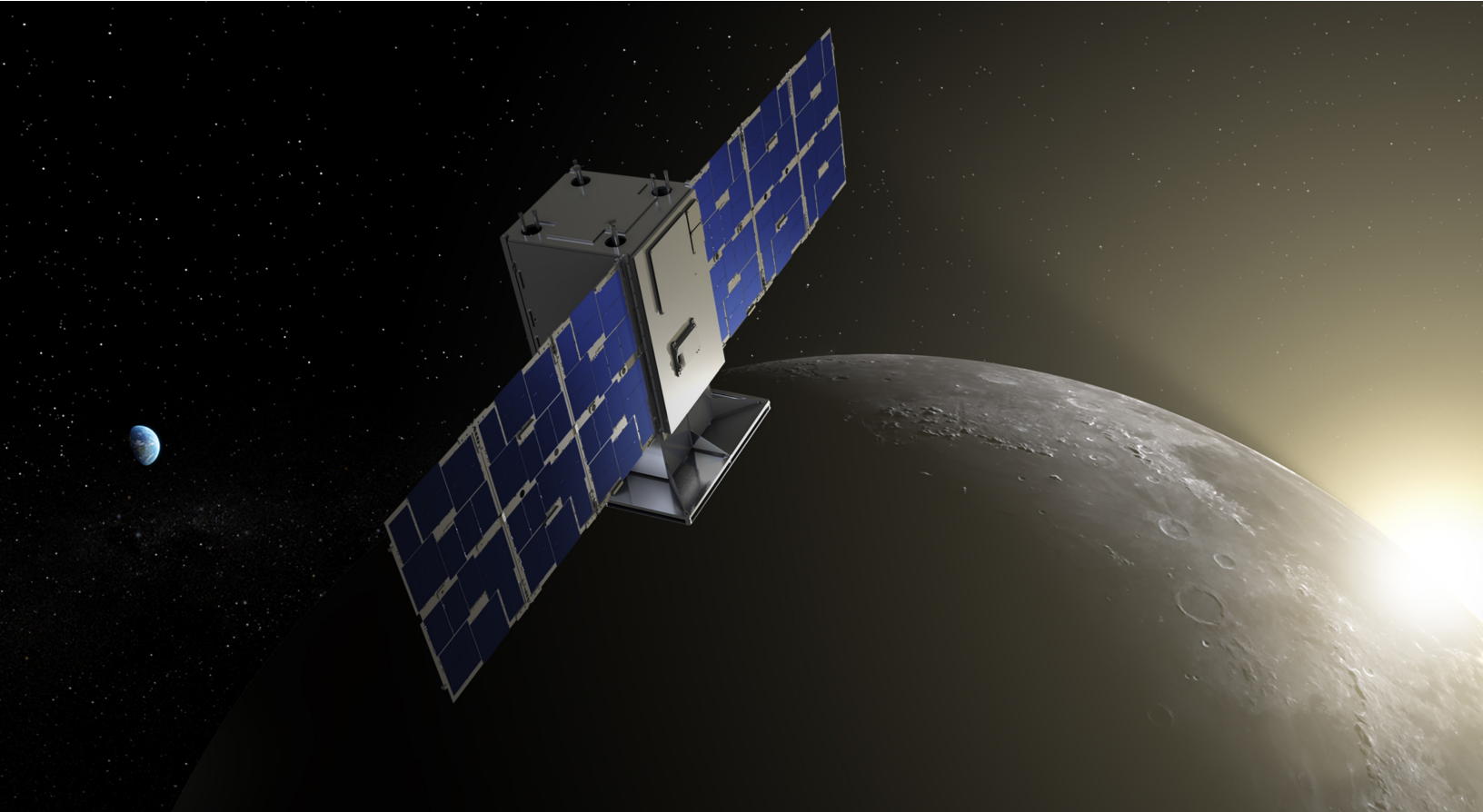


IDA Space Forum

Envisioning a Future in Cislunar Space: Opportunities and Challenges

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IDA



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A. Background

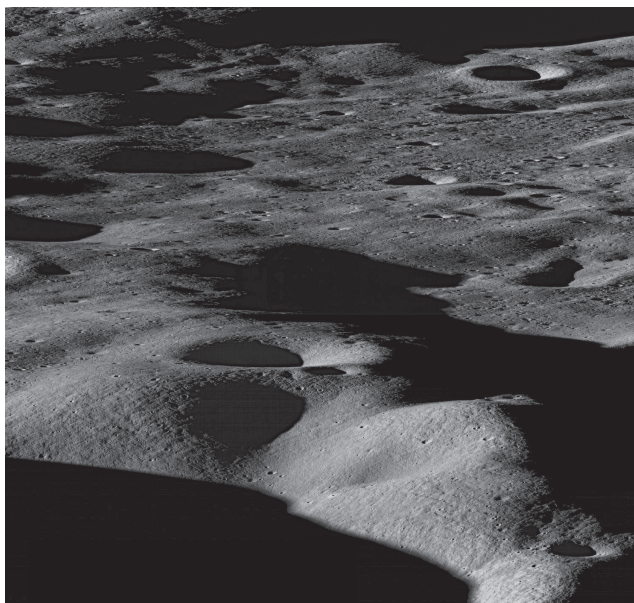
The Institute for Defense Analyses (IDA) organized a forum to discuss the future technical and policy challenges in cislunar space. The event was invite-only and convened about 50 space experts from a range of domestic sectors including the military, Federal Government, academia, and industry. IDA staff and guest speakers presented unique ideas and perspectives regarding national and global exploration in cislunar space and facilitated robust conversations across each session. Topics discussed included the authorization of lunar missions, technical and physical constraints on cislunar activities, considerations for cislunar governance frameworks, and projections for cooperation or conflict with key space actors, most notably China and India. Since the forum was held under the Chatham House Rule, this document summarizes collective insights without attribution of ideas to specific individuals or organizations.

IDA's Space Forum focused on navigating an uncertain future while optimizing opportunities for engagement across sectors in cislunar space development. The forum underscored the importance of multilateral and multi-stakeholder engagement in cislunar governance to ensure the long-term peaceful use of the Moon.

B. Key Takeaways

- 1. Mission authorization guidelines will have to grow and change as mission cadence increases, potentially to include a *national interest* standard.**

As more commercial partners and space agencies plan lunar missions, concern regarding what objects are authorized to go to the Moon was raised by panelists and participants alike. The conversation regarding payload authorization was rooted in how oversight and transparency should be implemented. In early 2024, the launch of Astrobotic's Peregrine lander with human cremated remains aboard sparked debate regarding what objects should be restricted from lunar missions



on the basis of cultural beliefs and whether the payload authorization processes should be amended.

Currently, the U.S. Federal Aviation Administration (FAA) is the last step in mission authorization and provides launch licenses to launch providers after a payload review. The payload review examines missions to ensure they do not pose a risk to national security, public health, or the safety of property, or conflict with international obligations. As participants from government noted, existing authorization standards are limited and do not provide predictability to commercial operators. As a consequence, they do not address the issues that may arise with the forthcoming increase in the number and variety of payloads.

One clear example of these issues is the question of whether human remains are an appropriate payload for missions to the lunar surface, even though no current standard would prevent their launch. In that vein, another participant noted that the NASA Commercial Lunar Payload Services (CLPS) missions have already illuminated inefficiencies in the authorization process. As a solution, a government participant proposed that the FAA should regulate clear red flags, such as weapons or the destruction of heritage sites, and then expand as needed while the industry grows. There was a healthy discussion



regarding the complicated nature of the review processes between commercial providers and the various government agencies such as the National Aeronautics and Space Administration, FAA, and the Office of Space Commerce. Another consideration for the current mission authorization processes that was discussed included requiring providers to disclose both primary and secondary payloads at the beginning of the process to reduce the amount of time it takes to get a flight license and increase transparency with the public, though this might be complicated by payloads that are in flux right up until launch. As CLPS and other mission components and structures expand, mission authorization will have to adapt as needed. How the international community addresses and authorizes missions will have a role to play as well.

The debate surrounding human remains as payloads on lunar missions also led to discussion of the distinction between functional and non-functional payloads. Some participants argued that by definition no payload sent to space is non-functional, even if

the function is pure sentiment. Participants who viewed the functional/non-functional distinction as meaningful suggested that non-functional payloads should be evaluated on factors like utility, maneuverability, tracking, and stealth to determine the appropriate categories for regulation.

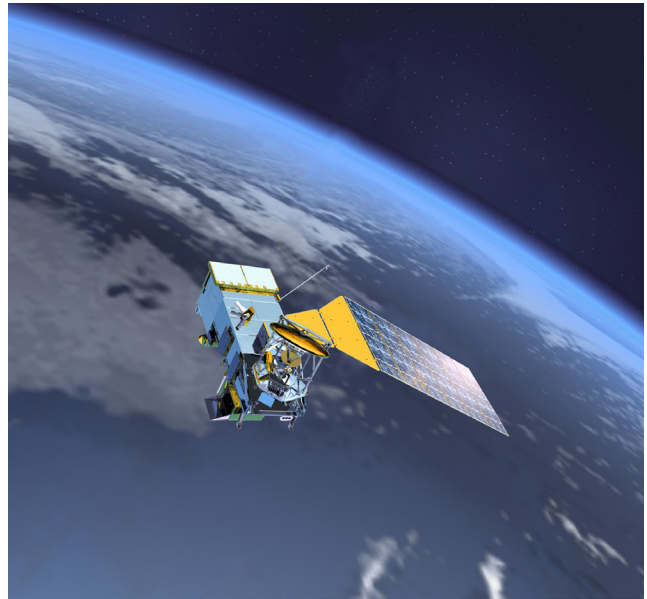
The concept of *national interest* as a consideration for mission authorization, and as described in the National Space Council's updated authorization framework,¹ was also a subject of discussion. Some discussants argued that the inclusion of national interest as an authorization standard would increase unpredictability, dampening commercial interest in cislunar missions and potentially curbing international competitiveness by stifling innovation and economic growth in the United States. There was also disagreement on the definition and interpretation of *national interest* as a term. Participants from the U.S. Government underscored that national interest was meant to be a tool to restrict U.S. actions; for instance, not authorizing a launch when it might spread carcinogens

¹ *United States Novel Space Activities Authorization*: <https://www.whitehouse.gov/wp-content/uploads/2023/12/Novel-Space-Activities-Framework-2023.pdf>

at a level too faint to fall afoul of the immediate public health standard but that is nonetheless concerning. However, another participant remarked this definition of national interest was not likely to be in keeping with the perspective of the international space community, which might view U.S. national interest as an attempt at agenda setting for the entire community. One participant suggested that the Artemis Accords could provide an avenue for ameliorating this misunderstanding. This participant argued that, by signing on to the Accords, countries agree to specific policy positions on contentious topics such as space resource extraction or mission authorization. With specific examples of U.S. policy present in the Accords and already agreed upon, signing countries might be less concerned about different interpretations of *national interest* because they will have an example of what that looks like in practice.

2. The astrodynamics of cislunar space and other technical constraints, some of which remain to be determined or fully explored, will inform cislunar policy, especially around debris disposal requirements.

The panel and audience discussed the technical difficulties of missions in cislunar space, and expressed how astrodynamics and technical considerations such as debris disposal, radiation exposure, and microgravity will inevitably inform policy decisions. For instance, as members of the panel asserted, debris orbiting in cislunar space is influenced by the gravity of multiple planetary bodies, making orbits far more complicated and expanding the spatial extent of debris resulting from collisions to include much of cislunar space and the lunar surface. Panel members also articulated that current orbital debris mitigation standards do not translate well to a cislunar environment given that the current guidelines permit leaving debris anywhere farther from Earth than geosynchronous Earth orbit (GEO). In response, a participant reasoned that cataloging space objects would only grow more challenging as more missions to the Moon result in the accumulation of debris.



Participants suggested that debris mitigation should be incorporated into mission authorization to better track the existence of space objects going to cislunar space, and that this requirement should be developed quickly before more lax norms have time to become accepted. Furthermore, a number of participants reasoned that the current most promising approach to debris disposal in lunar orbit would be controlled impact on the lunar surface at end of life. Discussants argued that given the development of specific parameters like safety distance and designated impact sites, direct lunar impact disposal would allow for small- and medium-sized missions to occur, whereas strict disposal regimes not on the lunar surface might be prohibitively challenging or expensive for smaller missions.

Several other technical considerations with policy implications were briefly touched on. One participant raised concern over spacefaring states using safety zones around numerous strategically distributed small missions to appropriate key locations on the Moon, though another participant noted that this would violate the Outer Space Treaty. Discussion of safety zones also brought up the technical considerations required to make them meaningful, such as a deeper understanding of the range of dispersion of lunar regolith upon landing. Another subject raised was that Lagrange points are better described as zones

with approximately five times the volume of GEO for hosting stable orbits, and alternatively that constant but low levels of propulsion drastically expand the available space for stable orbits. This combination of factors suggests that, counter to the conventional view that Lagrange points are strategically important and scarce resources, there is more than enough available space and competition over them is unnecessary.

3. The role of commercial entities in setting norms for cislunar space is unclear, and likely depends on the degree to which this sector grows, while government and international bodies could be vital in developing governance frameworks and norms for behavior.

The audience and panelists discussed the rise of international and commercial interest in exploring the Moon and considered how the advent of both public and private activities will influence the development of a cislunar governance regime. Panelists and participants agreed that the process of establishing a system of rules and norms for the Moon benefits from cooperation across the full gamut of space users, from spacefaring nations to public and private entities with commercial interest in cislunar space. However, the extent to which each actor will influence a set of norms, rules, and behaviors for the Moon was contested among the forum's discussants.

In particular, some participants held that having commercial entities included in the decision-making process is crucial since many planned missions to the Moon involve private companies, and that existing frameworks such as the Washington Compact² outline an avenue for commercial involvement that has garnered support from stakeholders in academia, government, and the commercial sector. In support of their position on the importance of commercial involvement, participants noted that commercial

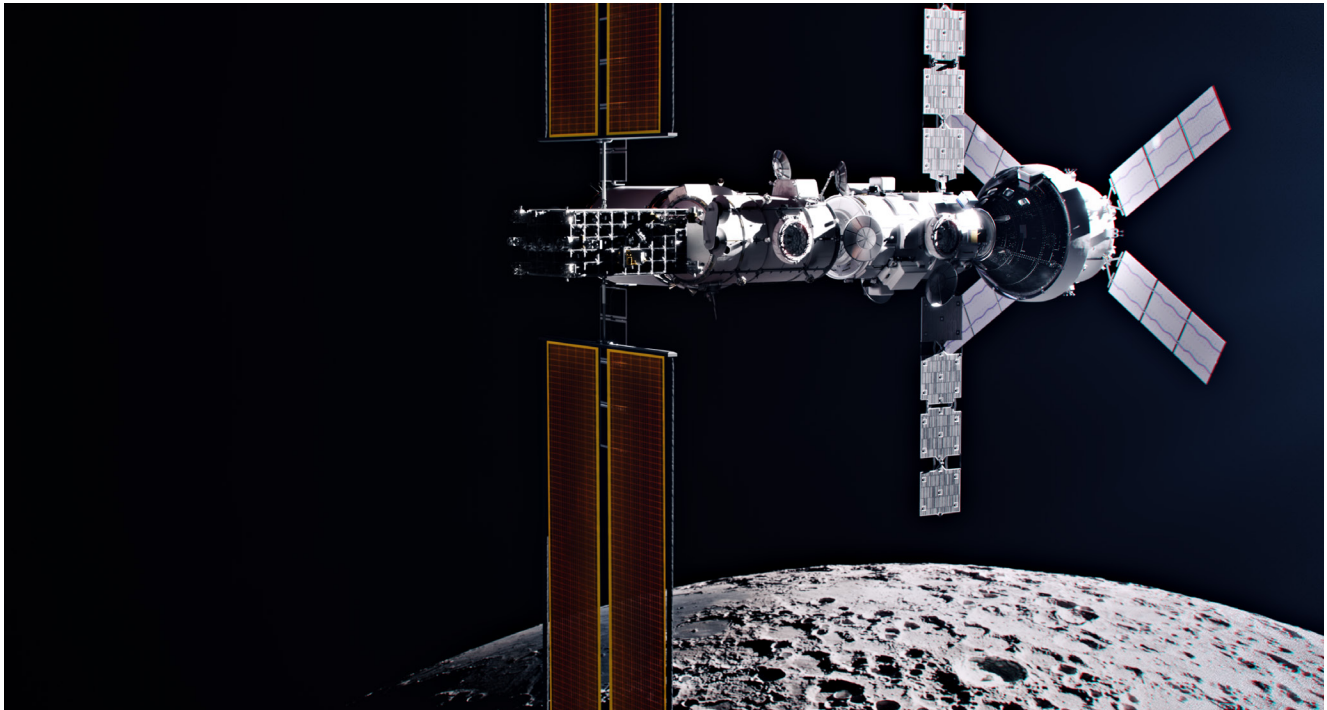
The Term *Cislunar*

There was broad dissatisfaction with the term *cislunar*. Some participants raised the concern that cislunar gives the impression of a 2D space with clearly defined boundaries wholly distinct from traditional Earth-centric orbits, while in fact orbital dynamics enable some cislunar orbits to pass within low Earth orbit. This viewpoint may lead to incorrect demarcations between areas of responsibility, creating confusion. Comparisons were made to the Maginot Line to raise the concern that this misleading definition may lead to attack from unexpected directions. No participant proposed an alternative term.

entities can add specificity to technical standards because they will be the entities deploying those standards and driving much of the technological research and development in this area. Other participants posited that commercial industry is primarily concerned with technological innovation and may not have the interest or capacity to consider cislunar governance. Another specific objection centered on the distinction between private and commercial entities. A participant pointed out that while there may be private entities operating on the Moon prior to the establishment of a robust lunar economy, the vast majority of their funding ultimately flows from governments and so they are not truly independent commercial companies. Therefore, it was argued, governments should be the dominant force in norm setting for cislunar space.

Other participants focused on the importance of states and international bodies such as the United Nations Committee on the Peaceful Uses of

² *The Washington Compact on Norms of Behavior for Commercial Space Operations*: <https://thehagueinstituteofglobaljustice.org/wp-content/uploads/2023/02/The-Washington-Compact.pdf>



Outer Space (COPUOS) as the ultimate source of governance. Discussants noted that the Outer Space Treaty and the Liability Convention confer on states jurisdiction over the space activities of any entities launching from their territory. Furthermore, spacefaring nations like the United States and China have already spearheaded the Artemis Accords and the International Lunar Research Station (ILRS), respectively, which are governance initiatives that focus on norm-building between international partners. One distinction between the two is that only state space agencies can sign the Artemis Accords, while any space entity can sign on to the ILRS. One participant suggested that the Washington Compact is an appropriate mechanism to bring commercial entities into a U.S.-aligned international space agreement in parallel to the Artemis Accords.

While participants debated the various approaches to developing a cislunar governance regime, it was agreed that multilateral cooperation among space users is necessary for creating a governance system. Moreover,

as the conversation evolved, a final theme emerged: norms are only formed when multiple actors choose to adhere to them over time, which makes a sustained presence and multilateral cooperation vital.

4. **China has thus far been a good actor during international space discussions, even as those discussions grow more contentious, but their long-term perspective may confer advantages in norm setting and place them at odds with future U.S. cislunar goals.**

Participants agreed that while the international legal regime in space is growing more complicated, as demonstrated by the failure of the COPUOS Working Group on Legal Aspects of Space Resource Activities to agree on a final report,³ China is not necessarily the source of that conflict. Two Chinese civil society organizations have signed the Washington Compact, and one participant raised the common language in both the Artemis Accords and the ILRS as evidence that cross-recognition between ILRS and the Artemis

3 *Report of the Legal Subcommittee on its Sixty-Second Session*: https://www.unoosa.org/res/oosadoc/data/documents/2023/aac_105/aac_1051285_0_html/AC105_1285E.pdf

Accords might be possible. Other participants noted that China is willing to work within the international regime because they anticipate that being an effective strategy for their goals. A comparison was made between China's actions in Antarctica, where they have sway over norms because of their research stations, and the possibility that their proposed lunar missions might similarly allow them to influence norms because of their significant presence.

India's plans for cislunar space were also discussed, and the degree to which their ambitions have been driven by a desire to compete with China and command respect on the international stage was noted. Participants deliberated on the potential implications of future Indian cislunar activities and briefly touched on areas of potential cooperation between the United States and India to compete with China in cislunar space.

Participants also discussed the gap between how the United States views the *New Space Race* and how China views it. One set of IDA presenters espoused the view that China may not view it as a race at all; rather, China is both proud of its current accomplishments and is thinking about long-term objectives such as robotic in-situ resource utilization to enable lunar habitation and eventually a crewed visit to Mars. The presenters expanded on this

perspective in a companion paper released for the event.⁴ A participant highlighted that China's plans are longer term than those of the United States, which might be a good reason for the United States to expand its perspective beyond just focusing on the next Moon landing towards a bigger space objective or a more developed long-term strategy.

C. Conclusion

The IDA Space Forum was the fourth in an ongoing series of annual events hosted by IDA on current issues facing the U.S. space community. As more missions are planned for cislunar space, cooperation between the domestic commercial, civil, and military sectors—as well as a coordinated approach to international frameworks—is increasingly vital to address existing and upcoming challenges. These types of events enable discussions among stakeholders on how to confront technical and policy challenges in a cislunar environment through governance mechanisms and without impeding commercial innovation and growth. The engagement of many varieties of space stakeholders within the United States will contribute to ensuring the long-term sustainability and peaceful use of the Moon.

⁴ *People's Republic of China in Cislunar Space: Activities, Motivations, and Implications*: <https://www.ida.org/research-and-publications/publications/all/p/pe/peoples-republic-of-china-in-cislunar-space-activities-motivations-and-implications>