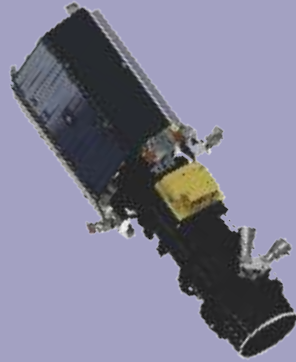
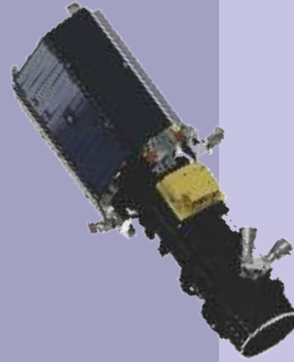




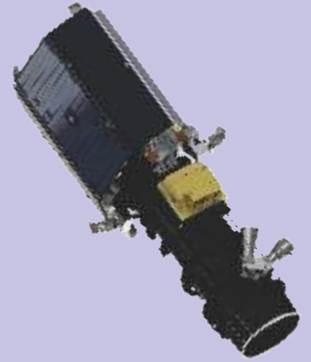
DMC3-1



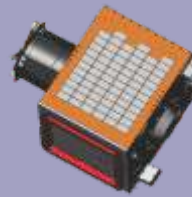
DMC3-2



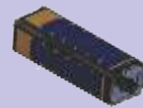
DMC3-3



CBNT-1



De-OrbitSail



PSLV-C28 DMC3

PSLV-C28/DMC3 MISSION



PSLV-C28 at First Launch Pad

The Polar Satellite Launch Vehicle (PSLV), in its thirtieth flight (PSLV-C28), will launch three identical DMC3 optical earth observation satellites built by Surrey Satellite Technology Limited (SSTL), United Kingdom (UK). The three DMC3 satellites, each weighing 447 kg, will be launched into a 647 km Sun-Synchronous Orbit (SSO) using the high-end version of PSLV (PSLV-XL) from Satish Dhawan Space Centre, Sriharikota (SDSC-SHAR), the spaceport of India. PSLV-C28 will be the ninth flight of PSLV in 'XL' configuration.

The PSLV-C28, in addition to the three DMC3 satellites, will also carry two auxiliary satellites from UK, viz., CBNT-1, a technology demonstrator earth observation micro satellite built by SSTL, and De-OrbitSail, a technology demonstrator nano satellite built by Surrey Space Centre.

With the overall lift-off mass of the five satellites amounting to about 1440 kg, this mission becomes the heaviest commercial mission ever undertaken by Antrix/ISRO.

Accommodating the three DMC3 satellites each with a height of about 3 metre within the existing payload fairing of PSLV, was a challenge. To mount these satellites onto the launcher, a circular Launcher adaptor called as L-adaptor and a triangular deck called Multiple Satellite Adapter-Version 2 (MSA-V2), were newly designed and realised by ISRO for this specific purpose.

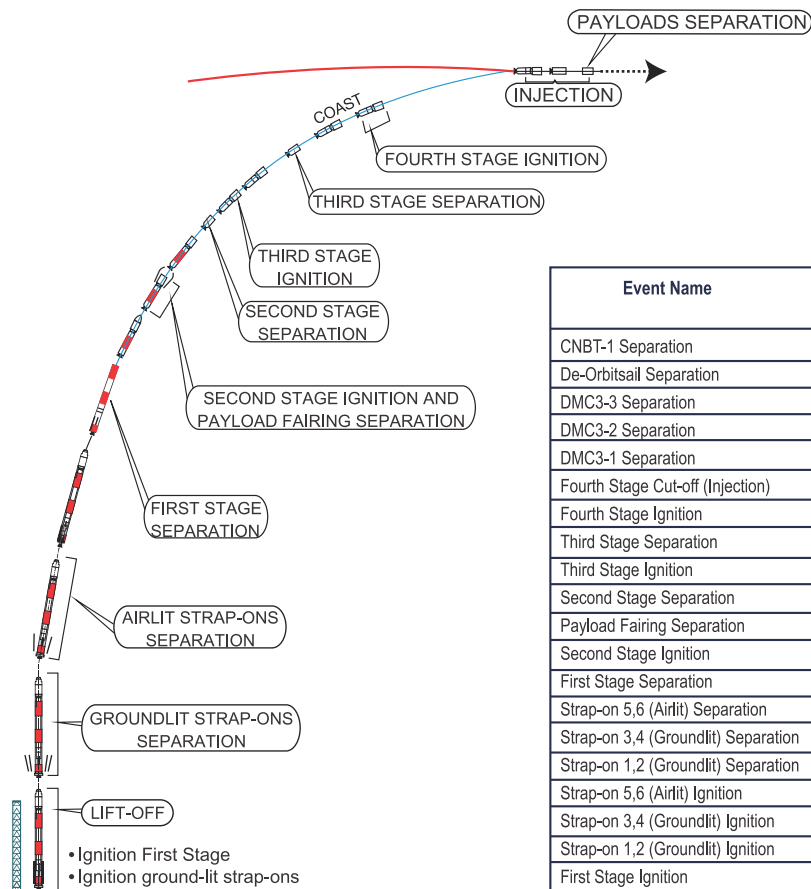
These international customer satellites are being launched as part of the agreement entered into between DMC International Imaging (DMCii), a wholly owned subsidiary of SSTL, UK and Antrix Corporation Limited (Antrix), the commercial arm of Indian Space Research Organisation (ISRO), a Government of India Company under Department of Space.

PSLV-C28 at a glance (Vehicle 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	Solid (HTPB based)	Liquid (UH25 + N ₂ O ₄)	Solid (HTPB based)	Liquid (MMH + MON-3)
Propellant Mass (T)	138.2 (Core), 6 x 12.2 (Strap-on)	42.0	7.6	2.5
Max Thrust (kN)	4819 (Core), 6 x 716 (Strap-on)	804	240	7.3 x 2
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

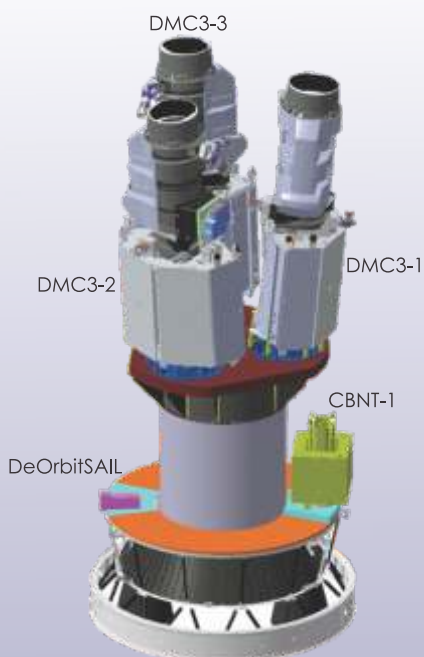
HTPB : Hydroxyl Terminated Poly Butadiene, UH25 : Unsymmetrical Dimethyl Hydrazine + 25% Hydrazine Hydrate
 N₂O₄: Nitrogen Tetroxide, MMH : Mono Methyl Hydrazine, MON-3: Mixed Oxides of Nitrogen

PSLV-C28/DMC3 MISSION

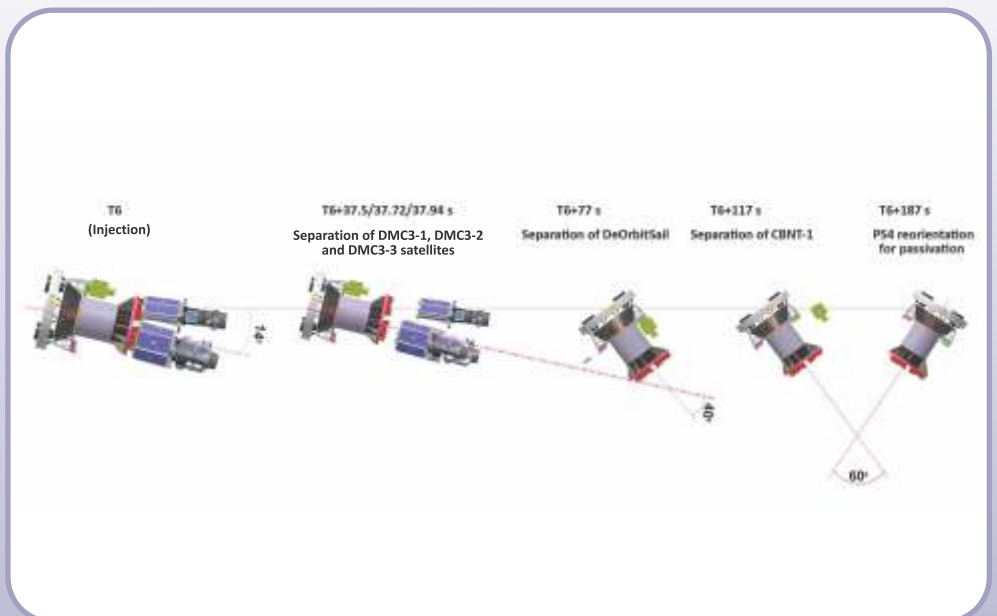


Event Name	Time after lift-off	Altitude (kilometre)	Velocity (metre per second)
CNBT-1 Separation	19 min 16.08 sec	654.75	7531.42
De-Orbitsail Separation	18 min 36.08 sec	653.09	7531.81
DMC3-3 Separation	17 min 57.02 sec	653.09	7532.16
DMC3-2 Separation	17 min 56.80 sec	653.09	7532.16
DMC3-1 Separation	17 min 56.58 sec	653.08	7532.16
Fourth Stage Cut-off (Injection)	17 min 19.08 sec	652.34	7527.46
Fourth Stage Ignition	8 min 47.20 sec	514.29	5948.51
Third Stage Separation	8 min 37.20 sec	506.29	5959.77
Third Stage Ignition	4 min 23.32 sec	233.25	4187.50
Second Stage Separation	4 min 22.12 sec	231.85	4190.50
Payload Fairing Separation	2 min 34.68 sec	118.51	2428.63
Second Stage Ignition	1 min 50.38 sec	69.06	2146.66
First Stage Separation	1 min 50.18 sec	68.82	2147.52
Strap-on 5,6 (Airlit) Separation	1 min 32.0 sec	47.47	1868.57
Strap-on 3,4 (Groundlit) Separation	1 min 10.1 sec	26.85	1308.81
Strap-on 1,2 (Groundlit) Separation	1 min 9.90 sec	26.69	1304.21
Strap-on 5,6 (Airlit) Ignition	25.0 sec	2.68	570.51
Strap-on 3,4 (Groundlit) Ignition	0.62 sec	0.024	451.89
Strap-on 1,2 (Groundlit) Ignition	0.42 sec	0.024	451.89
First Stage Ignition	0 sec	0.024	451.89

PSLV-C28 Typical Flight Profile



Location of payloads on the mounting adopters of PSLV-C28



Separation details of PSLV-C28 payloads

PSLV-C28/DMC3 MISSION

DMC3

The DMC3 constellation, comprising of three advanced mini-satellites DMC3-1, DMC3-2 and DMC3-3, is designed to address the need for simultaneous high spatial resolution and high temporal resolution optical Earth Observation. Launched into a single Low-Earth Orbit plane and phased with a separation of 120° between them, these satellites can image any target on the Earth's surface every day. Major application areas include surveying the resources on earth and its environment, managing urban infrastructure and monitoring of disasters.



CBNT-1 (left) and three DMC3 satellites (right) in clean room

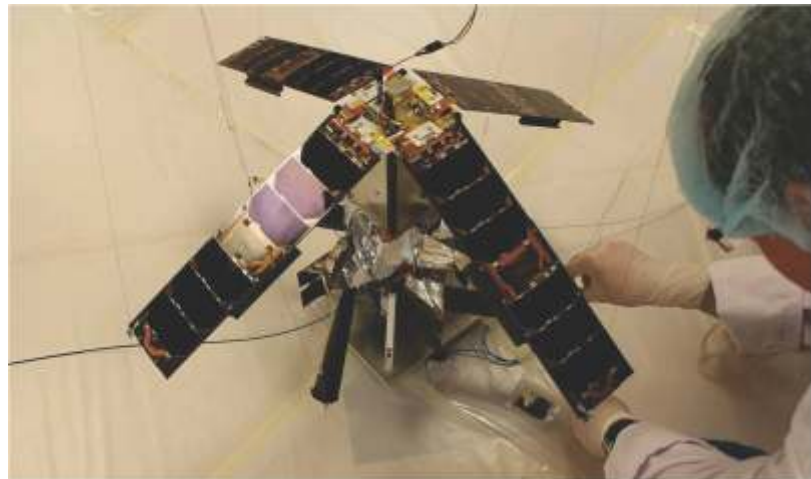
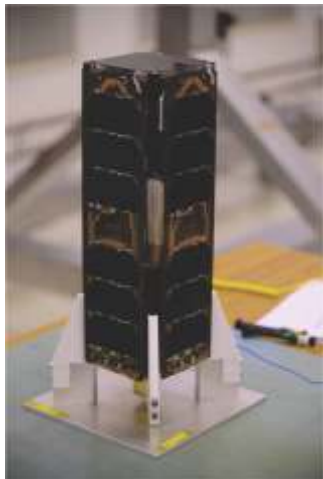
Salient features of DMC3

Satellite mass	447 Kg
Orbit (Sun Synchronous Orbit)	647 km (Nominal)
Inclination	98.06 degree
Payload	High resolution Imager
Imaging Resolution	1m Panchromatic, 4m Multi-Spectral (Blue, Green, Red, NIR)
Swath width	23.35 km
Power	Lithium Ion 480 Whr, Solar panel – 230 W Peak BOL
Propulsion System	Xenon
Attitude control	3 axis stabilised, Wheels, Star Trackers, Magnetometers, Sun Sensors, Torque Rods
RF system	S- Band TTC, X- Band Payload Data
Mission life	7 years

PSLV-C28/DMC3 MISSION



CBNT-1 undergoing pre-launch tests



De-OrbitSail undergoing pre-launch tests

CBNT-1, weighing 91 kg, is an optical Earth Observation technology demonstration micro satellite built by SSTL. The 7 kg De-OrbitSail from Surrey Space Centre, is an experimental nano satellite for demonstration of large thin membrane sail and drag deorbiting using this sail.

Antrix Corporation Limited

Antrix Corporation Limited (Antrix), incorporated in 1992, is a wholly owned Government of India Company under the administrative control of Department of Space (DOS) and the commercial arm of Indian Space Research Organisation (ISRO). Antrix promotes and commercially exploits the products and services emanating from the Indian Space Programme. Antrix was awarded the 'MINIRATNA' status in the year 2008.

So far, Antrix has provided launch services on-board PSLV for 40 customer satellites from 19 countries. In addition to providing launch services for international customer satellites, Antrix provisions communication satellite transponders for broadcasting and telecommunication services, markets data from Indian Remote Sensing (IRS) satellites, builds and markets satellites and satellite subsystems and extends mission support services for satellite launches.

Satellites of other countries launched by PSLV

SL. NO.	NAME	COUNTRY	DATE OF LAUNCH	MASS (kg)	LAUNCH VEHICLE
1	DLR-TUBSAT	GERMANY	26-05-1999	45	PSLV-C2
2	KITSAT-3	REPUBLIC OF KOREA	26-05-1999	110	PSLV-C2
3	BIRD	GERMANY	22-10-2001	92	PSLV-C3
4	PROBA	BELGIUM	22-10-2001	94	PSLV-C3
5	LAPAN-TUBSAT	INDONESIA	10-01-2007	56	PSLV-C7
6	PEHUENSAT-1	ARGENTINA	10-01-2007	6	PSLV-C7
7	AGILE	ITALY	23-04-2007	350	PSLV-C8
8	TECSAR	ISRAEL	21-01-2008	300	PSLV-C10
9	CAN-X2	CANADA	28-04-2008	7	PSLV-C9
10	CUTE-1.7	JAPAN	28-04-2008	5	PSLV-C9
11	DELFI-C3	THE NETHERLANDS	28-04-2008	6.5	PSLV-C9
12	AAUSAT-II	DENMARK	28-04-2008	3	PSLV-C9
13	COMPASS-I	GERMANY	28-04-2008	3	PSLV-C9
14	SEEDS	JAPAN	28-04-2008	3	PSLV-C9
15	NLS5	CANADA	28-04-2008	16	PSLV-C9
16	RUBIN-8	GERMANY	28-04-2008	8	PSLV-C9
17	CUBESAT-1	GERMANY	23-09-2009	1	PSLV-C14
18	CUBESAT-2	GERMANY	23-09-2009	1	PSLV-C14
19	CUBESAT-3	TURKEY	23-09-2009	1	PSLV-C14
20	CUBESAT-4	SWITZERLAND	23-09-2009	1	PSLV-C14
21	RUBIN-9.1	GERMANY	23-09-2009	1	PSLV-C14
22	RUBIN-9.2	GERMANY	23-09-2009	1	PSLV-C14
23	ALSAT-2A	ALGERIA	12-07-2010	116	PSLV-C15
24	NLS6.1 AISSAT-1	CANADA	12-07-2010	6.5	PSLV-C15
25	NLS6.2 TISAT-1	SWITZERLAND	12-07-2010	1	PSLV-C15
26	X-SAT	SINGAPORE	20-04-2011	106	PSLV-C16
27	VesselSat-1	LUXEMBOURG	12-10-2011	28.7	PSLV-C18
28	SPOT-6	FRANCE	09-09-2012	712	PSLV-C21
29	PROITERES	JAPAN	09-09-2012	15	PSLV-C21
30	SAPPHIRE	CANADA	25-02-2013	148	PSLV-C20
31	NEOSSAT	CANADA	25-02-2013	74	PSLV-C20
32	NLS8.1	AUSTRIA	25-02-2013	14	PSLV-C20
33	NLS8.2	AUSTRIA	25-02-2013	14	PSLV-C20
34	NLS8.3	DENMARK	25-02-2013	3	PSLV-C20
35	STRAND-1	UK	25-02-2013	6.5	PSLV-C20
36	SPOT-7	FRANCE	30-06-2014	714	PSLV-C23
37	AISAT	GERMANY	30-06-2014	14	PSLV-C23
38	NLS7.1(CAN-X4)	CANADA	30-06-2014	15	PSLV-C23
39	NLS7.2(CAN-X5)	CANADA	30-06-2014	15	PSLV-C23
40	VELOX-1	SINGAPORE	30-06-2014	7	PSLV-C23