Capabilities of Small Satellites of ISRO

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Project Director
Small Satellite Projects

Points covered …

- Advantages of Small satellites
- Small satellite busses of ISRO
- Missions with IMS-1
- Missions with IMS-2
- Possible missions with ISRO’s small satellites

Advantages of small satellites

- LOW MASS, LOW POWER AND LOW VOLUME
- LESS COMPONENTS – MORE RELIABILITY
- LOWER COST PER SATELLITE
- QUICK REALISATION
- MORE NO. OF SATELLITES PER LAUNCH
- MISSIONS WITH CONSTELLATION OF SATELLITES AND FORMATION FLYING -- FEASIBLE
- PERFORMANCE ON PAR WITH EARLIER OPERATIONAL SATELLITES

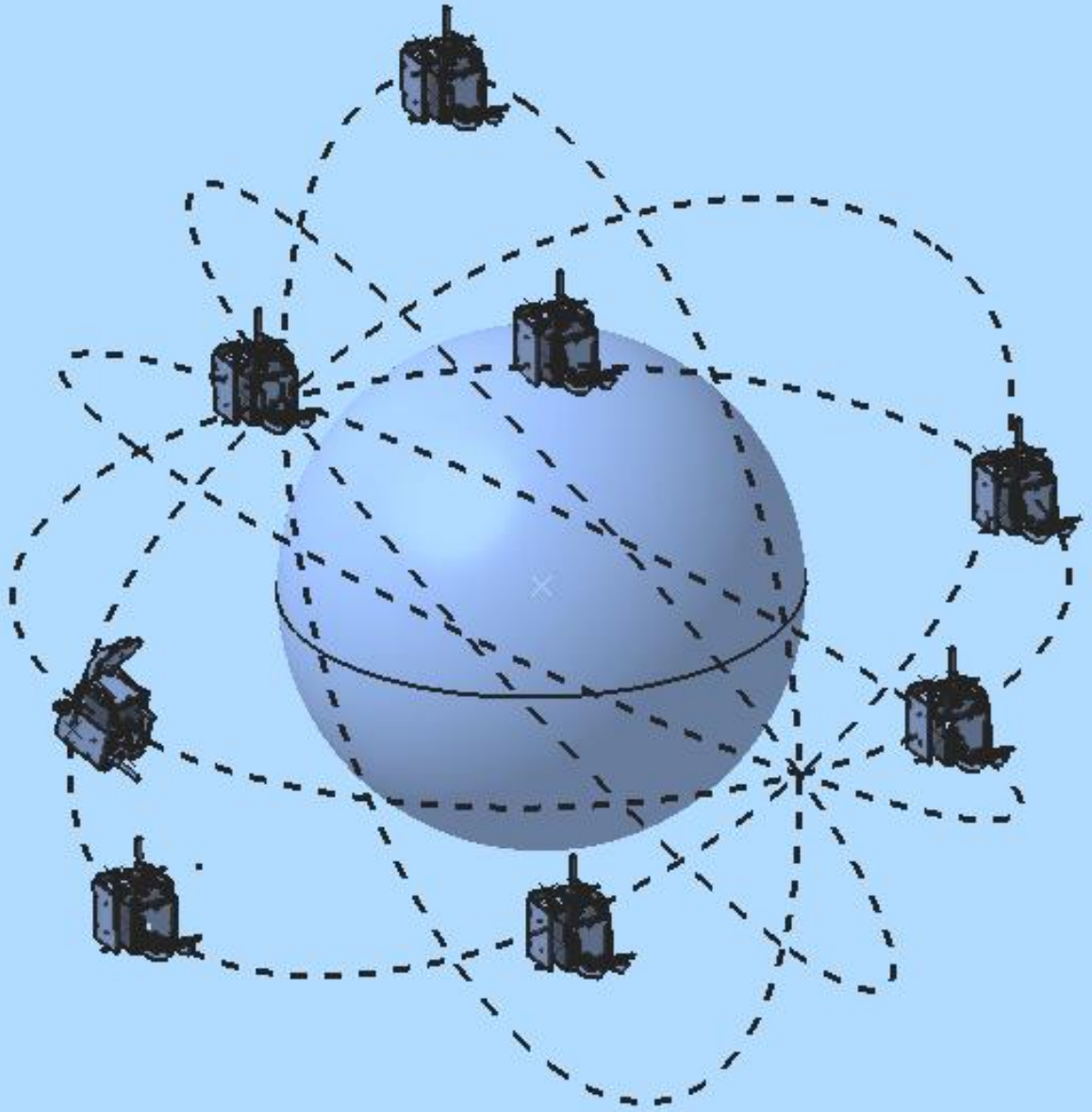
Constellation of Satellites

Constellation for

- Disaster management
  - forest fire detection
  - flood monitoring

  ……
- Frequent revisit (hourly)
  - security applications
- Weather monitoring
  - GPS occultation
- LEO communications
- Ship tracking

etc.



INDIAN SMALL SATELLITE BUS CLASSIFICATION

Micro Satellites : IMS-1

Satellite mass < 100 kg
Payload mass < 30 kg

Mini Satellites: IMS-2

Satellite mass < 450 kg
Payload mass < 200 kg

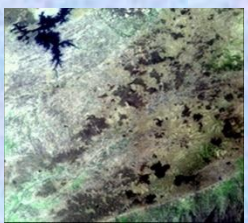
IMS-1

Miniaturization Achievements

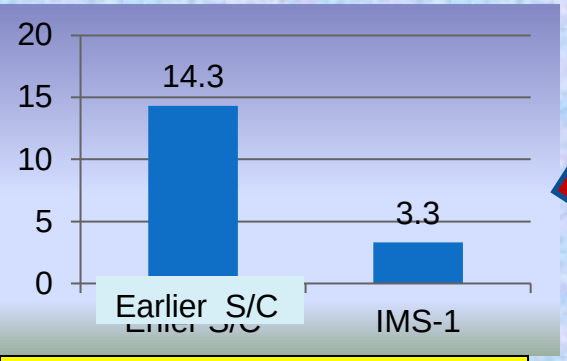
IRS 1A/1B Mass – 1000 Kg
Power generated – 800W
LISS-2 - mass :160 kg -
four Bands
Resolution 36m
swath 148 km

IMS total Mass – 85 Kg
Power – 250W
Payloads – Multi Spectral Camera
Mass – 5.4 kg ; four bands
Resolution 37m ; swath 151km
+ 64 band Hyper Spectral Camera

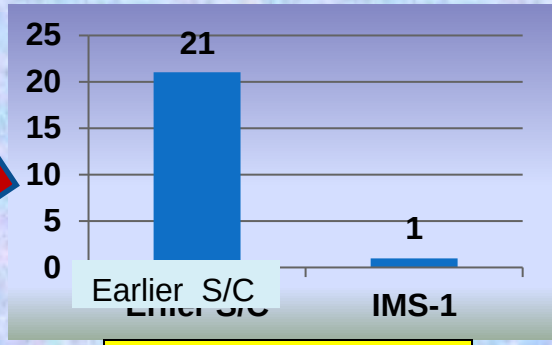
IMS-1



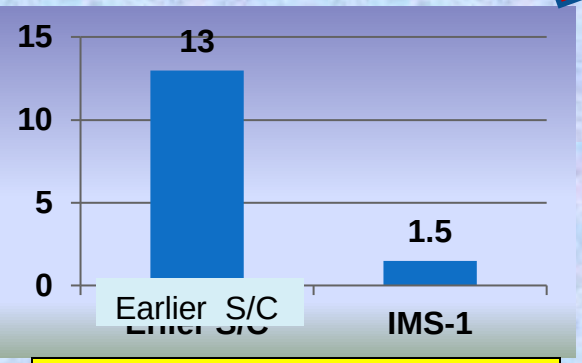
MINIATURISATION OF SOME OF THE SUB-SYSTEMS In IMS



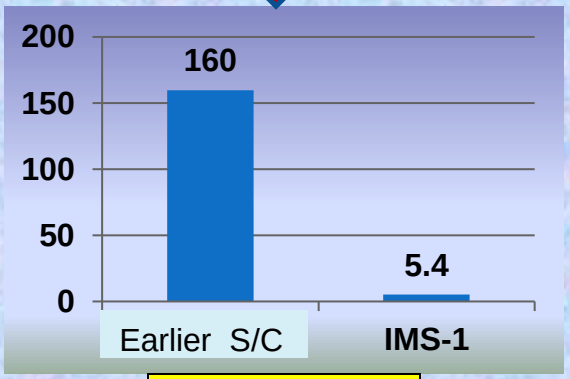
Inertial Reference Unit



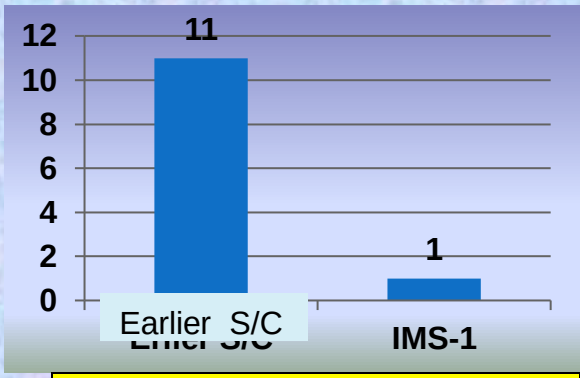
Data Handling



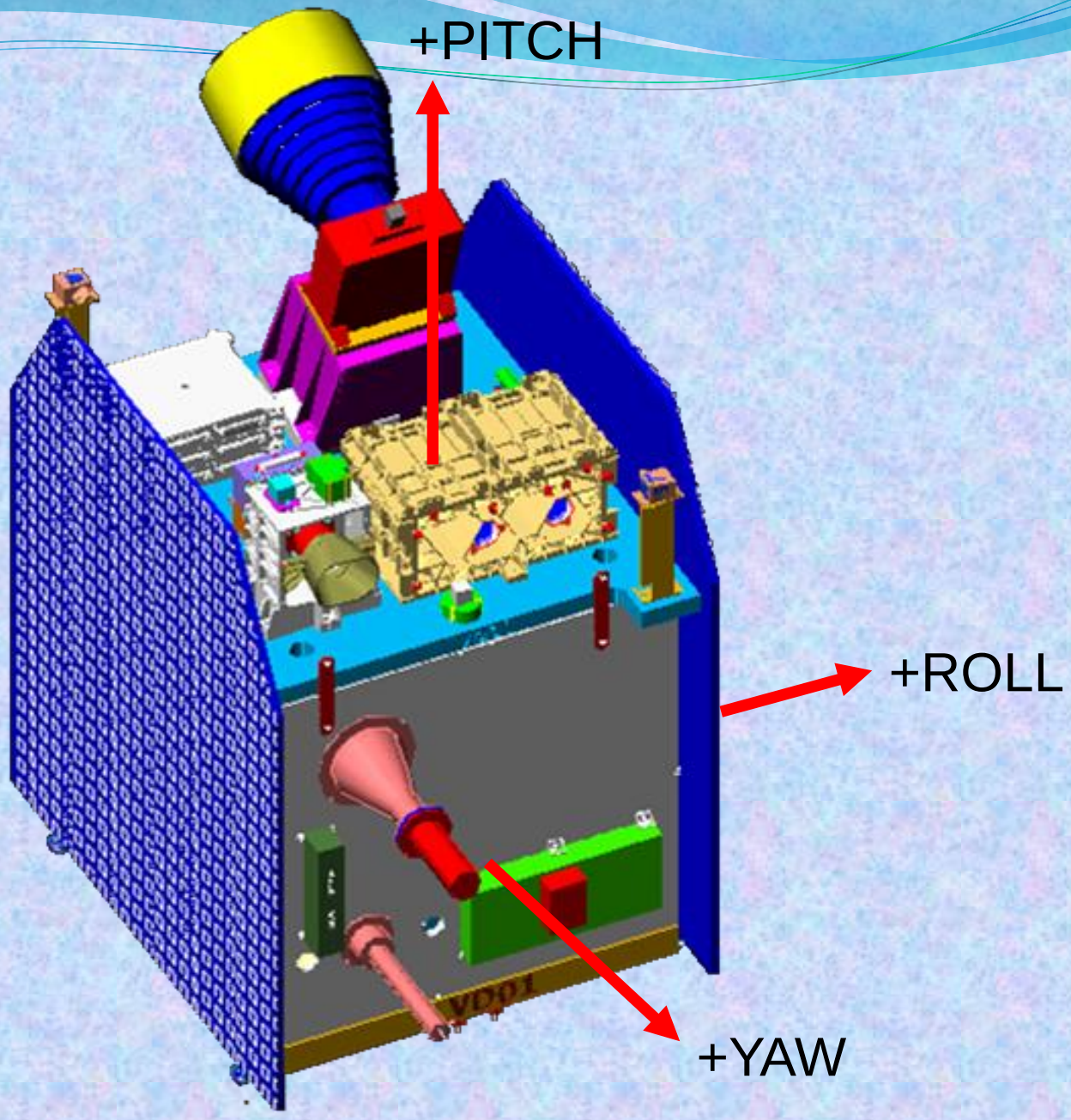
Bus Management Unit



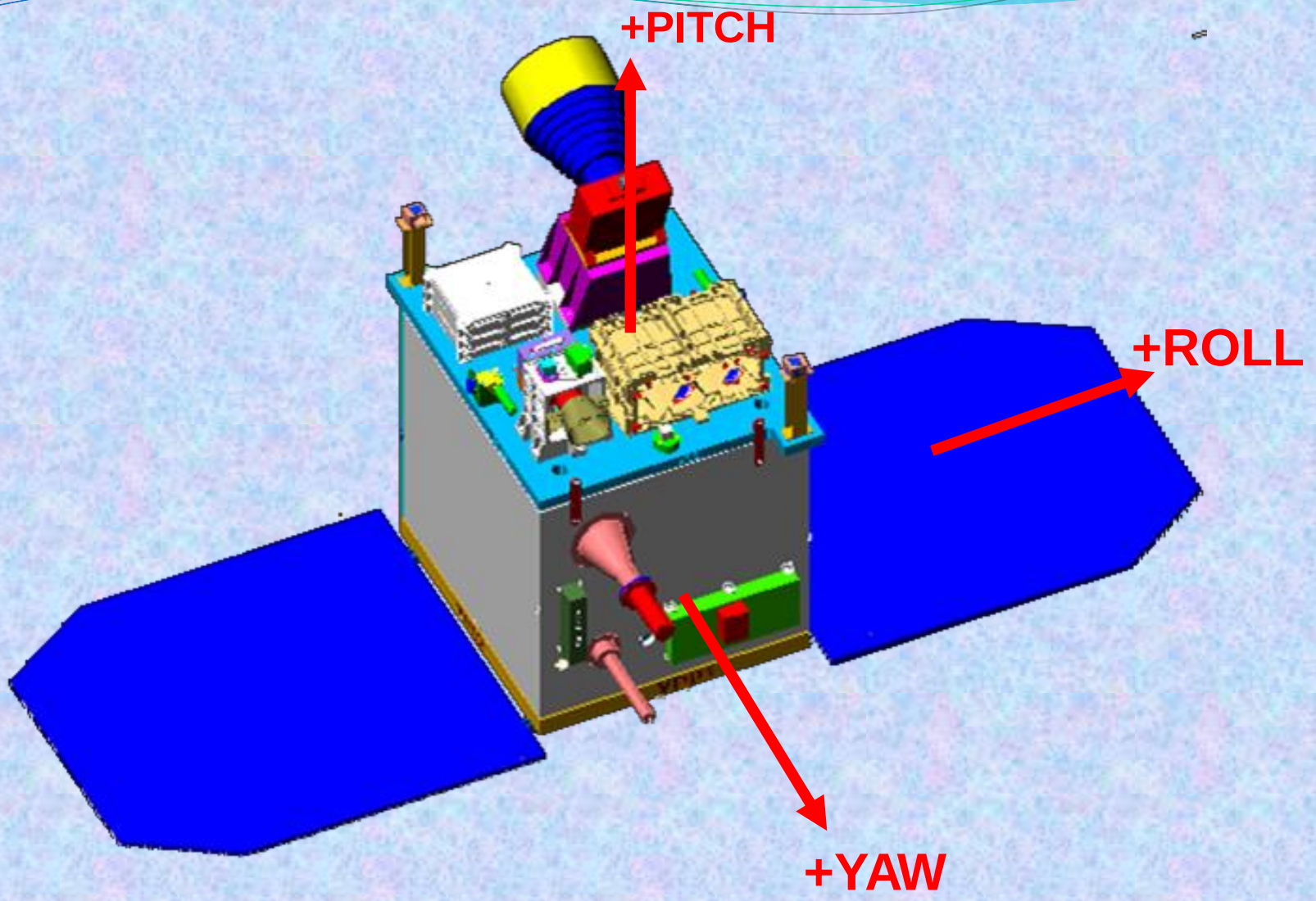
Payload



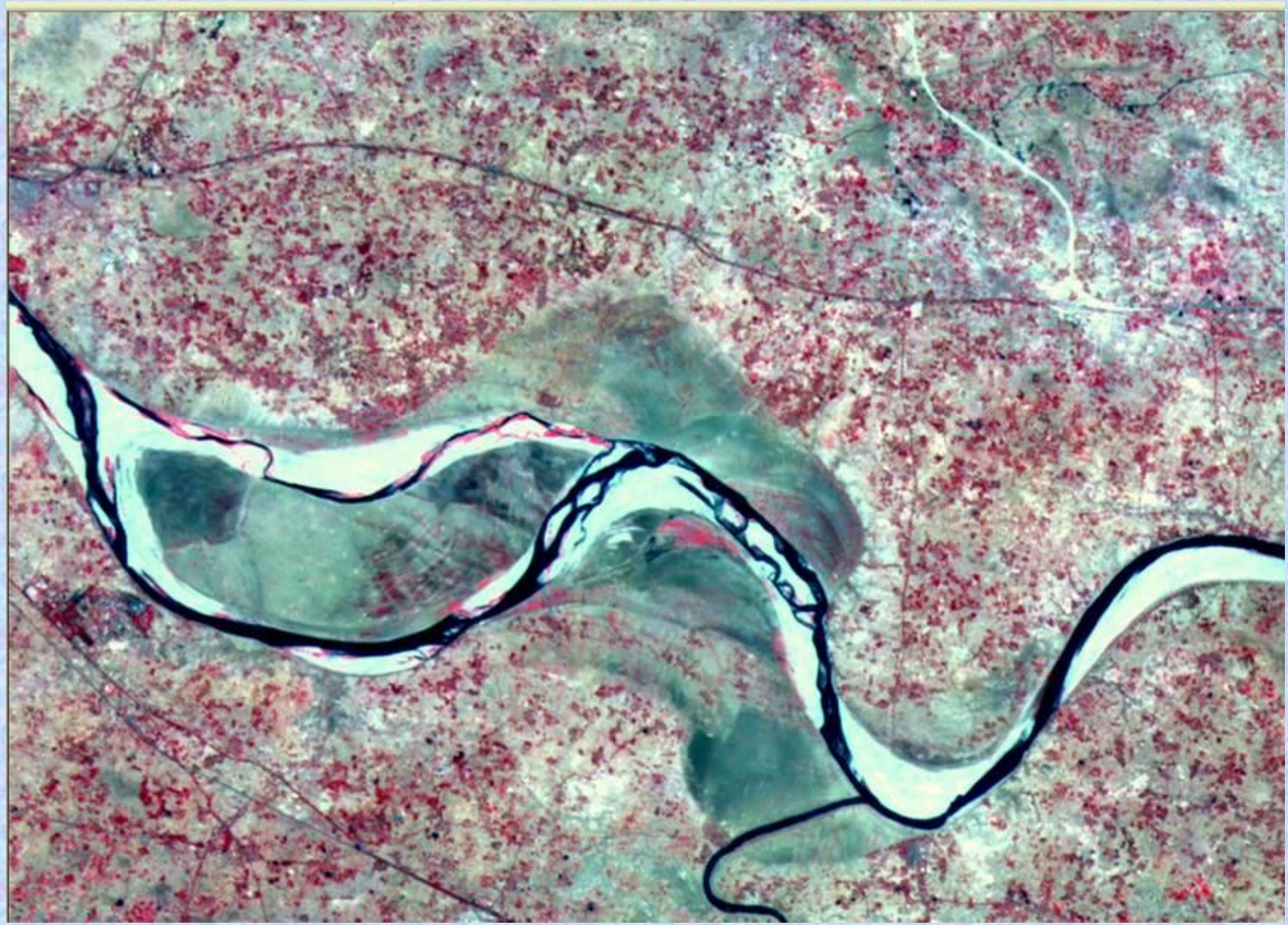
Deployment Mechanisms



TWSAT AXES DEFINITION



TWSAT AXES DEFINITION



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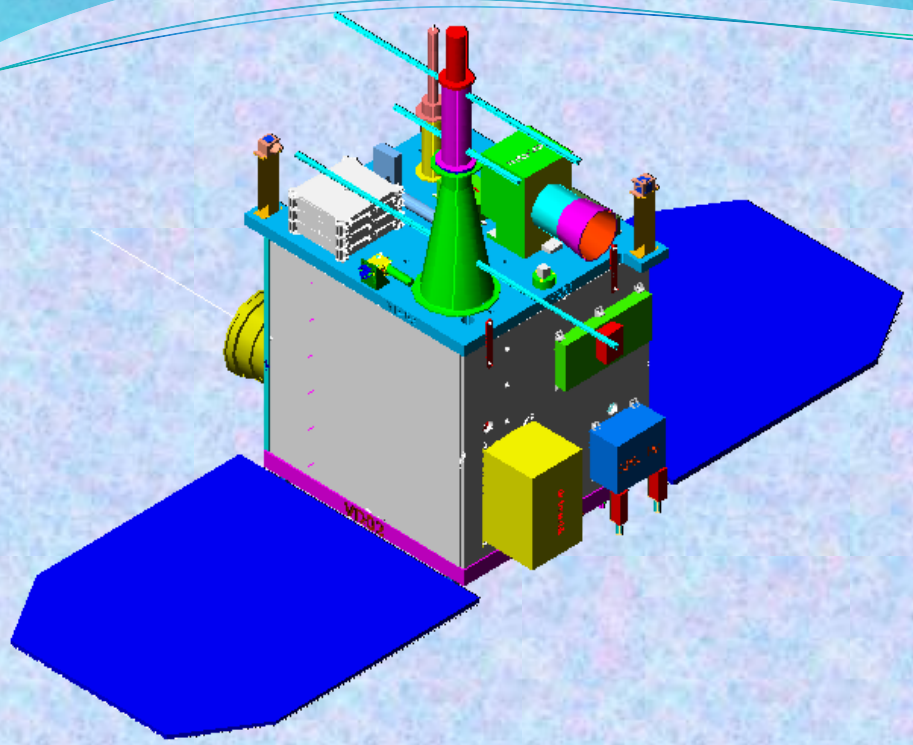


IMS-1A (YOUTHSAT)

YOUTHSAT PAYLOADS

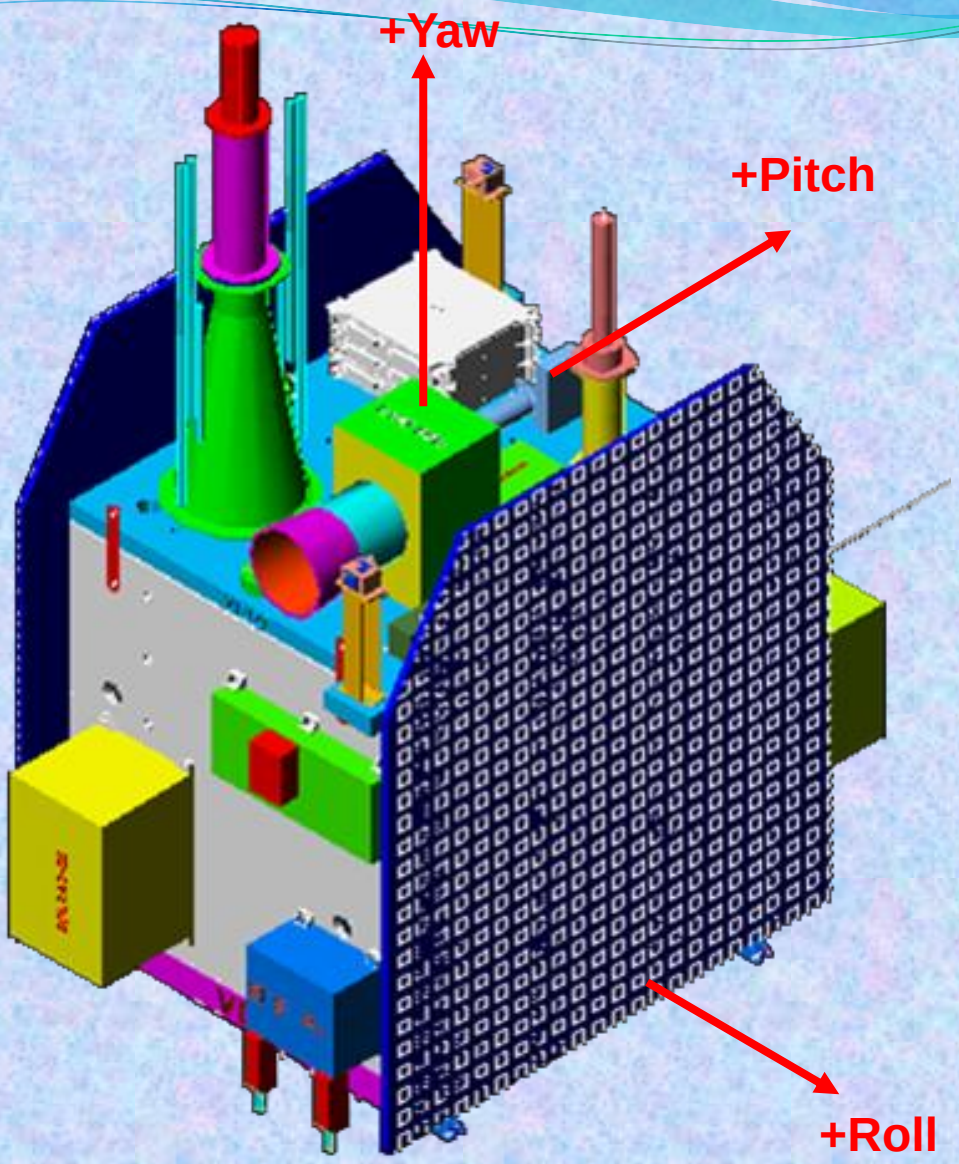
1. **SOLRAD by Moscow University**
   - Research of solar flare activity
   - Involvement of young researchers, i.e students and post graduate students in all stages of preparation and realization of the space experiment.

2. **RABIT by SPL-VSSC, Andhra University**
   (Radio Beacon for Ionosphere Tomography)
   - For mapping the Total Electron Content (TEC) of the Ionosphere.
   - The TEC is derived from the phase difference between two electromagnetic waves as it propagates from onboard beacon through the ionosphere to ground receiver.

3. **LiVHySI by VSSC & SAC (Limb Viewing Hyper Spectral Imager)**

   - The main objective of the proposed instrument is to perform airglow Measurements of the Earth's upper atmosphere (80 to 600 km) in a spectral range of 450 nm to 950 nm with a spatial resolution of 4 km and a spectral resolution of 8 nm.
   - The observations would aid in understanding and modeling the earth's atmosphere as a whole in general and the upper atmosphere in particular

YOUTHSAT AXES DEFINITION



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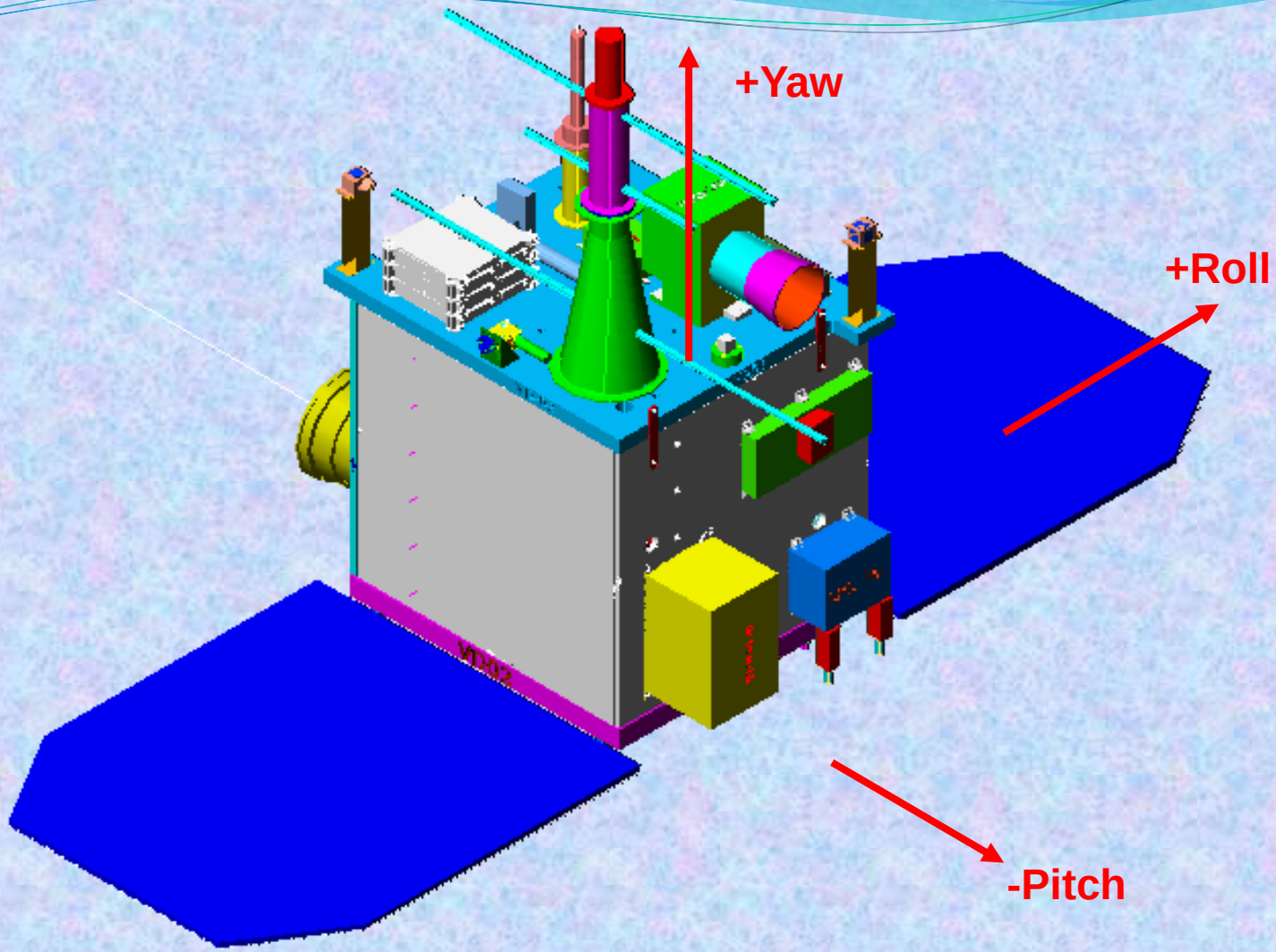
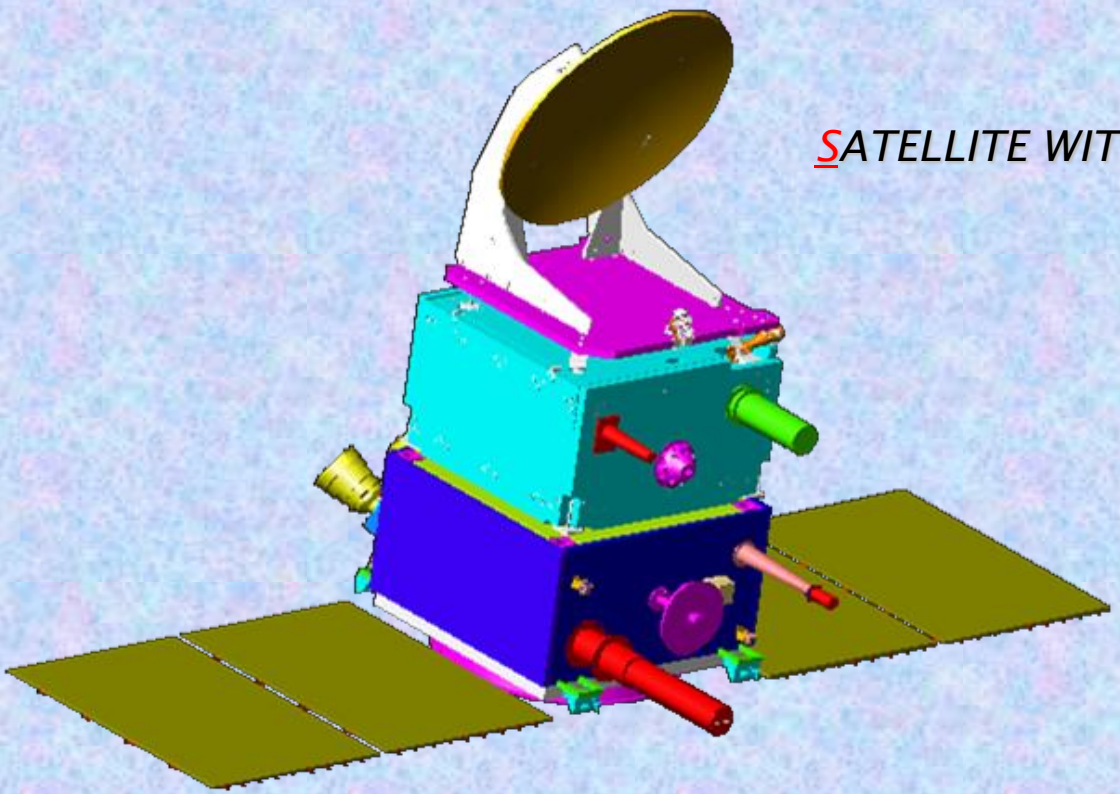


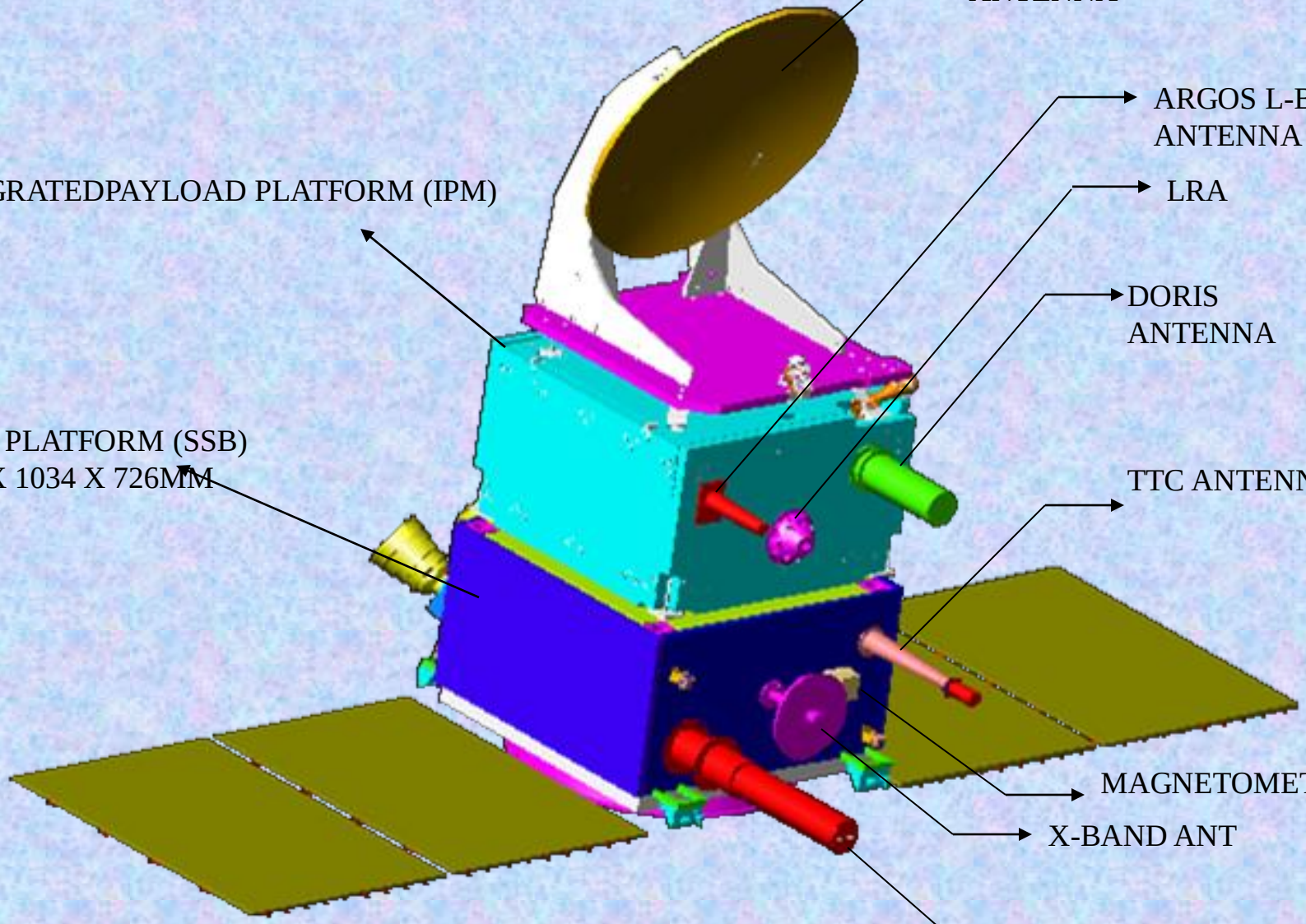
SARAL



SATELLITE WITH ARGOS AND ALTIKA PAYLOADS

SARAL SPACECRAFT 3D VIEW

(DEPLOYED CONFIGURATION)



SARAL SPACECRAFT FEATURES

- 400- 450 kg class satellite
- Separate module for payloads.
- Maximum available power ~ 855 W
- Compatible with PSLV Dual launch configuration
- Nominally configured for sun pointing/earth pointing missions
- Heritage from IMS-1 / IRS Missions
- Life : 5 years
- Reliability goal for bus : > 0.9

PAYLOAD CAPABILITY

MICRO SATELLITE BUS	SMALL SATELLITE BUS
P/L Mounting : on the TOP DECK or AEV DECK Volume : 450(R)x500(Y)x200(P) Mass : 30 kg Power : 20 W Continuou 35 W Peak (15 min x 14) Power I/f: Raw Bus (28 –33 V) Data I/f : LVDS / 1553 B Data rate: up to 8 Mbps HK I/f : 1553B	P/L Mounting : on a separate platform over TOP DECK with four point interface Volume : 900x900x800 Mass : 150 -200kg Power : 150 W Continuous Power I/f: Raw Bus (28 –33 V) Data I/f : LVDS / 1553 B Data rate: up to 20 Mbps HK I/f : 1553B

Coming up Missions with IMS-1

- WIFS sat : carries miniaturised Awifs payload of IRS-P6
- OCM sat : carries miniaturised OCM payload of Oceansat-2
- HR IMS : Panchromatic cum Multispectral high resolution imaging mission
- SENSE : payloads for magnetic, electric field measurements and particle detectors
- IRSIS : Payload for Survey of selestial IR sources

Coming up Missions with IMS-2

- Aditya : Solar corona imaging satellite
- POLIX : X-ray polarimeter to study polarisation of selestial X-Ray sources
- TES HySI : Technology experiment satellite with Hyper spectral imager
- ISTAG : Environment monitoring mission
- Disaster management constellation

PAYLOAD CATEGORIES FOR IMS-1 & 2

- Optical remote sensing payloads
- Microwave remote sensing payloads
- Payloads for Ocean and atmospheric missions like Radiometers, altimeters, aerosol instruments, Lidars etc.,
- Stellar / space science payloads
- Low earth orbit communication payloads
- Constellation missions

THANKS
for attention

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