From TRMM to GPM: Advancing Precipitation Observations for Science and Society

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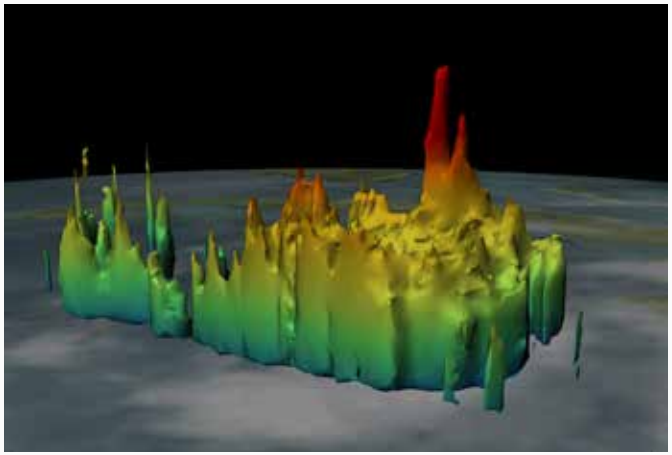
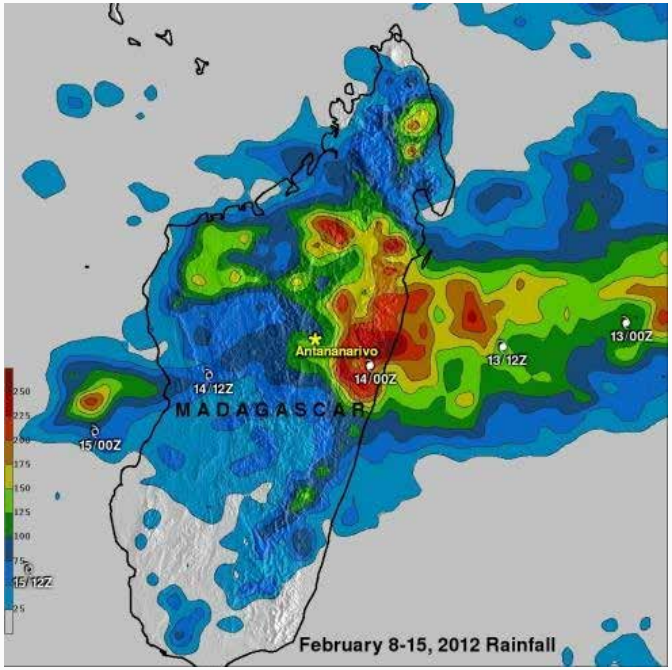
Tropical Rainfall Measuring Mission

- Launched in 1997 to measure tropical rainfall
- Currently has a 17-year record of precipitation from ~35 ° North to 35 ° South
- Partnership between NASA and the Japan Aerospace Exploration Agency (JAXA)
- Data at http://trmm.gsfc.nasa.gov

GPM instrument enhancements and improved retrievals estimate light rainfall and snow typically found in higher latitudes

Hot Towers observed in Hurricane Wilma

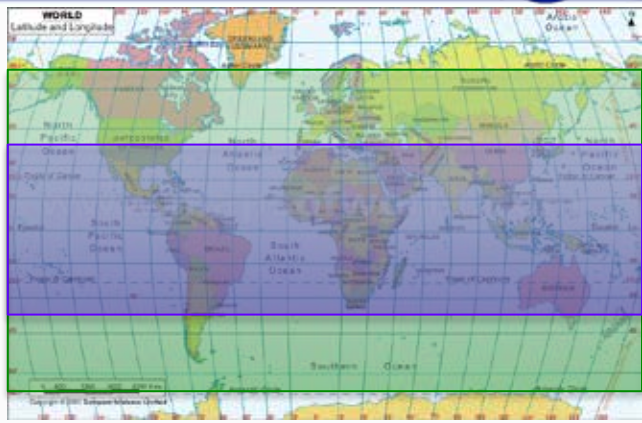


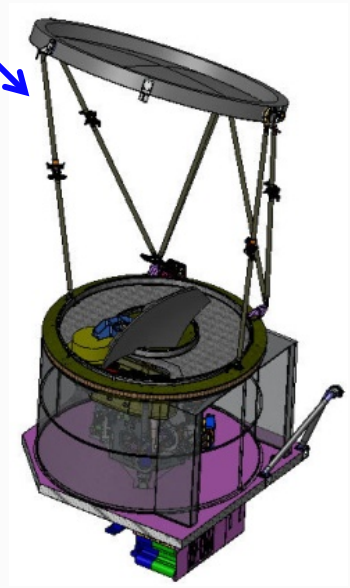


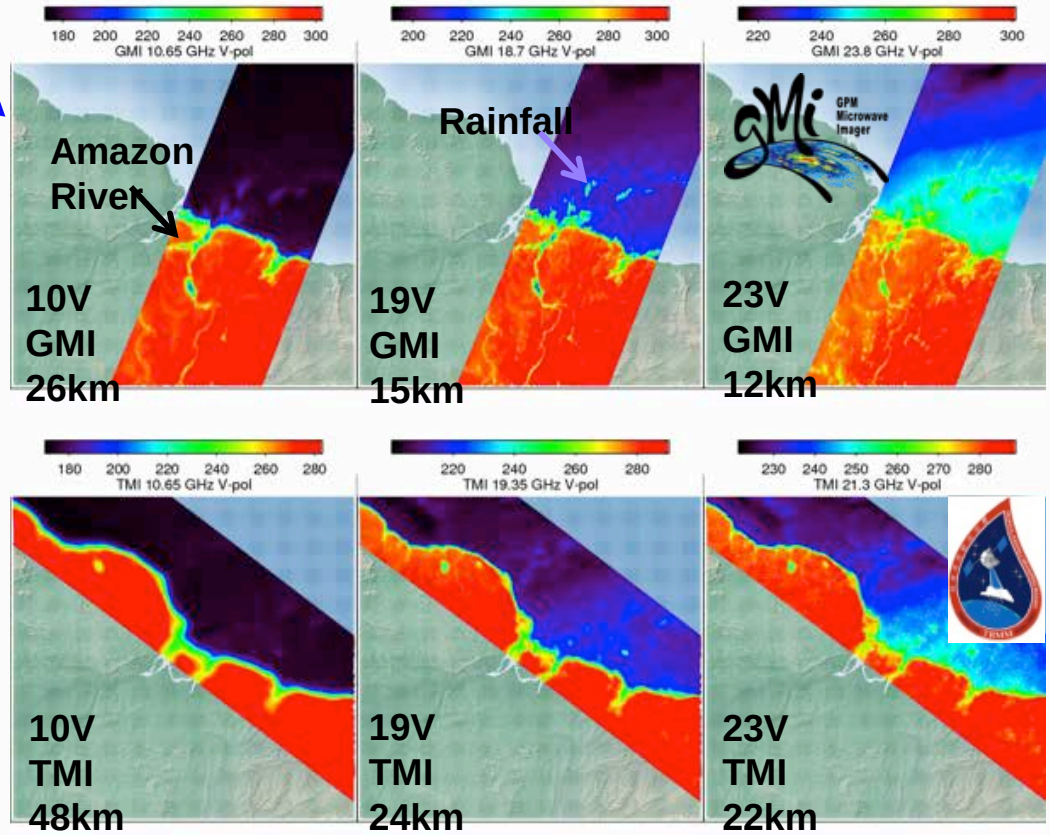
Rainfall Accumulation from Tropical Cyclone Giovanna, triggering deadly floods in Madagascar

GPM Enhancements Compared to TRMM

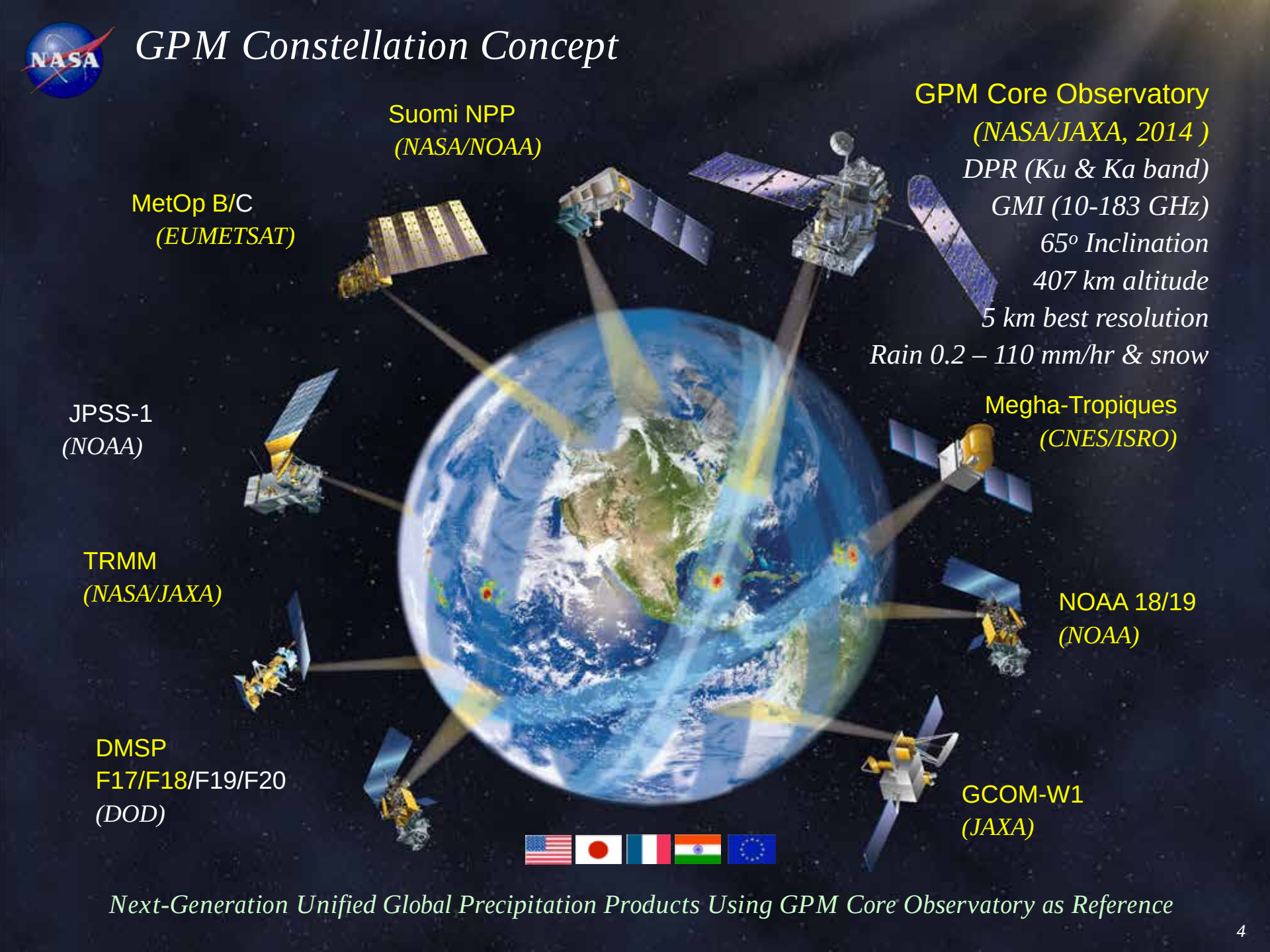
- Increased Earth Coverage
- Advanced Instruments
  - Dual Freq. Precipitation Radar (DPR)
  - GPM Microwave Radiometer (GMI)
- Finer spatial resolution
- Well designed GMI radiometer (unifies partner estimates)







GPM Constellation Concept



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

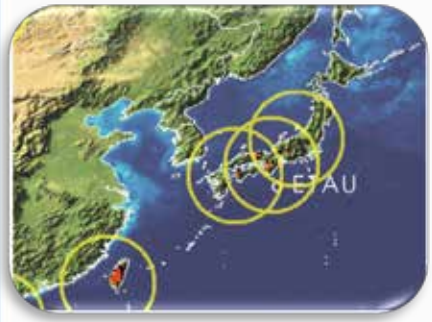
GPM: A science mission with integrated application goals

Science Objectives:

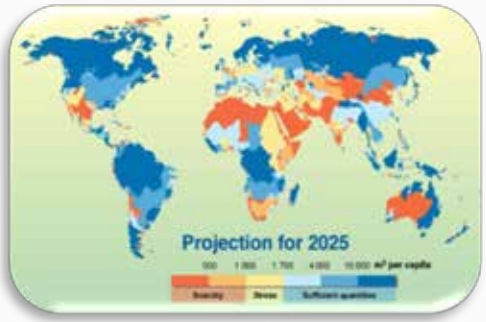
- New reference standards for precipitation measurements from space
- Improved knowledge of water cycle variability and freshwater availability
- Improved numerical weather prediction skills
- Improved climate prediction capabilities
- Improved predictions for floods, landslides, and freshwater resources

Societal Benefits:

Floods and Landslides

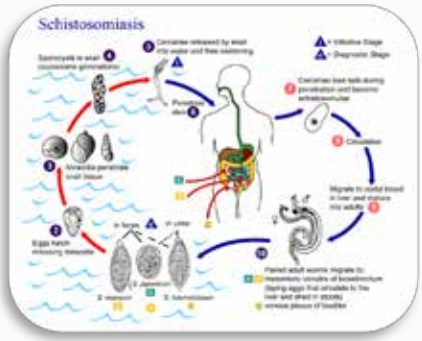


Freshwater Availability/ Agriculture/Famine



Extreme Events

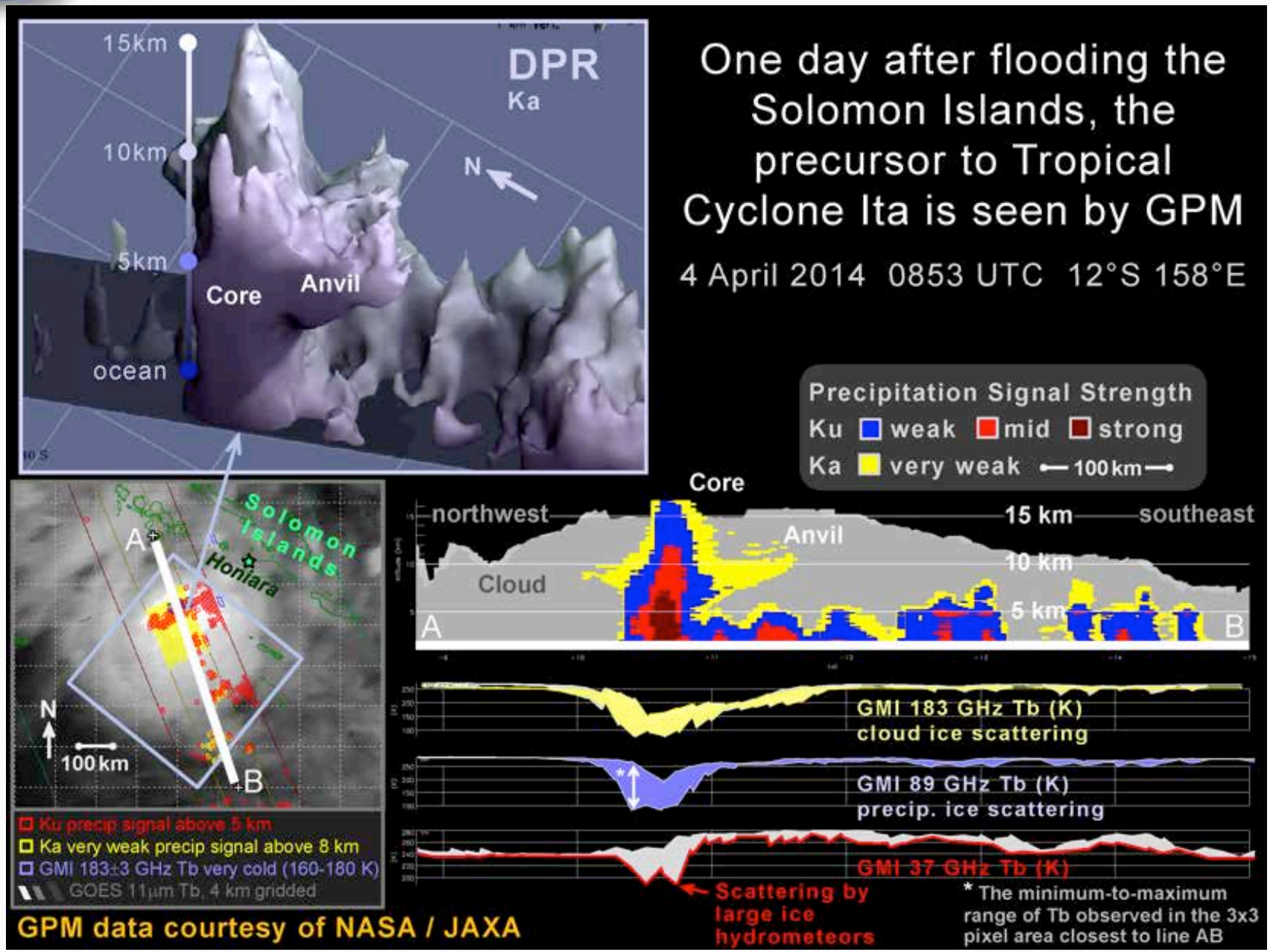
World Health



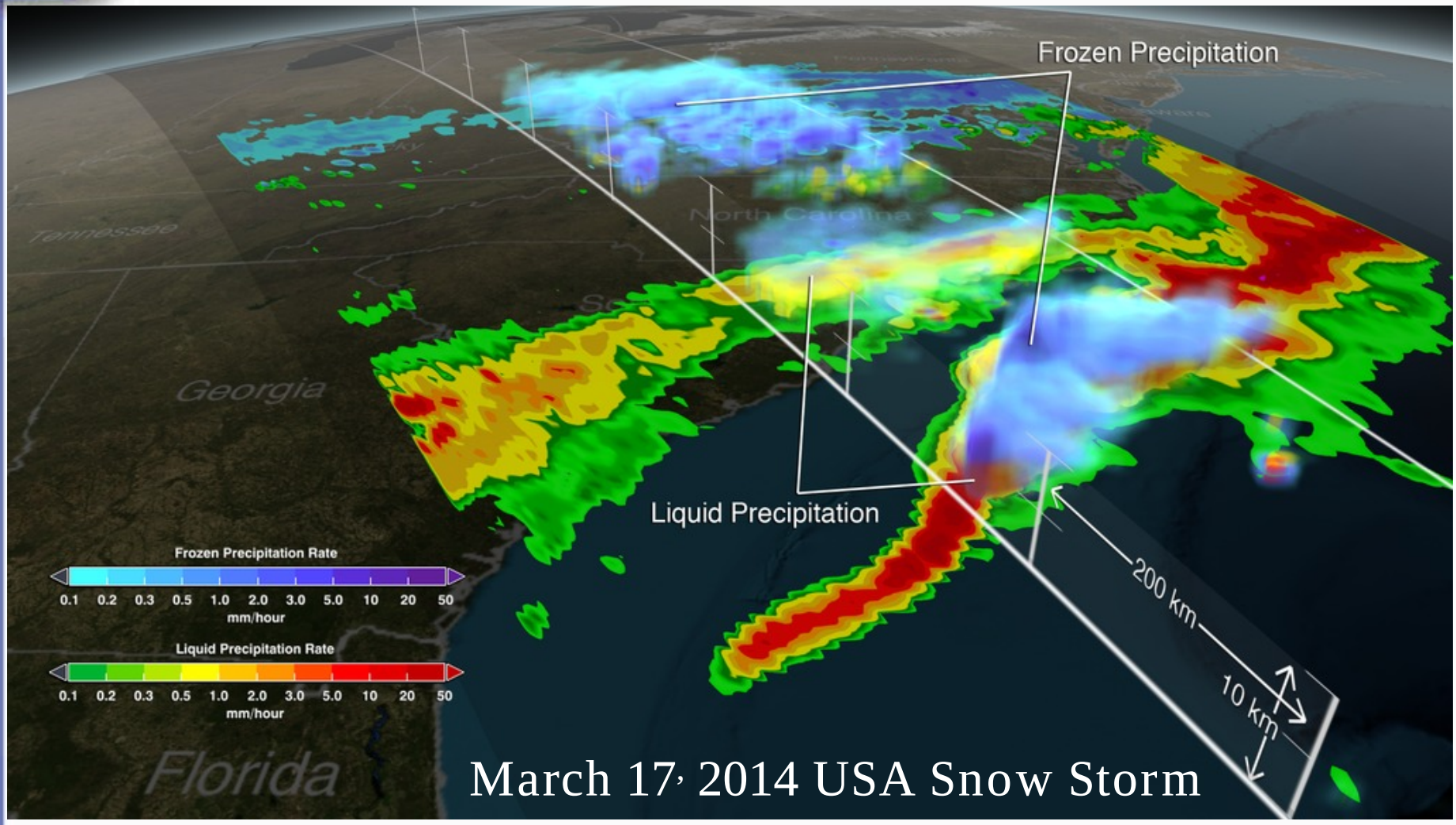
Applications & Users:

Cyclones, Re-insurance, Famine Early Warning, drought, water resource management, Agriculture, Numerical Weather Prediction, Land System Modeling, Global Climate Modeling Disease tracking, Animal migration, Food Security

GPM Core Observatory: New Scientific Capabilities

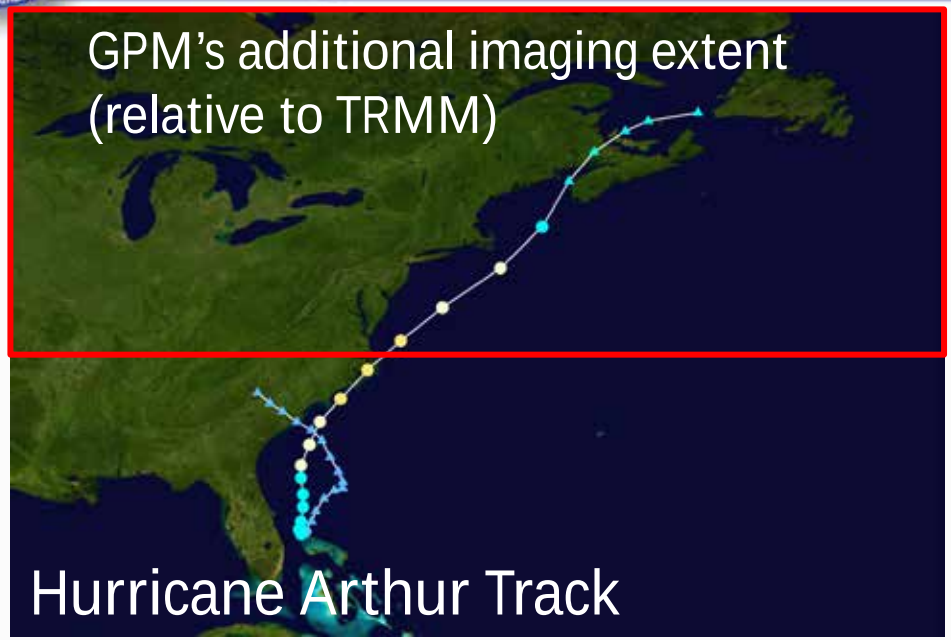


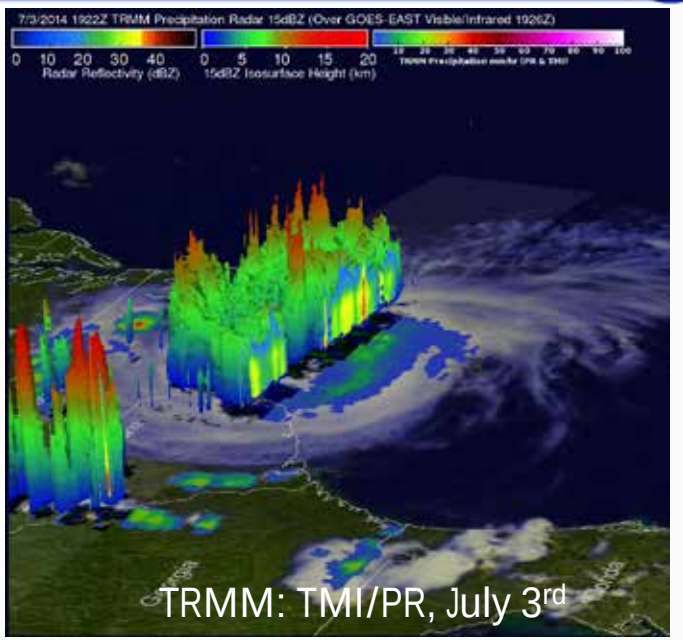
GPM Measures Falling Snow



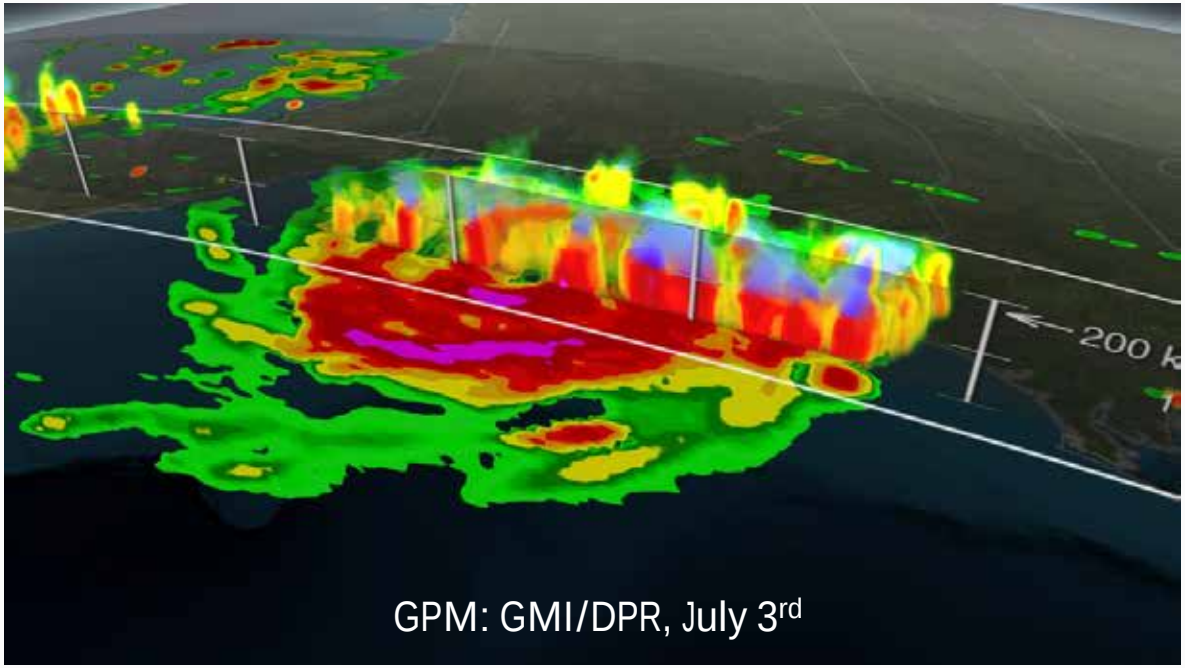
On March 17, 2014 the Global Precipitation Measurement (GPM) mission's Core Observatory flew over the East coast's last snow storm of the 2013-2014 winter season. This was also one of the first major snow storms observed by GPM shortly after it was launched on February 27, 2014. Visualization: http://svs.gsfc.nasa.gov/cgi-bin/details.cgi?aid=4173

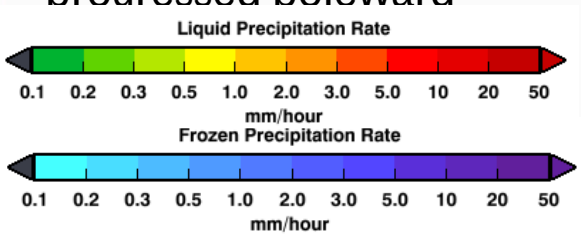
Observing Hurricane Arthur, 2014





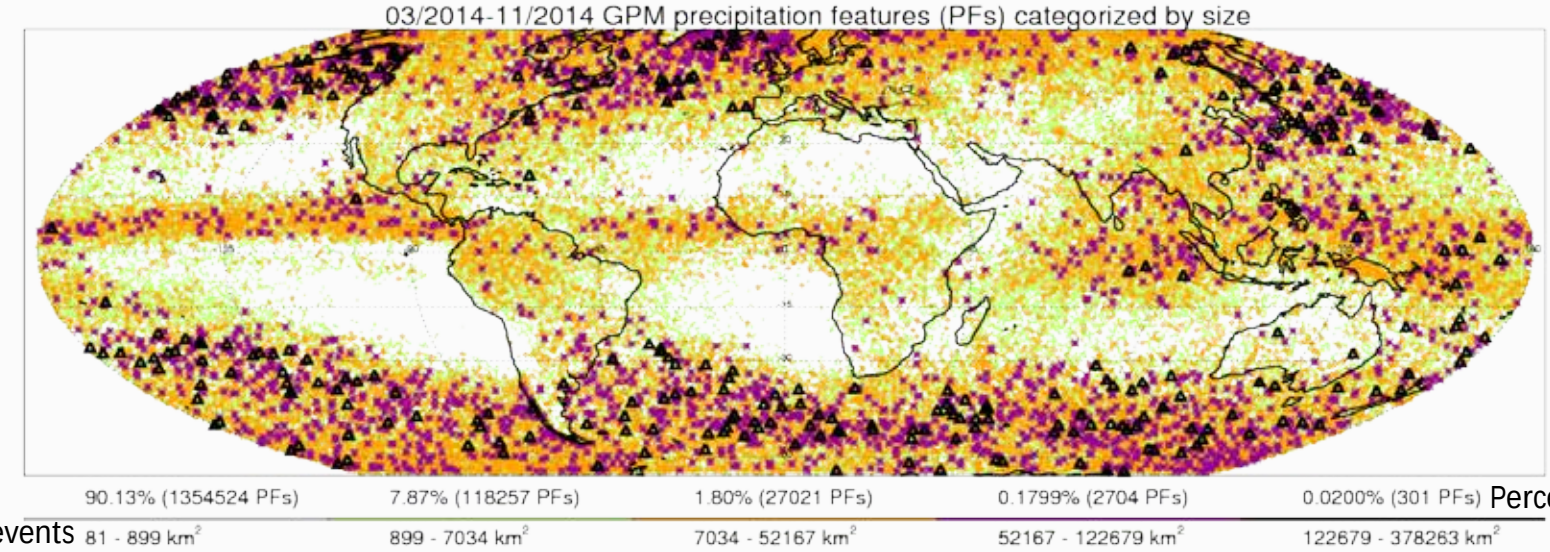
Hurricane Arthur affected the East Coast of the U.S. from July 1-7th. TRMM and GPM viewed the storm multiple times throughout its lifecycle. GPM was able to view the storm as it progressed poleward



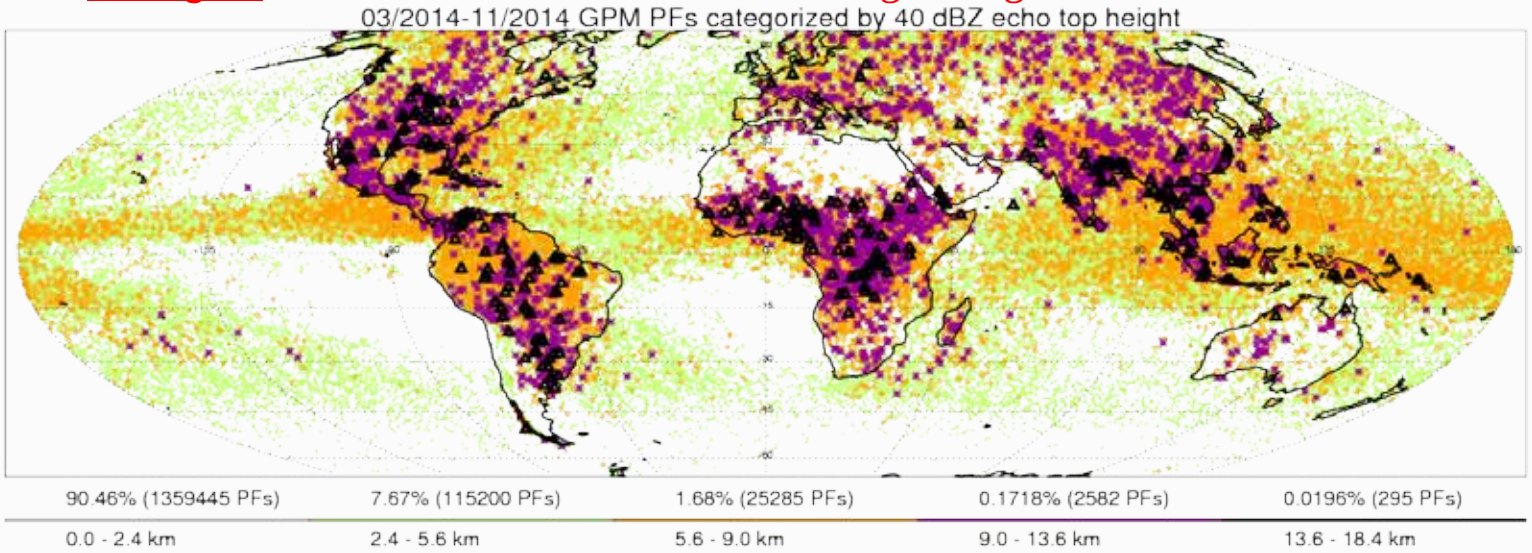


GPM's Largest & Strongest Precipitation Systems

The most ***extensive*** precipitation systems are found over mid and high latitude ocean



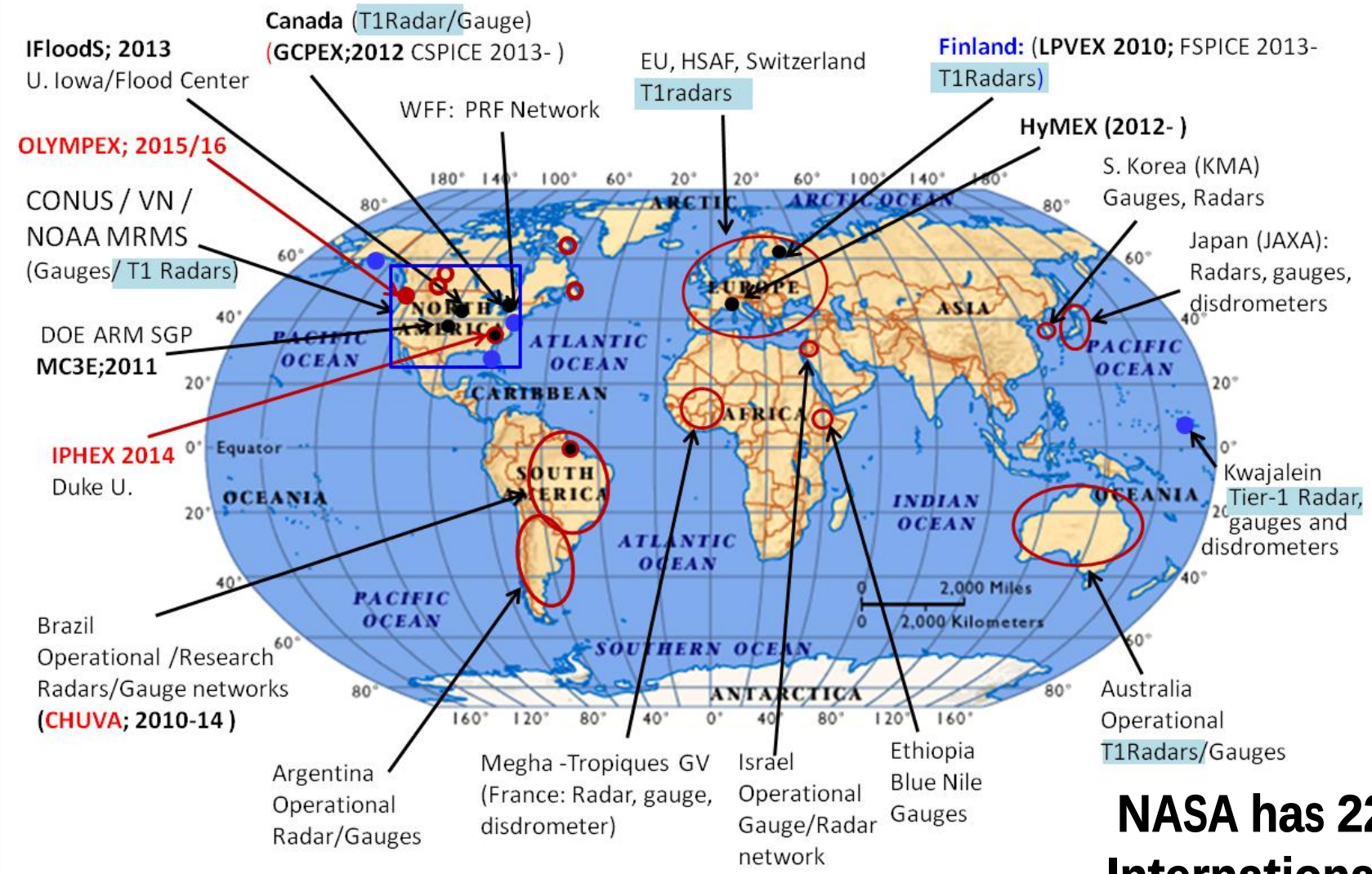
The ***strongest*** storms such as hailstorms and lightning storms are dominant over land



Credit: Chuntao Liu, Texas A&M – Corpus Christi

Ground Validation is Interagency & International

GPM is a global mission with an international team



NASA has 22 International Partners

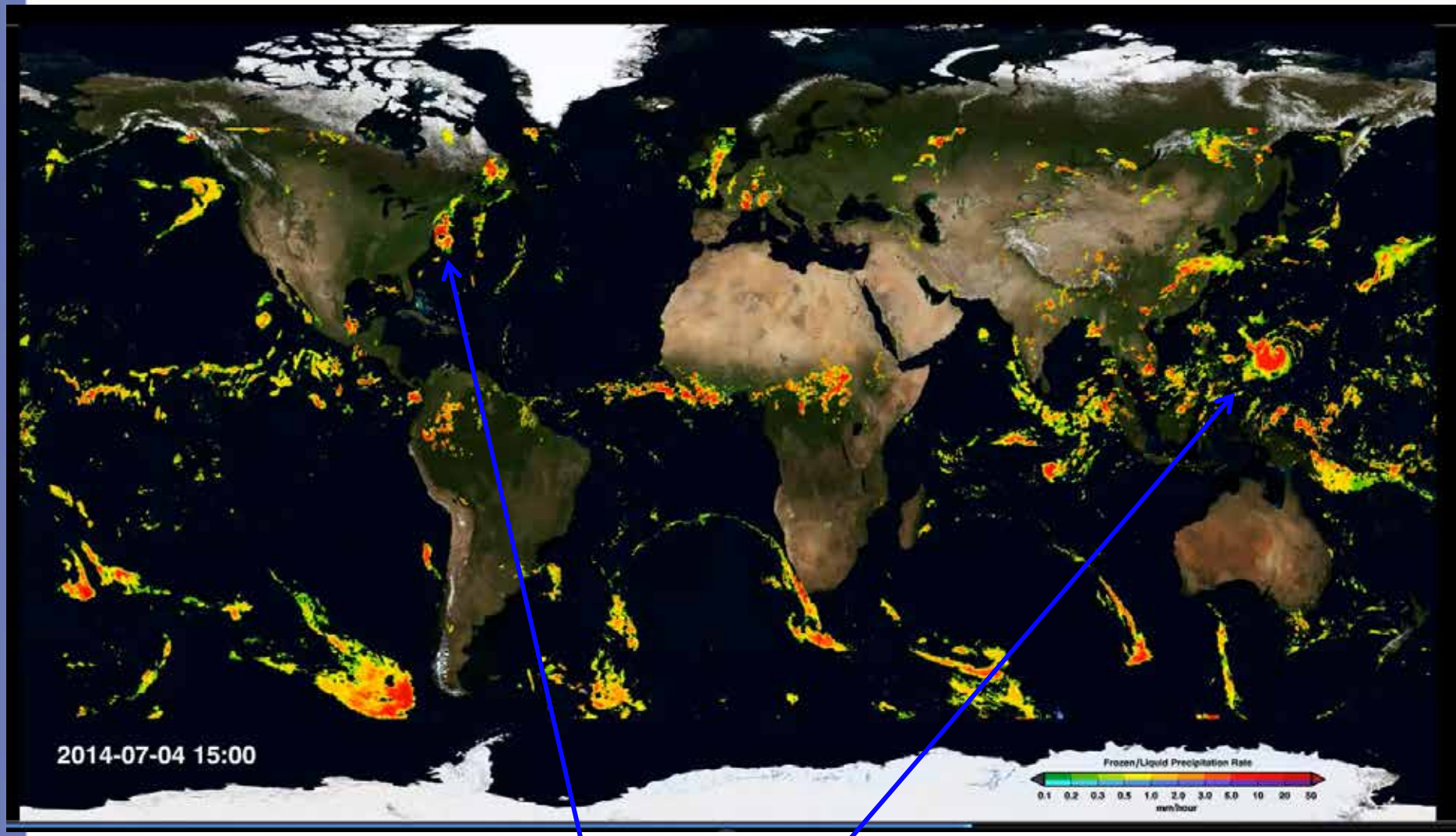
GPM Data Milestones

- **June/July 2014 (early release)**: GMI Data with precipitation rates released as swath data to the public
- **September 2014**: DPR & Combined DPR+GMI precipitation rate data released
- **January 2015**: NASA's Integrated Multi-Satellite Retrievals for GPM (IMERG) released
- **March 2015**: Release of IMERG Real-time products
- **Early 2016**: Expect to compute the first-generation TRMM/GPM-based IMERG archive, 1998-present

All data is freely distributed through NASA's Precipitation Processing System (PPS) at GSFC: http://pps.gsfc.nasa.gov

GMI products were released early due to exceptional GMI performance and to support operational forecasters for the 2014 Hurricane Season (*e.g.*, Navel Research Lab)

IMERG: Integrated Multi-satellitE Retrievals for GPM



Hurricane Arthur

Typhoon Neoguri

NASA Communications & Education Outreach

Videos

In a data-processing room at NASA's GSFC, racks of high-powered computers are getting ready to make a global map. Link

Just three percent of the water on our planet is freshwater. This video explores how our most precious resource is used, Link

Raindrops are actually shaped a hamburger bun. This new video from GPM explains why. Link

Feature Articles

Of stars and stripes: NASA satellites used to predict zebra migrations

http:/gpm.nasa.gov/education

For more information on the TRMM and GPM Missions:

http://gpm.nasa.gov; http:/gpm.nasa.gov/education

www.nasa.gov/gpm

Twitter: NASA_Rain (11K followers) Facebook: NASA.Rain (>20K)

GLOBAL PRECIPITATION MEASUREMENT