



2013 PMM Science Team Meeting, Annapolis, MD

NASA HQ Welcome and Program Status

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8th Precipitation Science Team Selection

- **NASA Research Announcement (NRA)**
- **Precipitation Science Team**
- **Solicitation:** NNH12ZDA001N-PMM
- **Date Released:** February 14, 2012
- **NOIs Due:** April 30, 2012
- **Proposals Due:** June 29, 2012
- **Selection Date:** November 30, 2012
- **Funds available:** Approximately \$7.2 M/year for 3 years
- **Number of Awards:** 57 out of 129 proposals

This is in addition to 22 international Principal Investigators from 14 countries selected outside the ROSES cycle



NRA Research Categories

1. Algorithm/Product validation and enhancement

This includes enhancement of precipitation algorithms for GPM Core Observatory Sensors and GPM constellation radiometers contributing to global precipitation sampling and error characterization of satellite rainfall retrievals using ground validation (GV) and other techniques.

2. Utilization of satellite/GV products for process studies and model development

This research focus area covers climate and physical process studies utilizing satellite and GV data and the application of existing data sets to improve atmospheric and land surface models ranging from cloud-resolving to climate scales.

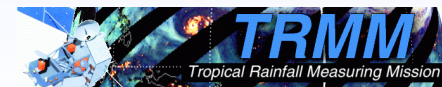
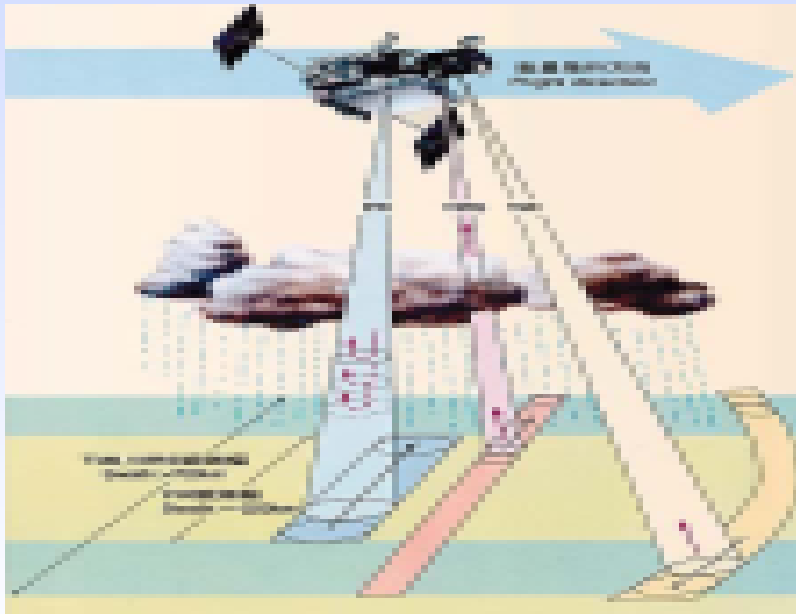
3. Methodology development for improved applications of satellite products

This research area focuses on the development of methodologies that combine information from observations and models to produce improved analyses of rainfall, downscaling of satellite rainfall estimates to hydrometeorologically relevant spatial and temporal scales, and improved application of satellite products in numerical weather prediction and data assimilation.

Tropical Rainfall Measuring Mission (TRMM)

- **Science Objective:** *Advance knowledge of global water and energy cycles through observed time and space distributions of tropical rainfall, hydrometeor structure and latent heating.*
- **Approach:** *Accurate estimation of precipitation characteristics through first-time use of passive and active microwave instruments.*

- **Joint NASA/JAXA mission** launched in Nov. 1997 into inclined (35°) orbit; spacecraft and instruments in excellent condition
- **Program:** NASA's Precipitation Measurement Missions (PMM); PMM science team covers TRMM and GPM
- **Instrument Payload:**
 - TRMM Microwave Imager (TMI)
 - 10, 19, 37, 86 GHz, conical scanning
 - Precipitation Radar (PR) [Japan]
 - 14 GHz, cross-track scanning
 - Lightning Imaging Sensor (LIS) [MSFC]
 - Staring optical array
 - Visible IR Scanner (VIRS)
 - 5-channel, cross-track scanning
 - Cloud & Radiant Energy System (CERES) [LRC]
 - Radiation budget (failed after 6 mos.)

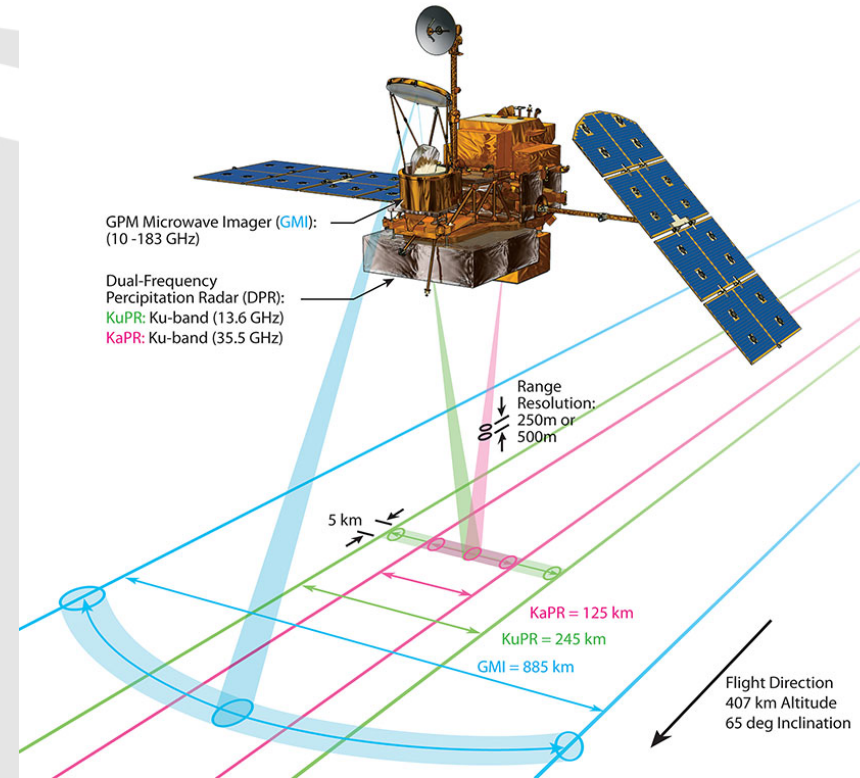


Dual-Frequency (Ku-Ka band) Precipitation Radar (DPR):

- Increased sensitivity (~12 dBZ) for light rain and snow detection relative to TRMM
 - Better measurement accuracy with differential attenuation correction
- Detailed microphysical information (DSD mean mass diameter & particle no. density) & identification of liquid, ice, and mixed-phase regions

Multi-Channel (10-183 GHz) GPM Microwave Imager (GMI):

- Higher spatial resolution (IFOV: 6-26 km)
 - Improved light rain & snow detection
 - Improved signals of solid precipitation over land (especially over snow-covered surfaces)
 - 4-point calibration to serve as a radiometric reference for constellation radiometers

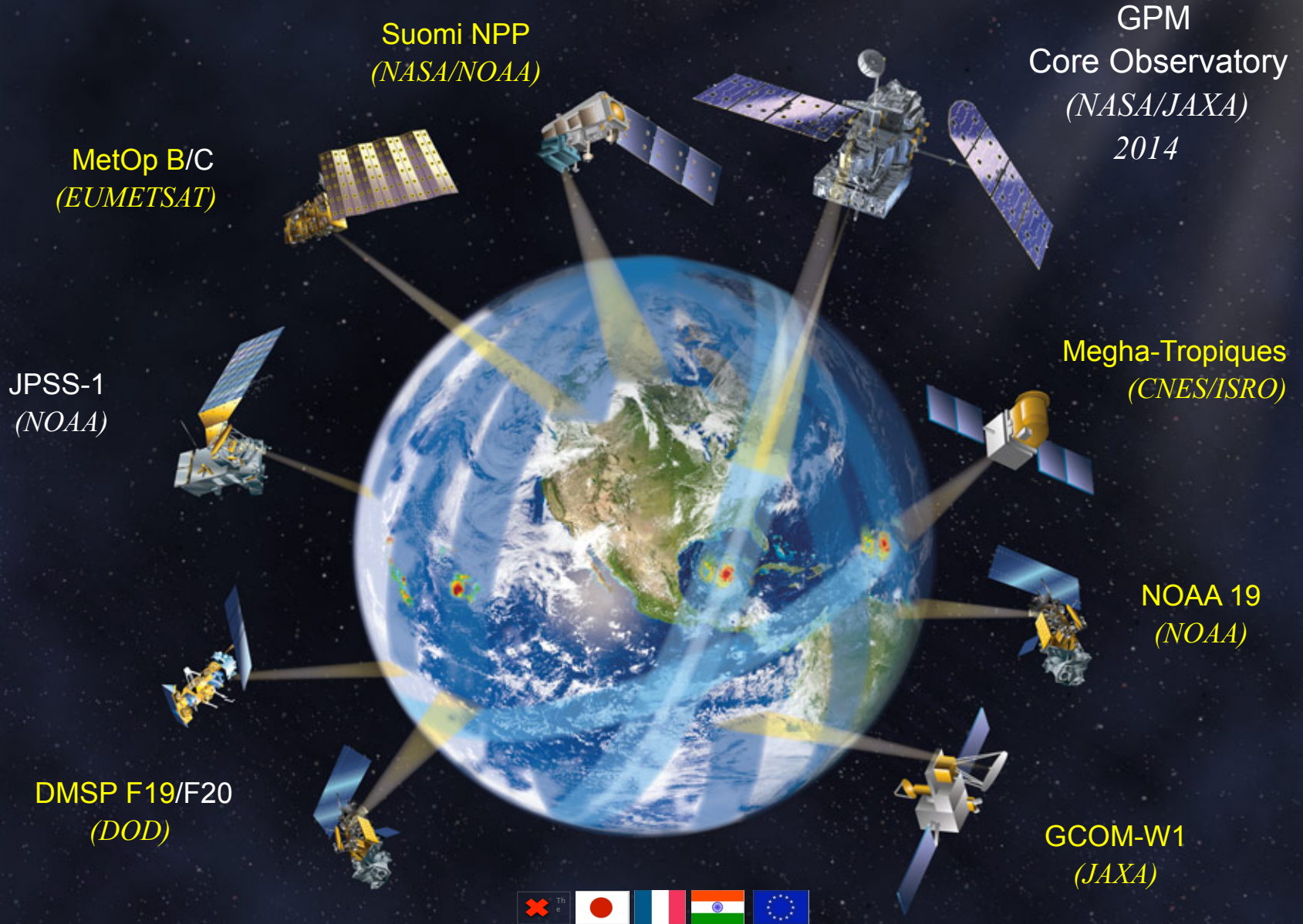


Combined Radar-Radiometer Retrieval

- DPR & GMI together provide greater constraints on possible solutions to improve retrieval accuracy
 - Observation-based a-priori cloud database for constellation radiometer retrievals



GPM Constellation of Satellites



Next-Generation Unified Global Precipitation Products Using GPM Core Observatory as Reference



GPM and TRMM Status

- GPM Project is in Phase D (System Integration & Test) environmental testing
 - The Core Observatory completed Thermal Vacuum/Thermal Balance testing in January
 - Preparations are underway for EMI, vibration/acoustics, and shock/separation testing
 - All “at launch” L2 and L3 algorithms delivered to Precipitation Processing System (PPS) and are under test
- NASA and JAXA are working to a February 2014 Launch Readiness Date
- TRMM will complete 15 years of on-orbit operations on November 27, 2012 (with 11+ years at 402 km and 3+ years at 350 km)
- Based on current fuel consumption expectations, TRMM data could be available into **2014-2015**, providing the potential for some overlap with GPM



GPM Core Observatory at GSFC





TV/TB testing completed on January 14th

