis/>.

2. **International Leadership Versus Nuclear Risks:** There was concern over China and Russia using nuclear deflection as a pretext for militarizing space. The U.S. must lead by promoting nonnuclear methods through international frameworks like the U.N. Committee on the Peaceful Uses of Outer Space (COPUOS).
3. **Technological Opportunities and Preparedness:** The council explored leveraging heavy-lift rockets for planetary defense and proposed a “Space Coast Guard” for space situational awareness and debris removal, positioning the U.S. as a leader in planetary defense innovation.

NSpC Participants’ Recommendations

Recommendation 1: Immediately organize a brief, fact-based press conference to reassure the public about safety, provide transparency regarding ongoing monitoring, and acknowledge the importance of planetary defense. In the long term, launch a public education campaign about the realities of asteroid threats.

Recommendation 2: Advocate for a global planetary defense strategy by engaging with international bodies like the COPUOS. Strengthen global coordination with a planetary defense task force, modeled on successful international disaster response efforts, to pool resources, expertise, and strategies.

Recommendation 3: Commission a comprehensive study to evaluate the actual risk posed by near-Earth objects and the costs to develop advanced detection and mitigation systems. Next, reexamine funding priorities to ensure planetary defense support is adequate—and ensure we are efficiently leveraging existing space programs to enhance preparedness.

Recommendation 4: Consider creating a U.S. Space Guard agency, modeled after the U.S. Coast Guard that operates under the Department of Homeland Security during peacetime. A U.S. Space Guard could transition to the Defense Department during crises. Ensure efficient integration with existing space-related agencies.

Scenario 4: PRC Begins Construction of Megawatt-Class Solar Power Satellite in Geostationary Orbit

The Daily Astronomer | Front Page
June 1, 2029

In a groundbreaking move that has captured the attention of the global energy and space communities, the People's Republic of China has officially commenced construction on its first megawatt-class solar power satellite. The project, unveiled at a high-profile event in Beijing, marks a significant step forward in the nation's quest for sustainable energy sources.



The satellite, named Tian Guang-1 (Heaven's Light), is designed to harness solar energy directly from space, where solar radiation is stronger and more consistent than on Earth's surface. This energy will then be converted into microwave (5.8Ghz) and optical frequency (1064nm) energy and transmitted back to ground-based receivers. These stations will convert the energy back into electricity, feeding it into the national power grid.

The satellite, estimated to cost upward of 10 billion yuan (\$1.5 billion), will be assembled robotically in space from sections launched from the newly expanded Wenchang Space Launch Center on Hainan Island. Once complete, it will measure a staggering 1 kilometer across, dwarfing any existing space structure at nearly 10 times the length of the International Space Station. Tian Guang-1 will orbit Earth in a geosynchronous position, constantly bathed in sunlight.

"This project is not just a technological leap; it is a bridge towards a greener future," said Dr. Li Wei, director of the China National Space Administration, during the satellite's unveiling. "We aim to provide a viable solution to our growing energy needs while reducing our carbon footprint."

The construction of Tian Guang-1 involves collaboration between China's top scientific institutions and several international technology firms, highlighting a new era of global cooperation in space technology and renewable energy.

At the core of the project is an array of high-efficiency solar panels spread over an area equivalent to 10 football fields. This expansive design allows the satellite to capture sunlight with unprecedented efficiency. The innovative transmission system is expected to mitigate energy loss, a challenge that historically has plagued similar endeavors.

Experts suggest that the success of Tian Guang-1 could revolutionize power generation globally. "If China succeeds, it will be a game-changer. Imagine a future where energy could be

harnessed and distributed anywhere on Earth, without the need for extensive infrastructure," explained Dr. Emily Rausch, a U.S.-based energy analyst.

However, the project is not without its critics. Concerns have been raised about the potential for weaponization of the energy transmission technology and about the environmental impact of constructing and launching the massive satellite. Additionally, the economic feasibility of such an ambitious project remains a topic of intense debate.

As the construction progresses, the international community watches closely, eager to see whether China's bold venture into space-based solar power will soar to success or encounter turbulence. Either way, Tian Guang-1 represents a bold stride toward a future where space not only captures the imagination but also powers our homes.

Despite the concerns, China is forging ahead and the Chinese government has committed significant resources to the project, viewing it as a cornerstone of their national energy strategy. Plans are already underway for additional satellites, pending the successful deployment and operation of Tian Guang-1.

The ambitious project is expected to take two and a half years to complete, with initial power generation slated for 2030. The success, or failure, of Tian Guang-1 will be closely watched by the international community, potentially ushering in a new era of space-based renewable energy or serving as a cautionary tale. China's bold actions on a project of such immense scale have called into question the U.S. space leadership. While the idea of a solar power satellite was invented in the United States, it has failed to develop a program. Takeshi Nakamura, military analyst with the Sakura Security Institute, expressed doubts the U.S. Space Force will be able to keep pace: "America has severely underinvested in space mobility and logistics and in-space servicing, assembly and manufacture. Is it even possible to catch up?" The U.S. president is likely to receive many questions at the upcoming NATO and Group of Seven summit.

NOTE: The President saw this article and is concerned. He has asked the Vice President to convene a National Space Council to provide the President with options and recommendations for immediate response and long-term programmatic response options.

Scenario Selection Rationale

Space-based solar power is a concept for a novel renewable energy system.¹³ It would involve placing into orbit very large satellites that collect solar energy and beam it to the ground. Unlike terrestrial solar, the satellites collect sunlight 24 hours a day and can beam through clouds and weather, overcoming problems of intermittency, storage, and long-distance transmission to

¹³ Cody Retherford, "The Promise of Space-Based Solar Power," *Space Policy Review*, American Foreign Policy Council, September 2022, no. 1, https://www.afpc.org/uploads/documents/Space_Policy_Review_-_issue_1_-_9.21.2022.pdf.

provide green, renewable power that is city scale, base-load appropriate, and dispatchable. In principle, it could scale to meet all global demand, offering a very low carbon alternative.

China has announced an ambitious plan to develop space-based solar power. That plan includes multiple progressively larger demonstrations. The announced goal of a 1-megawatt (MW) solar power station (enough to power 1,000 homes) in 2030 represents an extremely significant capability.¹⁴ Currently only the International Space Station has 120 kilowatts (kW),¹⁵ with most high-power communication satellites being in the range of 5–20kW. The ability to construct a 1-MW platform is significant. The Lockheed/Department of Defense IFPC-HEL at 300kW¹⁶ is among the most powerful military lasers, and the U.S. Air Force airborne laser (which could shoot down ballistic missiles) was a megawatt-class laser.¹⁷ The emplacement of such a high power and directed energy platform is likely to raise concerns among the American public.

Discussion Summary

1. **Technological and Strategic Lag:** The U.S. risks falling behind China in space-based solar power (SBSP) and in-space servicing, assembly, and manufacturing (ISAM). There is a lack of proactive investment and strategic planning to counter China’s rapid advancements, particularly in developing large-scale SBSP infrastructure and space logistics capabilities.
2. **Weaponization and Geopolitical Risks:** Concerns are high that China’s SBSP technology could be weaponized, with limited U.S. intelligence on Chinese capabilities heightening fears. Additionally, China could leverage this technology to dominate global energy markets, shift geopolitical power, and create energy dependence among its allies, undermining U.S. leadership.
3. **Public-Private Partnerships and Political Hurdles:** While many council members advocate for leveraging private-sector partnerships to accelerate U.S. competitiveness in SBSP, there is concern about inefficiencies in government-led initiatives. Political resistance, particularly from big energy companies and parts of Congress, presents significant obstacles to securing the necessary support and funding for U.S. SBSP projects.

NSpC Participants’ Recommendations

Recommendation 1: Establish international partnerships for SBSP and increase public-/private-sector investment in commercial SBSP ventures and ISAM services to compete with China—

¹⁴ Andrew Jones, “China Aims for Space-Based Solar Power Test in LEO in 2028, GEO in 2030,” *SpaceNews*, June 8, 2022, <https://spacenews.com/china-aims-for-space-based-solar-power-test-in-leo-in-2028-geo-in-2030/>.

¹⁵ “Solar Arrays on the International Space Station,” NASA, April 14, 2015, <https://www.nasa.gov/image-article/solar-arrays-international-space-station-2/>.

¹⁶ “U.S. Army Selects Lockheed Martin to Deliver 300 kW-class, Solid State Laser Weapon System,” Lockheed Martin, October 10, 2023, <https://news.lockheedmartin.com/2023-10-10-US-Army-Selects-Lockheed-Martin-to-Deliver-300-kW-class-Solid-State-Laser-Weapon-System>.

¹⁷ “February 3, 2010: Testing of YAL-1 Airborne Laser Test Bed,” Air Force Test Center, February 3, 2021, <https://www.aftc.af.mil/News/On-This-Day-in-Test-History/Article-Display-Test-History/Article/2462050/february-3-2010-testing-of-yal-1-airborne-laser-test-bed/>.

push for fast development timelines. Promote clean energy initiatives and consider nuclear and other innovative energy solutions.

Recommendation 2: Take a firmer diplomatic stance toward China, and launch a global diplomatic campaign to address implications of China's SBSP project and its potential weaponization, while simultaneously reassuring U.S. citizens and allies.

Recommendation 3: Closely monitor the development of the 1-MW laser technology for potential national security implications.

Recommendation 4: Develop Lunar-based power beaming systems as part of the Artemis program. Explore Lunar rovers capable of energy transmission, propulsion systems powered by beamed energy, and the use of lasers for deflecting asteroids (e.g., laser ablation).

Scenario 5: China's Asteroid Return: A Scientific Triumph or Public Safety Nightmare?

The Daily Astronomer | Front Page
September 20, 2029

The People's Republic of China is on the verge of accomplishing an unprecedented space feat: the return of a small asteroid to Earth.

Launched in early 2029, the PRC announced today that its mission, known as Tian Kuang (Heavenly Miner), had succeeded in capturing its target with a huge bag, affixing the reentry heat shield, and accomplishing its departure burn to return to Earth.



The mission has been celebrated by the PRC as a milestone in space exploration and a leap forward in the quest for resources beyond our planet with the potential to return tons of precious metals such as iron, nickel, copper, gold, and platinum group metals.

The target asteroid, nicknamed "Xīng Guī" (Returning Star) is about 10 meters in diameter and weighs between 1,047 and 2,618 metric tons. The asteroid is currently about 100 million kilometers from Earth, with its anticipated reentry into Earth's atmosphere in early 2034. If all goes as planned, the heat shield will slow the asteroid from 12.5 kilometers per second to 140 meters per second for its touchdown in north China's Inner Mongolia Autonomous Region.

Public concerns over safety and regulation have surged, along with a renewed interest in the potential of asteroid mining. "A controlled reentry of a sample is one thing, but bringing back an entire asteroid presents a multitude of risks," stated Dr. Haruto Nakamura, a leading astrophysicist at the Asia-Pacific Regional Space Agency Forum. "What measures are in place if the trajectory changes? The potential for impact could have disastrous consequences," said South Korean defense analyst Dr. Min-seok Choi. Public forums and social media are abuzz with debates over the international space treaties and the need for more robust regulatory frameworks. Many have called for greater transparency from the PRC and international bodies on the protocols established to ensure the safe handling of such missions. Simultaneously, the promise of asteroid mining has come back into the spotlight, reigniting discussions about the economic and environmental implications. The potential for extracting rare minerals and metals from asteroids could transform industries and economies but also raises ethical questions about space exploitation and environmental stewardship.

In the United States, the upcoming asteroid return has triggered reflections on the nation's own space program's priorities. "Are we behind in the new space race for resources?" asked a recent op-ed in the *Washington Post*. The National Aeronautics and Space Administration has assured the public that its efforts in space resource utilization are well underway, pointing to the Artemis missions and the ongoing Lunar Gateway project.

As the Tian Kuang mission approaches its next critical moment, the world holds its breath, not only for the safety implications but also for the glimpse into a future where space could become humanity's next frontier for mining. The outcome of this mission may very well set the stage for the next chapter in space exploration and international space policy.

"The safe return of Tian Kuang could herald a new age," former Indian Space Research Organization Chairman Dr. Patel adds optimistically. "But it must be approached with caution, respect for international concerns, and a collective commitment to the responsible use of space." As the countdown continues, all eyes turn skyward, waiting for history to be made—or, perhaps, for lessons to be learned.

The issue has become entangled with the annual U.S. defense authorization bill, which is about to go to Congress. The House Intelligence Committee chair, House speaker, and House Committee on Natural Resources chair, who have been "concerned for weeks about the national security threat posed by 'anything less than perfectly controlled reentry' to the U.S. homeland, and U.S. satellites," have sent the president an open letter asking about the competency of the U.S. government to assure the safety of the Chinese operation. "How do we know this won't land on Washington, DC, or Houston?" and "What steps is the U.S. taking to keep pace on asteroid mining?"

NOTE: The President saw this article and is concerned. He has asked the Vice President to convene a National Space Council to provide the President with options and recommendations for immediate response and long-term programmatic response options.

Scenario Selection Rationale

China has articulated a long-term goal of mining asteroids by 2040.¹⁸ Toward that end, China is pursuing heavy-lift rockets, advanced in-space power and propulsion, and asteroid missions. Distinct from its 2025 Tianwen-2 Asteroid Sample Return,¹⁹ and its 2030 Asteroid Deflection mission,²⁰ China has discussed plans to send a mission in 2029 to capture an entire asteroid and bring it back to Earth's surface in 2034.²¹ While any such return is likely to be small, the

¹⁸ Stephen Chen, "China's Nuclear Spaceships Will Be 'Mining Asteroids and Flying Tourists' as It Aims to Overtake US in Space Race," *South China Morning Post*, November 17, 2017, <https://www.scmp.com/news/china/policies-politics/article/2120425/chinas-nuclear-spaceships-will-be-mining-asteroids>.

¹⁹ Andrew Jones, "China to Launch Near-Earth Asteroid Sample Return Mission in 2025," *SpaceNews*, September 25, 2024, <https://spacenews.com/china-to-launch-near-earth-asteroid-sample-return-mission-in-2025/>.

²⁰ Robert Lea, "China Plans to Deflect an Asteroid by 2030 to Showcase Earth Protection Skills," *Space.com*, July 11, 2024, <https://www.space.com/china-planning-planetary-defense-asteroid-mission>; Andrew Jone, "China Targets Its First Planetary Defense Test Mission," *Planetary Society*, July 2, 2024, <https://www.planetary.org/articles/china-targets-its-first-planetary-defense-test-mission>.

²¹ "China Focus: Capture an Asteroid, Bring It Back to Earth?" *Xinhua*, July 23, 2018, http://www.xinhuanet.com/english/2018-07/23/c_137342866.htm; Phillip Keane, "China's Asteroid Capture Plan," *SpaceTech Asia*, October 22, 2018, <https://www.spacetechnasia.com/chinas-asteroid-capture-plan/>.

precedent and newsworthiness of returning an asteroid to Earth is likely to raise significant questions about safety and regulation, and renew interest in asteroid mining.

Discussion Summary

1. **Safety and Security Risks:** The council expressed significant concerns about the potential dangers of China’s asteroid reentry mission, including the risk of an off-course impact on U.S. territory or global space assets, with some members advocating for military readiness to intercept or divert the asteroid if necessary.
2. **Geopolitical and Strategic Competition:** There was widespread anxiety that China’s success could shift global leadership in space resource exploitation, prompting calls for the U.S. to rapidly develop a strategic plan to regain its competitive edge and shape international rules for space mining.
3. **Public Perception and Communication:** Managing public fear and media scrutiny emerged as a key priority, with the council emphasizing the need for clear messaging and preparing for worst-case scenarios, alongside efforts to educate the public on the importance of space resources.

NSpC Participants’ Recommendations

Recommendation 1: Launch a communication campaign to explain the threat of PRC asteroid return. Frame China’s mission as an overreach, using it to motivate U.S. innovation and reinforce the nation’s leadership in responsible space exploration.

Recommendation 2: Convene a U.N. Committee on the Peaceful Uses of Outer Space (COPUOS) meeting to discuss guidelines for responsible asteroid return, and demand transparency from the PRC about its safety protocol and mission details.

Recommendation 3: Develop contingency plans with allies to intercept or divert if the asteroid becomes a threat and appoint a “space czar” to oversee and coordinate the U.S. response across the U.S. government. Prioritize the development of advanced space tracking systems to monitor space objects.

Recommendation 4: Reassess and expand current NASA programs related to space resource utilization—specifically, accelerate investments in space resource extraction technologies and space-based material processing.

Scenario 6: Global Tension Escalates as North Korea and Iran Showcase Anti-Satellite Might

The Daily Astronomer | Front Page
December 7, 2029

In a striking demonstration of military capability, North Korea and Iran have simultaneously conducted kinetic anti-satellite (ASAT) weapons tests, joining the ranks of a select group of nations with such advanced capabilities. These tests serve not only as a bold challenge to U.S. space leadership but also as a deterrent against intervention, showcasing their ability to target critical space assets. Notably, both countries have undertaken measures to minimize space debris, mirroring India's responsible approach to ASAT testing, to position themselves as conscientious actors in the arena of space security.



This development has sparked a domino effect, with Pakistan and Saudi Arabia signaling their intentions to acquire similar ASAT capabilities, potentially altering the balance of power in space. The tests by North Korea and Iran, nations with a history of collaboration in rocket technology, underscore the proliferation of space warfare technology and the increasing number of states capable of engaging in such acts.

Further clarity has emerged regarding the technology behind these tests. Our investigative journalists have learned that both nations have utilized passive coherent tracking, leveraging commercial space situational awareness radars to analyze signals from Starlink satellite constellations to locate and guide their ASAT missile to their targets. This technique, previously demonstrated by Germany for radar tracking purposes, highlights a sophisticated method of identifying and targeting satellites, emphasizing the growing accessibility of advanced targeting capabilities.

The cooperation between North Korea and Iran in their rocket programs has been well documented, and these latest tests suggest a continuing partnership in developing military strategies that extend into space. This collaboration, combined with these countries' efforts to minimize debris generation, suggests a nuanced strategy to assert their presence in space without drawing undue ire for irresponsible actions.

The international response to these provocations remains to be seen, but the implications for global space security are profound. With the potential expansion of ASAT capabilities to additional nations such as Pakistan and Saudi Arabia, the urgency for diplomatic and regulatory efforts to manage space as a contested domain has never been higher. As the global community grapples with these developments, traditional U.S. allies are looking to the U.S. to stem the proliferation and rebuke both the ASAT testers and would-be testers. American hawks want the U.S. to give a show of force, while the broader world looks to the U.S. to develop a

collective approach to prevent the militarization of space and ensure that its peaceful use is underscored, amid an increasingly complex geopolitical landscape.

NOTE: The President saw this article and is concerned. He has asked the Vice President to convene a National Space Council to provide the President with options and recommendations for immediate response and long-term programmatic response options.

Scenario Selection Rationale

To date, only the U.S., USSR/Russia,²² China,²³ and India²⁴ have demonstrated direct-ascent kinetic anti-satellite weapons tests. All these nations also have significant assets in space that they rely on. Lesser powers do not have such reliance on space, but they do have the missile capability or capability to reach orbit and as well as national security pressures that could lead them to conduct debris-causing tests. For example, both North Korea²⁵ and Iran²⁶ have succeeded in launching satellites into orbit. Orbital capability is not even required for a direct-ascent ASAT missile, as an ASAT missile does not need to achieve orbital speed, but merely a high enough altitude that a satellite will smash into it. Even sounding rockets can reach such altitudes,²⁷ and Pakistan and Saudi Arabia have more capable long-range missiles that can reach 2,750 km and 4,000 km, respectively. The U.S. has recently taken the lead in a moratorium on the testing of debris-creating direct-ascent ASAT missiles.²⁸ Thus, proliferation of direct-ascent ASAT weapons by second-tier space powers is not likely to be well tolerated by the United States.

Discussion Summary

1. **Proliferation and Deterrence:** The proliferation of ASAT capabilities among second-tier actors, such as North Korea, Iran, and potentially Pakistan and Saudi Arabia, poses a serious threat to U.S. space leadership. The test prompted a call for a multifaceted response, including diplomatic initiatives, economic sanctions, and potential military

²² “Russian Direct-Ascent Anti-satellite Missile Test Creates Significant, Long-Lasting Space Debris,” U.S. Space Command, November 15, 2018, <https://www.spacecom.mil/Newsroom/News/Article-Display/Article/2842957/russian-direct-ascent-anti-satellite-missile-test-creates-significant-long-last/>.

²³ Greg Hadley, “Saltzman: China’s ASAT Test Was ‘Pivot Point’ in Space Operations,” *Air and Space Forces*, January 13, 2023, <https://www.airandspaceforces.com/saltzman-chinas-asat-test-was-pivot-point-in-space-operations/>; Brian Weeden, “2007 Chinese Anti-Satellite Test Fact Sheet,” Secure World Foundation, November 23, 2010, https://swfound.org/media/9550/chinese_asat_fact_sheet_updated_2012.pdf.

²⁴ Doris Elin Urrutia, “India’s Anti-Satellite Missile Test Is a Big Deal. Here’s Why,” Space.com, August 10, 2022, <https://www.space.com/india-anti-satellite-test-significance.html>.

²⁵ Vann H. Van Diepen, “Modest Beginnings: North Korea Launches Its First Reconnaissance Satellite,” 38 North, November 28, 2023, <https://www.38north.org/2023/11/modest-beginnings-north-korea-launches-its-first-reconnaissance-satellite/>.

²⁶ “Iran Launches New Research Satellite Chamran-1 Into Orbit,” *Al Jazeera*, September 14, 2024, <https://www.aljazeera.com/news/2024/9/14/iran-launches-new-research-satellite-chamran-1-into-orbit>.

²⁷ “Sounding Rockets,” NASA, https://sites.wff.nasa.gov/code810/files/Sounding%20Rockets_NASA_fact_sheet.pdf.

²⁸ “Vice President Harris Advances National Security Norms in Space,” The White House, April 18, 2022, <https://www.whitehouse.gov/briefing-room/statements-releases/2022/04/18/fact-sheet-vice-president-harris-advances-national-security-norms-in-space/>.

deterrence. The council grappled with balancing immediate action against long-term strategic investments in space resilience and sustainability.

2. **Geopolitical and Economic Risks:** There are concerns about a coordinated effort by adversaries such as China and Russia to undermine U.S. space dominance, using proxies to disrupt global space assets. Economic fallout, especially for space-related industries, is a major risk if debris or further tests occur, prompting calls for targeted sanctions and stronger global norms.
3. **Vulnerability Versus Leadership:** The U.S. faces a strategic dilemma due to its high reliance on space assets, making it particularly vulnerable to ASAT threats—the risks from space debris could jeopardize civilian, commercial, and military satellites, along with key missions such as Artemis. This vulnerability contrasts with the need to project strength and maintain space leadership, driving recommendations for developing more resilient space architectures and pursuing diplomatic efforts to establish international norms for responsible space behavior.

NSpC Participants' Recommendations

Recommendation 1: Invest in terrestrial and non-space-based positioning, navigation, and timing (PNT) alternatives to reduce reliance on vulnerable satellite systems.

Recommendation 2: Strengthen the ability to quickly replace or repair space assets in the event of an attack—specifically, invest in tactical responsive space (TACRS) capabilities, and partnerships with private companies such as Firefly Aerospace, to deploy replacement satellites rapidly. Additionally, establish debris mitigation and response systems to address the aftermath of ASAT tests or attacks.

Recommendation 3: Implement non-space-based deterrence strategies to dissuade North Korea and Iran from pursuing further testing (leverage diplomatic and economic measures).

Recommendation 4: Acknowledge past hypocrisy of ASAT weapons testing, collaborate with allies, engage adversaries (Russia and China) about shared interest in space, and pursue an international ban on ASAT systems (engage the United Nations as part of ASAT condemnation plan).

CONCLUSIONS AND MACRO RECOMMENDATIONS

The National Space Council exercise provided participants with a realistic sense of the challenges and opportunities U.S. policymakers will face in the coming years. The scenarios demonstrated that in the not-too-distant future the space domain will see strategic competition, rapid technological development, and a fight for global influence.

Critical to maintaining U.S. leadership in space is maintaining U.S. leadership in heavy, reusable launch. This requires a system of light-touch regulation, an approval process that can keep pace with innovation and testing, and incentives for private industry to stay in the lead. It will also require anticipation of a potential accident involving human life and discipline to stay the course and not overreact in such a way as to lose U.S. advantage.

As space systems become larger and their physical interactions more frequent, the chances of a catastrophe increase, necessitating the creation of plans and capabilities for an emergency response. Such planning should begin now.

To the extent such a catastrophe might involve humans in space, the U.S. should be thinking ahead to develop capabilities and plans for space rescue operations. Such plans might begin as little more than response checklists, capability wish lists, and options in a Commercial Augmentation Space Reserve (CASR) contract. But the U.S. should at least have a plan.

Advance planning is also required for planetary defense (asteroid deflection) contingencies. The U.S. Congress should assign responsibility for a planetary defense campaign to the Department of Defense (U.S. Space Command, U.S. Space Force) with NASA and the Department of Energy in support. The Defense Department should be tasked with developing a concept plan (CONPLAN) and requirements to submit to the Joint Requirements Oversight Council.

The U.S. will need much more than a plan to regain its failing position in space-based solar power. Moreover, the nation cannot look to NASA as its champion to catch up. NASA is failing to meet timelines and budgets on nearly every major project and, moreover, has demonstrated hostility to even considering a role for itself in space-based solar power. Congress should situate any space-based solar power program in a more capable and can-do agency, such as the Defense Advanced Research Projects Agency (DARPA), the Office of Space Commerce, or the Energy Department.

Lastly, the U.S. likely has a significant interest in preventing further direct-ascent, debris-causing kinetic anti-satellite proliferation. While the nonbinding, voluntary moratorium was a first step, it is unclear if global disapproval is a sufficient disincentive.

These scenarios were more diverse than in previous workshops, making thematic grouping of recommendations more difficult. Nevertheless, several ideas and themes were prominent across several scenarios.

Strategic recommendations drawn from the entire scenario set:

1. **The U.S. must enable its private sector to maintain the lead in reusable launch technology.**
 - The U.S. must recognize that China is trying hard to eclipse the U.S. in reusable launch and must provide a regulatory environment that enables rapid learning.
 - The U.S. must be ready for potential accidents and must not overreact in such a way as to lose its advantage.
2. **The U.S. must develop space debris contingency plans.**
 - Multiple scenarios could cause a hazard to navigation at such a scale that immediate action is required to prevent a much larger disaster.
 - Thinking through such contingencies early and building them into mobilization and Commercial Augmentation Space Reserve (CASR) is a necessary step.
3. **U.S. Space Command and U.S. Space Force should develop contingency plans for asteroid deflection and planetary defense.**
 - U.S. Space Command should develop contingency plans in advance of Apophis to give the nation confidence that it has a plan and tools.
4. **Posture the U.S. for space rescue.**
 - Develop a forward-looking White House strategy and implementation guidance similar to the National Preparedness Strategy and Action Plan for Near-Earth Object Hazards and Planetary Defense.
 - Assign responsibilities for space rescue in the Unified Command Plan (UCP).
5. **The U.S. needs a national space-based solar power program.**
 - a. The People’s Republic of China’s plans for a large prototype are likely to have a significant psychological impact on the U.S. and the world.
 - b. Waiting to respond until 2030 will be late-to-need.
6. **The U.S. needs to anticipate and develop responses for anti-satellite proliferation.**
 - a. The technology for direct ascent anti-satellite technology appears within reach of multiple second-tier states, which could start a domino effect.
 - b. The U.S. should anticipate this development and examine response options.

LIST OF PARTICIPANTS

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Project Authors

Lt. Col. Peter Garretson, USAF (Ret.) is a Senior Fellow in Defense Studies at AFPC and a co-director of the AFPC Space Policy Initiative (SPI). He is a prolific writer and is co-author of *The Next Space Race: A Blueprint for American Primacy* (Praeger, 2023) and *Scramble for the Skies: The Great Power Competition to Control the Resources of Outer Space* (Lexington Books, 2020). Previously, Garretson spent over a decade as a transformational strategist for the Department of the Air Force, where he served as a strategy and policy advisor for the Chief of Staff of the Air Force, as Division Chief of Irregular Warfare Strategy Plans and Policy, and as the Chief of the Future Technology Branch of Air Force Strategic Planning. Garretson has extensive wargaming expertise, having helped design, been a player in, and led both red and blue teams in Net Assessment wargames. Garretson has designed, planned, and executed a diversity of simulations and wargames, including three Title X wargames for HQ U.S. Air Force, the first interagency planetary defense simulation, the U.S.-U.K.-France trilateral strategic initiative airpower wargame, the Air Command and Staff College Joint Warfare wargame, and two Space Horizons Task Force wargames (including one with NASIC). Garretson has designed multiple scenarios supporting U.S. Space Force Space Futures Workshop, Keplerian Chess, the Nonproliferation Policy Education Center (NPEC), and the AFPC National Space Council Simulation.

Mr. Richard Harrison is the Vice President of Operations and Director of the Defense Technology Program at AFPC, where he co-directs the AFPC Space Policy Initiative (SPI). He has published numerous articles and is co-author of *The Next Space Race: A Blueprint for American Primacy* (Praeger, 2023) and co-editor of *Cyber Insecurity: Navigating the Perils of the Next Information Age* (Rowman & Littlefield, 2016). Prior to his work at AFPC, Harrison spent several years as a systems engineer in the aerospace sector for Lockheed Martin. He completed his master's degree in Security Studies from Georgetown University's School of Foreign Service and also earned a bachelor's degree in Aerospace Engineering from Penn State University.

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ABOUT THE SPACE POLICY INITIATIVE

For America, space represents the next great strategic frontier.

Yet the United States now faces growing competition, and a growing threat, in that domain from countries like Russia and China, each of which is developing technologies capable of targeting U.S. space assets. At the same time, the global space economy is primed for lift off, as technological advances and scientific breakthroughs increasingly put investments and resources there within reach. According to some estimates, within the next two decades, ventures like space tourism, the harnessing of solar energy, and space mining will propel the overall value of the space economy to \$1 trillion.

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In order to act, America’s leaders need to grasp the implications of the unfolding space race. AFPC’s Space Policy Initiative (SPI) is designed to broaden the knowledge base among key officials and stakeholders through a wide range of educational activities, from convening major space conferences to publishing cutting-edge analysis to hosting tabletop wargames and simulations. Our efforts focus on four main themes: (1) developing a robust space economy, (2) harnessing space energy, (3) ensuring that the U.S. military maintains a secure space environment, and (4) understanding the societal impacts of space.

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APPENDIX

The appendix provides a comprehensive overview of the scenarios explored during the workshop, offering valuable insights and supplementary data. Each scenario is accompanied by detailed information that was furnished to the participants, specifying the assigned Democratic or Republican administration in power. The appendix also includes the assessments, concerns, and recommendations put forth by each National Space Council (NSpC) participant. To further enhance understanding, a discussion summary (aided by AI) is included, which succinctly highlights the key tensions and points of deliberation that emerged during the scenario discussions. This additional context aims to provide a more nuanced and complete picture of the complex issues addressed throughout the workshop.

Scenario 1: Tragedy in Orbit: Call for Tighter Regulations After Fatal Commercial Spaceflight Incident

Scenario Supplemental Data Provided

To the NASA Administrator: Any significant stand-down will cause the U.S. to miss its deadlines to return humans to the Moon and likely allow China to land before the U.S.

Issues and Considerations

For this exercise, the National Space Council (NSpC) was assembled under a Democratic administration. Below are the summaries of each NSpC participant's contributions to the debate on how best to respond to the respective scenario, along with points of conflict:

Vice President

Assessment: Relative to U.S. adversaries, GalaxyZ has much greater reusable and heavy-launch capability at a significantly reduced cost.

Concerns: There could be serious ramifications such as the potential frequency of large hazards and damage to the International Space Station or potential catastrophic damage to structures like the Chinese space station. Will there be implications for MarsShip subsidization and continued proper funding. How will this impact the Human Landing System (HLS) refueling operations? How many space companies are capable of conducting debris mitigation of this scale? How often can we expect catastrophic events of this nature to occur—every 5 years, 10 years, 15 years?

Recommendations: When the press release is disseminated, it should acknowledge ownership of the problem, express condolences to the families of people who lost their lives, and explain that it's a tragedy—space has risks. The Department of Defense should be tapped to leverage their debris characterization and clearance capabilities.

Secretary of Defense

Assessment: The U.S. has reusability allowing ships to land, do things, and repeat it, which is a national security advantage that the U.S. must adequately protect. The U.S. is the only nation capable of turning this situation into a positive outcome, and this is an opportunity to demonstrate capabilities in space debris management. It is a top priority to remain vigilant while blocking and making sure others understand it is a keep-out zone. Action must prevent bad actors from interfering, take responsibility, and use our unique capabilities to act. There should be contingency plans in place to prepare for these missions.

Concerns: There is a chance that adversaries might reposition assets for surveillance and propaganda. There is potential for blow-back on the Hill and allies who suffered casualties.

Recommendations: Turn down any offer of assistance from adversaries and proactively clear debris, in collaboration with NASA and GalaxyZ. Establish a contingency plan with the Department of Defense and NASA. Increase the level of vigilance on adversary space capabilities in case they are attempting to reposition assets for intelligence, surveillance, and reconnaissance options.

Director of National Intelligence

Assessment: There is a chance the debris field could affect U.S. military constellations, so evaluations will need to be made to understand immediate and long-term impact assessments. Be cautious about being too brash in a “U.S. has this under control” message as it is impossible to control it 100 percent and the risks remain.

Concerns: There is potential for a Kessler Syndrome effect, where there is a cascade of debris collisions making several orbits unusable.

Recommendations: Conduct thorough assessments on the impact on military operations and Earth observations and ensure satellite operators are aware of both real and perceived risks.

Secretary of Commerce

Assessment: It is important to get in front of the press relations with consistent messaging between the White House and the Department of Commerce. Regulations that impede U.S. industry will negatively impact the U.S. as a nation.

Concerns: Space has been overwhelmingly safe, and over-regulation will create an anticompetitive environment.

Recommendations: Messaging should express sadness of lives lost and reassure the importance of space. Commerce should host a summit on the risks in space, with U.S. industry actors and some close allies, to gain collaboration on increasing space safety and addressing regulatory issues.

Secretary of State

Assessment: Thankfully the U.S. has a good relationship with the countries whose citizens lost their lives, but these relationships will need to be managed carefully. It will be important to acknowledge the severity of the incident, demonstrate responsiveness, and be transparent about intentions to reassure the allies.

Concerns: Adversarial statements on U.S. ability to control its space sector.

Recommendations: Reach out to the countries affected (Japan, South Korea, Norway, and Brazil) and ensure proper dissemination of information. Reassure allies with transparency of what the U.S. is immediately doing regarding safety and regulations. Reach out to the African Space Authority to communicate that the U.S. has the situation under control and is taking proper steps to mitigate the criticism. Issue a U.S. and allied statement that discusses the devastation over lives lost. Respond to adversarial statements reassuring U.S. control over regulations and institutions in space and collaboration with our core partners. Consider calling for a world space safety summit and conduct a joint press conference with the Secretary of Commerce.

NASA Administrator

Assessment: *Challenger* and *Columbia* provided a good understanding of the lesson learned and capabilities needed to address a situation like this. International Traffic in Arms Regulations (ITAR) should be taken into consideration when dealing with space launcher vehicles. It is important to get to the root cause that led to this issue to ensure it does not happen again.

Concerns: The International Space Station (ISS) is still operational, but this situation presents an increasing threat environment for the ISS in the foreseeable future. The U.S. has a space haven with limited ability to maneuver the ISS if necessary.

Recommendations: Review and possibly upgrade our response capabilities. Technically ready to assist with either an investigation or debris removal. Reaffirm GalaxyZ's stellar record in space and that space is hazardous in general. Utilize NASA's contracts with GalaxyZ to demonstrate fueling capabilities. Investigate to determine the root cause of the problem and reform policies to ensure it does not happen again.

Heavy Reusable Launch Expert

Assessment: Commercial spaceflight regulation should be focused on safety over ownership. GalaxyZ has the capability and is likely capable of the lion share of debris-clearing capabilities. Since it occurred in low-Earth orbit, it is much more manageable since the debris will decay naturally. Capabilities that GalaxyZ offers relative to other space capabilities are profoundly more significant.

Commercial innovation that is focused on cost and price is only going to make space more accessible to the West over others.

Concerns: Negatively impacting our advantages, for example, there is a risk of stifling innovation through over-regulation.

Recommendations: Blue-ribbon flight safety panel for this incident composed of U.S. only with limited allies. Host an International Space Comet Summit. Leverage the Department of Defense and other international organizations to conduct debris characterization—the vast majority will be coplanar and large elements can conduct rendezvous, recovering operations. Utilize incidents as an opportunity for the U.S. to lead future mitigations of these types of incidents. Commercial spaceflight regulations should focus on safety.

Assistant to the President for Domestic Policy

Assessment: Protecting reusable capabilities and GalaxyZ is critical. Do not provide an environment that can create negative press campaigns regarding this event. The public affairs campaign needs to trickle down to what we say in our schools and individuals continuing to learn about space. This is an opportunity to address any potential gaps in executive branch authorities.

Concerns: Negative public affairs could push commercial companies toward China—moving operations outside the U.S.

Recommendations: Protect reusability capabilities and GalaxyZ. Continue to invest in and build space education programs. Determine if the authorities granted to the secretaries of Commerce and Defense are appropriate for addressing space debris remediation. Check to see if additional authorities and appropriations are necessary in the upcoming National Defense Authorization Act and defense appropriations bill. Moreover, identify required appropriations for the departments of Defense and Commerce for space traffic management.

Director of the Office of Science and Technology Policy

Assessment: The debris field will not be static, and as it evolves the severity of the impacts will depend on the size of the objects and speeds relative to the objects it could collide with. The U.S. has the best system to assess the evolution of the debris cloud and provide timely updates on future impacts.

Concerns: There is potential for a cascade of space collision events and the long-term impact on the growing satellite population.

Recommendations: Subject matter experts should provide hourly updates to the White House on the debris field status to ensure it can properly warn commercial, allied, and adversarial assets. We need to identify lessons learned about the evolution of debris from the Chinese anti-satellite destruction tests and Cosmos collisions.

Chinese Communist Party Subject Matter Expert

Assessment: Security and tourism are at the bottom of priorities. Identify who is going up into space and reaffirm that it is not a place for “joy rides.” Acknowledge the mistake and take responsibility for its cleanup. Better articulate U.S. interest in returning to the Moon.

Concerns: What will be the impact on national security? The President may have concerns over a big investigation committee, which just fuels the problem and makes it bigger.

Recommendations: Emphasize that traveling in space has inherent risks. There should be clear messaging, including U.S. acknowledgement, responsibility, and rectification of the incident.

White House Press Secretary / External Press Agitator

Assessment: The event is garnering significant media attention (1 billion views!). The public is shocked and circulating the video, creating a messy environment. It is important to get out in front of the situation quickly with a press conference at either Commerce or the White House. Actionable

policy is needed to provide the public with what to expect. Messaging needs to cater to both domestic and international audiences.

Concerns: How do we manage the narrative carefully to avoid negative public perception and effectively coordinate with managing Elon Musk’s public statements. The public statements also need to thread the needle with portraying space exploration as both adventurous while being respectful of human life. The press will likely scrutinize the licensing process and question how such an incident could occur in the first place.

Recommendations: Press conference ASAP at Commerce or the White House with clear policy of immediate action catered to both domestic and international audiences. Messaging should feature condolences, acknowledgement, ownership, commitment to action, and plan. Work with GalaxyZ in terms of coordination of an actionable plan and to acquire status on the affected families. Respond to adversarial U.N. calls.

Presidential Policy Advisor

Assessment: There will be a direct impact on the Human Landing System (HLS) program, and we need to get ahead of it immediately to avoid political ramifications. Short-term messaging is important to understand economic and technical components. Solution for the debris field cleanup is necessary. The President will need to reach out to congressional members to ensure they are properly briefed. An economic assessment will have to be conducted to better understand the incident’s implications and our options.

Concerns: What are the political ramifications and the potential repercussions for Artemis and other space programs? We need to ensure a proper response to avoid having the President appear weak on the issue.

Recommendations: The President should work with the Secretary of State, and contact affected nations to improve collaboration. The incident will need to be addressed ASAP to diminish political ramifications and not appear weak. Communicate with Congress to ensure proper briefing. Assess and acquire essential information on the economic and technical aspects, implications, and possibilities. Next, the President should engage the Cabinet to understand the various aspects of a potential response and use a “war room” to manage the crisis. The President should task a specific entity with leading the response, whether U.S., international, or coalition-based.

Discussion

The central tension in the NSpC discussions revolved around balancing the need for greater regulation in space tourism with the imperative to maintain U.S. leadership in the commercial space sector. The Vice President and others emphasized that GalaxyZ’s reusable, low-cost spaceflight capabilities provide the U.S. a significant strategic advantage over global adversaries. Yet they also acknowledged the serious risks posed by incidents like this one, which could cause damage to critical infrastructure, including the International Space Station and adversarial space assets.

Concerns about over-regulation were voiced by the Secretary of Commerce and Heavy Reusable Launch Expert, who argued that an overly aggressive regulatory response could stifle innovation and undermine the competitive edge of U.S. companies in the global space market. They pointed out that the commercial space sector has operated relatively safely thus far and that this incident, while tragic, should not lead to reactionary policies that could damage the industry. At the same time, there was a recognition that maintaining public trust and demonstrating responsible governance would require some regulatory recalibration. The Vice President proposed an

investigation into the root cause of the malfunction, while other members suggested a review of current safety protocols to prevent future accidents, without unduly hindering the industry's growth.

International relations and diplomatic fallout formed another major point of tension in the discussion. The Secretary of State highlighted the delicate task of managing relationships with the countries whose citizens were killed in the disaster, including Japan, South Korea, Norway, Brazil, and Nigeria. Although the U.S. has strong alliances with these nations, the incident would require careful handling to prevent strains in diplomatic relations. The Secretary of Defense and the Director of National Intelligence, by contrast, raised concerns about adversaries exploiting the tragedy for propaganda or surveillance purposes. Both urged caution in messaging, recommending the U.S. project confidence in its ability to manage the crisis, while avoiding the appearance of complete control—given the inherent risks involved in debris management.

Debris mitigation and the potential threat of a Kessler Syndrome scenario were seen as critical issues, especially by the Director of National Intelligence and Director of the Office of Science and Technology Policy. With the growing satellite population and the importance of military constellations in low-Earth orbit, the evolving debris field posed both immediate and long-term risks to U.S. assets and global space operations. The Secretary of Defense saw this as an opportunity for the U.S. to take proactive leadership in debris management, leveraging its military capabilities to clear the field and prevent future collisions. There was consensus on the need for thorough tracking and real-time updates on the debris field, but the council wrestled with the question of how aggressively the U.S. should pursue debris-clearing operations in collaboration with commercial actors like GalaxyZ.

A central theme in the discussion was the political ramifications of the incident, particularly in relation to the broader U.S. space program. The Presidential Policy Advisor warned of significant fallout for the Human Landing System (HLS) program, which had already seen multiple delays. Any further setbacks could diminish U.S. leadership in the race to return to the Moon, especially with China's planned human landing on the horizon. Managing the public narrative was also crucial, with the White House Press Secretary stressing the need for swift, coordinated messaging that reassured both domestic and international audiences. This included holding a press conference to convey condolences, take responsibility, and outline the U.S. response plan to mitigate the damage and prevent future accidents.

Ultimately, the council recognized that while the disaster demanded a serious response, it needed to strike a careful balance between fostering continued innovation in commercial spaceflight and implementing tighter safety regulations. Suggestions for an international space safety summit and a blue-ribbon safety panel of U.S. experts aimed to position the U.S. as a leader in both space safety and innovation.

Scenario 2: China’s Game-Changer: Long March 9’s Stunning Debut Signals New Era in Space Race

Scenario Supplemental Data Provided

To the Secretary of Commerce: U.S. companies have stated they don’t think they can compete with China’s predatory low-price “friendship prices.”

Issues and Considerations

For this exercise, the National Space Council (NSpC) was assembled under a Democratic administration. Below are the summaries of each NSpC participant’s contributions to the debate on how best to respond to the respective scenario, along with points of conflict:

Vice President

Assessment: The Starship is currently more capable than the Long March 9, but the U.S. is only about 2–5 years ahead and will face challenges maintaining its heavy and reusable launch lead over China. China’s advantage appears to be in building long-term plans and the ability to execute those plans.

Concerns: The U.S. needs to articulate a clear long-term vision or “North Star” for space exploration because, without one, China will surpass us. The regulatory hurdles on U.S. companies may reduce competitiveness—we do not want a potential loss of U.S. leadership in space technology and commercialization.

Recommendations: Elevate the Artemis consortium with a focus on enhancing export control and technology collaboration. Regulatory reform is essential, particularly International Traffic in Arms Regulations (ITAR), and there is a need to improve workforce development and immigration policies. Create balanced short-, medium-, and long-term strategies to maintain U.S. leadership in space and consider centralizing funding for civil space activities (potential Department of Space). Send a congratulatory response to China.

Secretary of Defense

Assessment: It is the capability to reliably launch and conduct operations in space that are not possible with expendable rockets. This is a watershed moment. This is both a commercial and military race for capabilities. There are long-term implications for defense, commerce, and energy. The U.S. Space Force has been successful outside of national security space. NOAA, NASA, the intelligence community, and the Department of Defense all have competing interests. The U.S. has not exploited the advantage of reusability to its full potential, and adversaries have seen this. Implications for U.S. prosperity, competitiveness, and national security.

Concerns: China has a pattern of agreeing to norms but not complying, and there is potential for Cislunar dominance and ceding a U.S. military advantage in space.

Recommendations: Interests and priorities need to be driven downward from the White House to corral actors and streamline interests. Use a whole-of-government approach to exploit reusability advantages that maintains technical and military leadership. Investments should be made for space-based solar power and offshore industries. We need to support the full exploitation of Starship for commercial *and* national security purposes. National space strategy to compete with China’s potential game-changing capabilities, and it should be an interagency lead rather than the Department of Defense lead to properly be a whole-of-government approach. Must properly prepare for long-term implications on the commerce, defense, and energy industries. Finally, we need to implement a “trust but verify” approach to international space cooperation.

Director of National Intelligence

Assessment: This was an unfortunate intelligence failure as we did not realize that China was this far ahead. The space economy is evolving with increasing demand for launch capabilities, and China's ambitious plans to launch a large constellation of satellites will result in rapid expansion of satellites in orbits, which will increase risks. Examine how the U.S. can proactively channel China's energy and efforts.

Concerns: There are potential intelligence gaps regarding Chinese space capabilities. Will increased space activity lead to higher risks of collision or conflicts? There is likely a need for better space situational awareness and traffic management.

Recommendations: Establish consensus on norms for behavior in space and develop strategies to monitor and verify compliance with international space agreements. We should send a congratulatory message to the Chinese government; while simultaneously acknowledging they will need to follow rules to maintain safety in space. In response to this surprise, we should reform and evaluate intelligence failure on Chinese capabilities. Establish collaboration with the Department of Defense, the Director of National Intelligence, and the Department of Commerce to manage and understand the implication of China's ambitious plans. Enhance space situational awareness capabilities, including the Joint Space Operations Center and the Traffic Coordination System for Space.

Secretary of Commerce

Assessment: Banner moment that the U.S. must recognize the out-of-date nature of export control systems. International Traffic in Arms Regulations (ITAR) is not preventing the Chinese from getting the materials they need. We need an export control regime that is up to date that gives the U.S. an advantage and maybe includes closest allies. Industry is burdened by safe-haven environmental regulations. There is a risk of companies picking up and going other places in terms of data, but not in the launch arena because of ITAR.

Concerns: How does this development affect U.S. global competitiveness in the launch market? How much are regulatory hurdles stifling innovation in the U.S. space industry?

Recommendations: Update and reform export control regime that ensures an advantage for the U.S. and potentially includes closest allies. To remain competitive, focus should be placed on the economic growth, talent development, and innovation aspects of space. Additionally, to inform policy decisions, the U.S. government should conduct a comparison of Chinese and U.S. launch capabilities. Take into consideration the barriers and burdens of regulations that could potentially drive U.S. companies toward adversaries.

Secretary of State

Assessment: This new Chinese launch capability has wide-reaching soft-power implications. As the global space race evolves, there will be opportunities to partner with nonaligned countries (such as India) that the U.S. should engage with before China does.

Concerns: How will this new development affect the Artemis Accords signatories; can the U.S. maintain cohesion? We will need to find ways to balance cooperation and competition with India.

Recommendations: The President's input at the State of the Union or budget should highlight the Artemis Accords and desire of regulation reform to maintain U.S. leadership. Work with India on technology and improving visa processes and develop a workforce development strategy to advance U.S. strategic technologies of space, robotics, and artificial intelligence. Update the 2024 Joint Statement to identify the four key technologies. Establish U.S. global alignment on space-based solar power. Conduct, in collaboration with the Department of Commerce, an ally-supported summit on export controls to identify improvements and how to handle these issues with allied and U.S. commercial companies. Take advantage of the Artemis Accords by enabling our own public-private partnerships to upgrade our controls.

NASA Administrator

Assessment: This Chinese technological accomplishment is significant, but definitely not insurmountable—though it does provide an opportunity for soft power, and they may try to convince other countries that their system is superior. The U.S. maintains a lead in launch capability and other areas of space, but we cannot become complacent. Must determine a whole-of-nation approach to space with launch vehicles and developing a space economy.

Concerns: The U.S. has an aging workforce, and there is potential for retirement and loss of expertise. China also has far more STEM graduates than the U.S.

Recommendations: We have to address the NASA workforce issue. This starts with establishing a talent pipeline with enough students trained to keep the U.S. competitive in several areas, from artificial intelligence to quantum to energy. This will involve increasing efforts to educate STEM students in space-related fields and developing plans for NASA to attract and retain this talent. We need to enhance and expand public-private partnerships to keep the U.S. competitive. Establish a whole-of-nation approach to conduct space operations and develop a space economy to ensure the U.S. maintains its lead. Jim Cameron gave NASA some advice years ago. He said, “You need to tell your story better and you need a better story to tell.” I think we should take this to heart. The capability of China to use this technology for point-to-point travel is a very serious consideration. Finally, we should redouble efforts in other transaction authority (OTA) agreements to remain competitive.

Heavy Reusable Launch Expert

Assessment: Super heavy-lift capabilities can have profound implications for civil, commercial, and defense, and unfortunately, we have failed to recognize the potential and leverage them. By allowing the commercial enterprise that is unique to the U.S. to run at full speed, it will help maintain strategic advantage in space.

Concerns: China recognizes the power of super heavy-lift, is “all in” on super heavy-lift, and is mimicking Starship. The Chinese are now catching up and could exploit this technology.

Recommendations: Allow the commercial enterprise to run at full speed. Leverage commercial space innovation. We need to clearly communicate the significance of the Long March 9 capability and its implications. The U.S. government should identify and pursue appropriate use cases for super heavy-lift vehicles across government sectors.

Assistant to the President for Domestic Policy

Assessment: Improve domestic policy for space infrastructure and for the whole-of-nation Astronautical Strategy (similar to National Maritime Strategy) that advances U.S. ability to start manufacturing in the U.S. and space industrial space. We need to start increasing subsidies for space companies and providing tax incentives to keep companies going, while also lowering barriers to launch. Examine education and ensure it properly builds tomorrow’s space workforce (engineers and PhDs). China currently has maritime infrastructure to build point-to-point space lifts around the world, so it can only get worse if they prove this capability and leverage it. The executive agent for the National Maritime Strategy is MARAD, which falls under the Department of Transportation and is funded through the Navy and defense appropriations bills. Space needs to be reorganized under the White House with proper definition, resourcing, and funding.

Concerns: Does the U.S. have sufficient domestic manufacturing capabilities for space and related industries? Are there insurmountable barriers to attracting and retaining global talent in the U.S. space sector? There are serious potential economic impacts of Chinese dominance in space-based technologies (e.g., point-to-point transportation).

Recommendations: Establish a National Astronautics Strategy as clear as the National Maritime Strategy with Congress directing the White House through the Air Force. Develop a national space strategy, specifically Air Force, that would be mandated through the National Defense Authorization

Act and produced biannually. Major steps should be taken to improve domestic policy for space infrastructure and to increase subsidies for companies with tax incentives. Lower barriers to launch by properly resourcing and funding regulatory agencies (e.g., Federal Aviation Administration). We should review the education budget for space schools, while simultaneously increasing federal funding for tradecraft schools that build the technical skills of individuals who did not attend college. We need better policy for pathways to citizenship for all the people brought in to help the space workforce and industrial economy. This involves improving processes for visas for the talent coming in from other parts of the world, specifically India. Finally, we should consider establishing a Department of Space to centralize civil space activities and funding.

Director of the Office of Science and Technology Policy

Assessment: Important to know the specs of this rocket compared to our assets, specifically, relative capabilities. Critical to understand how this will affect our lead and whether China has caught up, or even surpassed the U.S. If China has surpassed the U.S., it is necessary to identify how much of a threat this is to commercial dominance. Important to determine the military implications.

Concerns: The current regulatory environment may be hindering U.S. competitiveness. Is there a potential loss of U.S. commercial dominance in the launch market?

Recommendations: A national space strategy should properly specify actors with real direction on who has the money and responsibilities. Defense, Commerce, and State must expand their cooperation with emerging space powers such as India and Europe on space launch. Examine the impact on regulatory creep in space exploration with regulator change to acknowledge. NASA should provide the implications of Chinese efforts in terms of their efforts to return to the Moon as soon as possible. The U.S. government will need to conduct a thorough assessment of the relative capabilities of Long March 9 and U.S. launch vehicles. Clearly communicate that the U.S. is the best place for developing new ideas and technologies in space.

Chinese Communist Party Subject Matter Expert

Assessment: China does not separate commercial from security—integrated approach—and it is moving ahead with commercial and military space applications. There is very little the U.S. can do to stop or hinder China’s commercial activities, so when U.S. companies complain, it raises questions of what options do we have.

Concerns: Are U.S. companies potentially subsidizing Chinese space capabilities through partnerships? How are the current export control measures?

Recommendations: It’s time to create a national long-term competitive strategy in regards to space. We also need to focus on educating the public; getting congressional buy-in and support; reassessing export control measures, considering both positive incentives and potential sanctions; and evaluating the implications of U.S. companies using Chinese launch capabilities.

White House Press Secretary / External Press Agitator

Assessment: Response needs to be well thought out and pull together an immediate action policy. Large section of the U.S. population grew up thinking that spending money on space exploration and NASA is a waste of time as it takes away from other things such as schools. Take special care and reach out to these communities who feel they have been left out of the space economy, typically minorities.

Concerns: There could be a potential public backlash against increased spending on space because it is disconnected from everyday American lives. There are environmental and cultural concerns related to space activities (e.g., Boca Chica).

Recommendations: Press response should focus on a congratulatory message while highlighting immediate action in the mid-term and long term to reassure allies and private companies. Reach out to these communities, typically minorities, who feel they have been left out of the space economy—

ensure that messaging and policies include job creation for these populations in the space industrial revolution.

Presidential Policy Advisor

Assessment: The President needs to present a strong, visionary response to China’s achievement—there are a lot of downflow political issues that need to be addressed in messaging. It is important to not send the message of a big defense contract. There is an opportunity to work with Congress and ensure the U.S. is positioned technologically to support the industrial base.

Concerns: There is a risk of the response appearing solely as a defense-oriented reaction.

Recommendations: Work with Congress to ensure the U.S. is positioned technologically to support the industrial base, but make sure to develop a broader vision for U.S. space activities that goes beyond defense considerations. Examine if there is an alternative way to articulate American abilities and strength in the international community that could shift the narrative. Finally, consider reorganizing space activities under direct White House oversight for better coordination and resourcing.

Discussion

The Long March 9 is not only a technological achievement but also a clear signal of China’s ambition to dominate both commercial and military space sectors. A primary tension that emerged during the discussion was the perceived narrowing gap between U.S. and Chinese space capabilities. While some members, like the NASA Administrator, maintained that the U.S. still holds a lead in launch capability, others, including the Secretary of Defense, viewed this as a watershed moment with significant implications for national security, commerce, and energy sectors. This disparity in assessments highlighted the urgent need for a comprehensive evaluation of relative capabilities and a unified strategy to maintain U.S. leadership.

Many council members identified the U.S. regulatory environment, particularly export controls such as International Traffic in Arms Regulations (ITAR), as a significant barrier to maintaining competitiveness. These regulations are stifling innovation and pushing U.S. companies to either slow their development or look for alternative markets, which could ironically benefit adversarial nations. The Vice President and the Secretary of Commerce both argued that unless the U.S. reforms its regulatory framework, American companies may lose their commercial edge, which would directly affect national security. The Secretary of Defense echoed this, noting that the U.S. has yet to fully exploit reusability in space technologies, even though its commercial space sector pioneered the concept. There is a clear consensus that without regulatory reform, the U.S. risks losing both its technological leadership and its strategic military advantage in space.

Workforce development also emerged as a critical area of concern. The NASA Administrator and several other members highlighted the aging U.S. space workforce and the country’s relative lack of STEM graduates compared to China. This demographic challenge threatens the U.S. ability to sustain innovation and leadership in space technologies. In contrast, China is producing a large number of STEM graduates, giving it a potentially insurmountable edge in the technical expertise required to dominate space exploration, manufacturing, and commercialization. To address this, members recommended bolstering STEM education, reforming immigration policies to attract global talent, and creating incentives for young professionals to enter the space sector.

Another major point of contention involved the military implications of China's advancements. The Secretary of Defense and the Director of National Intelligence raised concerns about China's potential to dominate Cislunar space and disrupt U.S. space operations. The ability to rapidly deploy space systems through reusable rockets gives China a strategic advantage that could undermine U.S. military and commercial activities in space. This led to recommendations for a whole-of-government approach to counter China's rising capabilities, with several members calling for better interagency collaboration and a clear national strategy that prioritizes space security, economic interests, and energy initiatives like space-based solar power.

In terms of diplomacy, several officials, including the Vice President and the Director of National Intelligence, advocated for sending a congratulatory message to China, framing it as a gesture of goodwill while signaling the expectation that China adhere to international norms in space. While there was a consensus on the need to strengthen international partnerships, particularly through initiatives like the Artemis Accords, there was also recognition of the need to maintain a competitive edge over China. This was particularly evident in discussions about engaging with nonaligned countries such as India, where the U.S. must find ways to cooperate without ceding strategic advantages. These alliances are seen as critical to countering China's growing soft power in space, particularly as Beijing may seek to persuade other nations that its space program is superior. The Chinese Communist Party Subject Matter Expert's input further complicated this dynamic, highlighting China's integrated approach to commercial and military space applications and the limited options for the U.S. to hinder their progress without potentially harming U.S. interests.

Finally, the council grappled with the challenge of public perception and resource allocation. The White House Press Secretary noted that a significant portion of the U.S. population views space exploration as a waste of resources that could be better spent on earthbound issues like education. This creates a tension between the perceived need for increased investment in space capabilities and potential public backlash, particularly from communities that feel left out of the space economy.

Scenario 3: Global Anxiety Swells as Apophis Prepares for Close Earth Approach in 2029

Issues and Considerations

For this exercise, the National Space Council (NSpC) was assembled under a Democratic administration. Below are the summaries of each NSpC participant's contributions to the debate on how best to respond to the respective scenario, along with points of conflict:

Vice President

Assessment: Planetary defense will require an internationally coordinated response. We need to consider how this could impact global supply chains and resource allocations.

Concerns: Could there be a perception of failure of U.S. leadership during a crisis (from an international perspective)? Could public panic trigger supply chain disruption—stockpiling/scarcity like during COVID-19—and would there be potential market reactions?

Recommendation: First, it will be important to deliver a calming message to the public. Next, we should promote international collaboration through the U.N. Committee on the Peaceful Uses of Outer Space working group on planetary defense (also consider Quad forum). Finally, we need to prepare a disaster response and have policy options available (interest rate adjusts/increased budget).

Secretary of Defense

Assessment: As of 2024, there were scientific efforts coordinated with the Department of Defense to stage a study mission. It is in our interest to characterize these efforts from a defense and scientific perspective. We have a thorough understanding of orbital mechanisms, which are not a threat, and that needs to be clearly communicated to the world and public. Utilize this understanding to deter malicious actors from using this to gain grounds. If there were a threat with enough lead time, there is no other way to deflect a sizable object other than with nuclear weapons. If that is the case, we might want to think about how we would organize internationally to defend the human race against something like this. We can afford to act as independent but might want to consider how we would do this and what capabilities to acquire.

Concern: Could our adversaries use the Apophis opportunity to lower the threshold for nuclear weapons in space—possibly stationing a nuke as a guise for planetary defense?

Recommendations: Effectively communicate that these orbital mechanisms are not a threat. Examine the scope of international organization to properly defend the human race in a worst-case scenario if nuclear weapons needed to be used. Advocate for an international consensus to use nonnuclear deflecting techniques like the DART (Double Asteroid Redirection Test) mission. Investigate the capabilities and resources needed in this worst-case scenario.

Director of National Intelligence

Assessment: Note that China has released news that it is going to use nukes to deflect the asteroid. In 2024, Russia declared its intention to put the power system in space. This situation could give them the opportunity to test their capabilities and move forward the line of what is acceptable in space. Consider alternative approaches to deflect their action. Action does not need to be serious measures; rather, must be clear about analysis and transparent risks. Must be proactive by providing alternative measures to nuclear actions and actions to approach this in the future with the international community. Look up “Starfish Prime” as an example.

Concerns: China and Russia could use this opportunity to place nuclear weapons in space.

Recommendations: Consider alternative approaches to deflect Chinese action. Must be proactive by providing alternative measures to nuclear actions and actions to approach this in the future with the international community. Get out in front on the issue and shape the discourse, making it clear to the public that they know nuclear deflection is not necessary to change the course of Apophis.

Secretary of Commerce

Assessment: It appears that the likelihood of the threat is not the asteroid hitting Earth but rather mass disruption in space (communications, navigation systems). Markets are reacting to this situation, and financial stability is in question. It is important to be clear to the public about the reality of the threat, which markets may be disrupted, and how we can regain these assets. The space supply chain, in addition to economic and financial instruments on the ground, is going to depend on our ability to recover assets and move capacity.

Concerns: Will the mere threat of Apophis invite panic into the public and cause real-world problems (supply chain issues/damages to U.S. leadership)?

Recommendations: Clear and transparent communication to the public explaining the reality of the threat, potential market disruptions, and action to regain assets. Consider using the Defense Production Act to help bolster the space supply chain. Work with international partners to prepare for any potential communication navigation outages.

Secretary of State

Assessment: Republican colleagues say the President always gives up opportunities for U.S. leadership. Create leadership structure for planetary defense. India is recognizing this as a wakeup call. The President’s speech at the United Nations is an opportune moment to show leadership in terms of planetary defense. For reassurance at the global level, the U.S. proposes a U.N. Committee on the Peaceful Uses of Outer Space (U.N. COPUOS) working group on planetary defense. Russia released a plan to defend against an asteroid with nukes. Important to acquire a greater understanding of what these weapons would lead to as it causes a lot of anxiety. Colleagues in India point out it underscores the need for comprehension of international strategy. While we have discussions of probability and high-impact internally, the message externally is to showcase how serious the U.S. is in taking this as a potential high-level threat.

Concerns: Russia’s plan creates a dangerous precedent because outer space prohibits placement of weapons of mass destruction. We could be throwing existing space treaties out the window and setting dangerous precedents.

Recommendations: Form a coordinated international response, where the U.S. can take leadership. Reform State Department strategic framework for space diplomacy to include a section on planetary defense discussing catalog threats and partnerships. Propose a working group on planetary defense, ensuring leadership and all countries are included in conversations, including Russia and China (for example, U.N. COPUOS). Build a disaster response framework including allies and partners. Conduct summits and workshops to build institutional capabilities and international partnerships. The U.S. should take a leadership role in building international norms. Engage allies like India to collaborate on issues like space situational awareness.

NASA Administrator

Assessment: This is not a threat and no threat of impact of Apophis to planet Earth. This is going to be a close approach by astronomical standards and terrestrial standards coming close to the Belt. There is a small possibility it could run into something between Earth and geospatial orbit where lots of satellites are. It is visible to a lot of people on Earth, which creates speculation and doomsday scenarios. Must be prepared to deal with this and get out ahead of this, letting people know what is going to happen. For deflection, you must have knowledge long before it arrives. There are a number of things you can do if an asteroid is coming toward us, such as the asteroid impact demonstration years ago. For deflection, we need lead time, prepositioned assets, and coordinated activity. Note that not all asteroids are created equal as near-Earth objects or Earth crosses are the most concerning. The problem with nukes in space is the magnetic field would create a magnetic pulse that could wreak havoc. Response needed for an asteroid would not be much different than a disaster response, so an entirely new group is not needed. Resource value added to the asteroids as everyone needs the same data, which gives an added emphasis and ability to have many more stakeholders to gain the benefit to whatever system is put in plan to collect the data.

Concerns: We need to make sure the public has a realistic understanding of the actual threat level. Current asteroid detection and deflection systems do not inspire great confidence, and a nuclear weapons method could be very destabilizing.

Recommendations: Response should be calm and informative to educate people of the what and why, and to reiterate that there is no threat. We should continue monitoring and studying Apophis, while also highlighting NASA’s existing Planetary Defense Coordination Office as a good asset for addressing a potential threat. Focus should also be placed on educating the public on different types

of near-Earth objects and investing in technologies to handle asteroid deflections (like the DART mission). Additionally, if a nuclear weapon is set off in space, we will need to consider the effects of electromagnetic pulses on satellites, so an X-ray bomb could be considered to blow off part of the asteroid, changing its course.

Heavy Reusable Launch Expert

Assessment: Interesting use case for heavy lift. If we need to develop capabilities against potentially risky objects, this would be powerful. Heavy lift is going to have capabilities to put heavy telescopes into space for astronomical purposes. Review how these capabilities can focus on planetary defense as well.

Concerns: This situation is a double-edged sword, requiring the United States to take the lead; otherwise, adversaries can use this as cover for nefarious activities.

Recommendations: Examine the potential use of heavy-lift capabilities to focus on planetary defense as well (including large telescope launch for asteroid monitoring).

Assistant to the President for Domestic Policy

Assessment: There are several domestic jobs that could be created to provide improved capabilities for space situational awareness, advanced warning, planetary defense, debris removal, and international collaboration and action. Great opportunity for job creation and technical development.

Concerns: The U.S. needs to maintain leadership in planetary defense so that others do not develop a dangerous capability. Could lack of preparation for an asteroid approach lead to domestic panic or economic disruption?

Recommendations: Increase funding to schools that can help to create pipelines to domestic jobs that can improve space-related capabilities. Utilize the partnership with the Coast Guard and establish a Space Coast Guard model for planetary defense. Leverage the Quad forum. Develop positive economic measures like tax credits, subsidies for critical fields in planetary defense (space situational awareness, advanced warning systems, debris removal).

Director of the Office of Science and Technology Policy

Assessment: Require updated information on what's in place and how to deflect it, do we have the capabilities, etc. Utilize the National Academy to assess the latest information. The incident raises nuclear issues, highlighting the need to assess the entire complexity of detonating a nuclear weapon on a moving object. It is critical to have the best technical analysis of the complex situation and our ability to affect it. The President requires an assessment of the low probability, but potentially high impact, its priority of funding, and costs. This assessment is often missing from planetary risks discussions. Government has a large problem with determining funding for low-probability but potential high-impact problems.

Concerns: There is a lack of a comprehensive analysis on detection and mitigation capabilities for asteroids, in addition to a means to deflect them.

Recommendations: The National Academy should create a neutral document assessing low-probability but potentially high-impact incidents, the funding priority, and costs. Reform government funding for low-probability but potentially high-impact problems as a general category and viewed as an overall response.

Chinese Communist Party Subject Matter Expert

Assessment: China sees Apophis as a political opportunity, and it is expanding its nuclear forces with close to several hundred intercontinental ballistic missile silos it will be filling up. Issues could also be raised when the President addresses the national space strategy that there are security issues. Russia has been making nuclear threats almost daily related to the war in Ukraine and actually threatened several countries that could potentially be nuclear targets as they must be considering

using them. It is important to take a serious look at the use of nuclear weapons, likeliness to work, altitude of detonation, and impact on Earth communication. There is a near-term opportunity to use a nuclear asteroid deflection test as a political weapon, and the U.S. must take a step back to understand the plausibility of it. Short-term problem today is that Russia and China are using this potential threat for political gains and seizing the high ground by saying they are being proactive in attempts to make the U.S. look weak.

Concerns: Will China use this crisis as an opportunity to advance their space and nuclear programs?

Recommendations: Raise security concerns to the President in the national space strategy. Use this opportunity to develop planetary defense technologies alongside other space initiatives like Lunar exploration and space situational awareness.

White House Press Secretary / External Press Agitator

Assessment: The Russians have a history of anti-satellite weapons, and the situation presents an opportunity for either nation to show leadership. Russia is more equipped to do it faster, but whether Russia is ready to launch is unclear. Public perception of the event is driven by media coverage—as usual sensational headlines have potential to cause market disruptions.

Concerns: There is potential for adversaries to capitalize on this situation for propaganda purposes, and misinformation could lead to economic panic (e.g., runs on supplies, stockpiling).

Recommendations: The President should hold a press conference in the White House including the Vice President, NASA, the Department of Defense, the Department of Homeland Security, and FEMA to put the nation at ease. Coordinate with governors in preparation of a worst-case scenario. Finally, we need to monitor and respond to international media narratives, particularly from Russia and China.

Presidential Policy Advisor

Assessment: The general public is ignorant about these capabilities. Therefore, messaging must be timely through the supply chain to ensure the risk is comprehended and to eliminate panic buys. Make sure that the secretaries of Defense and State are making it clear that this is an international coordination issue rather than a serious threat to elevate any fears. Involve the U.S. and European science communities in talking to the public and each other. Priority should be ensuring people are safe. Potentially consider a talking point to alleviate any political posturing around the nuclear questions.

Concerns: Threats of bad reporting and the risk of exposing gaps in U.S. planetary defense capabilities.

Recommendations: Establish policy on deflecting supply chain issues in response to frantic population. Messaging should be timely through the supply chain to ensure the risk is comprehended and to eliminate panic buys. For the public, we need to develop talking points to address nuclear questions without escalating concerns. Domestically, emphasize collaboration among NASA, the Defense Department, and FEMA in planetary defense efforts; and internationally, involve the European science community.

Discussion

At the heart of the discussion was the growing anxiety surrounding the asteroid's trajectory, which, though not expected to impact Earth, could disrupt global satellites and spark public fear. The Vice President and several council members emphasized the importance of conveying a calm, unified message to the public. The fear was that media sensationalism, driven by dramatic headlines, could trigger panic reminiscent of the COVID-19 supply chain disruptions, leading to

stockpiling and market instability. Clear, coordinated messaging was seen as crucial to avoid such scenarios while reinforcing public confidence in government plans.

A key tension emerged around the issue of international leadership. While the U.S. must take charge in planetary defense efforts, there was concern that China and Russia, with their more aggressive approaches, might outpace the U.S. and seize the narrative. Russia's and China's talk of using nuclear deflection methods, under the guise of protecting Earth, was viewed with deep skepticism. The Secretary of Defense and the Director of National Intelligence highlighted the dangers of allowing adversaries to push the boundaries of acceptable space activity, including the possible placement of nuclear weapons in orbit. This tension underscored the need for the U.S. to balance strong leadership with international cooperation, as highlighted by the Vice President's suggestion to work through the UN's Committee on the Peaceful Uses of Outer Space (COPUOS) to craft a global planetary defense framework.

Public perception and the possibility of mass panic were another major concern. The Secretary of Commerce and the White House Press Secretary both warned that fearmongering around Apophis could lead to economic instability, with financial markets reacting to exaggerated threats of satellite damage or doomsday scenarios. The need for clear communication was echoed by multiple council members, including the NASA Administrator, who urged a science-based approach to inform the public that the likelihood of catastrophe was low. However, the concern remained that even the perception of risk—such as potential satellite collisions—could trigger real-world economic fallout. The council debated how to ensure transparency without inflaming public fears, advocating for a coordinated press conference that included NASA, the Department of Defense, and FEMA to reassure the public.

A particularly sensitive topic was the role of nuclear weapons in space. The Secretary of Defense and the Director of National Intelligence both raised alarms about Russia and China potentially using Apophis as a pretext to place nuclear weapons in orbit under the banner of planetary defense. While there was consensus that nuclear deflection should be avoided, the idea of preparing for a worst-case scenario lingered in the background. The NASA Administrator cautioned that a nuclear explosion in space could have devastating side effects, including electromagnetic pulses that would wreak havoc on satellite systems. This created a delicate balance—how to deter adversaries from taking dangerous steps while avoiding the perception that the U.S. might need to resort to similar measures. The Director of National Intelligence stressed the importance of getting ahead of the narrative by promoting nonnuclear deflection methods, such as the DART mission.

The council also explored opportunities to leverage current space technologies for planetary defense. The Heavy Reusable Launch Expert proposed examining how heavy-lift rockets could be used not only for asteroid deflection missions but also for placing large telescopes in space to enhance asteroid detection. This idea resonated with the council as a way for the U.S. to demonstrate leadership in planetary defense technology without resorting to nuclear options. Similarly, the Assistant to the President for Domestic Policy suggested establishing a Space Coast Guard to focus on space situational awareness, debris removal, and advanced warning systems. This would create jobs and position the U.S. at the forefront of planetary defense infrastructure.

Scenario 4: PRC Begins Construction of Megawatt-Class Solar Power Satellite in Geostationary Orbit

Issues and Considerations

For this exercise, the National Space Council (NSpC) was assembled under a Republican administration. Below are the summaries of each NSpC participant's contributions to the debate on how best to respond to the respective scenario, along with points of conflict:

Vice President

Assessment: The United States may not be able to keep up with China to create something similar, because it has not invested enough in development.

Concerns: There may be potential weaponization of this technology and danger of the U.S. falling behind. Why is the cost of the solar satellite so low at \$1.5 billion?

Recommendations: We need to get an assessment of Chinese capabilities from the Director of National Intelligence. Next, we should consider leveraging public-private partnerships—looking into Virtus Solis as a U.S. commercial alternative or exploring working with GalaxyZ to develop space-based solar power (SBSP) infrastructure and enable in-space manufacturing to keep the U.S. competitive. We could consider sanctioning the Chinese project.

Secretary of Defense

Assessment: The United States has the capability to compete with China on this front but lacks the will to compete. Officials continue to act surprised when China completes the projects it says it will in its five-year plan, and needs to be better prepared.

Concerns: Due to intelligence collection impediments, the U.S. has limited visibility into Chinese technological advancements. While energy transmission might be for fuel replacement purposes, it could also be weaponized.

Recommendations: The United States needs to read and react to China's five-year space plans in advance to avoid getting caught off guard. We need to focus on developing megawatt-class diode pumped alkali lasers (DPALs) for space. We should prioritize building large-scale SBSP infrastructure, potentially working with GalaxyZ and developing Lunar infrastructure to surprise adversaries.

Director of National Intelligence

Assessment: It is hard to tell whether China will be successful at leveraging this system, but there are significant renewable energy upsides if it actually works. Regardless, assuming it is viable, the United States is behind on this capability.

Concerns: How will China be able to use this system to get power to allies and then leverage allies against the United States? The downstream effects could alter the global energy market and create energy independence for China. There appears to be a lack of information sharing from China, and this will impact the United States's ability to understand the full extent of China's advancement with this system.

Recommendations: We need to conduct an analysis of this technology's impacts on fossil fuel markets and energy independence. U.S. intelligence agencies and allies should increase collection on Chinese aerospace and space-related activities. The U.S. needs to focus on its production capabilities to understand the ways in which China could use this technology against it.

Secretary of Commerce

Assessment: This is a major concern that needs to be addressed through funding from private companies alongside the government.

Concerns: The U.S. government will take a less efficient approach to addressing the issue, as opposed to leveraging the private finance sector—typical with traditional defense procurement processes.

Recommendations: The government should incentivize the private finance community to fund the development of competitive infrastructure. We need to encourage private-sector investment by sending a clear demand signal and leveraging federal resources—for example, EXIM Bank and the U.S. International Development Finance Corporation (DFC). Additionally, to ensure better competitiveness in space, we should also align foreign economic policy with U.S. industry.

Secretary of State

Assessment: This is a major and growing threat, especially as it threatens U.S. allies through increasing Chinese development. For example, China appears to be leveraging the project for international partnerships (e.g., United Arab Emirates collaboration).

Concerns: Will the U.S. lose global leadership in space technology? How will this development extend China’s strategic partnerships and challenge U.S. efforts?

Recommendations: The U.S. should take advantage of international projects for development in allied countries, the President should work to undo the narrative that the United States is underinvested in space, and the United States should come up with a decision to share with allies about the future of their partnerships in space development. For example, the U.S. could respond by building partnerships with the European Space Agency, Japan, and India for a collaborative SBSP project; improve global support for in-space servicing, assembly, and manufacturing (ISAM); address concerns about U.S. leadership at upcoming NATO and Group of Seven summits; and focus on civilian applications, leaving weaponization concerns to the Department of Defense.

NASA Administrator

Assessment: The project is controversial, but it is possible. Solar power beaming technology is advancing but remains economically unviable currently. The United States needs to demonstrate U.S. technological superiority by showcasing greater technological capabilities than China.

Concerns: The U.S. still lacks a consistently funded ISAM program, which would be necessary to compete with China—the ability to assemble large structures in space is so important.

Recommendations: NASA should investigate developing Lunar beaming capabilities—consider SBSP applications for the Artemis program and Lunar settlements. This takes away the risk of weaponization and demonstrates capabilities that are far more advanced than what China showcased. This would be demonstrative of U.S. leadership. Additionally, we should restart NASA’s on-orbit servicing, assembly, and manufacturing (OSAM) program to build U.S. capabilities. The U.S. could also consider harnessing this energy and using it for laser ablation of meteors.

Heavy Reusable Launch Expert

Assessment: China is likely developing this capability for military purposes more so than power generation. The \$1.5 billion cost estimate for the project seems unrealistic—even considering the Long March 9 rocket helping to reduce the cost with its superior launch capability.

Concerns: The Department of Defense is still in the formative stages of figuring out how to leverage U.S. capabilities, and the department doesn’t have enough funding to implement the policies it comes up with. It is hard to predict if there will be any progress in the next five years.

Recommendations: The U.S. should leverage public-private partnerships to accelerate space logistics infrastructure and ensure the U.S. maintains its competitive advantage.

Assistant to the President for Domestic Policy

Assessment: The United States needs to find ways to leverage its capabilities with resilient infrastructure to serve domestic communities. Solar power has huge potential to bring manufacturing and jobs to the United States.

Concerns: The U.S. is already at a disadvantage when it comes to developing quickly because it’s not an autocracy like China. Under a Republican administration, there may be pushback on the Hill regarding allocating part of the budget toward space development. It may be difficult to secure solar power supply chains. There is potential backlash from constituents and Congress for hosting a “huge weapon” in space under the guise of power generation.

Recommendations: We should look toward other avenues to develop quickly, like microwave capabilities. The Republican administration could use the momentum developed in favor of clean energy during the Democratic administration to gain support for using space for clean energy development. The Defense Production Act could be leveraged to increase domestic solar manufacturing and secure supply chains for critical technologies. We also need develop other avenues for laser development and avoid a large geostationary orbit target.

Director of the Office of Science and Technology Policy

Assessment: This development is interesting and concerning. The truth is that a megawatt power system is an important milestone, but it is far from being commercially viable.

Concerns: Unfortunately, what is clear is that the U.S. is behind in megawatt and gigawatt levels of power generation in space. The problem with these advances in space logistics and SBSP is that China is on its way to becoming a leader in both military and commercial space power.

Recommendations: The first step will be to conduct a comprehensive analysis of China’s technology in SBSP and determine how far behind the U.S. is in developing megawatt and gigawatt levels of power. Then we will need to focus on scaling U.S. efforts in space logistics and pair these developments with commercial interests to keep up the pace of progress.

Chinese Communist Party Subject Matter Expert

Assessment: It is extremely difficult to understand how China gets from one development to the next because they don’t export their technology. This makes it harder for the United States to develop a plan to keep up. The United States is handicapped by its long-term commitment to not weaponize space, and it is making the U.S. fall behind.

Concerns: It is hard for the United States to anticipate China’s actions because of how little they share between the early science and the end result. Accordingly, it is difficult to “know what we don’t know.” Additionally, the United States does not have the resources to assume the worst of China and respond when it comes to space technology. China also has major advantages over the United States, including the amount of information it gets from the U.S. and its alliance with Russia. There is a significant dual-use nature to this technology, and it’s not clear how extensive the risks are for the U.S.

Recommendations: The United States needs to try and match what China is doing, as it is costly to wait until it already happens. To support this, the United States needs to address its commitment to not weaponize space and needs to advance education in STEM and Chinese language programs.

White House Press Secretary / External Press Agitator

Assessment: There are mixed messages in the media (some pro/con on the topic of SBSP), so there is potential for significant political changes.

Concerns: The administration will need to balance its desire to develop in this area against people on the Hill who are going to be very against solar power.

Recommendations: First, we need to determine the administration’s stance on leading in SBSP technology. If we can opt to become a leader, we should outline short-term and long-term messaging strategies and consider framing SBSP as an opportunity for immigration and job creation.

Presidential Policy Advisor

Assessment: This is a major national security threat (not energy), and the President needs to act quickly to counter China’s ambitions.

Concerns: Since this is a Republican administration, it is important to be mindful of big energy companies like oil that will have an issue with investment into new solar technologies.

Recommendations: The President needs to go to Congress to share this issue and frame it as a national security issue to incentivize the U.S. Space Force to prioritize addressing this. The executive branch needs to work with Congress to implement a plan. The administration needs to work to kickstart American engineering to get political buy-in and credibly counter China’s advance.

Discussion

The Vice President opened the discussion by noting the United States’s lag in space-based solar power (SBSP) development, with China’s apparent cost efficiency (\$1.5 billion) raising suspicions of undisclosed technological advancements. While the United States has the capacity to compete, a lack of sufficient investment in SBSP and in-space servicing, assembly, and manufacturing (ISAM) has left the U.S. behind, both technologically and strategically. The Secretary of Defense emphasized that China’s achievements align with its long-term space plans, which the U.S. has consistently underestimated, signaling a need for more proactive strategic planning to avoid being caught off-guard in the future.

A central tension in the discussion revolves around the potential weaponization of China’s SBSP technology. The Secretary of Defense, the Director of National Intelligence, and the Chinese Communist Party Subject Matter Expert all raised concerns that the microwave energy transmissions designed for power generation could be repurposed for military applications. One member emphasized the need to develop countermeasures, such as megawatt-class diode pumped alkali lasers (DPALs). The limited intelligence on Chinese advancements and their dual-use capabilities heightens fears that the satellite could be used to disrupt global security. This uncertainty is compounded by China’s lack of transparency, making it difficult for U.S. intelligence agencies to assess the full extent of the technological threat. The possibility of China leveraging this technology to gain energy independence—and extend that advantage to its allies—poses a significant geopolitical challenge, especially for the United States’s energy and defense posture.

Another key tension is the United States’s struggle to balance public- and private-sector involvement in SBSP development. The Secretary of Commerce and several other council members advocated for leveraging public-private partnerships to accelerate U.S. competitiveness. They suggested that companies like SpaceX or Virtus Solis could be crucial partners in building SBSP infrastructure, with government incentives needed to encourage private-sector investment. However, there are concerns that traditional defense procurement processes will be too slow and inefficient, potentially undermining U.S. efforts. Moreover, the Assistant to the President for Domestic Policy raised concerns about potential political

resistance, particularly within a Republican administration, which may face pushback from constituents and energy companies wary of investing in space-based solar technologies.

The question of U.S. space leadership also emerged as a critical issue. The Secretary of State and the NASA Administrator warned that China's successful development of SBSP could severely undermine U.S. leadership in space. If China manages to integrate SBSP into its energy infrastructure, it could not only cement its technological superiority but also create new strategic partnerships with countries like the United Arab Emirates, which would challenge the United States's global influence. To counter this, the Secretary of State recommended that the U.S. pursue international partnerships with allies such as Japan and India and the European Space Agency to develop a competitive SBSP program. A coordinated response could demonstrate U.S. leadership and reassure global allies about the future of space cooperation.

The NASA Administrator's proposal to focus on Lunar-based SBSP, as part of the Artemis program, introduces another angle of tension—whether to match China's geostationary orbit-based system or leapfrog it with more advanced technologies. Developing SBSP infrastructure on the Moon would reduce the risk of weaponization and serve as a more powerful demonstration of U.S. technological prowess. The Administrator's recommendation to revive NASA's on-orbit servicing, assembly, and manufacturing (OSAM) program was seen as essential for competing with China's ability to build large space structures, though concerns remained about securing long-term funding and political support.

Finally, domestic political realities emerged as a potential roadblock. The White House Press Secretary and the Presidential Policy Advisor highlighted the difficulty of framing SBSP development in a way that would garner bipartisan support. The administration needs to navigate opposition from big energy companies and secure buy-in from Congress, particularly with Republicans likely to oppose large investments in space-based solar technology. However, they also suggested that SBSP could be framed as a job creation initiative, leveraging clean energy momentum from previous Democratic administrations. This framing could help generate public and political support, but it remains uncertain whether it would be enough to counter China's rapid pace of development.

Scenario 5: China's Asteroid Return: A Scientific Triumph or Public Safety Nightmare?

Assumptions

Participants did not believe China could realistically accomplish the feats outlined in the scenario by 2031, more likely sometime between 2035 and 2045.

Issues and Considerations

For this exercise, the National Space Council (NSpC) was assembled under a Republican administration. Below are the summaries of each NSpC participant's contributions to the debate on how best to respond to the respective scenario, along with points of conflict:

Vice President

Assessment: The asteroid is an opportunity for resource exploitation. If there is a problem, there is likely enough lead time for the U.S. to solve it.

Concerns: If China mishandles this asteroid, it could be a serious national security problem.

Recommendations: The first step will be to determine what role the U.S. government can play and formulate a response. Next, analyze what space investments are important to compete with China. Finally, we will need to explore collaborative opportunities and simultaneously consider national security risks.

Secretary of Defense

Assessment: The U.S. will need around 3–6 months to create a defense against the asteroid if it believes there is a problem.

Concerns: There may be a need to defend the U.S. or allies if the asteroid veers off course.

Recommendations: The military will need to prepare for the possibility of needing to deflect the asteroid if there is a miscalculation in the trajectory.

Director of National Intelligence

Assessment: While the asteroid is useful for procurement of rare Earth (REE) elements, despite the name they are still accessible on Earth. However, the space economy should be pursued for development in in-space manufacturing. Once stress is put on this issue, the world could be dealing with multiple objects falling to Earth.

Concerns: This could be a ploy by China to distract from something else it is doing where it wants to keep a low profile. The U.S. may not have gained a competitive edge by the time this is a reality. When will the U.S. stop responding in a reactionary manner in space?

Recommendations: The U.S. will need to conduct a thorough assessment of terrestrial REE reserves. We need to invest more in space economic development and engage in dialogue with China about resource utilization.

Secretary of Commerce

Assessment: This could be a positive or negative situation because if the asteroid can come down to Earth safely, it could offer access to minerals. The U.S. is on its back foot regarding space resource exploration.

Concerns: There is no U.S. participation in asteroid mining, and when it arrives, it could lead to space resource exploitation. How are the Chinese going to address any potential biohazard concerns when bringing this space object back to Earth?

Recommendations: The United States should use foreign economic policy to leverage access to the minerals if this asteroid comes down to Earth. However, it would be better if it did not make its way to Earth in the first place. The U.S. will need to involve agencies like the U.S. International Development Finance Corporation (DFC) and the U.S. Trade and Development Agency (TDA) in space commerce. Aside from the domestic front, the U.S. will need to engage international bodies and allies, develop global regulatory frameworks, and integrate domestic industry into space resource development.

Secretary of State

Assessment: This is a plan the United States has known about, but the situation raises concerns about responsible behavior in space.

Concerns: China doesn't exactly have the best track record when it comes to uncontrolled reentries for its rocket boosters.

Recommendations: The U.S. needs to use its internal assessment of the asteroid path and have a strategic dialogue with China on reentry protocols. There should be a U.N. committee meeting talking about responsible use of the asteroid, where the U.S. asks for more transparency from China and reminds China that it is not supposed to militarize space according to its treaty commitments (consider NATO Article 5 obligation if the asteroid becomes a threat).

NASA Administrator

Assessment: Calculating the reentry of an object this massive is extremely challenging. The situation raises questions about China's accountability and capabilities.

Concerns: This is a concern, but there are many hidden agendas that prevent the U.S. from taking a "whole-of-government" approach. There are questions about the structural integrity of the asteroid and multiple items falling to Earth if the asteroid breaks apart.

Recommendations: First, we need to develop some key performance indicators for the U.S. and develop space milestones, so as not to fall behind China. Next, we will need to trust but verify the feasibility of China's reentry plans and possibly send a probe to evaluate the asteroid.

Heavy Reusable Launch Expert

Assessment: China's execution of this plan is highly unlikely because China has not demonstrated the ability to handle something of this scale with any experiments or tests. Therefore, the U.S. should not have any confidence that the Chinese can pull this off.

Concerns: There are truly global consequences if this asteroid goes off course. Due to the asteroid's size and China's inexperience, this mission seems prone to failure. The asteroid is difficult to intercept if it goes off course.

Recommendations: The U.S. should take the "high ground" with the world and try to divert this object to put it in a safe place where the U.S. can rationally find a way to use it. The U.S. should not use techniques involving more government to address the issue but, rather, focus on enabling commercial elements. The United States needs to communicate that it is the only nation that can turn the uncontrolled reentering into something that is more manageable. The U.S. will not need to blow up the asteroid, merely intercept or veer it off course if necessary.

Assistant to the President for Domestic Policy

Assessment: This advancement shows China's capabilities and demonstrates that it can surpass the United States on certain issues. China's space advancement is an assertion of domination.

Concerns: China's dominance puts it in a position where it has the potential to create the "rules of the road." The U.S. public doesn't understand the importance of space resources, and the country may lose the space race if it doesn't act.

Recommendations: The U.S. should look at space strategically across a long spectrum. It needs to respond to China's development and develop a plan to ensure the United States continues to be permitted to set international rules and standards—particularly now for space resource utilization. This could be an opportunity to educate the U.S. public on the importance of space resources, and America could start aggressively competing for space resource exploration.

Director of the Office of Science and Technology Policy (Unavailable)

Chinese Communist Party Subject Matter Expert

Assessment: China operates under competitive assumptions, and it is unlikely to accept U.S. help to control the reentry even if it's offered.

Concerns: The American people aren't educated enough to support space policies. Also, there isn't someone who is fully in charge of space policy to make final decisions. There is potential for hysteria when the asteroid approach becomes imminent.

Recommendations: The U.S. should prioritize more education about space, proceed with caution if collaborating with China, and consider opening the role of a "space czar" to make decisions and shed light on space issues (with budget impact abilities). We should also improve space tracking capabilities.

White House Press Secretary / External Press Agitator

Assessment: This presents an opportunity to collaborate with other nations, but there is significant media attention and public concern about the asteroid mission.

Concerns: This would be catastrophic if China has the reentry go wrong, particularly if there is a lack of a communication strategy.

Recommendations: The U.S. should prepare public messaging for the worst-case scenarios and formulate a response. We would also highlight mutual assistance plans with international allies in case of an emergency.

Presidential Policy Advisor

Assessment: This asteroid situation presents both a threat and an opportunity.

Concerns: The American people can be very ignorant when it comes to this type of space issue. The public lack of understanding of both the risk (and opportunity) could make it difficult for the U.S. to pursue space resources.

Recommendations: The U.S. should use this event to reassert itself as a leader in space and build an international consensus around the rules and standards for space resource utilization policy. We need to work with the State Department and Department of Defense to shape perceptions of the situation.

Discussion

While China has framed the mission as a breakthrough in space exploration and resource utilization, U.S. officials expressed deep concerns about the safety, geopolitical implications, and potential national security risks of such an ambitious operation. With the asteroid's reentry slated for 2034, the council was divided between viewing the mission as an opportunity for technological competition and fearing the catastrophic consequences of failure.

The discussion revealed a stark contrast between the perceived capabilities of the U.S. and China in asteroid mining and space resource exploitation. The Secretary of Commerce and the NASA Administrator expressed concern about the U.S. being on its back foot in this area, while the Heavy Reusable Launch Expert questioned China's ability to execute such a complex mission safely. This disparity in assessments pointed to a broader tension: how to accurately gauge and respond to China's space advancements without overreacting or underestimating its capabilities. There was clear anxiety that if the U.S. didn't act quickly, China could establish international norms and rules for space resource utilization, further undermining U.S. influence.

Concerns over China's ability to safely execute the asteroid reentry added another layer of tension. The Secretary of State pointed out China's poor track record with uncontrolled rocket reentries, warning that this asteroid mission could have even more dire consequences if

mishandled. The Heavy Reusable Launch Expert went further, doubting China’s technical capability to pull off such a complex operation, given its lack of experience with such large-scale space missions. These members argued that the U.S. must prepare for worst-case scenarios, including the potential need to intercept or divert the asteroid if China’s plans fail. There was a prevailing sense that while the mission could be a scientific triumph, the global risks were simply too great to ignore.

Public perception and education emerged as critical factors, with several members highlighting the American public’s lack of understanding about space resources and potential risks. The Assistant to the President for Domestic Policy and the Presidential Policy Advisor stressed the need to educate the public to garner support for more aggressive space policies. This revealed a tension between the urgency felt by the council and the time needed to build public understanding and support for major space initiatives.

The council also grappled with governance issues, both domestically and internationally. The lack of a centralized U.S. authority for space policy decisions was contrasted with the need to establish international rules and standards for space resource utilization. The suggestion of creating a “space czar” role highlighted the tension between current decentralized decision-making and the perceived need for more unified leadership in space matters.

Scenario 6: Global Tension Escalates as North Korea and Iran Showcase Anti-Satellite Might

Scenario Supplemental Data Provided

To the Secretary of State and the Director of National Intelligence: Pakistan and Saudi Arabia are thinking of testing in response; European nations think the U.S. should take a strong stand against this.

Issues and Considerations

For this exercise, the National Space Council (NSpC) was assembled under a Republican administration. Below are the summaries of each NSpC participant’s contributions to the debate on how best to respond to the respective scenario, along with points of conflict:

Vice President

Assessment: North Korea and Iran’s anti-satellite (ASAT) weapons tests represent a challenge to U.S. space security, and this development must be taken seriously.

Concerns: How can the U.S. deter further development, and what steps can be taken beyond deterrence in response? Will these tests lead to further proliferation and increase risk of conflict? How much potential is there for hazardous debris threatening civilian and military space assets?

Recommendations: Develop the ability to track and potentially intercept ASAT tests in real time. The U.S. should monitor this situation closely, engage in diplomatic and (possibly) military action to prevent further proliferation.

Secretary of Defense

Assessment: It is not surprising that second- and third-tier actors want to become relevant in conversations about space (gaining an asymmetric advantage), and the Department of Defense needs to be concerned. The U.S. needs to find a way to credibly deter these actors from gaining space control capabilities.

Concerns: This threatens power dynamics in space and allows for the potential of other actors to gain a foothold in space. This threatens U.S. national security—America has the most to lose in space conflict since it has by far the most space assets.

Recommendations: Three distinct lines of effort need to be pursued with a clear, bipartisan, and unambiguous set of consequences for ASAT actions. In sum, a three-tiered approach:

1. Deterrence against nations acquiring ASATs
2. Deterrence against the use of ASATs
3. Clear, strong response strategy if ASATs are deployed

Director of National Intelligence

Assessment: It is not clear if China is involved with the space development of these actors, and they may have a lot to lose if there are debris problems in space. Pakistan and Saudi Arabia ASAT tests are coming soon.

Concerns: The escalation of second- and third-tier actors can threaten the U.S. stronghold in space, especially if they are collaborating with larger actors. This becomes even more dangerous as countries move toward ASAT testing (risk of triggering an arms race).

Recommendations: The U.S. needs to dissuade these countries and others from testing by applying diplomatic pressure and sanctions.

Secretary of Commerce

Assessment: There is potential for ASAT weapons to harm global commerce—particularly in space-related industries (e.g., communications, GPS satellites).

Concerns: Will economic sanctions and embargoes be big enough to stop the proliferation trend? Major space companies that focus on launch services could be targeted.

Recommendations: Construct a sanctions regime that prevents companies in certain countries from participating in scientific/industrial collaborations, and extend sanctions to companies working on ASAT technology.

Secretary of State

Assessment: These ASAT tests could be viewed as part of a coordinated approach to build systems designed to against proliferated low-Earth orbit (PLEO) systems.

Concerns: This could be an escalation capability and could be part of a coordinated effort by larger powers (China and Russia)—how do we isolate the Iran and North Korea actions? The ASAT testing could escalate and spiral.

Recommendations: The U.S. should assert leadership and call for a U.N. Security Council meeting and propose a renewed moratorium on ASAT testing—especially if nuclear weapons are involved. This must be done in coordination with allies like India, Israel, the United Kingdom, and other European powers. The U.S. also needs to consider its messaging, especially toward China and Russia, who have U.N. Security Council veto power.

NASA Administrator

Assessment: If the U.S. condemns other countries for testing ASATs (something the U.S. has done multiple times), this could be seen as hypocritical. Regardless, this is a major threat to our security and space sustainability as a whole.

Concerns: If this situation escalates and generates uncontrollable space debris, it could impact the Artemis mission and make space unusable. The vulnerability of our space assets is a real problem, particularly because most are not able to be replaced quickly.

Recommendations: NASA should be the U.S. government agency that leads global initiatives on space sustainability, calling for a global moratorium on kinetic ASAT tests and promoting nondestructive alternatives. These developments should provide incentives for the development of more resilient satellite architectures and in-space servicing, assembly and manufacturing (ISAM).

Heavy Reusable Launch Expert

Assessment: The ASAT tests mark a dangerous trend toward destabilizing space operations.

Concerns: If these tests continue, the debris could cause restrictions on launch windows, and there will be increased risk for commercial, civilian, and military satellites. The debris-related concerns about damages to operational satellites will result in higher insurance premiums for space companies.

Recommendations: The U.S. needs to work to ensure there are stronger norms and guidelines for space behavior and collaborate with other countries to enact debris mitigation standards.

Assistant to the President for Domestic Policy

Assessment: This is evidence that there is a need for a strong U.S. Space Force and underscores why a PLEO system makes sense to pursue for global positioning and navigation.

Concerns: Communicating a message to the American people might be challenging, and the administration may be pressured to act. If there is an escalation yielding more testing and increased space debris, there could be a public outcry associated with disruption of commercial satellite services.

Recommendations: The U.S. should use this event as an opportunity to push for the importance of space defense, resilient systems, and a robust U.S. Space Force.

Director of the Office of Science and Technology Policy

Assessment: This is dangerous from a technological standpoint, because it shows that countries are beginning to develop capabilities that are similar to the U.S. and disrupt our space operations.

Concerns: These countries might be able to deploy this capability in significant numbers and could be a concern if these countries develop nuclear weapons as well. Additionally, this could be another way for Russia and China to put America at risk with deniability, which would build on the threat that rivals already pose to the U.S.

Recommendations: The U.S. needs to develop a plan for how to respond and hold these countries responsible from a technology point of view. One option would be to increase investment in self-aware/autonomous maneuvering systems for our low-Earth orbit satellites to counter threats.

Chinese Communist Party Subject Matter Expert

Assessment: This is a calculated effort by an anti-U.S. alliance that most likely involves China and Russia.

Concerns: In the lower orbit, the U.S. has a lot more to lose than Russia and China as we are very dependent on these assets. This dependence should be considered when thinking of how to respond. These ASAT tests present the possibility of using nuclear weapons in space, which could make America vulnerable given its dependence on space assets.

Recommendations: The U.S. needs to hold the sponsors of these countries liable for their behavior supporting proxies with space development. The U.S. should invest in a more robust space architecture that is hardened against nuclear ASATs.

White House Press Secretary / External Press Agitator

Assessment: The media will likely focus on the fear of space militarization and scrutinize U.S. space strategy being overly critical.

Concerns: We need to consider the risk of appearing hypocritical since we have tested ASATs for years and don't want to weaken our standing on the international stage. Will these new tests pose danger to the commercial space stations and the International Space Station.

Recommendations: The U.S. should immediately emphasize responsible space behavior, focusing on how its actions align with international norms.

Presidential Policy Advisor

Assessment: Failure to act decisively could erode U.S. credibility, so the President should take a firm stance.

Concerns: How will this rapidly changing environment impact the U.S. and its ability to draft effective space policy?

Recommendations: The U.S. should coordinate a domestic response but also work with international partners to enhance deterrence and prevent further ASAT testing. The U.S. should also invest in space resilience and sustainability.

Discussion

The council quickly identified that these ASAT tests signal a significant shift in the power dynamics of space, as second-tier actors like North Korea and Iran demonstrate their ability to disrupt critical space assets. Both countries' efforts to minimize space debris, while responsible on the surface, reflect a nuanced strategy aimed at legitimizing their actions. This raises a key tension: how the U.S. should respond decisively to these provocations without appearing hypocritical, given its own history with ASAT testing.

One major concern voiced by the Secretary of Defense and the Director of National Intelligence is the potential for rapid proliferation of ASAT technology, with countries like Pakistan and Saudi Arabia signaling intentions to develop similar capabilities. This proliferation threatens to destabilize space security, allowing more actors to challenge U.S. dominance in low-Earth orbit. The Secretary of Defense proposed a three-tiered strategy: deterring countries from acquiring ASAT technology, deterring their use, and implementing a clear response plan should ASATs be deployed. This plan, however, highlights another tension within the council—whether diplomatic efforts or military deterrence should be prioritized in the face of a growing space arms race.

Geopolitical implications also weighed heavily on the discussion. Both the Secretary of State and the Chinese Communist Party Subject Matter Expert pointed out that this could be part of a coordinated effort by larger adversaries like China and Russia, using North Korea and Iran as proxies to disrupt U.S. space assets. The Secretary of State emphasized the need to isolate North Korea and Iran diplomatically while ensuring that China and Russia are kept in check through global collaboration. However, this raises the question of how far the U.S. should go in involving international allies like India and Israel without escalating tensions further. The Secretary of Commerce echoed this concern from an economic standpoint, warning that space-related industries could suffer if the proliferation of ASAT capabilities leads to more debris and disrupted satellite operations.

The NASA Administrator and the Heavy Reusable Launch Expert were particularly focused on the threat of space debris. While North Korea and Iran claim to have minimized debris from their ASAT tests, even small amounts could pose significant risks to space operations, including the Artemis mission and commercial satellites. The council members debated the efficacy of the U.S. condemning ASAT tests when it has previously conducted similar operations, creating a potential diplomatic double standard. The NASA Administrator advocated for U.S. leadership in promoting space sustainability, calling for a global moratorium on kinetic ASAT tests while encouraging nondestructive alternatives, such as electronic jamming. They also emphasized the need for resilient satellite architectures and in-space servicing, assembly, and manufacturing (ISAM) to mitigate long-term risks.

Domestically, there was concern about the American public's perception of these developments. The Assistant to the President for Domestic Policy and the White House Press Secretary both noted that public outcry could mount if commercial satellite services, GPS, or other space-based utilities are disrupted by debris or additional ASAT tests. This creates pressure on the administration to act swiftly and decisively, balancing a strong defense posture with a message of space sustainability. The Press Secretary warned that appearing hypocritical or weak could erode public trust and international credibility, urging the U.S. to emphasize its commitment to responsible space behavior.