Ensuring U.S. Leadership in Space Exploration and Development

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The exploration and use of space has now developed beyond just space exploration and into the industrial and economic development of the Moon, Mars, and other celestial bodies. This raises national security, economic, legal, and policy questions—particularly about how to best position the United States for leadership, foster American prosperity, and lead in the development of international rules for prosperous and sustainable space exploration and development. The Administration should reaffirm its commitment to the Artemis program and U.S. leadership in returning humans to the Moon, work towards the adoption of the Artemis Accords, and engage in international discussions on space resources.

Background

International government and commercial interest in lunar presence, exploration, and utilization has increased in recent years. Five countries have successfully landed on the Moon: the United States, Russia, China, India, and Japan; additionally, last year brought about the first successful landing by a commercial actor. As of March 2025, the United States, India, China, and South Korea are operating active lunar missions, and at least nine countries have planned lunar missions[1] over the next decade.[2]

China aims to put humans on the surface of the Moon by 2030. In April 2024, the China Manned Space Engineering Office (CMSEO) announced that China remains on track to achieve this goal,[3] and in June 2021, China and Russia announced the International Lunar Research Station (ILRS), which consists of both a lunar exploration program and a set of principles for activities undertaken as part of that program.

In 2017, the Trump administration directed the National Aeronautics and Space Administration (NASA) to develop and enact the Artemis Program to

1 Planetary Society, "Every Moon Mission, Ever", https://www.planetary.org/space-missions/every-moon-mission.

2 C. Swope and L. Gleason, Salmon Swimming Upstream: Charting a Course in Cislunar Space (Washington, DC: Center for Strategic and International Studies, October 21, 2024), https://www.csis.org/analysis/salmon-swimming-upstream-charting-course-cislunar-space.

3 A. Jones, "China on Track for Crewed Moon Landing by 2030, Space Official Says", SpaceNews, April 24 2024, https://spacenews.com/china-on-track-for-crewed-moon-landing-by-2030-space-official-says/

return an American crew to the Moon.[4] [5] However, in December 2024, NASA announced that it would need to delay both—respectively, to April 2026 and mid-2027, due to problems with the Orion crew spacecraft and its heat shield.[6] Artemis would follow that landing up with a sustained human lunar presence through subsequent missions to both lunar bases and an orbiting gateway. NASA has begun procuring commercial and industry contributions to Artemis, including human landing systems and assorted robotic precursor missions. Although led by the United States, Artemis would be executed in cooperation with a range of international partners, including Canada, Japan, and several European states.[7] For example, one of the three primary components of NASA's Orion spacecraft, the service module, will be provided by the European Space Agency and Airbus Space.[8]

Sustained human presence in space and on the Moon will require the use of resources found in space to support crew life and function. A major focus of near-term lunar exploration will be to verify the extent and usability of these resources. The United States, China, and India all have planned missions that would land near the Moon's south pole because of this interest in possible sources of water. Lunar regolith itself may prove to be useful for building lunar structures and habitats, while other lunar resources may have scientific, exploration, and commercial utility.

However, some uncertainty exists around the legal framework that would enable rational and sustainable space resource activities. The Outer Space Treaty, of which the United States led in the negotiation and drafting, makes national territorial annexation over celestial bodies and parts thereof legally impossible. The Treaty also states that all celestial bodies are free for exploration and use by all. Multilateral discussions on the topic since 2016 have trended towards the position that space resource utilization is permitted, but these discussions have raised several questions over how that activity should be regulated, coordinated, and executed in a stable manner.

The United States lacks a consolidated strategy or coordination function for lunar activities. Commercial activities on the Moon do not have a clear regulatory structure and fall into the same gap in authorities and ad hoc licensing as many other nontraditional commercial space activities.

An increased tempo of activity on and around the Moon raises several governance and policy challenges. Measures must be developed to protect that while enabling future activities and use. As more operators function on the surface and in lunar orbit, there is an emerging need to develop space situational awareness (SSA) and space traffic coordination capabilities specifically for cislunar space. NASA and the International Committee on Global Navigation Satellite Systems (ICG) have

4 NASA, Artemis, https://www.nasa.gov/feature/artemis/.

5 A. Donaldson, "NASA Shares Progress Toward Early Artemis Moon Missions with Crew", NASA, January 9, 2024, https://www.nasa.gov/news-release/nasa-shares-progress-toward-early-artemis-moon-missions-with-crew/.

6 A. Jones, "NASA Delays Artemis Missions Again. What Could this Mean for the Moon, Mars and Space Leadership?", Space.com, December 23, 2024, https://www.space.com/space-exploration/artemis/nasa-delays-artemis-missions-again-what-could-this-mean-for-the-moon-mars-and-space-leadership.

7 Government of Canada, The Artemis Program: Humanity's Return to the Moon, last updated December 6, 2024, https://www.asc-csa.gc.ca/eng/astronomy/moon-exploration/artemis-missions.asp; NASA, "NASA, Japan Advance Space Cooperation, Sign Agreement for Lunar Rover", April 10, 2024, https://www.nasa.gov/news-release/nasa-japan-advance-space-cooperation-sign-agreement-for-lunar-rover/.

8 NASA, European Service Module, https://www.nasa.gov/humans-in-space/orion-spacecraft/european-service-module/; NASA, NASA, European Space Agency Formalize Artemis Gateway Partnership, https://www.nasa.gov/news-release/nasa-european-space-agency-formalize-artemis-gateway-partnership/

begun opening doorways to communication and transparency on these issues with other lunar actors.

There are also national security concerns about cislunar activities. National space security strategists in both the United States and China have referred to the lunar environment as the "ultimate high ground." It is possible that the Moon may become a place for geopolitical competition, specifically between the United States and China, and military conflict may arise as a result.

Current Policy and Gaps or Shortcomings

The United States lacks a consolidated strategy or coordination function for lunar activities. Commercial activities on the Moon do not have a clear regulatory structure and fall into the same gap in authorities and ad hoc licensing as many other nontraditional commercial space activities. Cislunar domain awareness is only just beginning to emerge as a serious element of national security space strategy.

Space resource activities raise several legal and regulatory challenges that are not adequately addressed through current policy and law. There is no mechanism for assignment and international recognition of priority or access rights to resources, nor are there means for deconfliction over potential competition for access to specific resource sites on the Moon or asteroids. Efforts to develop regulatory specificity should proceed in an adaptive, incremental manner which encourages innovation and private sector investment in a space resources economy. Addressing these issues will require both domestic and international discussion. In this context, the United Nations has recently established an Action Team on Lunar Activities Coordination (ATLAC) to initially focus on information sharing and deconfliction amongst lunar actors. Meanwhile, another working group at the United Nations has been developing legal principles on the exploitation and use of space resources, and will likely circulate these draft principles to UN Member States in the first half of 2025.[9]

The first Trump administration initiated the Artemis Accords, a nonbinding political commitment to allow for sustainable space exploration. Through the Accords, the United States seeks to secure commitments from other countries to follow several principles related to lunar (and other space) activities and interpret their implementation in a specific way. These principles cover a range of topics, including space resources utilization, safety zones, heritage site protection, and interoperability. As of January 2025, the Artemis Accords have 53 state signatories. However, some of these Artemis Accords signatory states have questioned what their actual engagement and involvement in the Artemis Accords will be, and what signing gets them. In addition to seeking new states to sign the Artemis Accords, efforts should be made to coordinate and engage with existing members, including with options and opportunities in the Artemis program. ●

9 United Nations Office for Outer Space Affairs, Working Group on Legal Aspects of Space Resource Activities, March 2024, https://www.unoosa.org/oosa/en/ourwork/copuos/lsc/space-resources/index.html.

Policy Recommendations

→ Sustain commitment to the Artemis program.

The Administration should reaffirm its commitment to the Artemis program and U.S. leadership in lunar exploration. Technologically, the Moon is the gateway to Mars, and many international arrangements have been made under the Artemis program and Artemis Accords—the reneging of which would harm U.S. space leadership and space diplomacy. The Administration should work with Congress to establish bipartisan support for a sustained crewed lunar exploration program that serves as the cornerstone of further space exploration and development.

→ Continue to work with the international community to implement the Artemis Accords.

The principles of the Artemis Accords represent a practical approach forward to addressing several cislunar governance issues. Efforts should be made to continue to work towards the adoption of these Accords, including engagement with possible competitor nations. In addition to seeking new countries to sign the Artemis Accords, efforts should be made to coordinate and engage with existing members, including with options and opportunities in the Artemis program.

→ Continue multilateral engagement on space resources governance.

The United States should continue to positively engage in discussions at the United Nations Committee on the Peaceful Uses of Outer Space and other multilateral fora to develop consensus principles to enable space resources activities. These principles can complement U.S.-led approaches like the Artemis Accords and serve a coordinating function.

→ Employ the U.S. Space Force to support increased cislunar situational awareness.

While the United States should continue to observe its international legal obligations not to put military installations on the Moon or conduct military maneuvers there, there remains a role for the U.S. military to continue to help enhance cislunar situational awareness as a matter of spaceflight safety for the increased number of lunar missions.[10]

10 Air Force Research Lab, "AFRL's Oracle Developing Nation's 1st Cislunar Space Situational Awareness Capabilities", December 11, 2023, https://afresearchlab.com/news/afrls-oracle-family-of-systems-developing-nations-1st-cislunar-space-situational-awareness-capabilities.