

Expanding cooperation to include India as a partner serves both the United States and India on several levels, including strengthening their growing strategic partnership and expanding economic and commercial ties. On the technical level, India possesses significant knowledge, skills, and experience and, with U.S. cooperation, can advance scientific endeavors as already demonstrated by the Chandrayan-1 mission. India's first unmanned lunar probe included the Moon Mineralogy Mapper from Brown University and the Jet Propulsion Laboratory, as well as the miniSAR, a NASA payload. India's launchers, especially the Polar Satellite Launch Vehicle (PSLV), which recently launched a communications satellite, offers the potential for cooperation on scientific endeavors that might otherwise be prohibitive because of launch costs for Western vehicles.

International cooperation in space for India, particularly with the United States, dates back to the 1960s, when some Indian scientists were trained in the United States on sounding rockets, as well as when the United States launched a sounding rocket in 1963 from India's Thumba rocket facility. Cooperation in space between the two countries has, of course, been subject to major shifts over time, with the United States curbing dual-use technology exports to India because of concerns over nuclear and missile proliferation. President Obama opened up major new possibilities for U.S.-India space technology cooperation when he announced on his 2010 trip that ISRO would be removed from the Department of Commerce's "Entity List." Earlier, the two countries had signed a Technology Safeguards Agreement, although a proposed Commercial Space Launch Agreement still needs to be finalized.

With NASA and ISRO now free to collaborate, the U.S. National Space Policy providing a useful framework for both nations to engage on space, and the U.S.-India Space Working Group up and running, the momentum is there for India and the United States to expand their cooperation on space. Four areas where the United States and India can strengthen their cooperation in space follow:

1. *Maritime Domain Awareness (MDA)*. MDA cooperation could significantly enhance security for both nations. Commercially available satellite data has made over-the-horizon MDA possible. Among India's 23 active satellites, 13 fly in low earth orbits (LEO). The NSP derives some of its strengths from increasing the number of satellites available to contribute to MDA data. Some of those 13 satellites would be useful in enhancing MDA. Increased data sharing could significantly enhance efforts toward achieving comprehensive maritime domain awareness, thus benefitting both India and the United States on monitoring India's coasts and major sea-lanes across the Indian Ocean.
2. *Space Situational Awareness (SSA)*. The U.S. Strategic Command (STRATCOM) is pursuing agreements with commercial entities, as well as countries—notably France

and Australia—to SSA data. Having a broader shared awareness allows the individual nations to better monitor the growing number of satellites in space. In particular, this can help avoid any repetition of satellite collisions such as that of the Iridium 33 satellite and Russia's Cosmos, which added to the space debris that are a threat to the International Space Station (ISS) and human spaceflight.

3. *Earth Observation and Science Education*. Cooperation on space sciences and exploration can be fruitful for India and the United States, as already evidenced by India's Chandrayan-1 mission where NASA had two hosted payloads. Earlier this year, Boeing expressed its interest to share expertise in launch escape systems (LES), vehicle health monitoring system and abort triggers (VHMSAT), life support systems, crew accommodations, and others areas such as reusable space systems and composite cryogenic tanks.
4. *Space Sustainability*. With both the United States and India heavily reliant on space technologies, they need to address the problem of governance in space. With approximately 966 functional satellites in space and almost 21,000 tracked pieces of debris, the threats to their space systems are real and expanding. While the United States has indicated positive interest in the European Union's proposed draft Code of Conduct in Space, Indian strategic experts have expressed concerns regarding the code—the main reservation being the lack of inclusion of Asian nations, including India, during the formulation of the code. A discussion where India is included along with the United States on addressing means of ensuring the long-term sustainability of the space environment will help serve the interests of both nations in addressing their concerns technically as well as politically.

A Higher Orbit

Cooperation in outer space offers both India and the United States a potential "win-win" situation. It can provide both countries with significant benefits to their individual space programs. Successful U.S.-India discussion of transparency and confidence-building measures and improvements to the long-term sustainability of the space environment could provide a template for discussion on other important areas such as nonproliferation, cyber security, and counterterrorism.

Cooperation in space between India and the United States today is principally at a lower level because of some lingering doubts as to the utility or attractiveness of deepening strategic cooperation, as well as concerns with possible reactions across the rest of Asia. While cooperation among European countries in space is quite common, there is nothing similar across Asian countries, where India, Japan, and China all have active space programs. Thus, increased space cooperation between the

United States and India has to take into account potential concerns of others in the region. In addition, the respective bureaucracies are still not fully familiar with each other and are in a “learning phase” in working with each other. It will take time to build trust between the two governments. But with both countries having so much in common, and India already being one of the largest suppliers of foreign technical students in the United States, there is no reason to believe that India and the United States will not gain the level of familiarity and trust needed, provided both countries are committed in the endeavor to take the partnership to a higher orbit.

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