

Status of Indian Satellite Meteorological Programme

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Indian Meteorological Satellite Missions



- **Payload and Satellite: Design & Fabrication**
 - Geostationary : Optical
 - Polar Orbiting: Thrust on Microwave (Passive/Active)
- **Launch :**
 - Polar : Operational
 - Geostationary : Operational
- **Signal and Data Processing , Retrievals, Validation**
- **Data Archival and Dissemination**
 - Meteorological & Oceanographic Satellite Data Archival Center (MOSDAC)
- **Calibration & Validation (CALVAL)**
- **Applications with Users**
 - Operational
 - R & D (National Institutions and Academia)

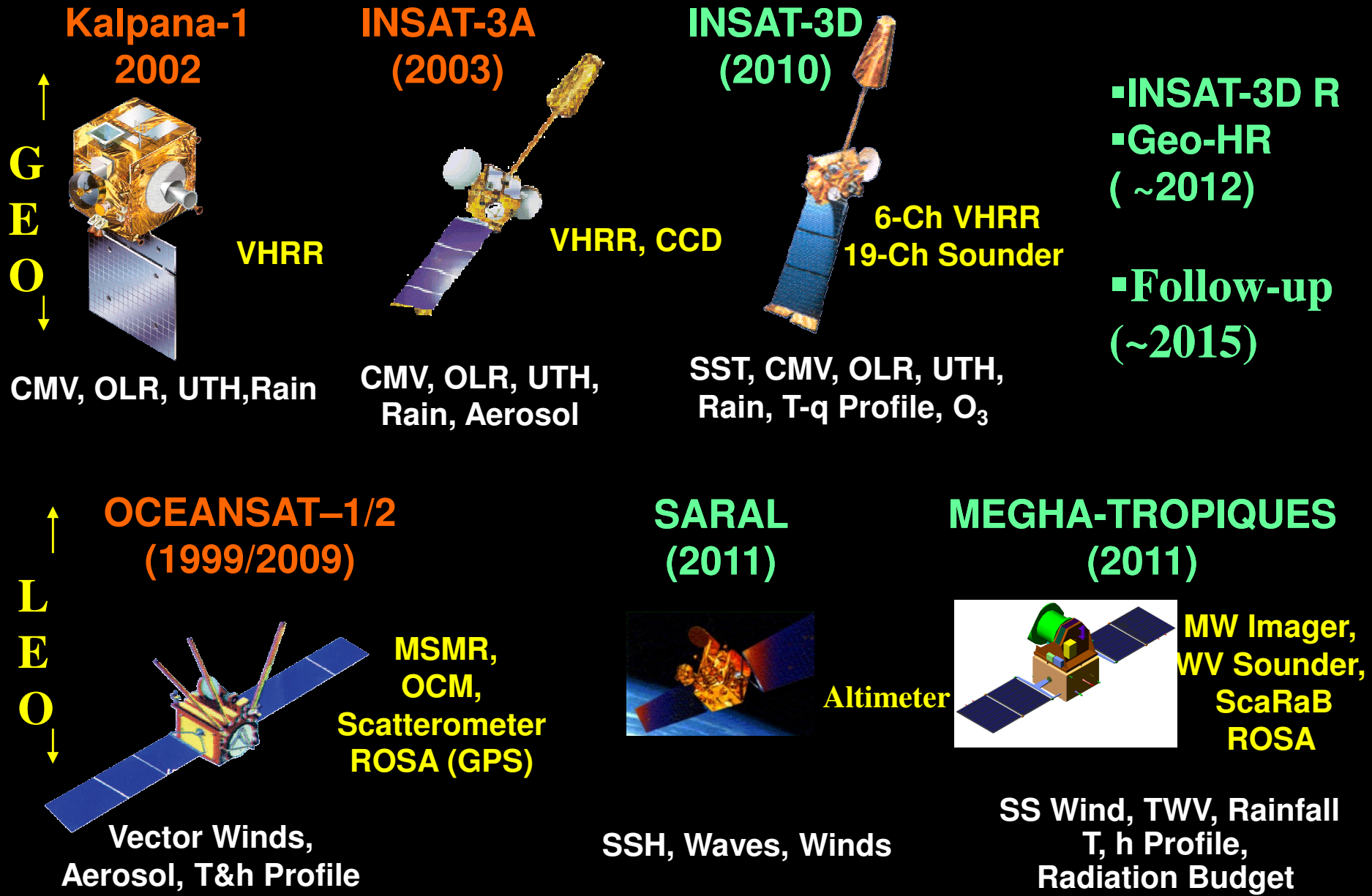


PSLV



GSLV

Indian Missions for Weather & Climate Studies : Current & Future



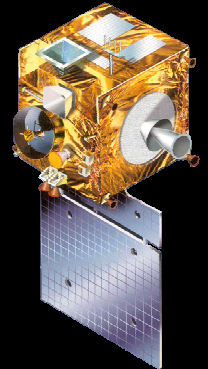
INSAT-3A & Kalpana-1

Location : INSAT 3A : 93.5°E
Kalpana-1 : 74°E

Payload : (i) VHRR & CCD camera in INSAT 3A
(ii) VHRR in Kalpana-1



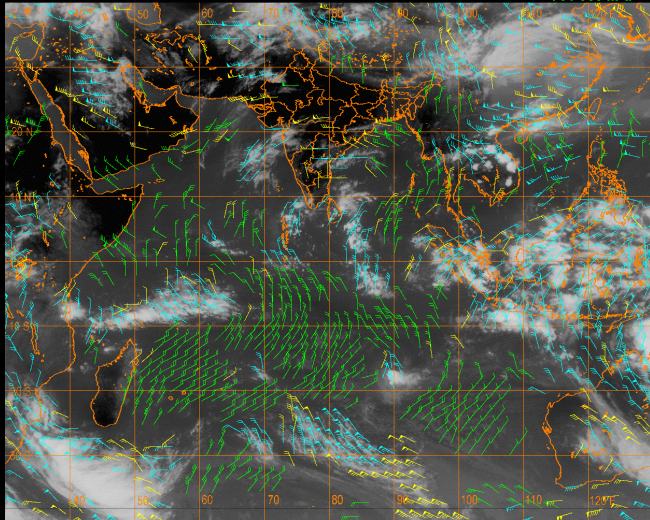
- **VHRR Bands (μm)**
 - Visible : 0.55 – 0.75
 - Water vapour : 5.70 – 7.10
 - Thermal Infra Red : 10.5 – 12.5
- **Resolution (km)** : 2 X 2 for Visible
8 X 8 for TIR and WV
- **CCD Camera Bands (μm)**
 - Visible : 0.62 – 0.68
 - Near Infra Red : 0.77 – 0.86
 - Short Wave Infra Red : 1.55 – 1.69
- **Resolution (km)** : 1 X 1 for all bands



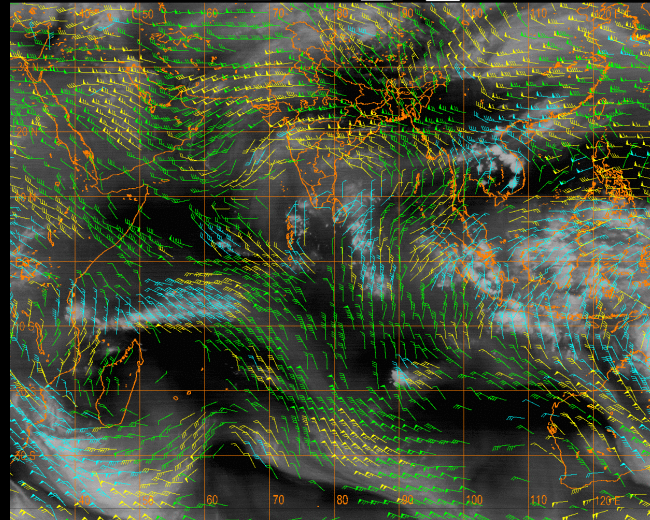
Kalpana-1 Products (IMDPS)



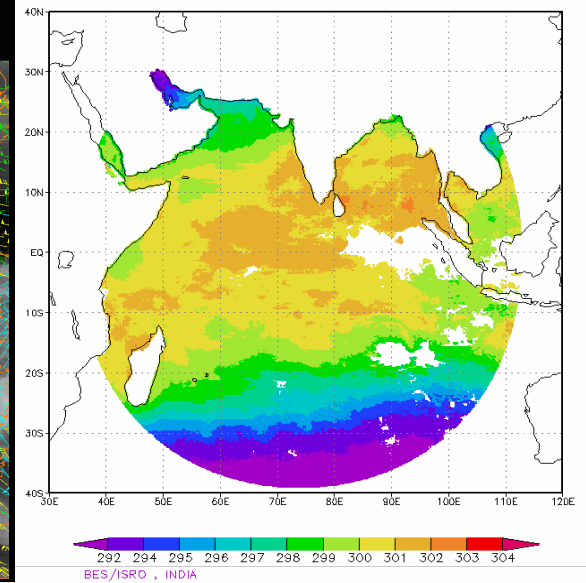
KALPANA-1 07APR2010 09:30 IR VHRR
 CLOUD MOTION WIND (1Kt = 0.5 m/s)
 100-300 hPa
 301-700 hPa
 701-950 hPa



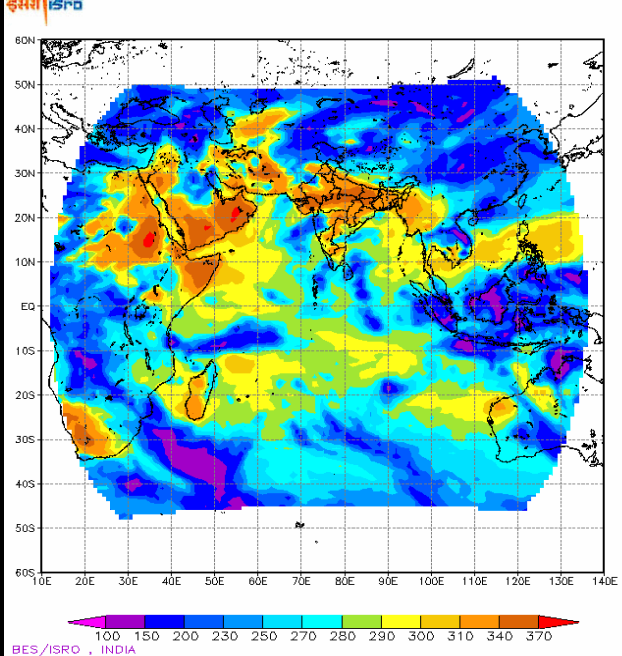
KALPANA-1 07APR2010 09:30 WV VHRR
 WATER VAPOUR WIND (1Kt = 0.5 m/s)
 100-250 hPa
 251-350 hPa
 351-500 hPa



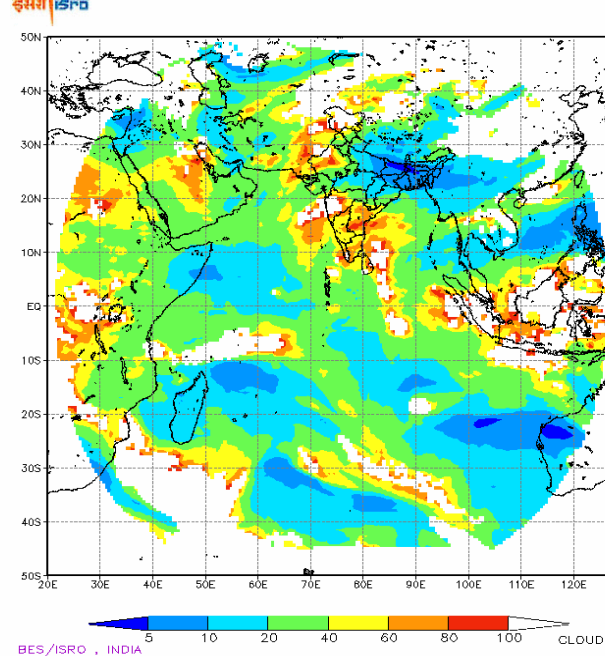
KALPANA-1 SST 07APR2010 WEEKLY



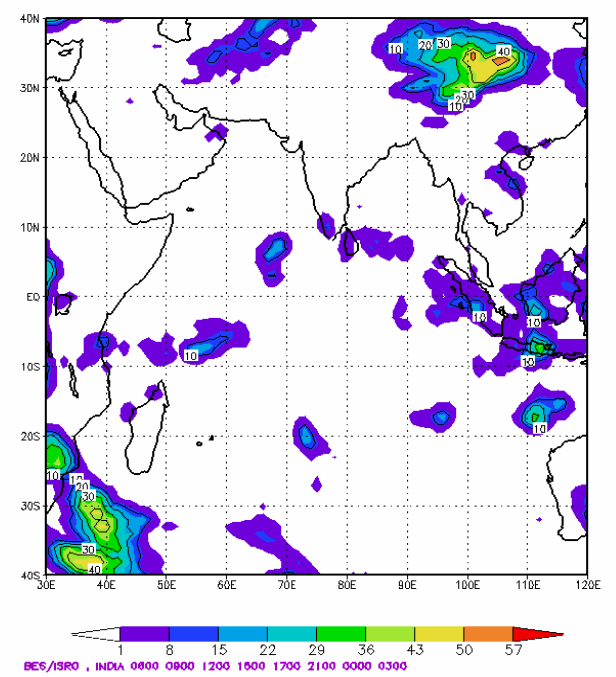
KALPANA-1 OLR (W/m²) 07APR2010 10:00 Z



KALPANA-1 UTH (%) 07APR2010 10:00 Z



KALPANA-1 QPE(mm, 1°x1°) 07APR2010 DAILY



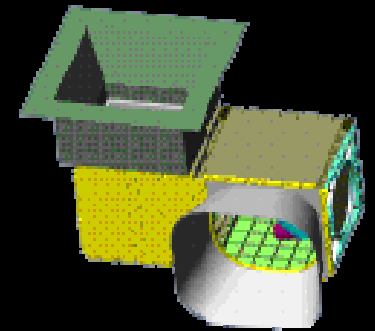
INSAT - 3D

6 Channel IMAGER

- Spectral Bands (μm)
 - Visible : 0.55 - 0.75
 - Short Wave IR : 1.55 - 1.70
 - Mid Wave IR : 3.80 – 4.00
 - Water Vapour : 6.50 - 7.10
 - Thermal IR – 1 : 10.30 - 11.30
 - Thermal IR – 2 : 11.50 - 12.50
- Resolution : 1 km for VIS, SWIR
4 km for MIR, TIR
8 km for WV

19 Channel SOUNDER

- Spectral Bands (μm)
 - Short Wave IR : Six bands
 - Mid Wave IR : Five Bands
 - Long Wave IR : Seven Bands
 - Visible : One Band
- Resolution (km) : 10 X 10 for all bands
- No of simultaneous sounding per band : Four



Oceansat -II



- **Instruments:**

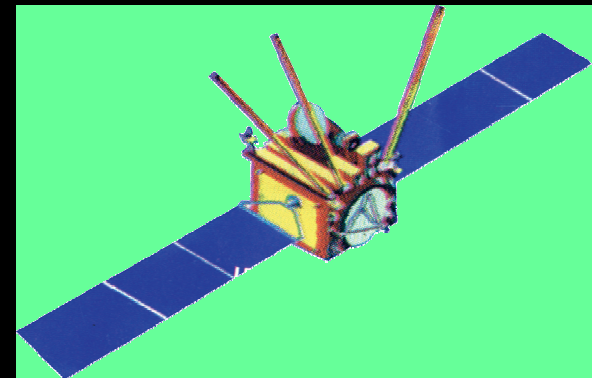
- Scatterometer Ku band (13.515 GHz)
- Ocean Colour Monitor (8 bands 0.4- 0.885 μm)
- Radio Occultation ROSA

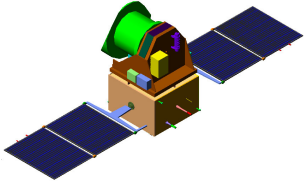
- **Launched**

- 23 September 2009

- **Applications:**

- Sea State Forecast: Waves, Circulation and MLD
- Monsoon and Cyclone Forecast
- Antarctic Sea Ice
- Fisheries and Primary productivity estimation
- Detection and monitoring of Phytoplankton blooms
- Sediment dynamics





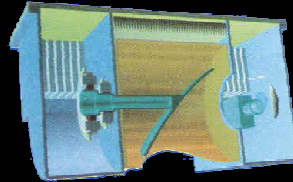
Megha Tropiques

For studying water cycle and energy exchanges in the tropical belt

Low inclination (20°) for frequent simultaneous observations of tropics

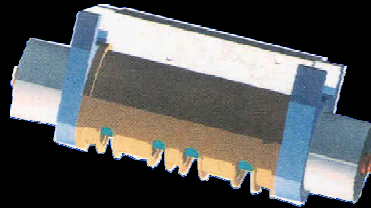
- Water vapour
- Clouds
- Cloud condensed water
- Precipitation
- evaporation

SAPHIR



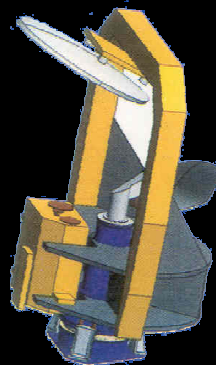
- 183 GHz WV Sounder
- Six atmospheric layers upto 12 km height
- 10 km Horizontal Resolution

SCARAB



- Outgoing fluxes at TOA
- 40 km Horizontal Resolution

MADRAS



- Precipitation and cloud properties
- 89 & 157 GHz : ice particles in cloud tops
- 18 & 37 GHz: cloud liquid water and precipitation
- 23 GHz : Integrated water vapour
- T & q profile

ROSA

Contributing to GPM and GEWEX

SARAL-Altika (ISRO-CNES)



- **Altika Mission:** Global altimetry system for the precise and accurate observations of ocean topography, circulation and sea surface monitoring
- **launch Date: 2011**
- **Altika Payload :**
 - A Ka-band (35.75 GHz, BW 500 MHz) radar altimeter
 - A dual-frequency MW radiometer (23.8 and 37 GHz), for tropospheric range correction
 - DORIS: For achieving adequate orbitography performances
 - LRA: For Orbitography and system calibration

Altika/SARAL central objective :

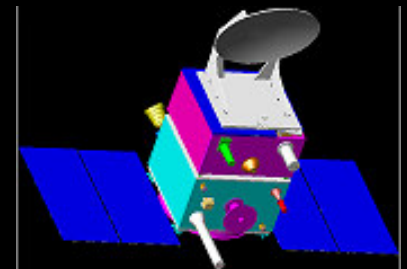
Ocean meso-scale variability: Sea state Monitoring & Now Casting

Data assimilation: Sea state forecasting

Coastal altimetry: Bathymetry, coastal upwelling, Circulations etc.

Satellite Description :

- Sun-synchronous, polar orbiting
- inclination: 98.38 Deg.
- Altitude: ~800 km,
- Repeat cycle: 35 days



Future Geostationary Satellites

- **INSAT 3D Repeat (~ 2012)**
- **Follow-up of INSAT-3D (~2015)**
- **Geo – HR (~2012) [name yet to be frozen]**
 - Visible – 50 m
 - 3 Channel IR – 1.5 Km
 - Visible and SWIR Hyper-spectral – 500 m
 - 50 – 60 channels in VIS
 - 50 – 60 channels in SWIR
 - For general remote sensing, can also be used for meteorological purpose
- **Microwave Temperature Sounder (Definition stage)**