



# MEGHA-TROPIQUES



A CO-OPERATION PROGRAMME BETWEEN

Centre National d'Etudes Spatial, France

Indian Space Research Organisation, India

By Denis Borel & M.Y.S.Prasad



## DEFINITION AND OBJECTIVES

- Megha-Tropiques, a joint satellite based mission devoted to
  - the study of atmospheric water cycle and associated convective systems in the inter-tropical zone
  - a better understanding of the tropical climatology
  - the eventual improvement of monsoon forecasting models
- Launch date target: mid of 2006 from Sri Harikota (SHAR)

*\*from the Sanscrit word for « clouds »*

## HISTORICAL STEPS

- 1998: joint decision by CNES & ISRO leading to a one year duration pre-feasibility study
- Statement of Intent signed end of 1999:
  - co-operation agreement with no exchange of funds
  - definition of the sharing of the agencies contributions
- 2000-2001: detailed feasibility studies leading to the freezing of the satellite baseline configuration
- MOU for definition studies signed in May 2001



## THREE INSTRUMENT PAYLOAD DEFINITION

- MADRAS (Microwave Analysis & Detection of Rains & Atmospheric Structure):
  - multifrequency passive scanning radiometer (18.7-157 GHz)
  - imaging water vapour, rains and ice distribution
- SCARAB (SCanner for RAdiative Budget):
  - measure of radiative fluxes from Earth in the IR domain
- SAPHIR (*Sondeur Atmosphérique du Profil d'Humidité Intertropicale par Radiométrie*):
  - water vapour profiler from 0 to 12 km altitude (around 183 GHz)

## SHARING OF RESPONSIBILITIES

<b>C N E S</b>	<b>I S R O</b>
- R F part of MADRAS	- MADRAS prime cont .
- S C A R A B equipment	- S c a n n i n g mechanism
- S A P H I R equipment	- MADRAS AIT
- S a t e l l i t e platform	- W h o l e payload AIT
- S a t e l l i t e AIT	- D a t a mission center
- C o n t r o l center	- P S L V launch



## FRENCH INDUSTRIAL DEVELOPMENTS

- MAdras Radio-Frequency EQuipment (MARFEQ) developed by Astrium Cy. (EADS group)
- SCARAB instrument developed by *Laboratoire de Météorologie Dynamique (LMD)*
- SAPHIR instrument developed by LMD + other labs.
- platform derived from the PROTEUS series developed by Alcatel Space Ind.

## DATA SAMPLING & ORBIT DEFINITION

- 867 km altitude orbit with 20° inclination for up to 6 revisits a day at any location of the intertropical zone
- chosen altitude compatible with the relatively low resolution required:
  - 40 km MADRAS pixel size for 18.7-36.5 GHz range
  - 10 km MADRAS pixel size at 89 GHz
  - 6 km MADRAS pixel size at 157 GHz
- quasi real time reception of data acquired over India

## CONCLUSION

- Megha-Tropiques, a model for similar co-operation projects between two space-fairing nations
- A mission to be conducted within an international recognised framework:
  - part of the thematic of the GEWEX programme
  - in continuity with the on going TRMM mission
  - in potential synergy with the next GPM mission
- Direct expected benefits for the tropical belt countries