Isro's 100th launch: why this is significant, the road ahead

ISRO 100th Rockets Launch, Significance: Since its formation in 1969, the space agency has developed several rockets, becoming a reliable launch partner even for satellites from other countries.

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Isro's 100th launch: The GSLV-F15 launch from Sriharikota on Wednesday morning. (Photo: X/@isro)

ISRO 100th Rockets Launch: With the first launch of 2025, the Indian Space Research Organisation achieved the significant milestone of having carried out 100 launches. The GSLV-F15 put in orbit the navigation satellite NVS-02 on Wednesday early morning. After the launch, the new Isro chairperson Dr V Narayanan, recalled the greats like Vikram Sarabhai, Satish Dhawan, and APJ Abdul

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Kalam. “On behalf of the present generation of Isro leaders, I salute all the previous generation of leaders, the past and present employees, and our family members,” he said.

Why is this significant?

The space agency has its roots in the Indian National Committee for Space Research set up under the Department of Atomic Energy in 1962. The Indian Space Research Organisation that we know today was set up in 1969 — the same year that the United States sent men to the moon. A separate department of space was created only in 1972.

The space agency has since developed several rockets, becoming a reliable launch partner even for satellites from other countries. It has also carried out scientific missions such as the three Chandrayaan missions, which provide useful data not only to researchers from within the country but across the world.

Rockets: Isro has so far developed at least six generations of launch vehicles, of which four remain in operation. The first two generations of launchers are no longer in use. There were three developmental flights and one operational flight of the four-stage, solid fuel vehicle SLV-3 that could carry 40 kg to low earth orbit. And, there were only four development flights of its augmented version that could carry 150 kg to low earth orbit.

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It was the third generation PSLV that continues to be Isro’s workhorse launcher. The four-stage rocket with solid and liquid fuel-based engines is capable of carrying just under 2,000 kg to low earth orbit. There have been 62 flights of PSLV, including three development flights. Only two of the launches using PSLV have been unsuccessful.

Then came the GSLV, whose initial flights used cryogenic engines supplied by Russia. When the technology could not be transferred from Russia because of geopolitical reasons, India developed its own cryogenic engine. GSLV-F15 utilised for the 100th launch is a variation of this vehicle — and the eleventh flight using an indigenously developed cryogenic engine. The GSLV MkIII, now called LVM3, capable of carrying nearly 8,500 kg to low earth orbit, is the heaviest vehicle India has. The vehicle has been used for seven launches so far, none of which have been

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unsuccessful. The vehicle was used for Chandrayaan-2 and 3 missions. And, a modified, human-rated version will be used for the Gaganyaan mission.

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Isro has also developed the Small Satellite Launch Vehicle to transfer to private industry for commercial launch of small satellites. There have been three developmental flights of the launcher.

Launches: In the 100 launches so far, the space agency has placed in orbit 548 satellites weighing 120 tonnes in total. This includes 433 satellites weighing 23 tonnes that came from foreign nations. Isro has launched communication satellites, earth observation satellites, navigation satellites, and experimental satellites.

The space agency has also launched several scientific missions such as space-based observatory AstroSat, Mars Orbiter Mission, Chandrayaan 1, 2 and 3, another space observatory XpoSat, and solar mission Aditya L1.

What are the upcoming developments?

With the space agency targeting big-ticket missions such as the sample return mission from the moon, the mission to Venus, setting up an Indian space station, and sending a man to the moon, Isro is working towards developing a heavier rocket called Next Generation Launch Vehicle.

NGLV will be capable of carrying up to 30,000 kg to low earth orbit. It will be 91 metres tall as compared to the 43 metres of LVM3. It will also have a re-usable first stage, which would be utilised 15 to 20 times, to make the launches more affordable.

The cabinet has also green-lit the setting up of the third launch pad needed for NGLV launches. Built at an estimated cost of R 3984.86 crores over four years, the third launch pad would also be capable of launching human missions along with the modified second launch pad. It will also help in increasing the number of LVM3 launches, thereby increasing the space agency's capability of carrying out heavy commercial missions.

What is NVS-02?

NVS-02 is one of the five replacement satellites for the Indian Regional Navigation Satellite System, also referred to as NavIC (Navigation with Indian Constellation). The new generation satellites are heavier with longer mission life. They carry the indigenously developed atomic clock onboard. And, importantly, they have been enabled with a third frequency L1, which is mostly utilised by the US Global Positioning System (GPS). This will help in the utilisation of the NavIC signals more,

with almost all devices including smaller ones such as personal trackers also carrying receivers for L1 band signals.

What is NavIC?

NavIC is a seven-satellite regional positioning system that can provide location data on the Indian mainland and up to 1,500 kilometres around. The NavIC satellites can provide position accuracy of up to 20 m under standard positioning service that is available to all and a restricted service for better accuracy available to customers.

A fully functional NavIC system with all seven satellites and ground stations outside of India is likely to be more accurate than the GPS in the region currently. The satellites for NavIC are placed directly over India, which ensures better availability of signals even in difficult geographical locations than GPS whose signals are received in India at an angle making it difficult to access in certain areas like valleys and forests.

Are there other countries that have similar systems?

India is the only country with a regional navigation system. Japan's four-satellite Quasi-Zenith Satellite System (QZSS) augments the GPS signals in the region. Other than there are four global navigation systems in the world — the American GPS, the Russian GLONASS (GLObalnaya NAvigatsionnaya Sputnikovaya Sistema), the European Galileo, and the Chinese Beidou. There have been discussions in the past about increasing the coverage area of India's IRNSS as well.

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Anonna Dutt is a Principal Correspondent who writes primarily on health at the Indian Express. She reports on myriad topics ranging from the growing burden of non-cc ***... Read More***