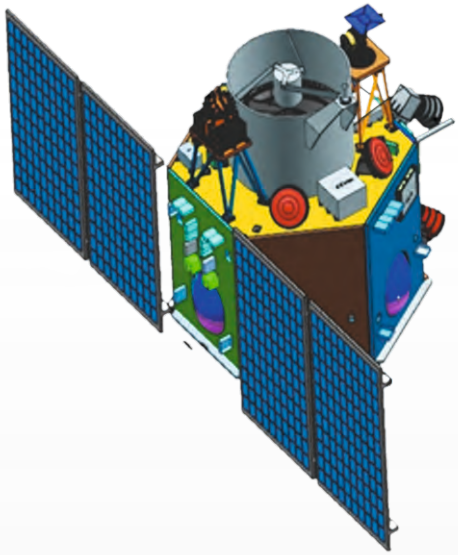


PSLV-C38

CARTOSAT-2 Series Satellite

PSLV-C38/CARTOSAT-2 SERIES SATELLITE

PSLV-C38 at the First Launch Pad

The Mission

India's Polar Satellite Launch Vehicle, in its fortieth flight (PSLV-C38), will launch the 712 kg Cartosat-2 Series Satellite for earth observation and 30 co-passenger satellites together weighing about 243 kg at lift-off into a 505 km polar Sun Synchronous Orbit (SSO). PSLV-C38 will be launched from the First Launch Pad (FLP) of Satish Dhawan Space Centre (SDSC) SHAR, Sriharikota. It will be the seventeenth flight of PSLV in 'XL' configuration (with the use of solid strap-on motors).

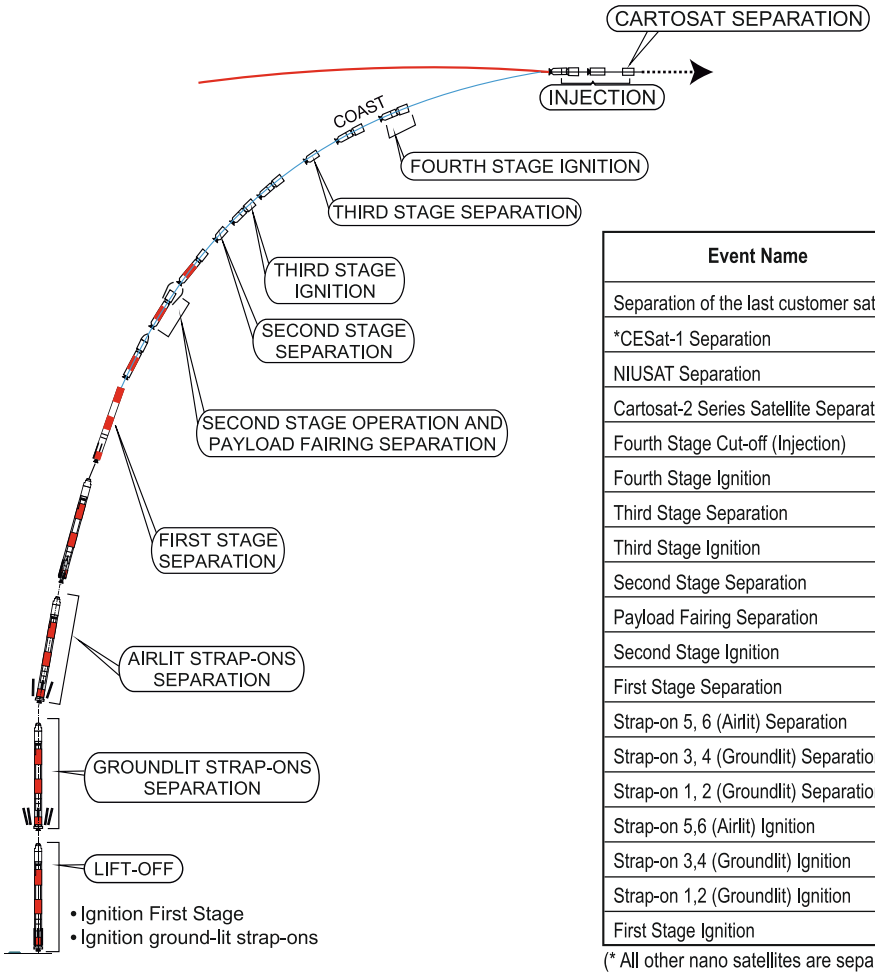
The co-passenger satellites comprise 29 Nano satellites from 14 countries, viz., Austria, Belgium, Chile, Czech Republic, Finland, France, Germany, Italy, Japan, Latvia, Lithuania, Slovakia, United Kingdom and The United States of America as well as one Nano satellite from India. The total weight of all the 31 satellites carried onboard PSLV-C38 is about 955 kg.

The 29 International customer Nano satellites are being launched as part of the commercial arrangements between Antrix Corporation Limited (Antrix), a Government of India company under Department of Space (DOS) and the commercial arm of ISRO and the International customers.

PSLV-C38 at a glance (lift-off Mass: 320 tonne Height: 44.4 m)

	Stage-1	Stage-2	Stage-3	Stage-4
Nomenclature	Core Stage PS1 + 6 Strap-on Motors	PS2	PS3	PS4
Propellant	Composite solid	Earth Storable Liquid	Composite solid	Earth Storable Liquid
Propellant Mass(T)	138.2 (Core), 6 x 12.2 (Strap-on)	42.0	7.6	2.5
Stage Dia (m)	2.8 (Core), 1 (Strap-on)	2.8	2.0	1.3
Stage Length (m)	20 (Core), 12 (Strap-on)	12.8	3.6	3.0

PSLV-C38/CARTOSAT-2 SERIES SATELLITE



Height: 505 km
Inclination: 97.44 deg

Event Name	Time after lift-off	Altitude (kilometre)	Velocity (metre per second)
Separation of the last customer satellite	23 min 18.94 sec	519.266	7604.85
*CESat-1 Separation	17 min 0.94 sec	511.052	7608.71
NIUSAT Separation	16 min 50.94 sec	510.853	7608.81
Cartosat-2 Series Satellite Separation	16 min 40.94 sec	510.656	7608.90
Fourth Stage Cut-off (Injection)	15 min 58.94 sec	509.854	7604.83
Fourth Stage Ignition	8 min 21.12 sec	430.405	5914.09
Third Stage Separation	8 min 11.22 sec	424.251	5923.04
Third Stage Ignition	4 min 22.92 sec	226.596	4040.56
Second Stage Separation	4 min 21.72 sec	225.378	4043.33
Payload Fairing Separation	2 min 38.96 sec	121.683	2456.24
Second Stage Ignition	1 min 50.46 sec	68.470	2157.42
First Stage Separation	1 min 50.26 sec	68.241	2158.26
Strap-on 5, 6 (Airlit) Separation	1 min 32.0 sec	47.254	1863.21
Strap-on 3, 4 (Groundlit) Separation	1 min 10.1 sec	26.973	1315.18
Strap-on 1, 2 (Groundlit) Separation	1 min 9.9 sec	26.816	1310.61
Strap-on 5,6 (Airlit) Ignition	25.0 sec	2.767	574.99
Strap-on 3,4 (Groundlit) Ignition	0.62 sec	0.0238	451.89
Strap-on 1,2 (Groundlit) Ignition	0.42 sec	0.0238	451.89
First Stage Ignition	0	0.0238	451.89

(* All other nano satellites are separating between 17 min 0.94 sec and 23 min 18.94 sec)

PSLV-C38 Typical Flight Profile

Placement of Base Shroud and Nozzle End Segment Module of PSLV-C38 core stage on the launch pedestal

Assembly of third and fourth stages of PSLV-C38 at Stage Preparation Facility

Primary Satellite

The Cartosat-2 Series Satellite is the primary satellite being carried by PSLV-C38. This remote sensing satellite is similar to the earlier five satellites of the Cartosat-2 series. After its injection into a 505 km polar Sun Synchronous Orbit by PSLV-C38, the satellite will be brought to operational configuration, following which it will begin providing regular remote sensing services using its Panchromatic and Multispectral cameras.

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

Cartosat-2 Series Satellite undergoing solar panel deployment test

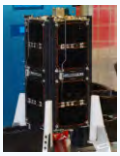
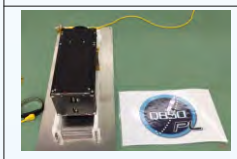
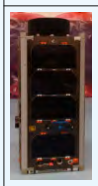
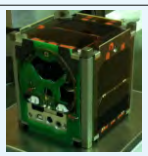
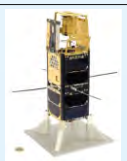
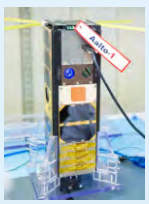
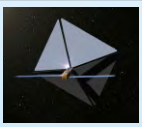
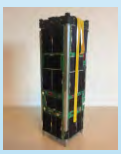
Salient features

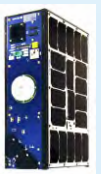
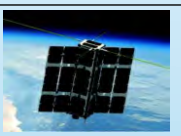
Satellite mass	712 Kg
Orbit type	Circular polar Sun Synchronous
Orbit height	505 km
Orbit inclination	97.44 degree
Orbit period	94.72 min
Local time of Equator crossing	9:30 am
Power	Solar arrays generating 986 Watts; Two Li-Ion batteries
Attitude control	Reaction wheels, Magnetic torquers and Hydrazine thrusters
Design life	5 years

PSLV-C38/CARTOSAT-2 SERIES SATELLITE

Co-passenger Satellites

International Customer Satellites (29 Nos.)

Nano Satellite	Country	Objective
 PEGASUS/AT03	Austria	Measuring the plasma temperature and density in the thermosphere
 QB50-BE06	Belgium	Atmospheric Ion/Neutral Particle Detection and Space Imaging
 InflateSail	Belgium	Demonstration of the effectiveness of drag deorbiting from LEO using inflatable boom and motor driven sail combination
 UCLSat	Belgium	To measure ions and neutrals in the thermosphere
 SUCHAI-1	Chile	To study the physics of LEO environment and its effects on electronic and systems
 VZLUSAT-1	Czech Republic	Atmospheric research
 Aalto-1	Finland	Technology demonstration of miniature Fabry-Perot spectral imager, small radiation monitor and satellite deorbiting with Plasma Brake
 ROBUSTA-1B	France	Scientific and educative
 QB50-DE04	Germany	DragSail deployment and fast de-orbiting for space debris removal demonstration
 URSAMAIOR	Italy	In-Orbit demonstration of reliable fail-safe computing architectures and a drag sail for deorbiting

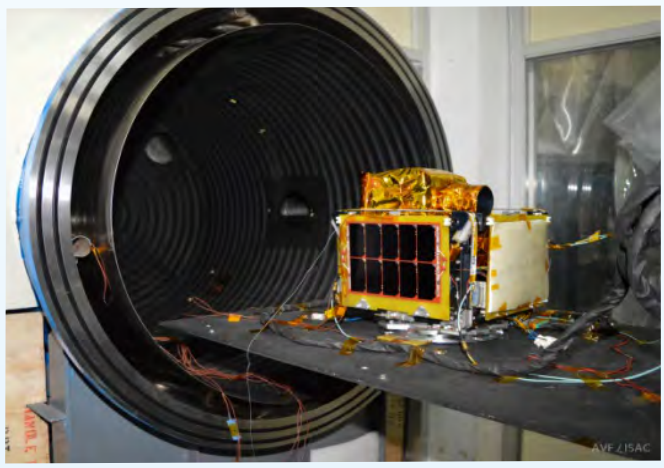
Nano Satellite	Country	Objective
 D-SAT	Italy	To demonstrate D-Orbit's decommissioning technology on-orbit
 Max Valier	Italy	Educational satellite with X-Ray telescope for universe mapping and maritime Automatic Identification System (AIS)
 CE-SAT1	Japan	Demonstration of remote sensing based on Canon group technology
 Venta-1	Latvia	Educational satellite for maritime Automatic Identification System (AIS), spherical 360° imaging system for vision based attitude determination and navigation experiments
 LituanicaSAT-2	Lithuania	Oxygen measurements Flux-Φ-Probe Experiment (FIPEX) and Ecologic chemical propulsion (EPSS) orbital demonstration
 skCUBE	Slovakia	Popularisation of science and technology, Technology verification
 3 Diamonds (3 Nos.)	United Kingdom	To provide voice, instant messaging, M2M and IoT services as a commercial demonstration for a full equatorial constellation
 CICERO-6	USA	Demonstration of GPS radio occultation sensor that allows the measurement of global weather patterns with high accuracy
 Tyvak-53b	USA	Technology demonstration for deorbiting the nano satellites
 LEMUR-2 (8 Nos.)	USA	Vessel tracking using Automatic Identification System (AIS) and weather measurement using GPS Radio Occultation

Indian University Satellite - NIUSAT

NIUSAT is an Indian University/Academic Institute satellite from Noorul Islam University in Tamil Nadu State. This 15 kg three axis stabilised satellite is built to provide multispectral imagery for agricultural crop monitoring and disaster management support applications.

A dedicated Mission Control Center with UHF/VHF antenna for Telemetry/Tele-command operations and S-Band antenna for Payload data reception has been established at the University.

NIUSAT in Clean Room



NIUSAT being Prepared for Thermal Vacuum Test

Salient features

Satellite mass	15 Kg
Overall Size	348 x 348 x 370 mm^3
Power	40 Watts
Battery	10 Ah, Li-Ion
Payload	RGB Camera
Resolution	25 Meters (from 500 Km altitude)
Image Size	50 Km x 50 Km

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