

Advancing Global Precipitation with GPM

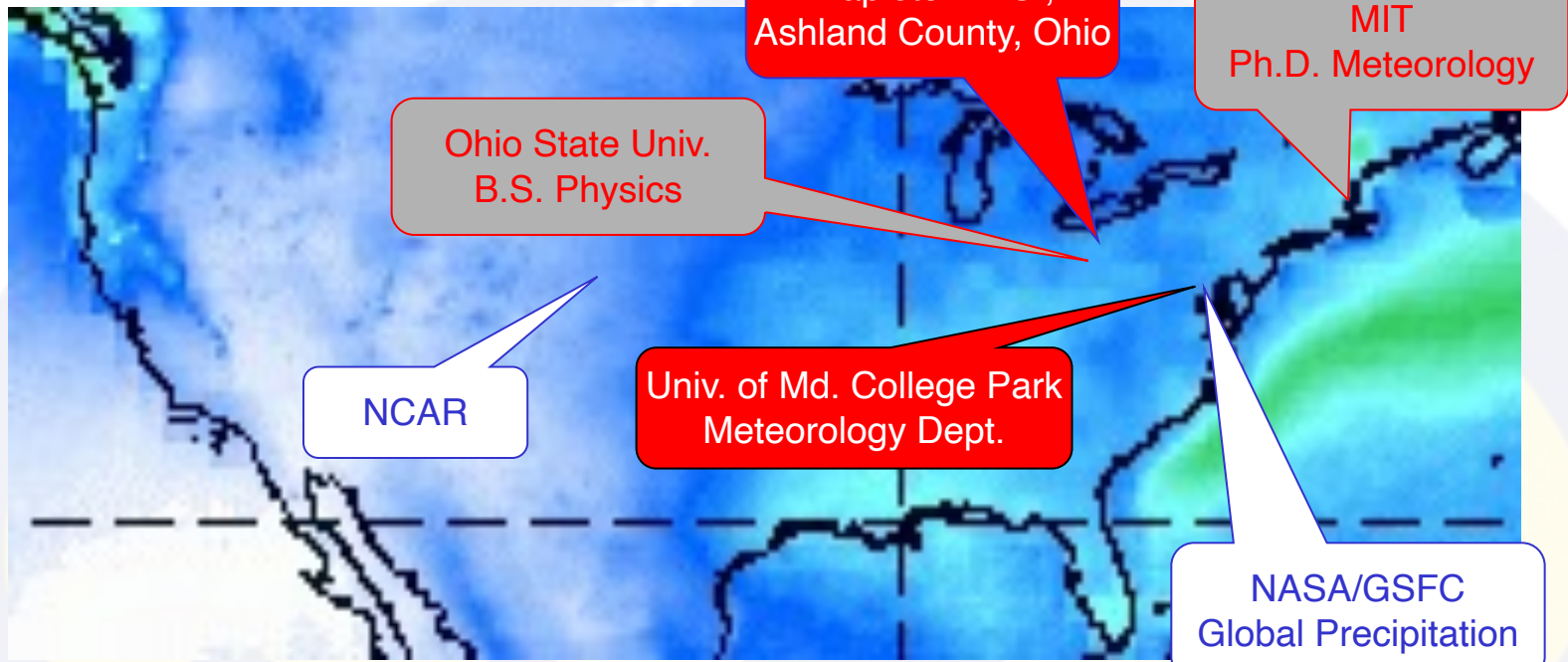
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Measurement (GPM) mission

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Biographical Sketch



Weather is cool, relevant, and funded

It requires

- lots of math and science
- computer skills
- English skills

GLOBAL PRECIPITATION MEASUREMENT

GPM is a joint project between NASA and the
Japan Aerospace Exploration Agency (JAXA)

The GPM Core Observatory

The first part of GPM is the Core Observatory satellite

Built at Goddard Space Flight Center

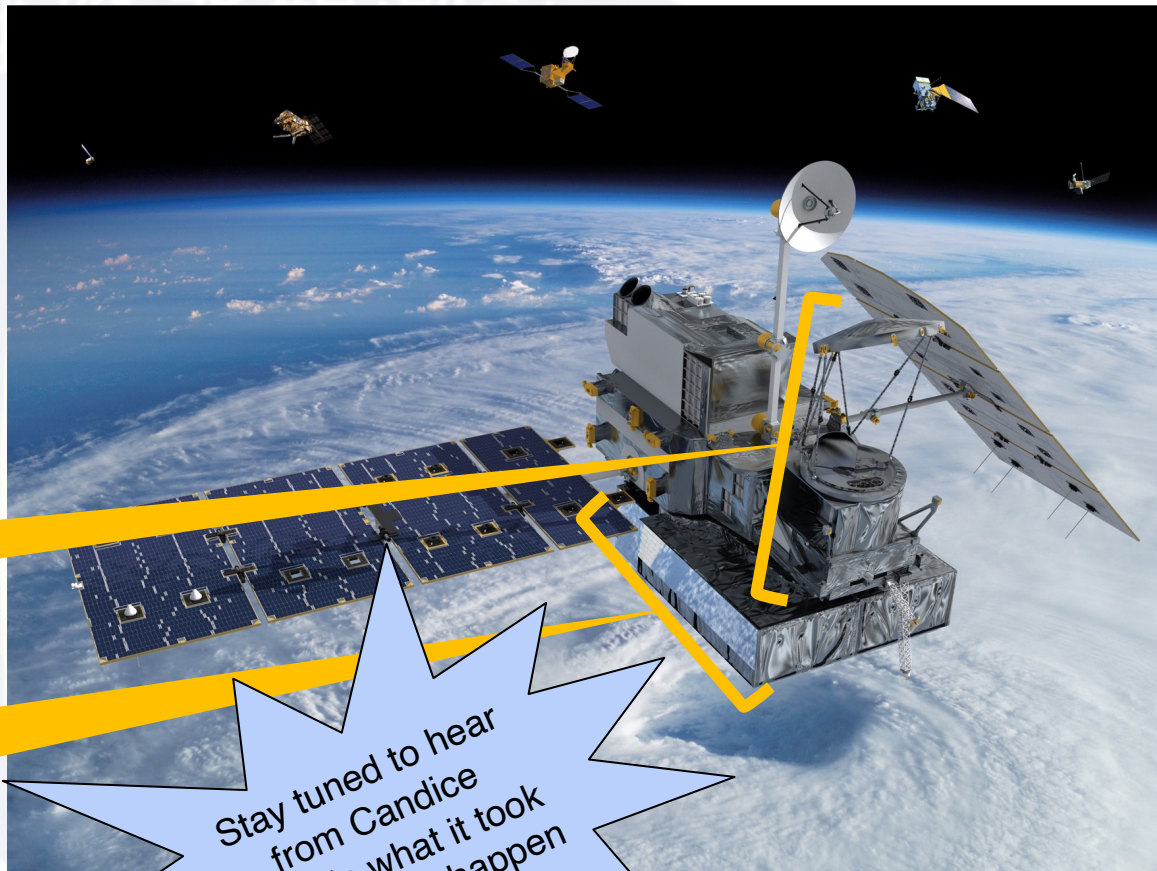
Launched in 2014 from Japan

65° inclined orbit

- 83 day precession

Carries 2 sensors

- GPM Microwave Imager (GMI)
 - 2-D wider swath
 - built in the U.S.
- Dual-frequency Precipitation Radar (DPR)
 - 3-D narrow swath
 - built in Japan



Stay tuned to hear
from Candice
Carlisle what it took
to make this happen

The GPM Constellation

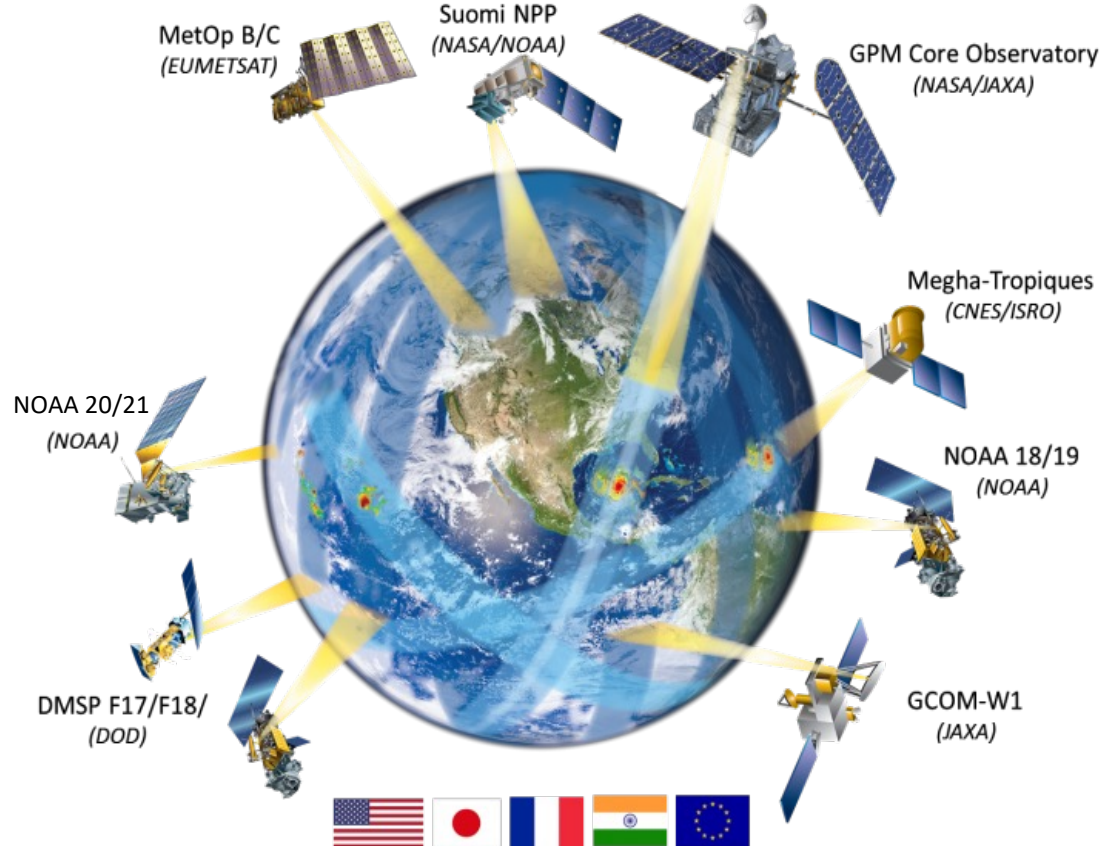
Mission Goals

- improved knowledge of water cycle variability
- improved prediction of floods, landslides, and freshwater resources

This requires more satellite observations than just the Core Observatory

- DPR gives 1 snapshot every 3 days
- GMI gives 1 snapshot per day
- work with other agencies to use precipitation-relevant “satellites of opportunity”
- currently 11 “other” passive microwave satellites

GPM Constellation Status

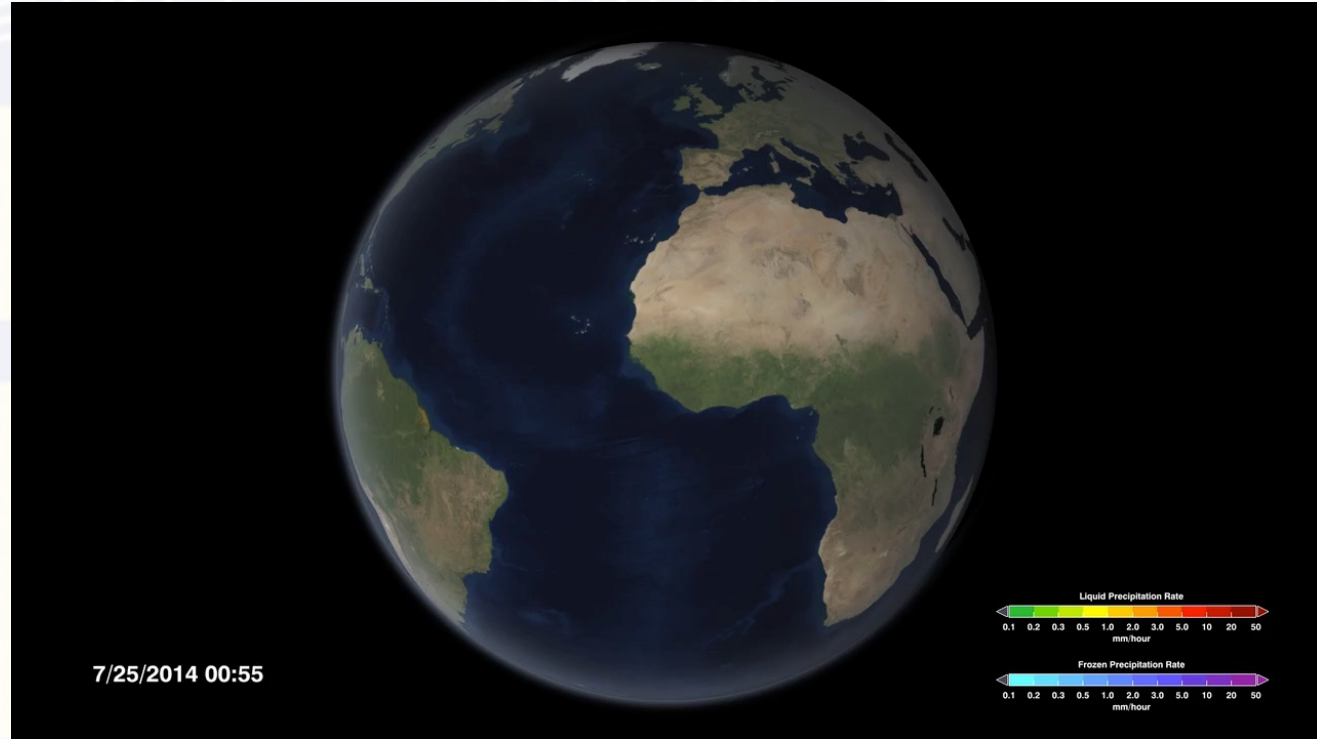


The GPM Constellation

This constellation provides observations every 3 hours

- geosynchronous infrared observations are used as a last-ditch fill-in

And then we do time interpolation to fill in the gaps



Flash Flood Event in Washington, DC Area

Up to 6" of rain fell (in places) during the morning rush hour

IMERG provides the regional map

An overpass by the GPM CO caught the peak of the event

- KuPR provides the 3-D structure
- rain in bright colors
- snow in blues and purples



Greg Shirah (NASA/ GSFC/SVS)

Jason West (NASA/ GSFC/PPS)

Tropical Cyclone Freddy's Record Lifetime

Satellite data reveal rain across the vast expanses of ocean where there are no other observations

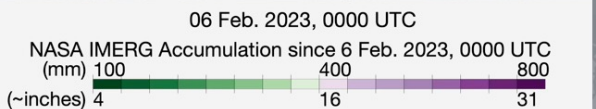
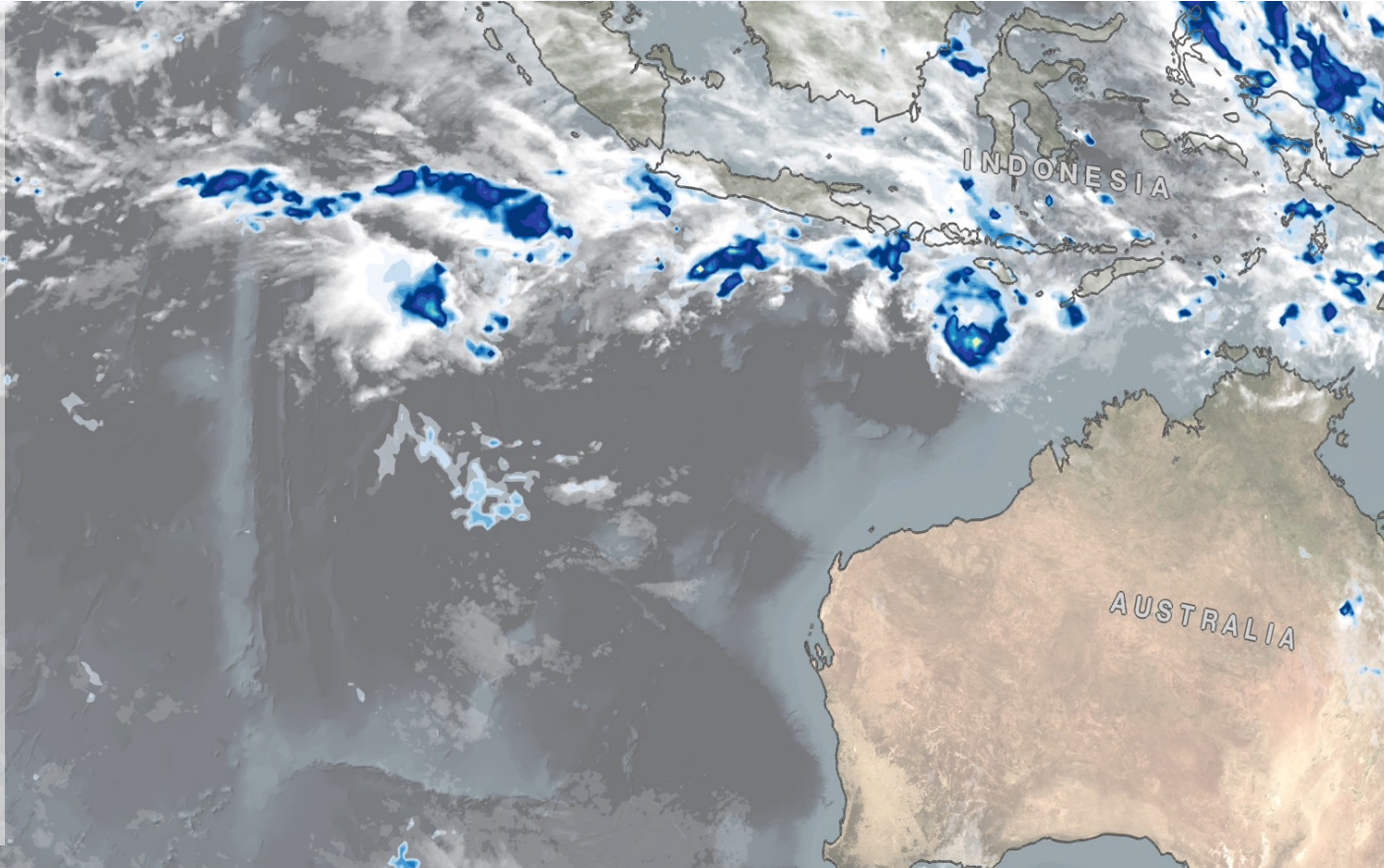
White/gray shading is cloudiness

- you see this on TV

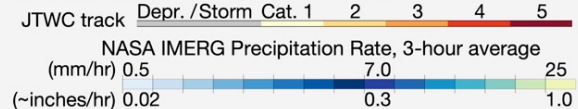
IMERG looks through the clouds and shows the precipitation

- rate (blues and yellows)
- accumulation (greens and purples)

Track/intensity is from tropical forecast centers



Jason West (NASA/GSFC/PPS)





Chris Kidd (U. Md. College
Park & GSFC)

In addition

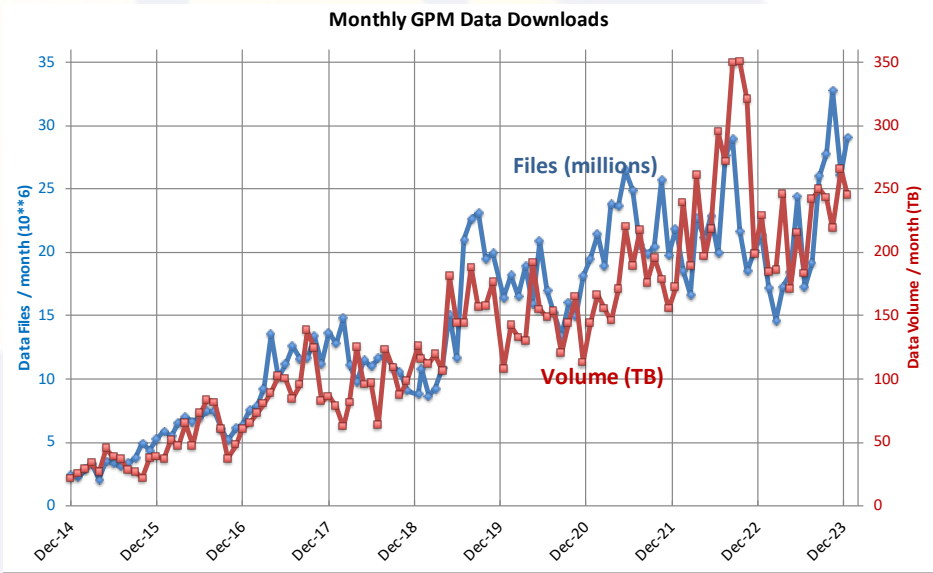
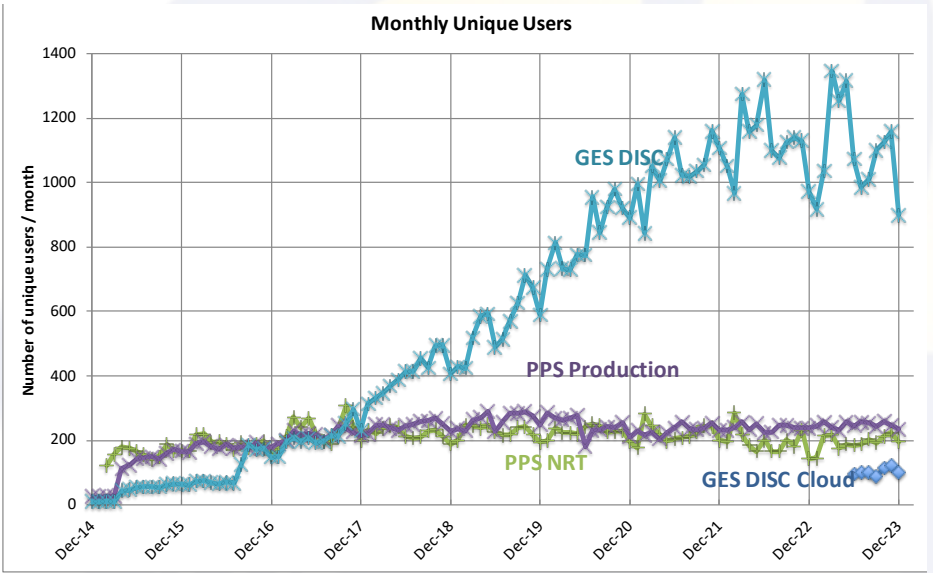
- Precipitation Processing System (PPS) performs data management and computations
- Goddard Earth Science Data and Information Services Center (GES DISC)
- Mission Operations Center (MOC) manages the GPM CO

GLOBAL PRECIPITATION MEASUREMENT

Sending Out Data

GPM product distribution by NASA continues to grow

- “unique” user counts can’t be combined, since there might be overlap
- PPS and GES DISC file numbers and data volume can be combined
 - they track together, but not closely – ratio is affected by sizes of products downloaded

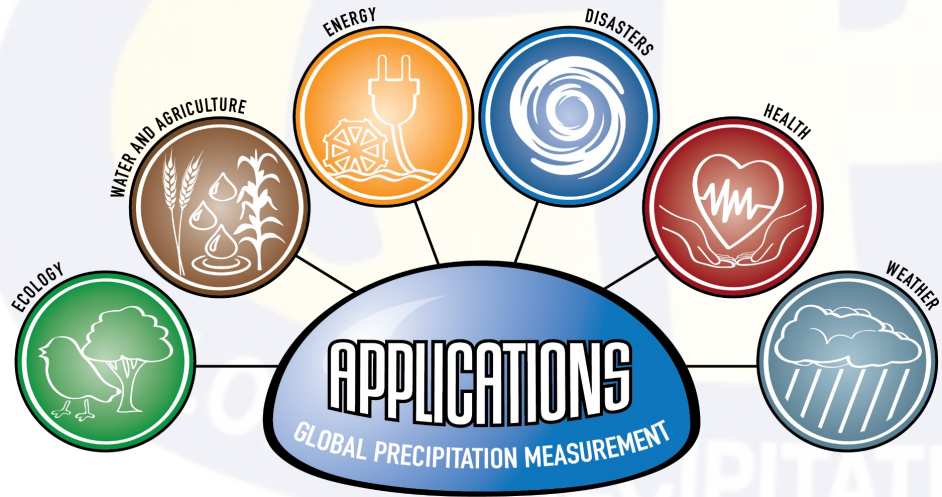


The total count of GPM-related papers is nearly 1000

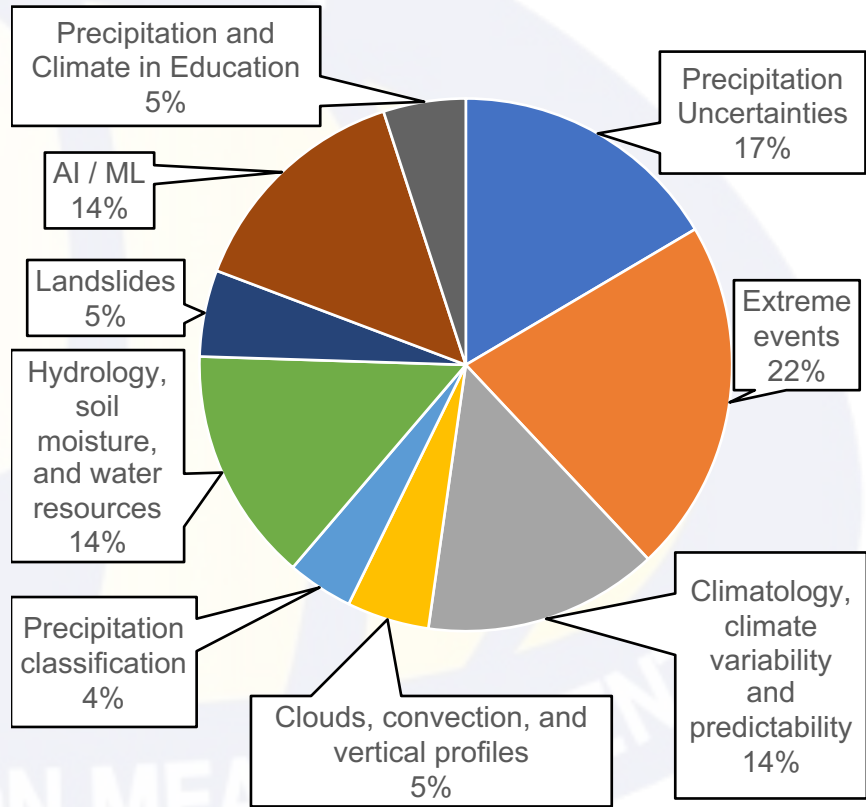
Where the Data Get Used – Applications

Engage user communities

- increase awareness of TRMM/GPM applications
- improve data/documentation access and user-friendliness
- capacity building
 - training sessions
 - mentor program



2023 applications summary



Closing Remarks

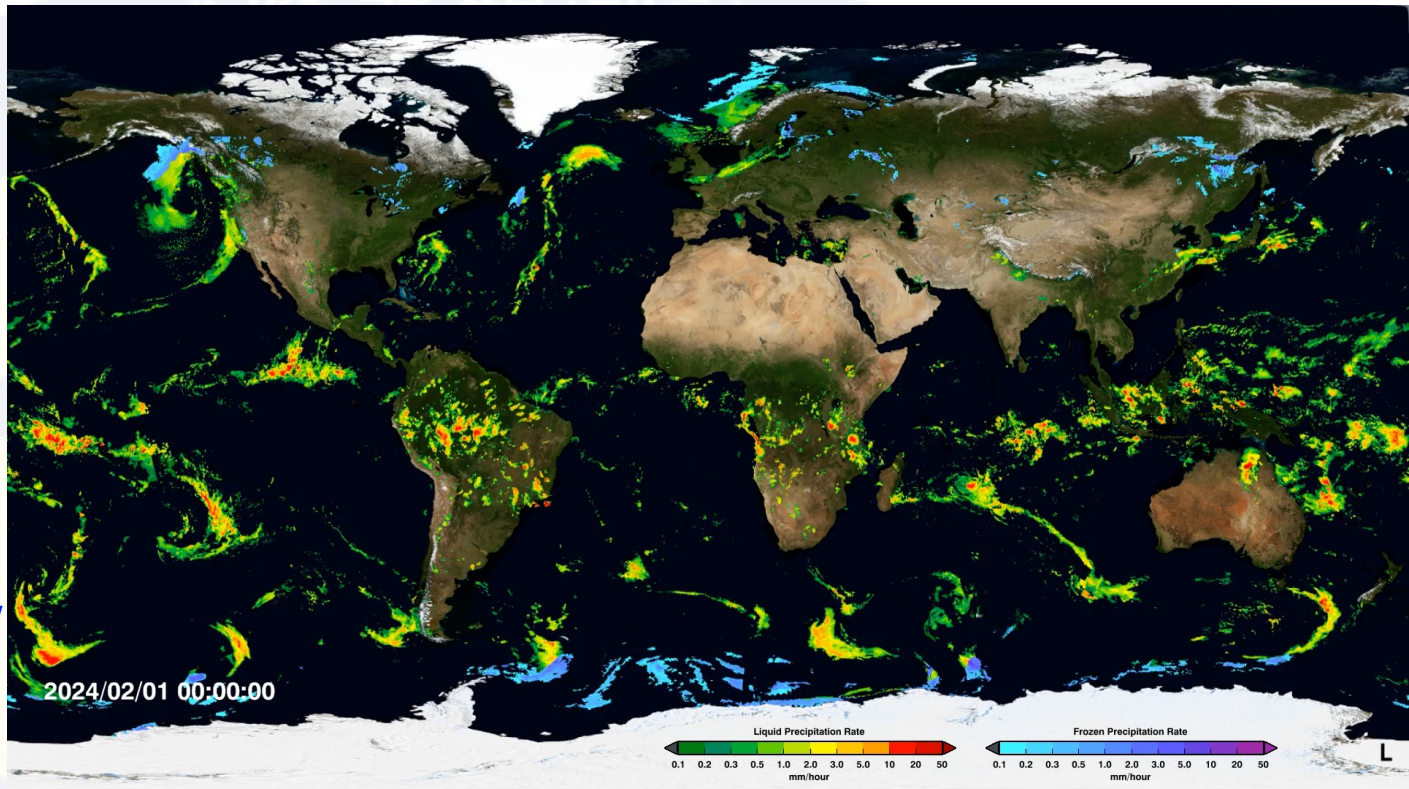
The Core Observatory is functioning well

The JAXA-NASA partnership is working well

GPM is contributing significantly to the precipitation community

- we still have more years for doing good research, likely into the 2030's

I look forward to seeing how the legacy of TRMM and GPM continues into the AOS era



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<https://gpm.nasa.gov/>

<https://svs.gsfc.nasa.gov/cgi-bin/details.cgi?aid=4285>



Building the GPM Core Observatory