

## **India Poised To Emerge as Space Super-Power**

The Indian Space Research Organisation (ISRO) created history by launching 104 satellites in one go from the Satish Dhawan Space Centre in Sriharikota, Andhra Pradesh, on Wednesday, February 15 morning. The Polar Satellite Launch Vehicle (PSLV) of the ISRO first launched India's 714 kg Cartosat-2 Series satellite, for earth observation, followed by the INS-1A and INS-1B, after it reached the Polar Sun Synchronous Orbit. It then went on to inject 103 co-passenger satellites, together weighing about 664 kg, in pairs. In this historic launch, ISRO scientists used the XL Variant – the most powerful rocket – earlier used in the ambitious Chandrayaan and during the Mars Orbiter Mission (MOM). This flight of C-37 of PSLV was a largely commercial flight as all but three passenger satellites, small nanosats, belonged to six other countries. The 29-minute launch went off precisely as planned; it took just 11 minutes from the release of the primary Cartosat-2 series satellite to the last launch of a client satellite, ISRO said after the mega-payload launch.

The PSLV, in the category of launch vehicles that can lift relatively light loads to space, now marks 38 successful missions in a row, out of a total of 39 flights. It deserves all the praise this time, it took to space a total of 1,378 kg, of which the main satellite was 714 kg. This latest Cartosat is the fifth in the series of six Cartosat-2 spacecraft, starting from Cartosat 2 in 2007 and followed by what were earlier marked A, B, C, D and E. The last one is due to be launched. This feat of Bharat has overhauled Russia's record of 37 launches created in 2014.

This is perhaps the most widely acclaimed world record of Bharat in the field of space technology. The country has reason to be proud for this global achievement. ISRO can take pride in its frugal innovation which is Bharat's most cost-effective demonstration, when it is emerging as a serious player in a crowded satellite launch market. However, for higher payloads of 2 tonne and above, we have to employ the Geo-synchronous Space Launch Vehicle (GSLV). Still, it is a hard-won achievement for Bharat to have achieved after a long history to reach current space technology level with a relatively very small investment. Bharat launched a lunar probe in 2008 and ranked first among Asian countries by having an unmanned rocket orbit Mars in 2013, at an unbelievably petty cost of Rs. 450 crores. Bharat would spend merely a little over \$1 billion a year on its space programme compared with US's budget of about \$19.3 billion for 2017. China had spent \$6.1 billion in 2013. But our achievements are no mean in comparison to the other 5 space-powers.

One of the main beneficiaries of the Indian space agency's launch of a record 104 satellites with a single rocket was a US firm that operates the largest privately owned constellation of Earth-imaging satellites. With such a meager budget, Bharat has proven its proficiency in the kind of rocket that launched a record number of satellites at one go. Now the country has to focus more upon future growth of the indigenous Geosynchronous Satellite Launch Vehicle (GSLV) programme that needs more perfection. The Polar Satellite Launch Vehicle (PSLV), which was used on February 15 to deliver 104 satellites into Earth's orbit has been the most reliable workhorse of Indian space programme, notching up about 40 successful launches since 1994. But, to carry communication satellites weighing above 2,000kg into space, we would need the Geo Synchronous Satellite Launching Vehicle (GSLV). To compete with countries such as France or China for the \$300 billion global space industry too, India needs to further improve upon its GSLV programme, as the country is forced to hire foreign space firms to launch its own heavy satellites.

Now, the country's GSLV programme too has to be activated and be made reliable and vibrant, equally after having successfully launched twice a home-built cryogenic engine, after successfully overcoming more than a decade of setbacks. The GSLV behaving as the 'naughty boy' of ISRO also needs to be worked upon now. It is in offing and our scientists would achieve it soon. The first time we launched a GSLV was in January 2014, and this launch of the GSLV-D5 has put ISRO on the map of a select club of nations that can launch heavy satellites. The agency again successfully launched a GSLV-Mk II rocket in September 2016.

Our aim should now be to become proficient in GSLV launches capable to carry payload category of 4500-5000 kg, The big fortunes of space business lies into that.

So Indian space scientists, are now rightly working upon developing the GSLV-Mk III launch vehicle which is expected to deliver payload weighing 4500 to 5000kg. Since the Russian and French rockets can carry four times more payload and into higher orbits. So, Bharat must also set an ambitious target for it. Now when we are already on the way ahead in targeting GSLV MkIII and then Mk III and a series of launch activities have already been planned to ensure that. ISRO has a very long term ambitious plan to undertake more than 50 missions and deploy 500 satellite communication transponders by 2019.

Bharat is poised to emerge as the most cost effective player in the space launch market of \$ 300 b making us a space super power to be reckoned with.



**(Prof. Bhagwati Prakash Sharma)**

**Editor in chief**