

The Space Review

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India's space infrastructure, such as its GSLV rocket, now allow the country to pursue more ambitious goals in space, including human spaceflight. (credit: ISRO)

The other rising Asian space power

by Jeff Foust

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This country is ramping up its space capabilities in an effort to be seen as a major global space power. It is moving beyond its traditional missions of developing communications and remote sensing satellites to focus on new areas, like navigation. It is also working on its first mission to the Moon, as reports—although incomplete and controversial—indicate it is interested in undertaking a manned lunar mission, perhaps by the end of the next decade. It has attracted the attention of the United States as a potential partner in space endeavors, despite a history of rocky relations.

What is China, Alex? Sorry, that's incorrect. The correct response is: what is India?

While a lot of attention in the last few years has focused on China's growing space program, including its human spaceflight efforts and lunar exploration program, India is hardly standing still in space, either. Once a small

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space program focused on providing specific services for the country, such as communications and imagery, India's space program is branching out into new fields, including satellite navigation and space science. India has also recently indicated that is revisiting its previous opposition to a human spaceflight program, and is already taking steps towards developing the technology needed for such missions. These developments all provide a new opportunity for cooperation for the US, with far less geopolitical baggage for America than dealing with China or even Russia.

Moving beyond serving society

India's space program is hardly a new development. Its origins date back more than four decades, when the Indian government established the Indian National Committee for Space Research (INCOSPAR) in 1962 to conduct sounding rocket research. As the program grew in the late 1960s INCOSPAR became the Indian Space Research Organisation (ISRO), and by 1975 ISRO launched its first satellite, Aryabhata, on a Soviet rocket. India's first indigenously-built orbital launch vehicle, the SLV-3, successfully put a satellite in orbit in 1980 (a year after an earlier flight failed), and ISRO continued a series of larger satellites and rockets in the years that followed.

ISRO has been devoted for most of its history to efforts with primarily practical applications, rather than for national prestige. This has meant a focus on communications satellites to provide critical services, including telemedicine and distance learning, to many parts of the nation that had little existing communications infrastructure; meteorology payloads (often flown on the same geosynchronous satellites that performed communications missions) to improve weather forecasting; and remote sensing satellites to identify and map the nation's natural resources. India adopted an unusually pragmatic approach to providing these services

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as it built up its own satellite manufacturing and launch capabilities: the first generation of INSAT communications satellites were built by a US company, Ford Aerospace (now Space Systems/Loral), and launched on Delta and Shuttle missions in the 1980s; later INSAT models, while built domestically, have been launched on Ariane vehicles.

Now, though, as India has built up its domestic space infrastructure, the government has shown a willingness to move beyond communications and remote sensing applications. While India is a partner in Europe's Galileo satellite navigation system currently under development, and has agreed to work with Russia to repopulate its GLONASS navigation system, ISRO announced earlier this year plans to develop its own regional satellite navigation system, building the satellites, ground stations, and receivers all within India.

India is also looking at applications that, unlike navigation, communications, or remote sensing, don't have an obvious practical role in aiding the country's development. ISRO is developing its first planetary science mission, the Chandrayaan-1 lunar orbiter, scheduled for launch in early 2008. That spacecraft is not intended to be a one-time mission, as the "1" designation after its name suggests: other science missions to the Moon and even Mars are in the early planning stages.

"The time has come where you do have the feeling that you have accomplished a lot" towards the original ISRO goals of aiding Indian society, said Virender Kumar, counsellor for space at the Indian Embassy in Washington, at a forum on US-India space relations at the Center for Strategic and International Studies (CSIS) last month. Kumar said that there was a feeling within India that the space program had become stagnant. "After some time it sort of feels that you are continuing to do regularly these things over and over again. The atmosphere tends to get a bit flat within the scientific community."

Kumar said that, after a series of discussions within

India's scientific community, ISRO has decided to embark on a more ambitious series of missions. "They basically demanded that we go forward and do these exploration missions," he said. Those missions include Chandrayaan-2, a second lunar mission, around 2011; a mission to an asteroid or comet in 2015; and a Mars mission in 2019.

Even more obvious than those robotic scientific missions, though, are tentative plans by ISRO to initiate a human spaceflight program. India has long shunned manned spaceflight, given its expense and limited practical applications, the only exception being the flight of Rakesh Sharma on a Soviet-era Soyuz mission in 1984. However, in November a panel of Indian scientists and other officials (among them Sharma), endorsed a proposal to develop a manned spacecraft that could be launched by an upgraded version of India's existing Geosynchronous Satellite Launch Vehicle (GSLV). The program, according to an ISRO statement, would cost 100 billion rupees (\$2.2 billion) over eight years: a not-insignificant sum for an agency whose current budget is around a half-billion dollars a year.

Such an effort would require major work in a number of technology fields, ranging from life support systems to crew escape systems. Existing technologies would also have to be improved, including India's overall launch capabilities: the GSLV has flown only four times since its introduction in 2001, and its most recent launch, in July, failed when one of its strap-on boosters shut down immediately after liftoff. Some of that work is already in progress, though, including the launch early next year of India's first recoverable spacecraft, an early but critical technology precursor for any future manned spacecraft.

While the initial focus of India's manned space program is on an orbital flight, similar to China's Shenzhou spacecraft, the country's scientists have ambitious plans. Kumar said in his presentation that one

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potential future mission would be a manned lunar mission as early as 2019, around the same time the US is scheduled to return to the Moon as part of the Vision for Space Exploration. However, Kumar didn't specify whether this would be a simple circumlunar mission—which would still be very challenging—or an actual landing attempt, which would be far more difficult and expensive.

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Kumar cautioned that these plans are just that: proposals by Indian scientists for future missions for ISRO that would take the agency beyond its historical mission of providing services to Indian society. "None of these plans are sanctioned by the government," he said. "This is the thinking process within ISRO and very soon we will be approaching our government to get these projects formalized." Indian media reports, though, do suggest that the government may be inclined to give its approval soon for at least the initial stages of a human spaceflight program, as well as other exploration missions.

Cooperation with the US

This change in both ambitions and capabilities should open up new opportunities for cooperation with the United States. And, in fact, such cooperation is already occurring: in May NASA administrator Mike Griffin visited India to sign a memorandum of understanding to allow two US instruments, a miniature synthetic aperture radar and a mineralogy mapper, to fly on Chandrayaan-1.

However, such cooperation has not always been possible. Just 15 years ago, noted Ambassador Teresita Schaffer, a former State Department official who now serves as director of the South Asia Program at CSIS, a bill in the House that would have cut off all financial assistance to India on human rights grounds came within three votes of passage. Relations worsened after India's 1998 nuclear tests prompted sanctions by the US.

Since then, though, and particularly after the 9/11

terrorist attacks in 2001, relations between the US and India have improved considerably. The two countries have agreed to work together in a number of areas, from cooperation in the war on terror to the transfer of civilian nuclear power technology to India. The evening before the CSIS event in November the Senate overwhelmingly passed a bill that approved a nuclear power technology agreement between the two countries, an accomplishment celebrated by several of the speakers.

Schaffer said the improvement in US-India relations could be traced to three general factors. One is the strong economic growth in India over the last two decades, which has helped shape Indian foreign policy. Another is the rise of the Indian-American community in the US, including its growth and overall prosperity, which has helped strengthen ties between the two countries. The last, and perhaps most important, Schaffer believes, is the end of the Cold War and India's reaction to it. "It took the government of India about ten years to digest the significance of the end of the Cold War," she said. "The United States had emerged as India's most important extra-regional friend." The overall transformation in policy, she said, eventually affected both major parties in both the US and India.

So what does this mean for cooperation between the two nations in space? As relations between the two countries warmed over the last few years, new space ties between the US and India emerged. Space cooperation was first explicitly stated in a joint statement by President George W. Bush and then-Prime Minister Atal Bihari Vajpayee in November 2001. "From the very beginning, it was realized that space was going to be one of those key areas" in US-India cooperation, said Bob Ford, a senior advisor in the State Department's Office of Space and Advanced Technology.

Space cooperation has been mentioned in a number of official documents in US-India relations since then, although details about such cooperation have usually

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been scant. However, there has been progress: in June 2005 the first meeting of a joint US-India working group on civil space cooperation took place in Bangalore, the Indian city that hosts the headquarters of ISRO. The working group “made good progress on several fronts”, Ford said, including NASA cooperation with ISRO on the Chandrayaan-1 mission. A second meeting of that working group is scheduled to take place in Washington in February.

cooperation, said the State Department’s Bob Ford.

Another area of interest has been in navigation, including making sure any Indian satellite navigation system is interoperable with the US GPS system. A US company, Raytheon, is already working with India to develop a terrestrial GPS augmentation system for aviation applications that is analogous to similar systems in the US, Europe, and Japan. Ford said that Earth observations “is the next big area of cooperation” with India, including the possibility of using data from India’s Resourcesat spacecraft as a supplement to or gapfiller for Landsat data as the US scrambles to come up with a replacement for the aging, ailing Landsat spacecraft currently in orbit.

The US is also in the process of negotiating a commercial space launch agreement with India that would allow US satellites to be launched on Indian vehicles. Ford said that the US Trade Representative’s office is leading those negotiations, which “hopefully will be reaching a critical stage in the near future.” A separate agreement being negotiated by the State Department to cover the handing of sensitive American technologies on such spacecraft; that effort “has gone very well and is relatively close to conclusion,” he said.

While there are still many hurdles ahead for US-India space cooperation, like the current restrictive export control regime in the US, many in both countries see signs of more positive developments between the two countries in space in the years to come, particularly as India’s space capabilities become more sophisticated.

While some have criticized India for devoting as many resources as it has to its space program, given that it is still overall a developing and relatively poor country, Schaffer said such efforts in both the US and India are not out of line, given the deep pools of technical talent in both countries. “It certainly seems to me reasonable to devote some piece of that talent pool, some piece of that country’s resources, to exploring basic and applied science beyond the grassroots.”

Ron Somers, president of the US-India Business Council, said that he talked with Mukesh Ambani, chairman of Reliance Industries Ltd., India’s largest company, after Indian Prime Minister Manmohan Singh visited Washington in mid-2005, and asked him what would be the best way to demonstrate the new partnership between the US and India. “He said, ‘Let’s launch a man to the Moon together.’”



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