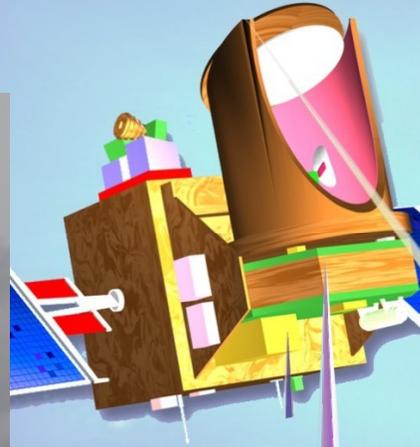


# Megha-Tropiques



Presentation by Indian Delegation at the 55<sup>th</sup> Session of UNCOPIUOS  
Vienna – 12 June 2012

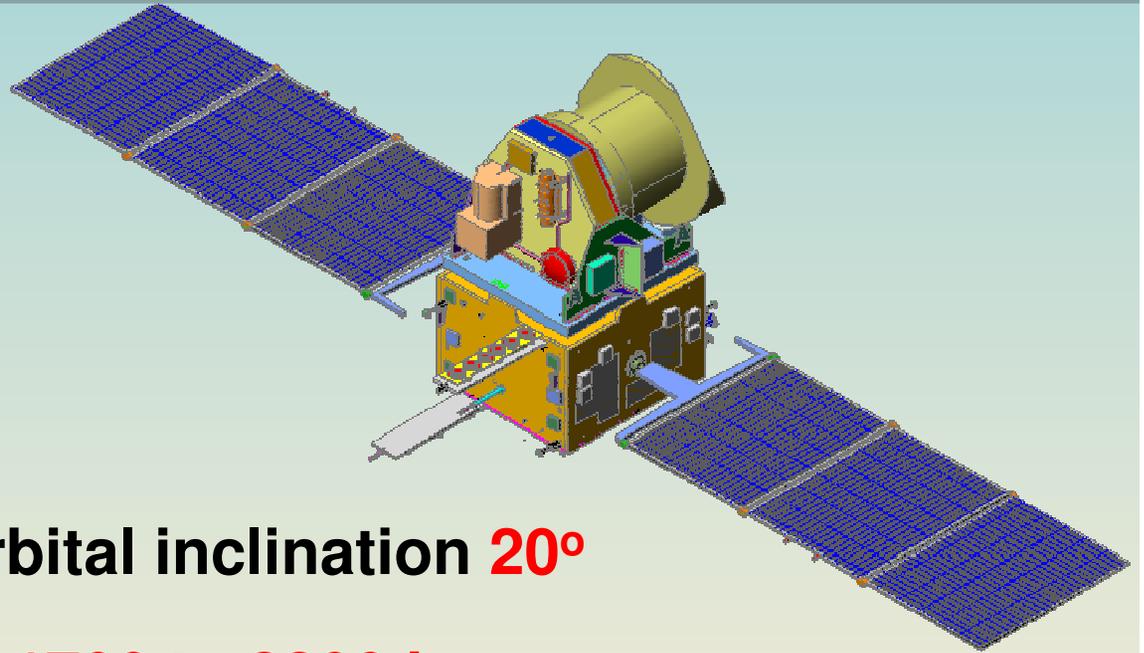
## Megha-Tropiques Mission

- Indo-French Joint Satellite for studying tropical atmosphere
- **Megha** in Sanskrit means clouds; **Tropiques** in French is tropics
- Payloads by ISRO and CNES ; spacecraft by ISRO
- Launched by ISRO's PSLV–C18 on 12 October 2011
- Spacecraft control and operations by ISRO (Bangalore)
- Science data reception by ISRO (Bangalore) and CNES (Kourou and HBK - Africa)
- Data products generation by ISRO

# Megha-Tropiques – Mission Objectives

- **To collect a long-term set of measurements with a good sampling and coverage over Tropical latitudes to understand better the processes related to tropical convective systems and their life cycle.**
- **To improve the determination of atmospheric energy and water budget in the tropical area at various time and space scales.**
- **To study tropical climatic events and their predictability: droughts, monsoon variability, floods and tropical cyclones.**

# Megha-Tropiques: Mission Characteristics



- INCLINATION: Low orbital inclination **20°**
- SWATH: Large swath **1700 to 2200 km**
- REPETIVITY: **6 times** a day over 10 – 20 deg latitude band, **4 times** at many other latitudes
- PAYLOADS: **4 payloads**: A large number of climate/atmospheric parameters from a common platform

# Megha-Tropiques: Instruments

**MADRAS (Microwave Analysis and Detection of Rain and Atmospheric Structure) :** 5 – Frequency, 9-channel Microwave imager; 18, 23, 36, 89 and 157 GHz;

All in V & H Polarisation except for 23 GHz – V only

*Wind speed, total water vapour, cloud liquid water, rainfall, cloud ice - built by ISRO and CNES*

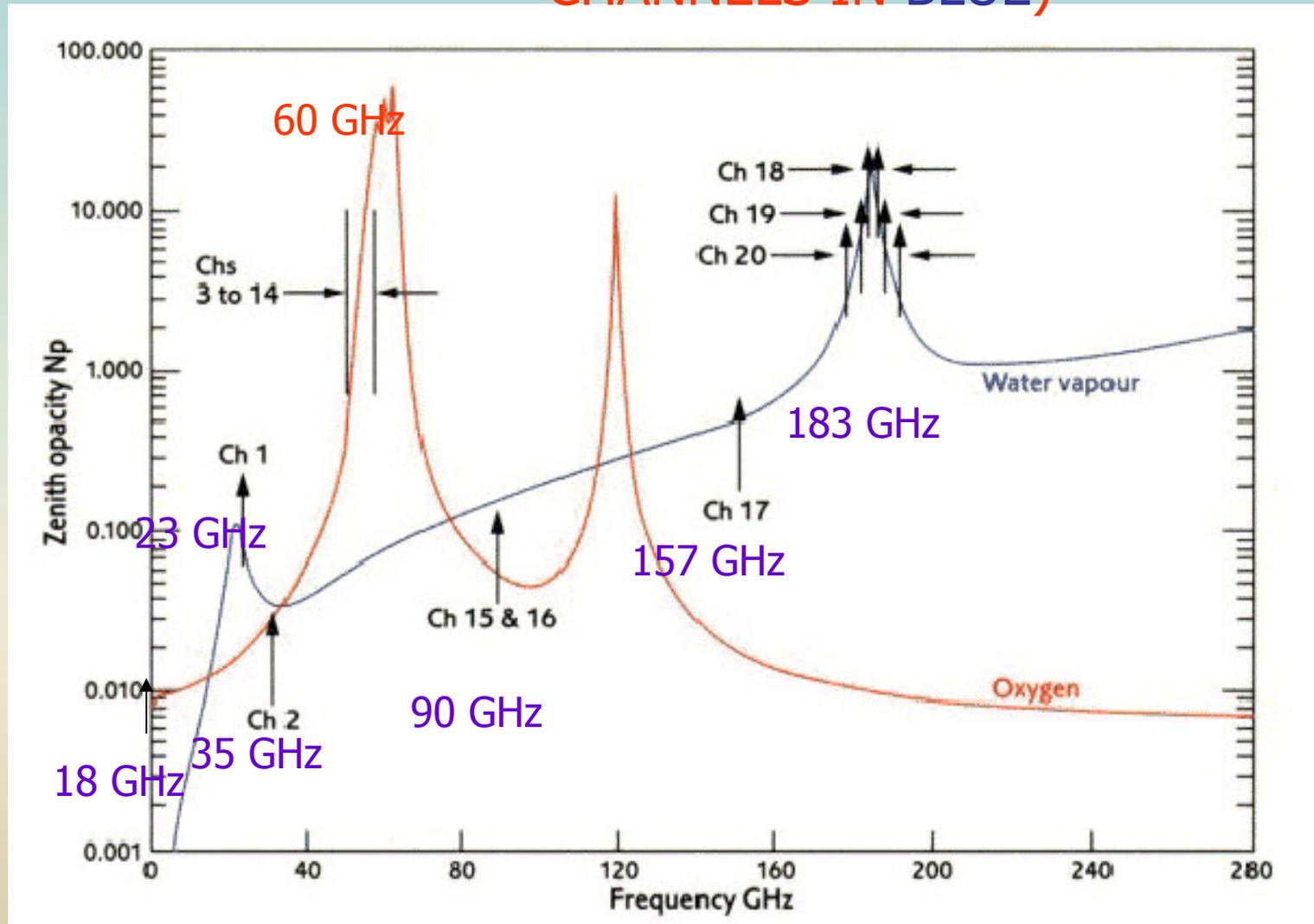
**SAPHIR (Sounder for Atmospheric Profiling of Humidity in the Inter-tropical Regions) :** - Six-channels at 183 GHz Water vapour Resonance frequency

*Humidity Profiling at 6 altitudes -built by CNES*

**ScaRaB (Scanner for Radiation Budget):** 4-channel radiometer – *Long-wave radiation fluxes -built by CNES*

**ROSA (Radio Occultation Sounder for Atmospheric studies):** - GPS receivers at L1 and L2 channels - *Temperature and humidity profiles -procured by ISRO from Italy*

# ATMOSPHERIC RESONANCE FREQUENCIES AND WINDOW FREQUENCIES: (MEGHA-TROPIQUES CHANNELS IN BLUE)



## **Megha-Tropiques: Parameters measured**

- **Cloud condensed water content**
- **Cloud ice content**
- **Convective-stratiform cloud discrimination**
- **Rain rate**
- **Latent Heat release**
- **Integrated water vapour content**
- **Profile of water vapour content**
- **Radiative fluxes at the top of the atmosphere**
- **Sea surface wind**



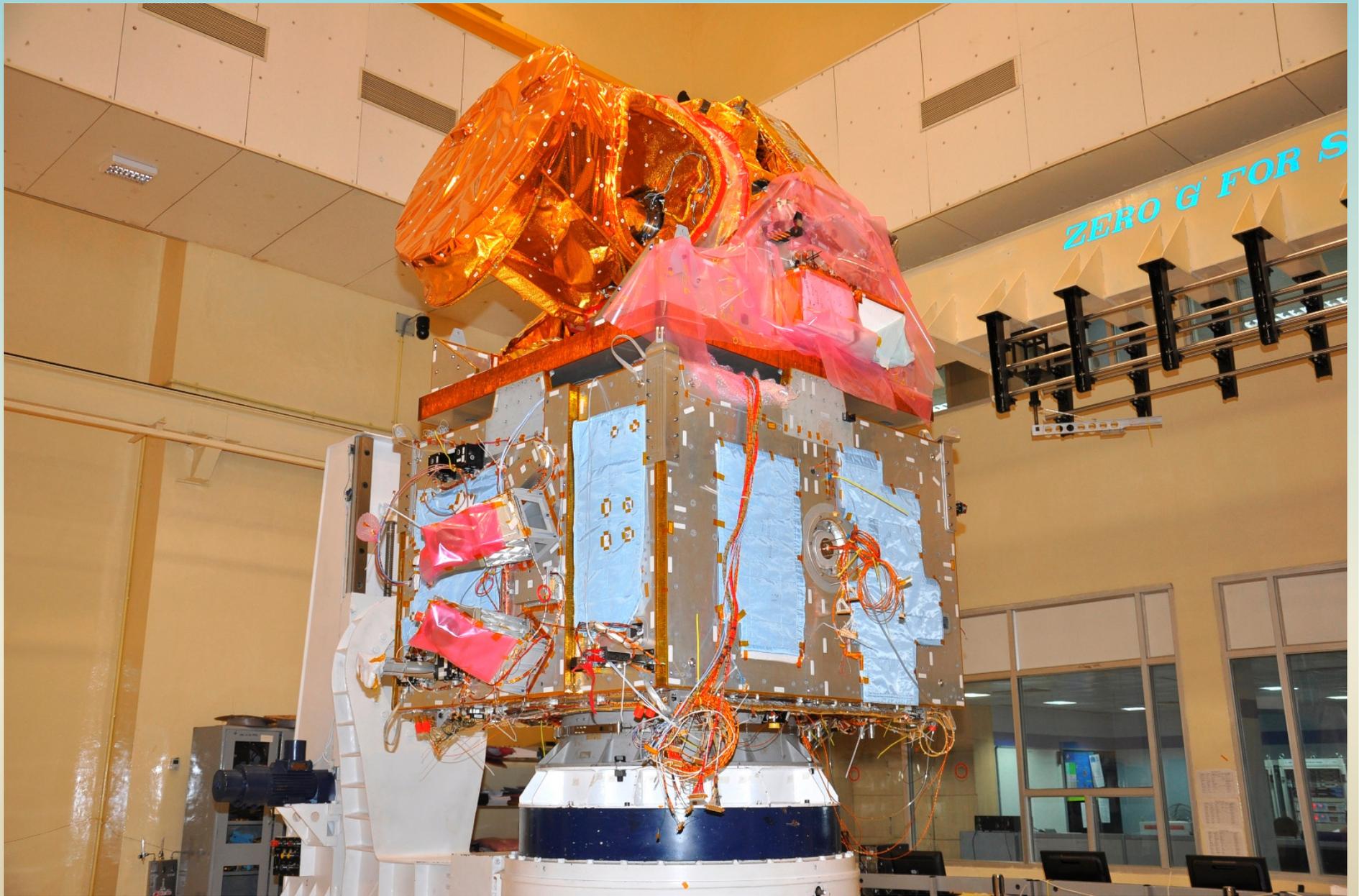
## *MADRAS, SAPHIR and SCARAB integrated on PIM*

- ***MADRAS, SAPHIR and SCARAB mechanically integrated on Payload Instruments Module (PIM)***
- ***Electrically interconnected with platform***
- ***Telecommand and House-keeping Telemetry checks have been carried out in disassembled mode test***
- ***Science Telemetry from all the three payloads acquired and checked for CCSDS packet integrity***
- ***PIM ready for platform integration***

## MADRAS UNDER THERMO-VAC TESTS IN LSSC

CRYO  
TARGET





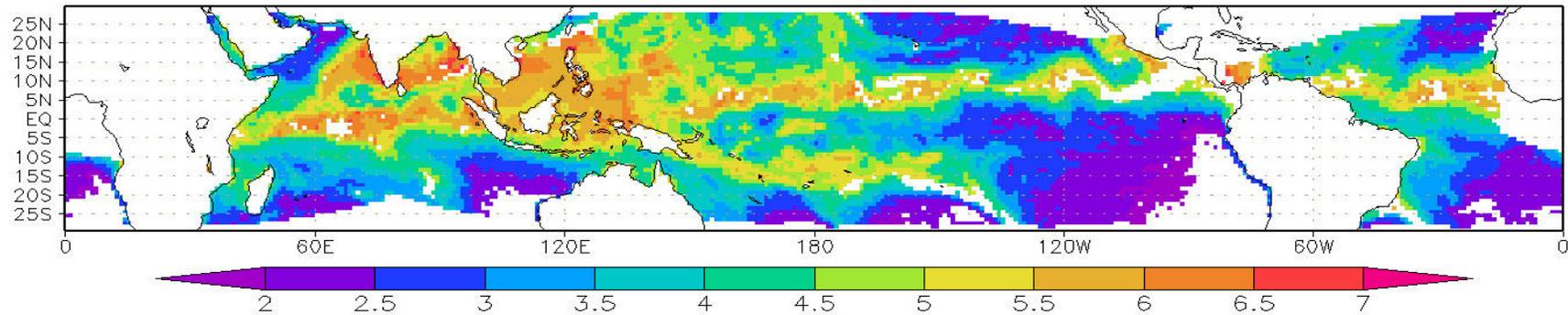
MEGHA-TROPIQUES IN CLEAN ROOM

## MEGHA-TROPIQUES SPACECRAFT UNDER THERMO-VAC TESTS IN 4M-FACILITY

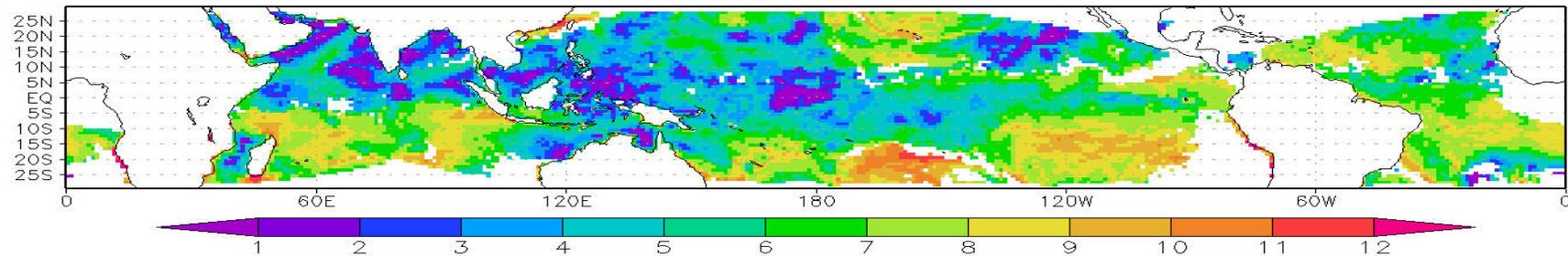


# Oceanic Geophysical Parameters from MADRAS

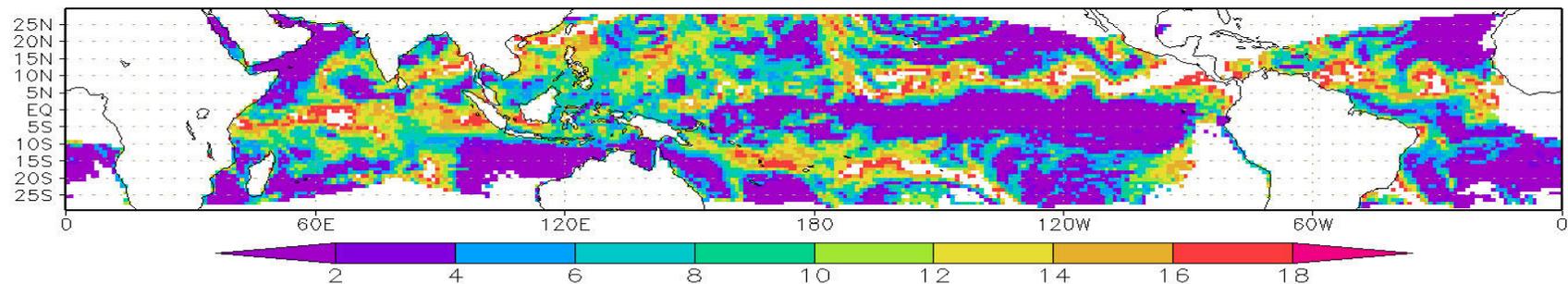
MT TPW – 18 Oct 2011 g/cm<sup>2</sup>



MT WS – 18 Oct 2011 m/s

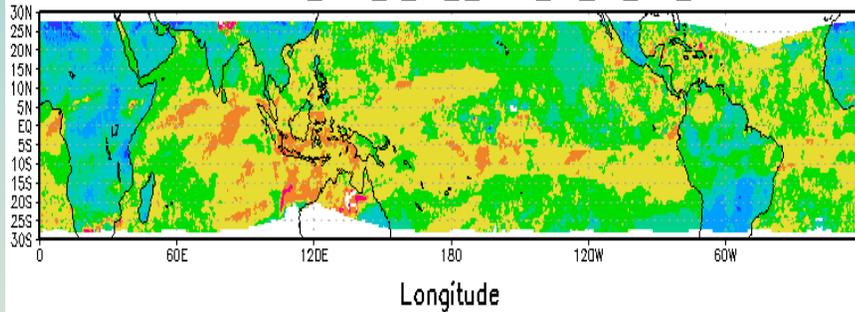


MT CLW – 18 Oct 2011 mg/cm<sup>2</sup>

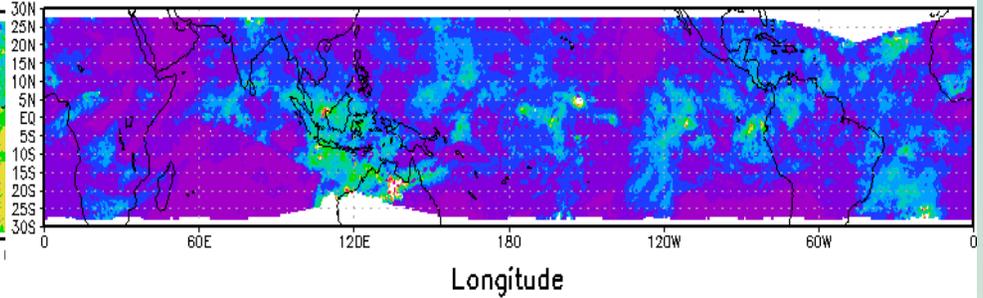


# Humidity Profile from SAPHIR

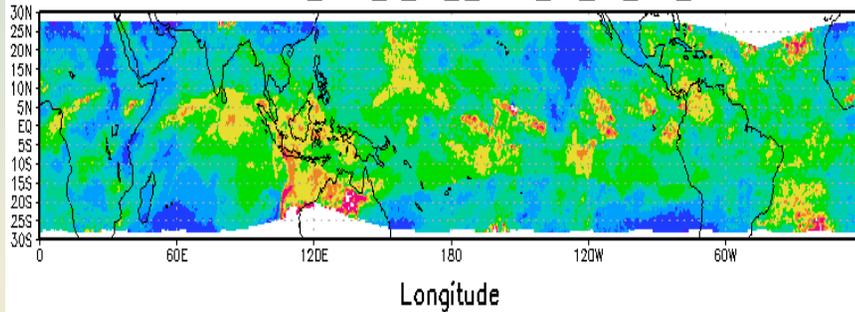
LAYER AVERAGE RELATIVE HUMIDITY (1000–850)mb  
MT1SAPSL1A\_1.00\_9\_01\_2011\_10\_18\_asc\_larh



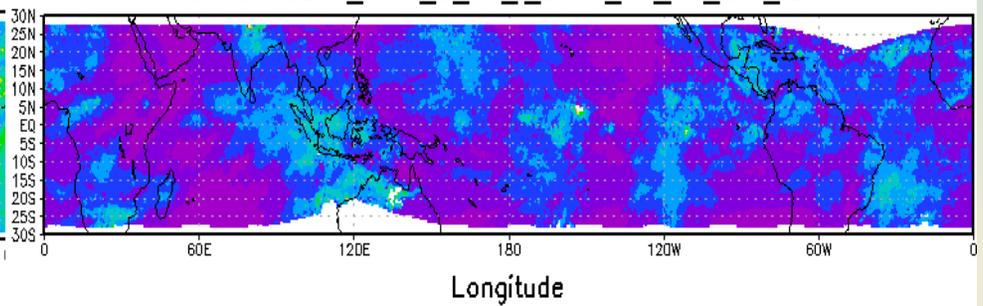
LAYER AVERAGE RELATIVE HUMIDITY (550–400)mb  
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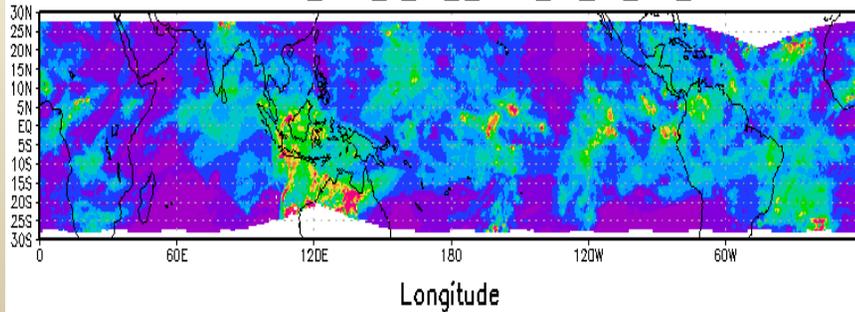
LAYER AVERAGE RELATIVE HUMIDITY (850–700)mb  
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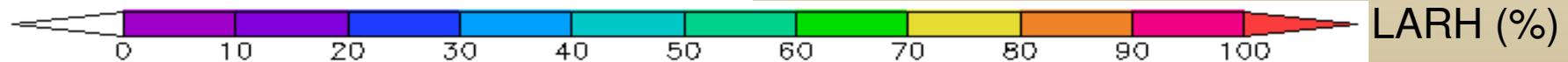
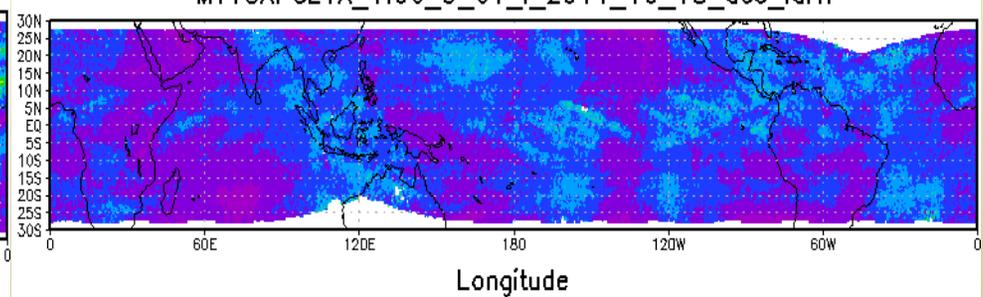
LAYER AVERAGE RELATIVE HUMIDITY (400–250)mb  
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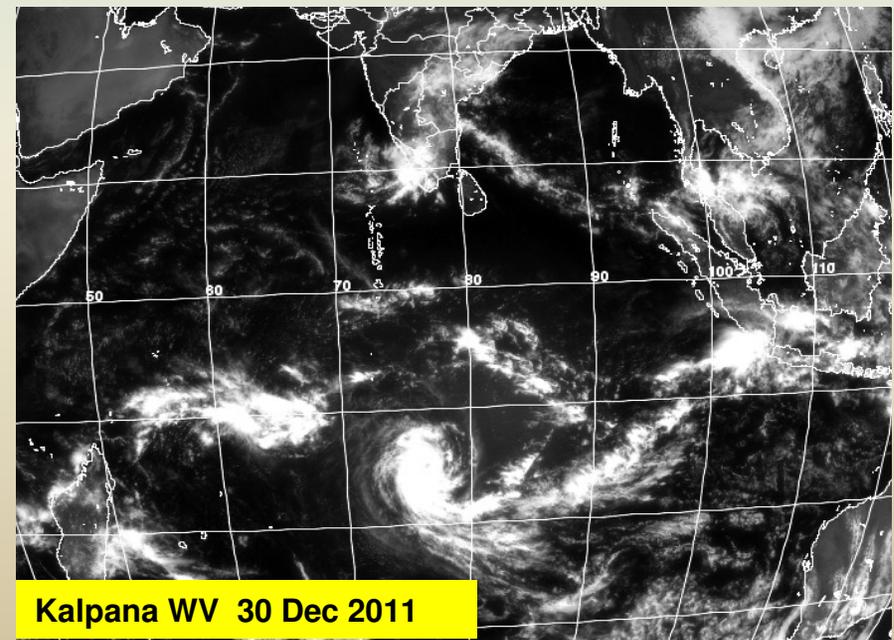
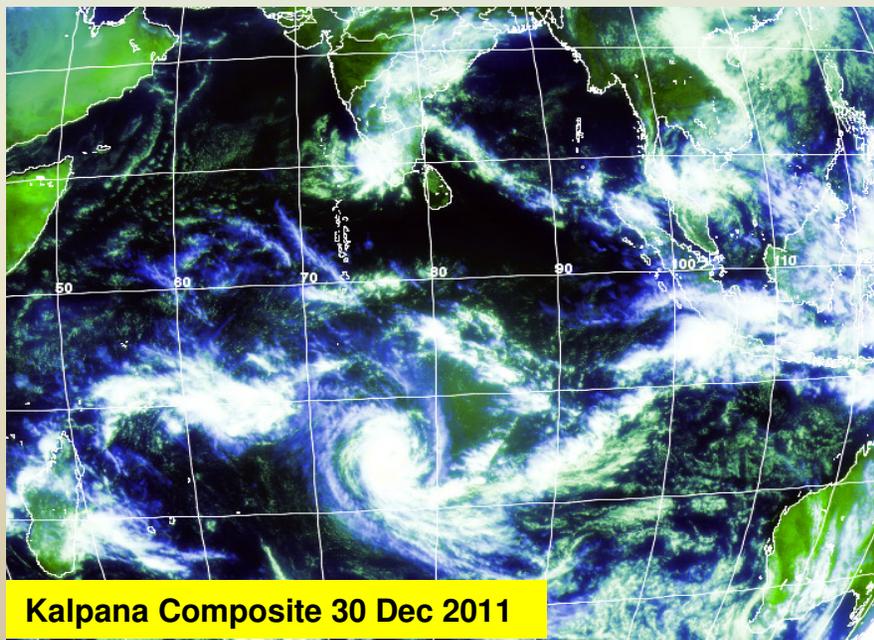
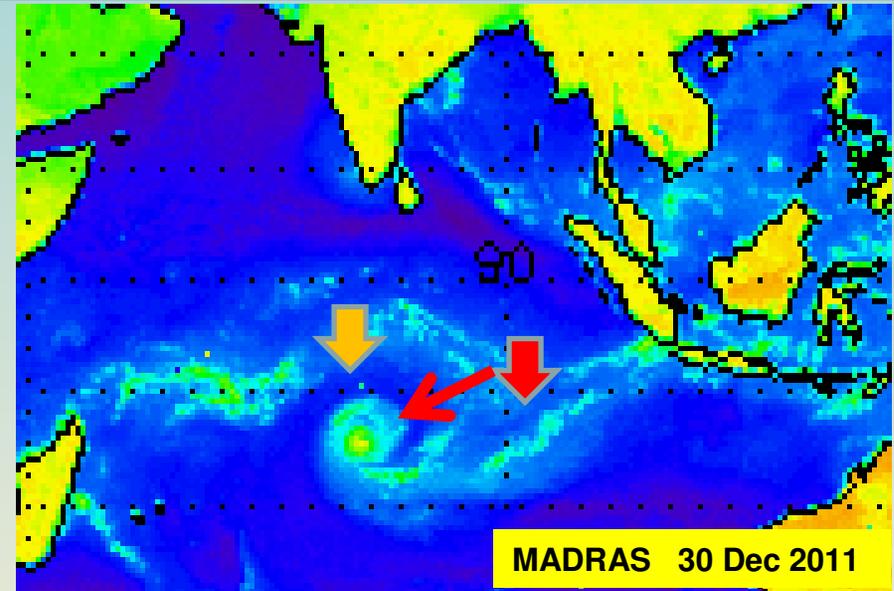
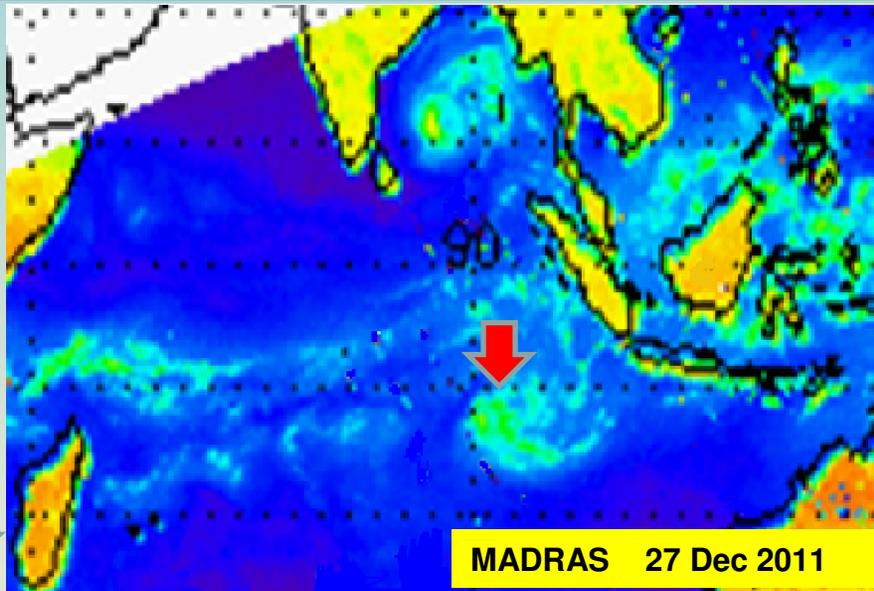
LAYER AVERAGE RELATIVE HUMIDITY (700–550)mb  
MT1SAPSL1A\_1.00\_9\_01\_2011\_10\_18\_asc\_larh



LAYER AVERAGE RELATIVE HUMIDITY (250–100)mb  
MT1SAPSL1A\_1.00\_9\_01\_2011\_10\_18\_asc\_larh



# Tracking Indian Ocean Cyclone using MADRAS

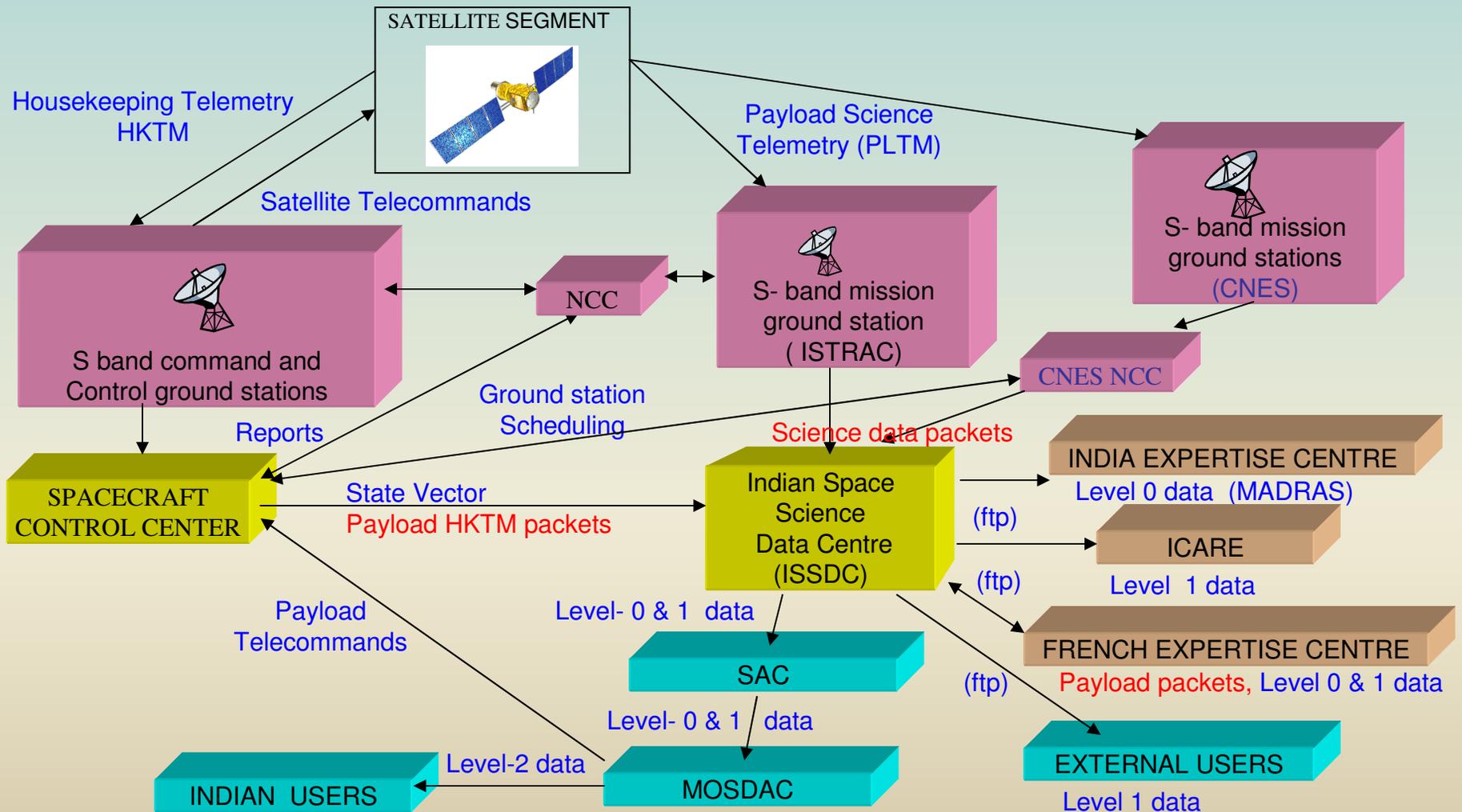


## Megha-Tropiques: Global outreach

- Other than the scientific community of India and France, 21 Scientific teams from Australia, Brazil, Italy, Japan, Korea, Niger, Sweden, UK and USA are using the initial data for research purpose under International Announcement of Opportunity (AO).
- EUMETSAT to get access to Megha-Tropiques data
- Data from Megha-Tropiques would contribute to Global Precipitation Measurement (GPM) coordinated by NASA, as the first satellite of the eight-satellite constellation.

# MT Ground Segment Plan

## Agreed by both ISRO & CNES Project teams



## Data dissemination plan

- Data of SAPHIR, ScaRaB and GPS-ROSA will be available to all Announcement of Opportunity Principal Investigators for validation work from **June 15, 2012**. MADRAS data will be released from **July 15, 2012**.
- Validation activities will be completed by **January 15, 2013**.
- Indo-French Workshop in **Dec 2012**
- International Conference in **Mid 2013**

**Thank you for your kind attention**