Global Precipitation Measurement Mission Overview & NASA Status

Gail Skofronick Jackson

GPM Project Scientist

(appointed 14 January 2014)

Replacing Dr. Arthur Hou

(1947-2013)

NASA Goddard Space Flight Center

Japanese FY25 PMM Meeting

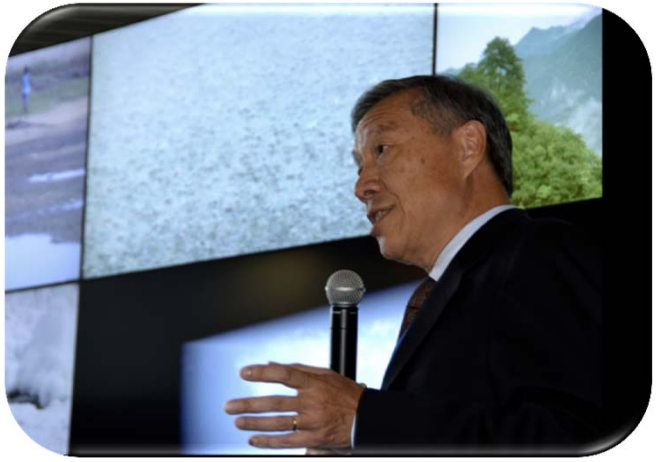
Tokyo, Japan

15-17 January 2014

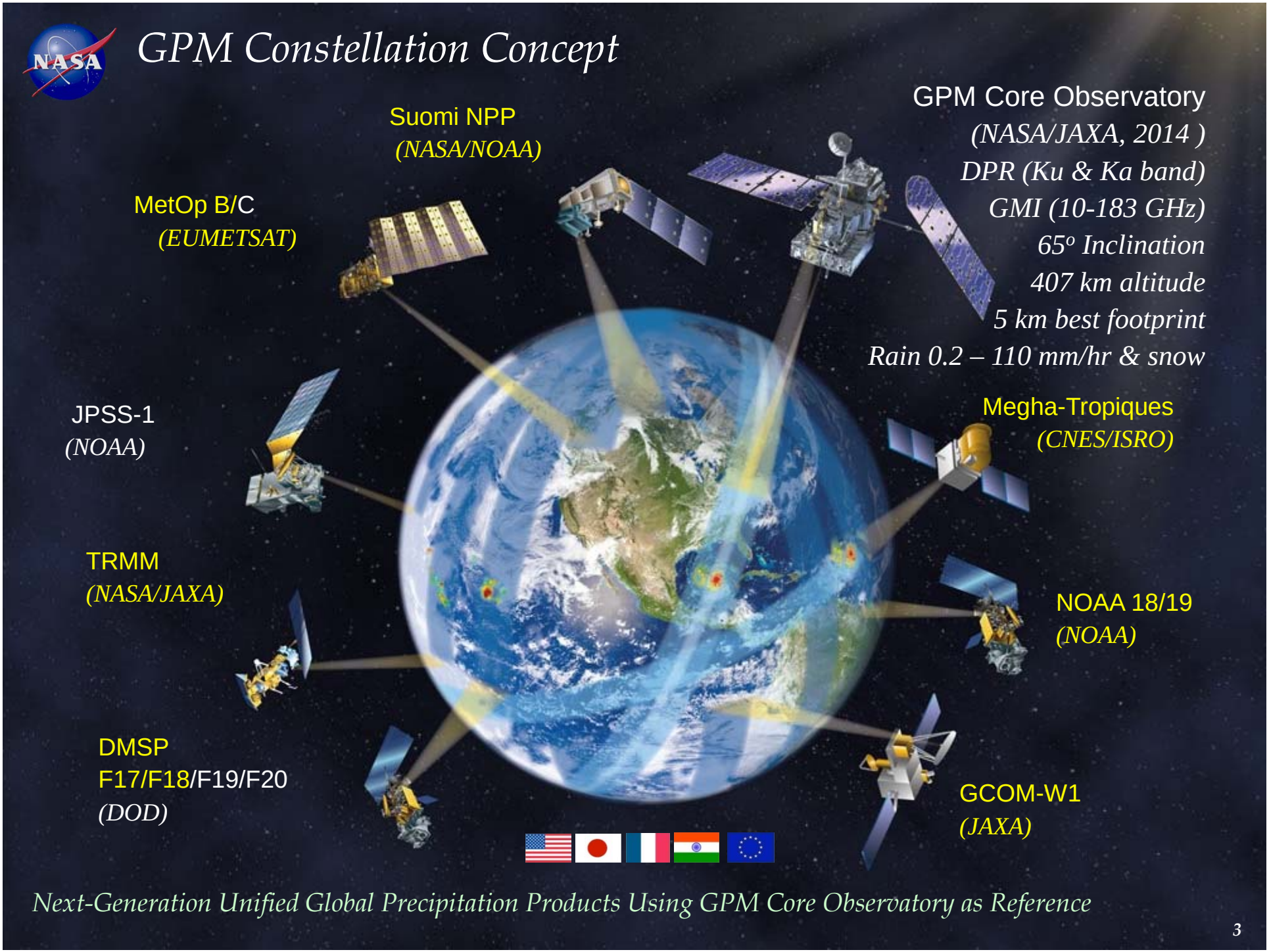
Dr. Arthur Hou (1947-2013)

GPM Project Scientist

Dr. Arthur Hou was an exemplary project scientist who kept the GPM flame alive during the various challenges as the project was being formulated and developed. He excelled in providing scientific oversight for achieving GPM's many science objectives and application goals. Dr. Hou was not only a superb scientist; he was also a gracious and thoughtful person. He forged international friendships with colleagues and partners around the world. His presence, leadership and generous personality set an example for all of us to follow. He was the consummate team player and will be greatly missed.

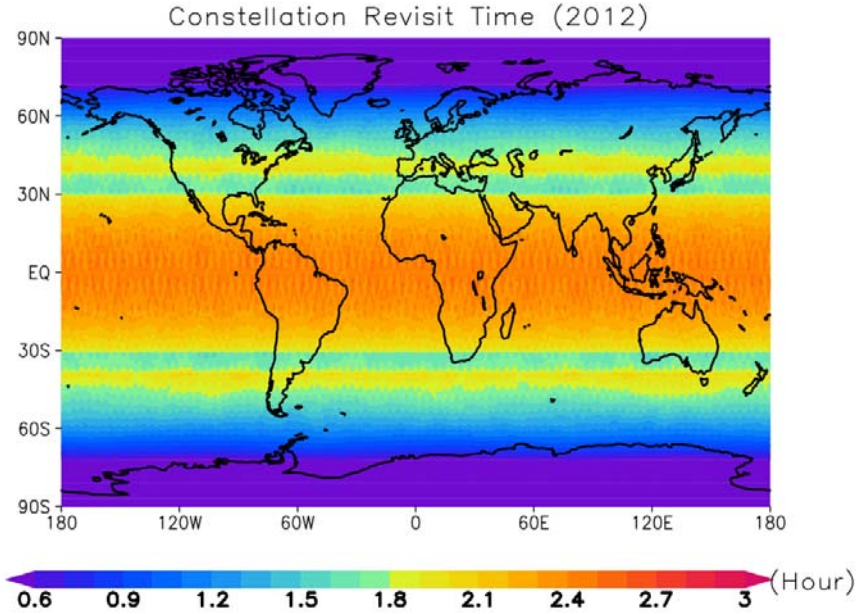


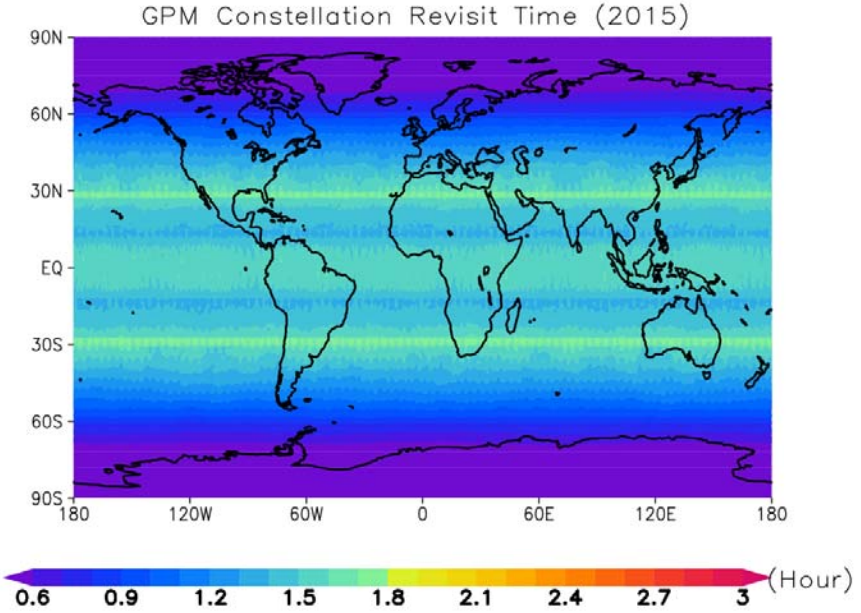
GPM Constellation Concept

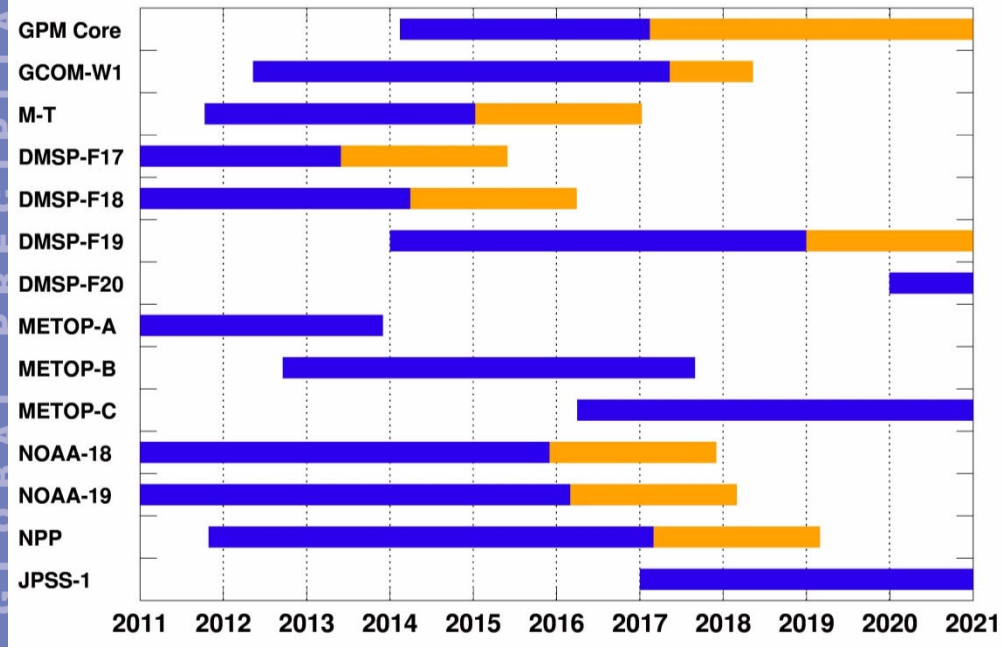


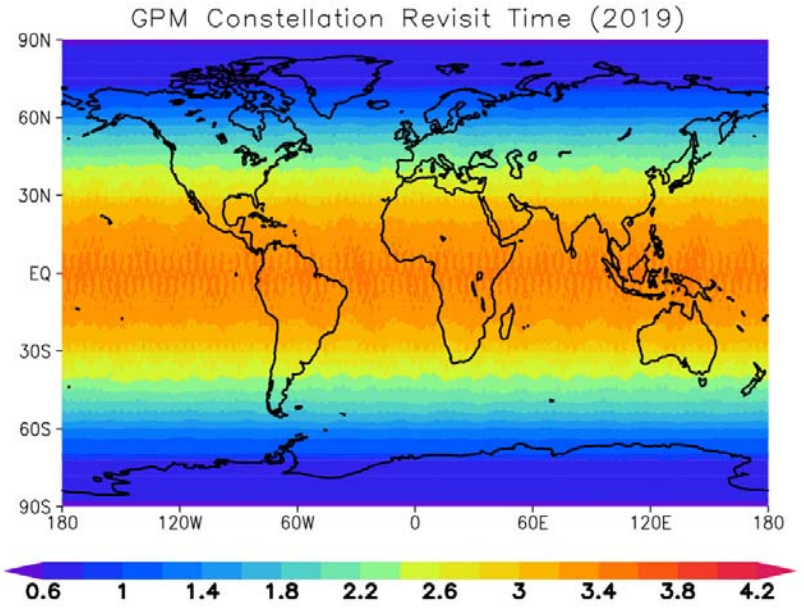
Next-Generation Unified Global Precipitation Products Using GPM Core Observatory as Reference

Temporal Sampling with GPM Constellation

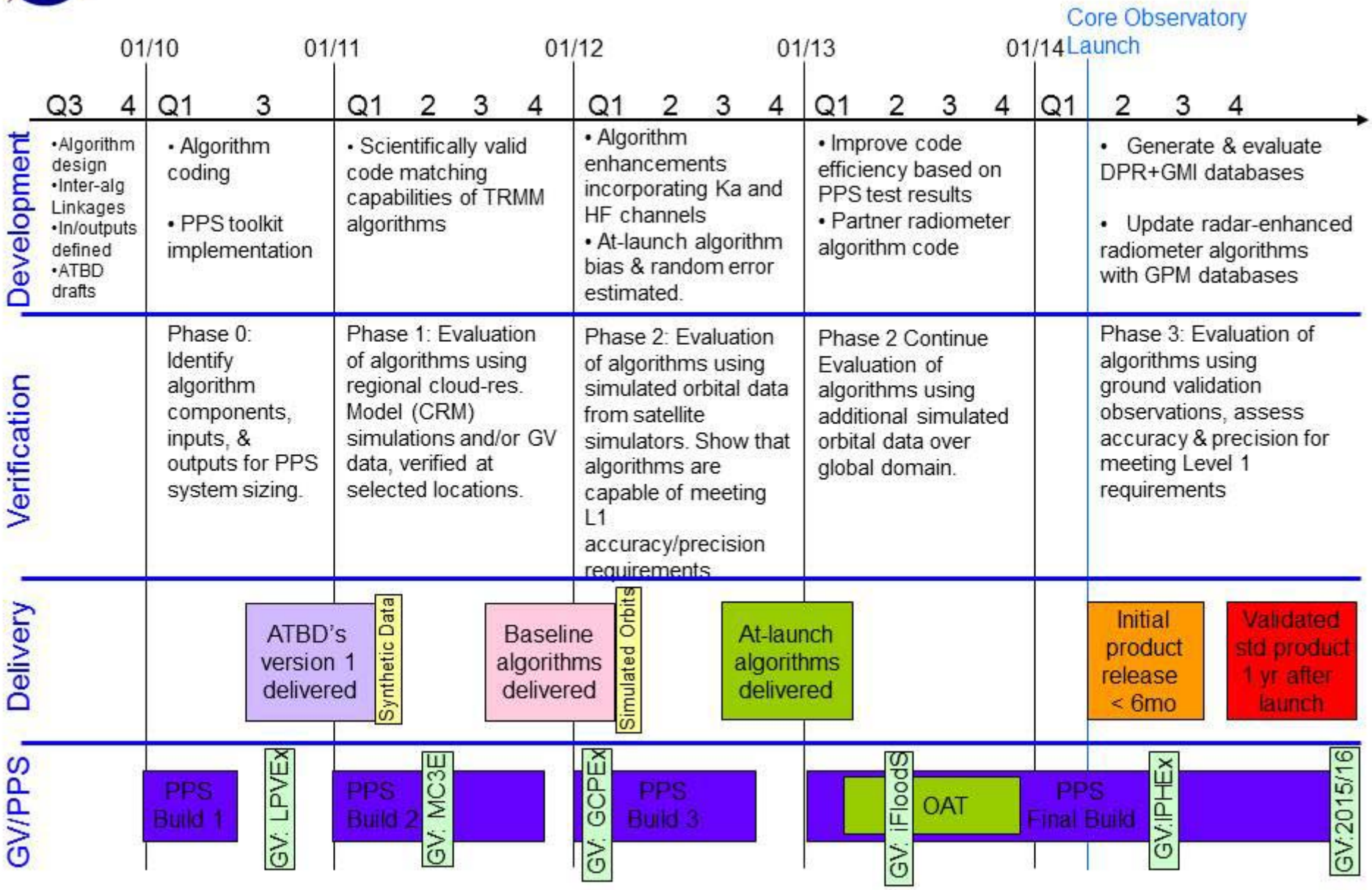








GPM Integrated Algorithm-GV-PPS Development Schedule



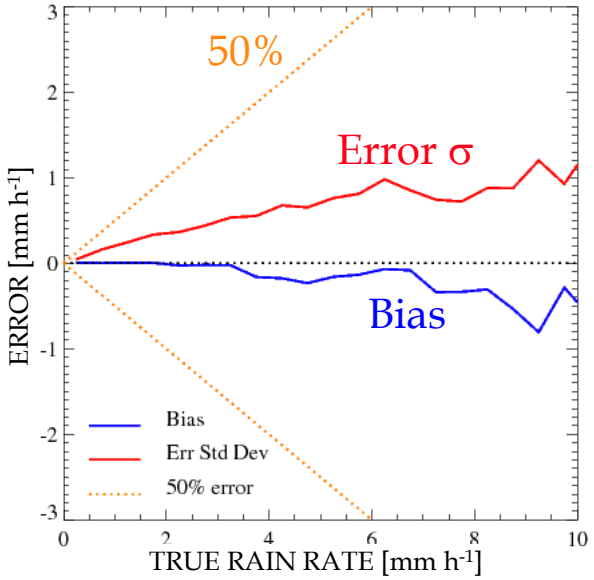
Product Listing

	Product Level	Description	Coverage
L1	Level 1B GMI Level 1C GMI *Latency ~1 hour*	Geolocated Brightness Temperature and intercalibrated brightness temperature	Swath, instrument field of view (IFOV)
L1	Level 1B DPR	Geolocated, calibrated radar powers	Swath, IFOV (produced at JAXA)
L1	Level 1C, partner radiometers	Intercalibrated brightness temperatures	Swath, IFOV
L2	Level 2 GMI *Latency ~1 hour*	Radar enhanced (RE) precipitation retrievals	Swath, IFOV
L2	Level 2 partner radiometers	RE precipitation retrievals from 1C	Swath, IFOV
L2	Level 2 DPR *Latency ~3 hours*	Reflectivities, Sigma Zero, Characterization, DSD, Precipitation with vertical structure	Swath, IFOV (Ku, Ka, combined Ku/Ka)
L2	Level 2 combined GMI/DPR *Latency ~3 hours*	Precipitation	Swath, IFOV (initially at DPR Ku swath and then at GMI swath)
L3	Level 3 Latent Heating (GMI, DPR, Combined)	Latent Heating and associated related parameters	0.25 x 0.25 monthly grid
L3	Level 3 Instrument Accumulations	GMI, partner radiometers, combined and DPR	0.25 x 0.25 monthly grid
L3	Level 3 Merged Product	Merger of GMI, partner radiometer, and IR	0.1 x 0.1 at a 30 minute grid
L3	Level 4 Products	Model Assimilated with partner data	Fine temporal and spatial scale TBD

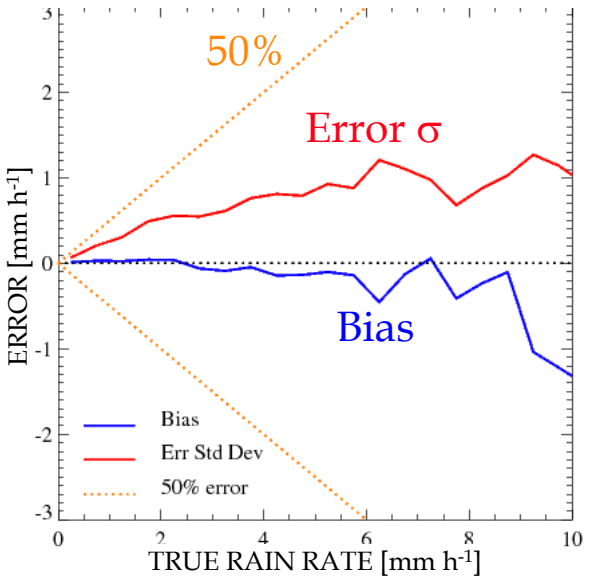
Combined Algorithm Pre-Launch Status

GLOBAL PRECIPITATION MEASUREMENT

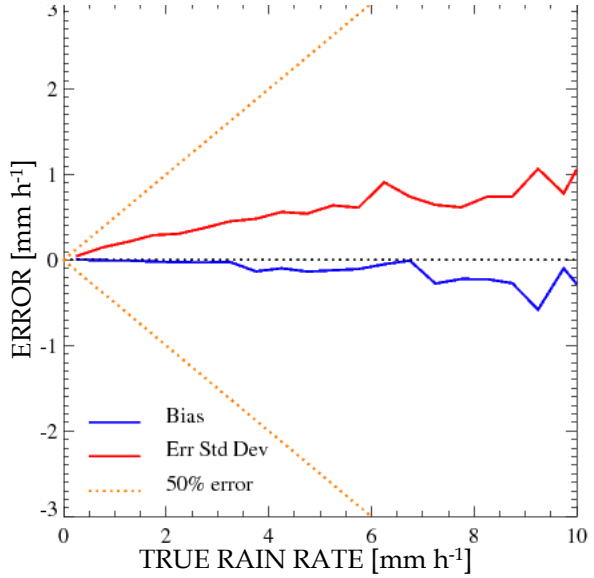
Ocean Error from Ku/Ka Z & PIA



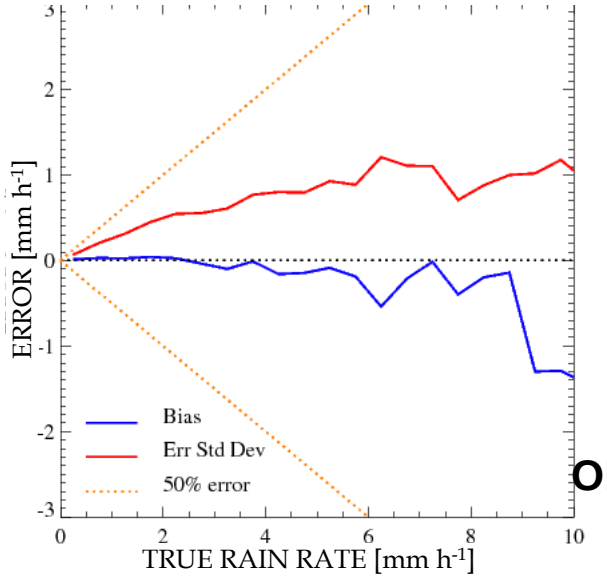
Land Error from Ku/Ka Z & PIA



Error from Ku/Ka Z & PIA, &TB



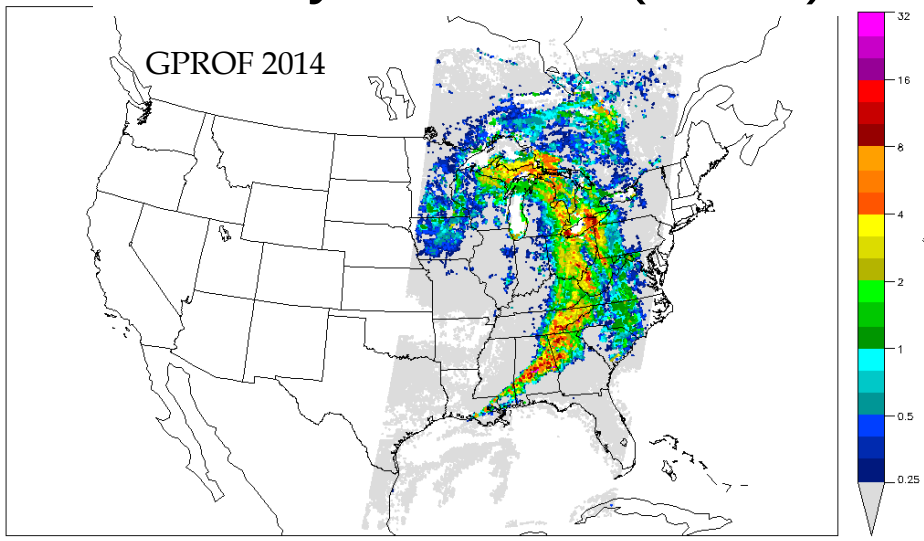
Error from Ku/Ka Z & PIA, &TB



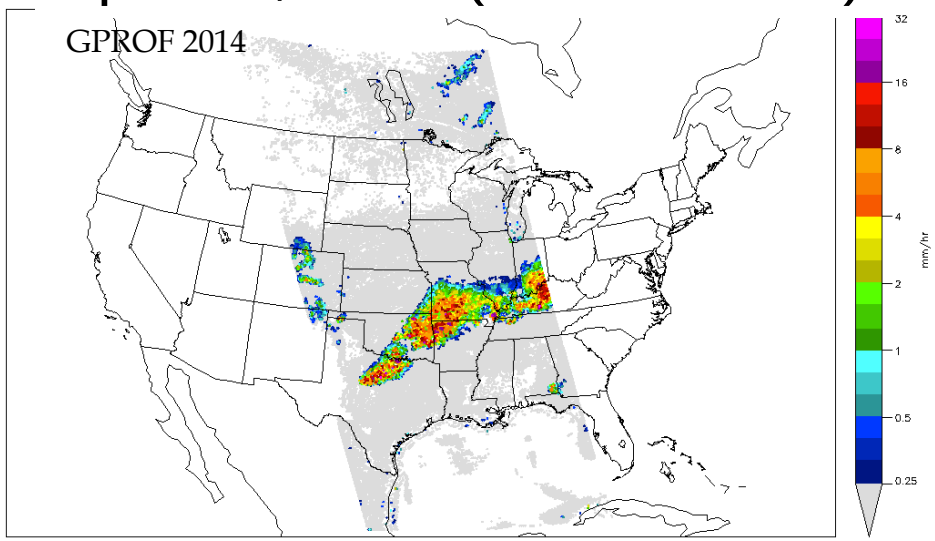
Olson (NASA)

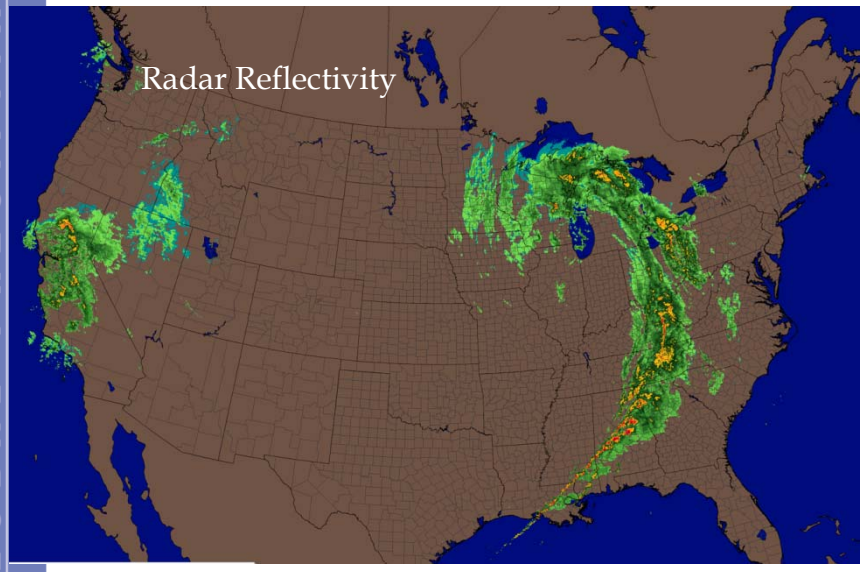
Radiometer Algorithm Pre-Launch Status

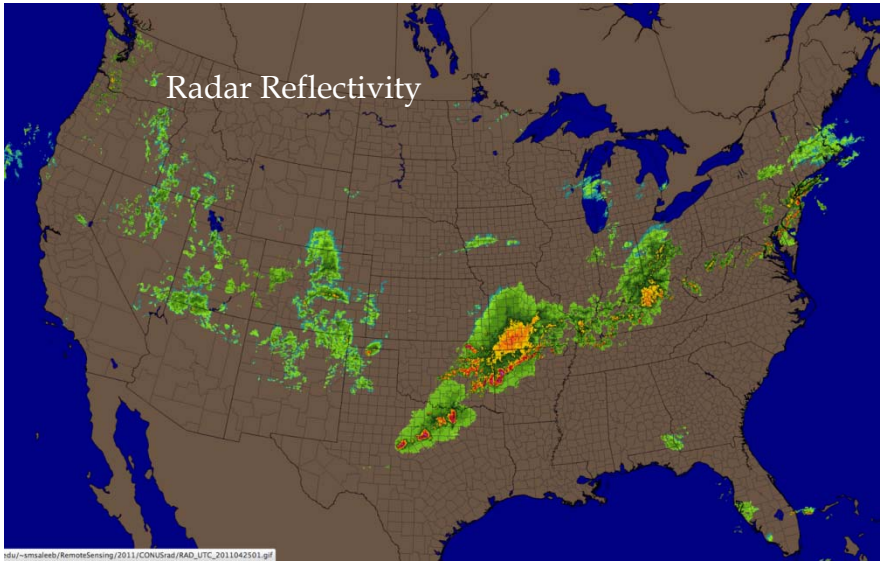
January 23, 2012 (Snow)



April 25, 2011 (Intense Rain)







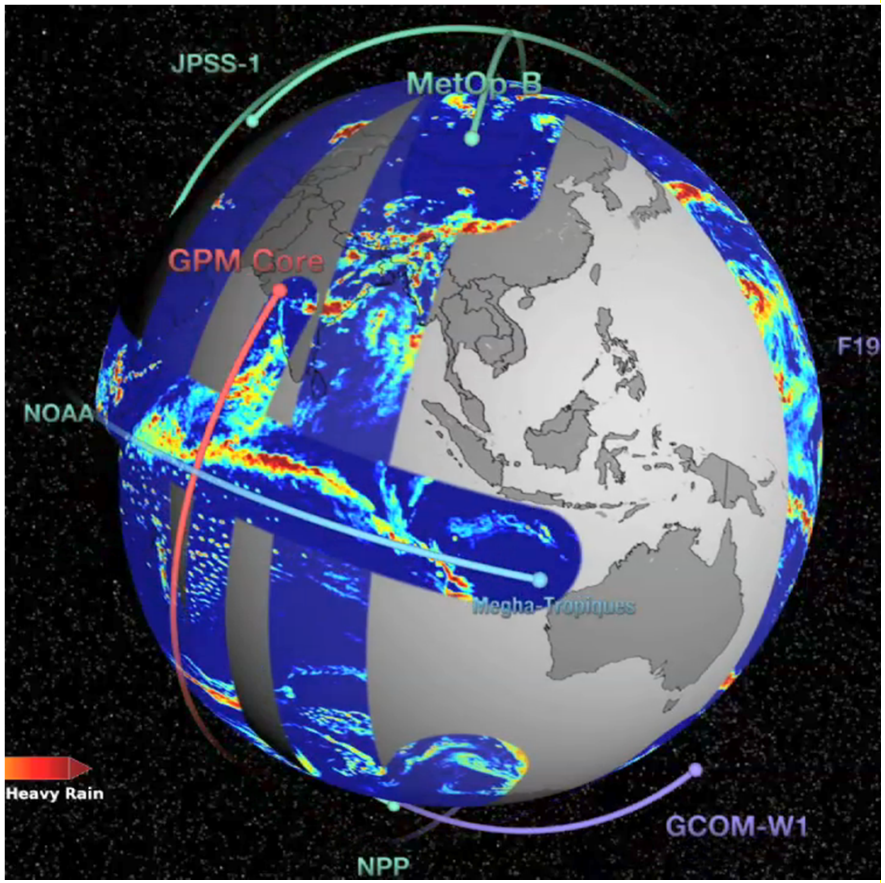
Using GMI for Inter-satellite Cross-Calibration

Must ensure that there are no biases in brightness temperatures from different constellation sensors

GMI engineering added special features to reduce common radiometer calibration problems.

Science expects the radiometer and its calibration to work flawlessly, however, science team members (X-CAL WG) will look for the unexpected.

X-CAL has already delivered calibration corrections for AMSR 2, SSMIS (16, 17 & 18), MHS (NOAA & Metop A), SAPHIR and SSM/I (F13, 14 & 15) and will deliver ATMS and Metop B MHS values 2/2014.



Using GMI for Uniform Precipitation Observations

Use the "same" Bayesian *a priori* database for all constellation radiometer precipitation retrievals

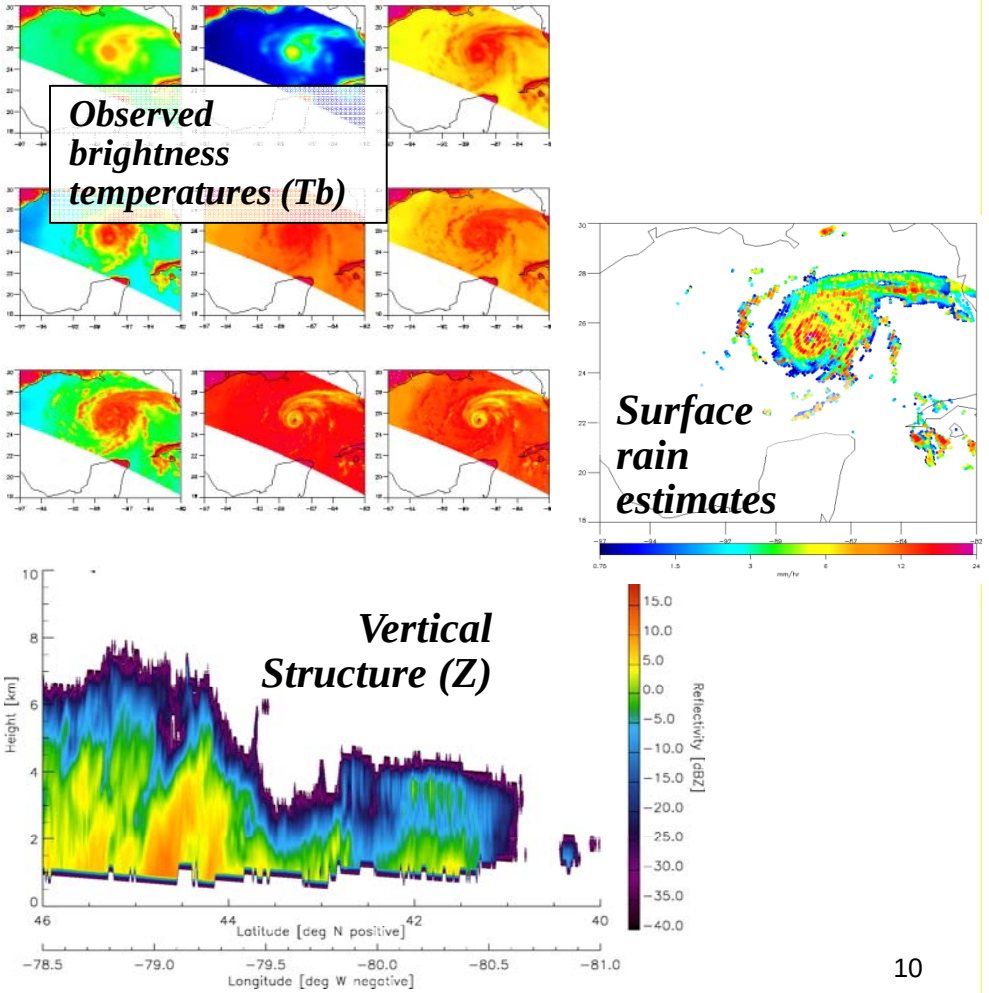
Unify precipitation retrievals using a common hydrometeor database constructed from combined DPR+GMI measurements.

At-Launch GMI and constellation algorithms rely on a proxy database consisting of PR+TMI, SSMIS+ground radar, MHS+ground radar, & models.

Proxy database to be replaced with GMI brightness temperatures and the combined algorithm DPR+GMI estimates.

GPM's database from DPR+GMI obs.

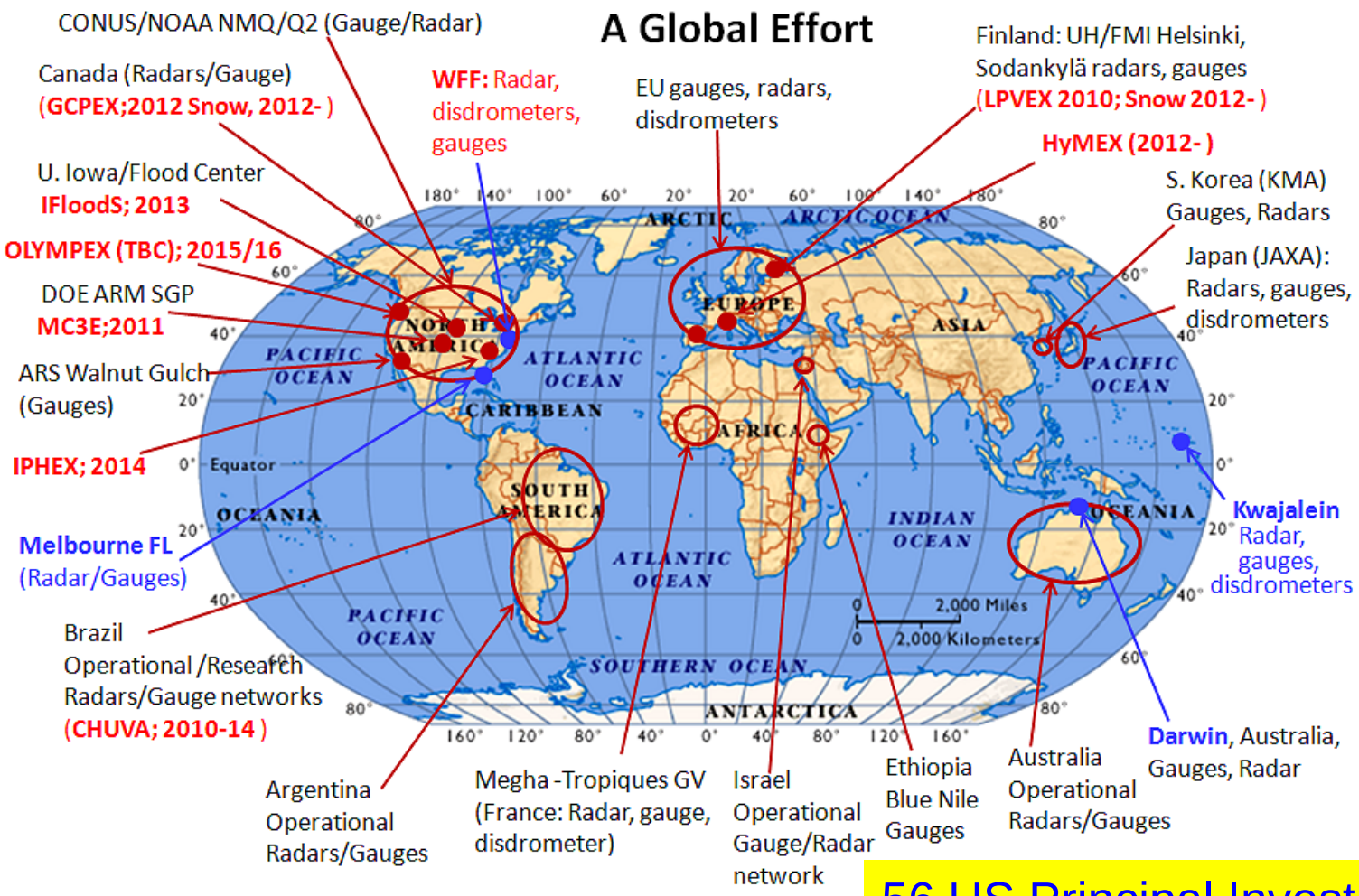
Observed T_b, Z, & combined retrievals



IMERG (NASA Level 3 GPM Product)

- IMERG is a unified U.S. algorithm combining diverse input estimates into the longest, most detailed record of "global" precipitation.
- 0.1°x0.1°; 30 min; 1998-present; Multiple product latencies: Early (~4 hr), Late (~12 hr), Final sat.-gauge (~2 months)

A Global View of Precipitation with a Global Team



56 US Principal Investigators and 22 International PIs/Partners from 14 nations

Summary of Science

- The US GPM Science team has experts required for studies on the GPM Science goals.
  - 56 US PIs beginning 2nd of 3 year funding cycle

- GPM Science algorithm leads have delivered code to convert GPM measurements to precipitation estimates
  - Radar algorithms
  - Combined Radar + Radiometer algorithms
  - Radiometer algorithms (to be used for GMI and partner radiometers)
- PPS is ready to produce products on day-one
- A post-launch data products test plan document is being developed
- For multi-satellite constellation products, the XCAL WG is prepared to inter-calibrate and the IMERG algorithm team has working code at PPS.
- NASA ground validation activities pre- and post-launch have and will continue to take data along with international GV partners.

Next Science Team Meeting: August 4-8, 2014 in Baltimore, MD

GPM Science is ready for GPM's launch on 28 February 2014!

Web Presence, Social Media, Educational Products

Web presence: http://gpm.nasa.gov www.nasa.gov/gpm

Social Media: Twitter: NASA_Rain Facebook: NASA.Rain

Educational Products: http://pmm.nasa.gov/education

In Memoriam: Arthur Y. Hou (1947-2013)

Arthur's passing coincided with the date that GPM was shipped to Japan for its planned February 28, 2014 launch.

Under Arthur's humble and dedicated
rship, GPM has become a truly global
with a global team. He excelled in
ding scientific oversight for achieving
's many science objectives and application goals, including delivering high-resolution precipitation data in near real time for better understanding, monitoring, and prediction of global precipitation systems and high-impact weather events. It goes without saying that Arthur successfully cultivated international partnerships around the globe, and because of his commitment to precipitation measurement science, a new capability will soon be in orbit.