

India over the moon, eyes Mars and Venus

Boosted By Chandrayaan-1 Success, Isro Plans To Launch Manned Mission To Space, Moon & Planetary Expeditions In The Next 25 Yrs

Srinivas Laxman | TNN

Chandrayaan has made India dream of the universe. The thrust area of the country's space programme in the next 25 years is expected to be the exploration of planets like Mars and Venus. Speaking to TOI, U R Rao, who headed Indian Space Research Organisation (ISRO) between 1984 and 1994, said that planetary exploration was in the "minds of everyone" and would be accorded top priority in the agency's missions for the next 25 years.

Rao's views assume significance in the context of him being the chairman of the governing council of the Ahmedabad-based Physical Research Laboratory (PRL), an autonomous body under ISRO. The PRL is playing a key role in the study of planets through exploration. At a recent Chandrayaan meet organized by PRL in Ahmedabad, he spoke about the importance of missions to Mars and called upon the scientific community to plan planetary expeditions. "The study of planetary geology and atmosphere can help us colonise planets like Mars," he said. About the moon missions, he says: "The moon is a strategic point for launching more explorations because of three reasons. First, there is a plenty of helium-3 available, which, if processed, at fusion reactors could ensure continuous availability of electricity. Second, because of less gravity on the moon, it could be a launchpad for future interplanetary explorations. Third, for security reasons, lunar missions are important," he said.

Following the success of the country's first lunar mission, 'Chandrayaan-1', India has tentatively slated to launch Chandrayaan-2 in 2013 that will execute a soft-landing on the lunar surface. A joint Indo-Russian venture, apart from the orbiter, Chandrayaan-2 will have a lander and two rovers. Of the two rovers, one will be Russian and the other Indian—that is being designed and developed at the Vikram Sarabhai Space Centre, Thiruvananthapuram.

India's first cosmonaut Rakesh Sharma, who spoke to TOI, believes that in the next 25 years, there will be a manned mission to the moon with the intention of exploiting its resources like helium-3. "A manned space programme will be inevitable. But I am surprised the government has not given the green light so far."

Another former ISRO chief, Krishnaswamy Kasturirangan, however, said it has to be a collaborative exercise to make the mission cost effective. "Since we have successfully demonstrated our capability for launching an international mission like Chandrayaan-1, I think we should go in for collaboration in future missions," he told TOI.

At the Ahmedabad meet, Kasturirangan said that following US President Barack Obama's decision to cancel Nasa's constellation programme because of budgetary constraints, India could avail itself of the opportunity to join an international manned mission to the moon since it would reduce costs. Agreeing with him is present Isro chairman K Radhakrishnan, who has been quoted

as saying that India could be a part of the global human flight to Mars. “A cost-effective space transportation system for India has to be put in place in the next 25 years,” Kasturirangan said.

Kasturirangan also told TOI that by 2035, a scientific mission to the Red Planet has to be launched as it will be a natural follow-up to the lunar mission. “I think our focus will be on how the planets can be exploited and at a later stage, even exploring the possibility of colonizing moon and Mars,” said G Madhavan Nair, who recently retired as Isro chairman. Nair said scientists have to start planning experiments like studying the Martian atmosphere. “Our study has to throw light on some new aspects of Mars and it should not be a repetition of what other countries have done,” he said. Other officials said that Nasa was keen on teaming up with Isro for a joint unmanned scientific flight to Venus.

Apart from interplanetary missions, some of the other focus areas for Isro during the next quarter century are:

Developing a satellite-based communication and navigation system

Enhancing imaging capability

The development of reusable launch vehicles that will reduce launch costs

Embarking on human space flights

Developing heavy lift rockets for flying heavy satellites

Aditya—mission to the sun

Astrosat—India’s first dedicated astronomy satellite

The second space capsule recovery experiment

Megha-Tropiques—An Indo-French mission to study climate

For the Astrosat flight, whose launch is slated tentatively for 2011, several scientific organizations like the Tata Institute of Fundamental Research and the Pune-based Inter University for Astronomy and Astrophysics have made significant contributions. Kasturirangan said the development of all these projects will further reinforce India’s position as a front-ranking space power in the Asian region. “We have the support of the political system and the scientific community,” he said. What better proof of this than the fact that the Budget for India’s space programme was over 40% in 2009-2010 as compared to 2008-2009, the total allocation being Rs 4,959 crore. However, the budget in the 11th plan (2007-2012) is two-thirds that of Nasa’s.

Kasturirangan, Rao and Nair stressed the importance of reducing launch costs. “It now costs \$20,000 to launch a kilogram and this has to come down by a factor of 50,” Rao said, while pointing out that India is in the process of designing and developing a reusable launch vehicle

that could either be a two-stage to orbit vehicle or a one-stage to orbit vehicle. Rao said the launch costs have to drop if India goes in for space-based solar-power. Nair said that by 2020, the launch cost has to come down to \$10,000 per kg with further reduction in the years ahead.

MANNED SPACE FLIGHT: The cost of the manned space flight is estimated to be Rs 13,000 crore and the rocket to be used for this mission will be the three-stage Geo Synchronous Satellite Launch Vehicle (GSLV) Mark 2. There will be two astronauts in the manned capsule operating for about a fortnight at an altitude ranging between 300 and 400 km from the earth before they splash down in the Bay of Bengal. The first space capsule recovery experiment (SRE-1) which was launched by the highly proven four-stage PSLV from Sriharikota on January 10, 2007, was successfully recovered on January 22, 2007. It was considered a trial flight for a manned mission. It was a feather in the cap for the country's space programme because this was almost the first time that a space capsule was launched and recovered in the first attempt itself. The manned space flight is being considered as a precursor to the possibility of a human mission to the moon around 2020.

MISSING THE ISS BUS: Cosmonaut Rakesh Sharma regrets that India missed the bus with regards to the International Space Station (ISS). "If we had joined the ISS, we would have already had a ready core of astronauts who could have done scientific experiments," he said.

NEW ROCKETS: The advanced version of the GSLV, designated as GSLV-3, which can carry satellites weighing nearly four tonnes, is expected to make its maiden flight next year. It is 42.4-metre tall. The current version of the GSLV can carry satellites weighing about two tonnes. The advantage of this is that it can attract more global customers who want to launch heavy satellites and that will fetch revenue for India.



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