

Topic: A Significant Achievement

Indian Space Research Organisation (ISRO), Indian space agency, **founded in 1969** to develop an independent Indian space program. Its headquarters are in **Bangalore**. Its chief executive is a chairman, who is also chairman of **the Indian government's Space Commission** and the secretary of the Department of Space. The Indian Space Research Organisation (ISRO) operates through a countrywide network of centres.

INSAT 3DR:

With the successful launch of advanced weather satellite - **INSAT 3DR**. ISRO has escalated to new heights. ISRO is determined to adapt the cutting edge technologies in space exploration, navigation and weather forecast. **INSAT 3DR, also called as GSLV-F05** (code name of the flight), was launched from Satish Dhawan Space Centre, Sriharikota on **Sep 8, 2016**.

1. INSAT-3DR was launched from the **second platform at the spaceport of Sriharikota**, around 110 km from Chennai.
2. ISRO's INSAT-3DR is a **climate satellite** that will give an assortment of 'meteorological services to the nation.'
3. GSLV-F05 is significant since it is the first operational flight of GSLV carrying **Cryogenic Upper Stage**.
4. After reaching the Geostationary Transfer Orbit, **the 2,211kg satellite** INSAT-3DR has used its own impetus framework to reach its destination - geosynchronous orbital home, which was positioned at **74 degree east longitude**.
5. ISRO's Master Control Facility at Hassan, Karnataka took control of the satellite and performed the initial orbit and placed it in circular Geostationary Orbit. **The entire process was completed within 17 minutes from the launch**.
6. Multipurpose satellite project - Besides offering a host of services, INSAT-3DR is expected to join the operational Search and Rescue service provided by INSAT-3D to various users, including Coast Guard, Airport Authority of India, Shipping and Defense Services.

SCRAMJET ENGINES:

Adding another feather to its cap, Indian Space Research Organisation (ISRO), on Aug 28, 2016, successfully tested two indigenous **scramjet engines at the Satish Dhawan Space Centre at Sriharikota** in Andhra Pradesh. The on-flight test of the two air-breathing engines was conducted successfully with Isro's Advanced Technology Vehicle (ATV), which is an advanced sounding rocket. The rocket weighed **3,277 kg during lift-off**. According to an Isro official, "The **scramjet engines were ignited 55 seconds** into the rocket's flight. The engines were **tested for six seconds**." **Scientists say that the scramjet technology effectively cuts down the cost of launching rockets by reducing its weight by more than half**. Oxygen is as essential for the process of combustion as it is for sustenance of life. Therefore a rocket, during its launch, needs to combine a **combustion fuel with liquid oxygen** to create the thrust needed for the take-off and flight. However, if the need for liquid oxygen is taken away, the space craft can be much lighter, hence cheaper to launch.

The technology also has the potential to be adapted to commercial planes and it can substantially reduce the travelling time as well. This is what essentially SCRAMJET or Super Sonic combustion Ramjet achieves, by **reducing the amount of oxidiser to be carried along with the fuel**. While conventional rocket engines need to carry both fuel and oxidiser on board for combustion to produce thrust, air-breathing rocket systems on the other hand uses the atmospheric oxygen from their surroundings and burn it with the stored on-board fuel. **Scramjet engines obtain oxygen from the atmosphere by compressing the incoming air before combustion at hypersonic speed**. It uses hydrogen as fuel and the oxygen from the atmospheric air as the oxidiser. When the rocket reaches a height of 11 km, the scramjet engines would start breathing air directly from the atmosphere; therefore the spacecraft can be smaller or **carry more payloads, making it a commercially viable option**. The engine when fully developed will eventually be used in Reusable Launch Vehicles or RLV's.

PSLV C-34:

ISRO has yet again scripted history, this time with the record launch of **20 satellites in one go on June 22, 2016!** Indian Space Research Organisation, or ISRO, has launched 20 satellites from Sriharikota relying on its workhorse PSLV C-34. ISRO had also created a **record in 2008 for placing 10 satellites into various low earth orbits in a single launch**.

1. Besides India's **Cartosat-2 Series satellite**, ISRO has placed **19 other satellites in orbit**. The total weight of all the 20 satellites is about **1,288 kg**.

2. The imagery sent by the Cartosat-2 satellite will be useful cartographic applications, urban and rural applications, coastal land use and regulation, utility management like road network monitoring, water distribution, creation of land use maps, precision study, change detection to bring out geographical and man made features and various other **Land Information System (LIS) and Geographical Information System (GIS) applications**.

3. One satellite that stands out from the lot of 20 is that of Terra Bella, a Google company. In a first, ISRO has launched a **Google-made satellite!** SkySat Gen2-1, or SkySat3, is a small Earth imaging satellite designed and built by Terra Bella, a Google company based in Mountain View, California, US. The satellite will be capable of capturing sub-meter resolution imagery and HD video. It has a mass of 110 kg.

4. The co-passengers included satellites from the **US, Canada, Germany and Indonesia as well as two satellites from Indian Universities**.

5. The mission carried **LAPAN A3 of Indonesia, BIROS of Germany, SKYSAT GEN 2-1 of US, MVV of Germany among the micro satellites**.

RLV:

ISRO's RLV-TD: India's first indigenous reusable space shuttle **RLV-TD** was successfully launched from Sriharikota in Andhra Pradesh on **May 23, 2016**. The purpose of the experiment is not to see it float but to **glide and navigate from a velocity five times higher than the speed of sound onto a designated virtual runway in the Bay of Bengal some 500 km from the coast**.

1. RLV-TD is a scale model almost **six times smaller than the final version**. The **6.5-m-long 'airplane'-like structure weighs 1.75 tonnes** and will be hoisted into the atmosphere on a special rocket booster.

2. RLV-TD is described as “**a very preliminary step**” in the development of a reusable rocket.

3. RLV-TD is a series of technology demonstration missions that have been considered as a first step towards realising a ‘**Two Stage To Orbit**’ (TSTO) **fully reusable vehicle**.

4. RLV-TD has a **flush air-data system**, slow burning propellant and composite movable fin. The RLV-TD is a scaled-down model of the reusable launch vehicle.

5. RLV-TD has been configured to act as a flying test-bed to evaluate various technologies, including hypersonic flight, autonomous landing, powered cruise flight and hypersonic flight using air-breathing propulsion.

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<http://www.isro.gov.in/about-isro/isros-timeline-1960s-to-today>

<http://indianexpress.com/article/technology/science/live-track-isros-20-satellite-launch-from-satish-dhawan-space-centre-in-sriharikota-2868290/>

http://zeenews.india.com/news/space/list-of-isros-achievements-over-the-last-two-years_1898515.html