

# PSLV-C31 / IRNSS-1E Mission

20 January , 2016

## THE MISSION

PSLV-C31 carrying on-board the IRNSS-1E Satellite lifted-off from the Satish Dhawan Space Centre (SDSC) SHAR, Sriharikota at 09:31 AM (IST) on January 20, 2016. About 18 minutes and 43 seconds after lift-off, PSLV-C31 placed IRNSS-1E into an elliptical orbit of 282.4 km X 20,655.3 km inclined at an angle of 19.21° to the Equator. The satellite was inserted into a sub Geosynchronous Transfer Orbit (sub GTO).

IRNSS-1E is the fifth satellite of the seven satellites constituting the Indian Regional Navigation Satellite System (IRNSS) space segment. IRNSS -1E carries two types of payloads – navigation payload and ranging payload.

## PSLV - C 3 1

### THE LAUNCH VEHICLE

PSLV-C31 in its 33<sup>rd</sup> flight used the 'XL' variant of PSLV, equipped with six strap-ons. It is the 11<sup>th</sup> time the 'XL' configuration has been flown.

### SPECIFICATIONS

<b>Height</b>	44.4 m
<b>Lift-Off Mass</b>	320 t
<b>No of Stages</b>	4
<b>Payloads</b>	IRNSS-1E
<b>Inclination (deg)</b>	19.21°
<b>Apogee</b>	20,655.3 km
<b>Perigee</b>	282.4 km
<b>Launch Pad</b>	Second Launch Pad (SDSC, SHAR)



### STAGE CHARACTERISTICS

	Stage-1	Stage-2	Stage-3	Stage-4
<b>Nomenclature</b>	Core Stage PS1 + 6 Strap-on Motors	PS2	PS3	PS4
<b>Propellant</b>	Solid (HTPB based)	Liquid (UH25 + N <sub>2</sub> O <sub>4</sub> )	Solid (HTPB based)	Liquid (MMH + MON-3)
<b>Propellant Mass (T)</b>	138.2 (Core), 6 x 12.2 (Strap-on)	42.0	7.6	2.5
<b>Stage Dia (m)</b>	2.8 (Core), 1 (Strap-on)	2.8	2.0	1.3
<b>Stage Length (m)</b>	20 (Core), 12 (Strap-on)	12.8	3.6	3.0

# IRNSS-1E

## THE SATELLITE

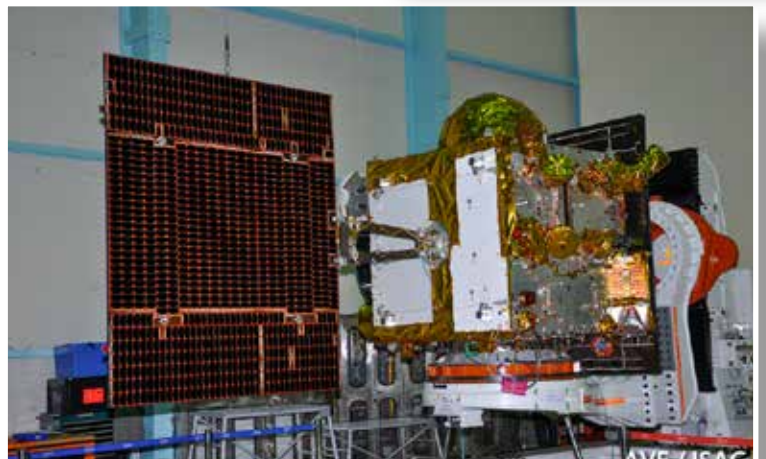
IRNSS is an Independent Regional Navigation Satellite System designed to provide position information in the Indian region. The configuration of IRNSS-1E is similar to that of IRNSS-1A, 1B, 1C and 1D. The two solar arrays of IRNSS-1E consisting of Ultra Triple Junction Solar Cells generate about 1660 W of electrical power. Sun and Star sensors as well as gyroscopes provide orientation reference for the satellite. Special thermal control schemes have been designed and implemented for some of the critical elements such as atomic clocks. The Attitude and Orbit Control System (AOCS) of IRNSS-1E maintains the satellite's orientation with the help of reaction wheels, magnetic torques and thrusters. Its propulsion system consists of a Liquid Apogee Motor (LAM) and thrusters.

IRNSS -1E carries two types of payloads – navigation payload and ranging payload. The navigation payload of IRNSS-1E transmits navigation service signals to the users. This payload is operating in L5-band and S-band. A highly accurate Rubidium Atomic Clock is part of the navigation payload of the satellite. The ranging payload of IRNSS-1E consists of a C-band transponder which facilitates accurate determination of the range of the satellite. IRNSS-1E also carries Corner Cube Retro Reflectors for LASER ranging.



### Applications of IRNSS

- Terrestrial, Ariel and Marine Navigation
- Vehicle tracking and fleet management
- Terrestrial navigation aid for hikers and travellers
- Disaster Management
- Integration with mobile phones
- Mapping and Geodetic data capture
- Visual and voice navigation for drivers
- Precise Timing



### SPECIFICATIONS

<b>Weight</b>	1425 kg
<b>Power</b>	1660 W, one Li-Ion battery of 90 Ampere-hour capacity
<b>Stabilisation</b>	Zero momentum system, orientation input from Sun and Star Sensors and Gyroscopes; Reaction Wheels, Magnetic Torquers and 22 Newton thrusters as actuators
<b>Propulsion</b>	440 Newton Liquid Apogee Motor, twelve 22 Newton Thrusters
<b>Type of Satellite</b>	Navigation
<b>Payloads</b>	<ul style="list-style-type: none"><li>• L5 and S-band Navigation with Rubidium Atomic Clocks</li><li>• C-band Ranging Payload</li><li>• Corner Cube Retro Reflectors for LASER Ranging</li></ul>
<b>Mission Life</b>	12 Years

