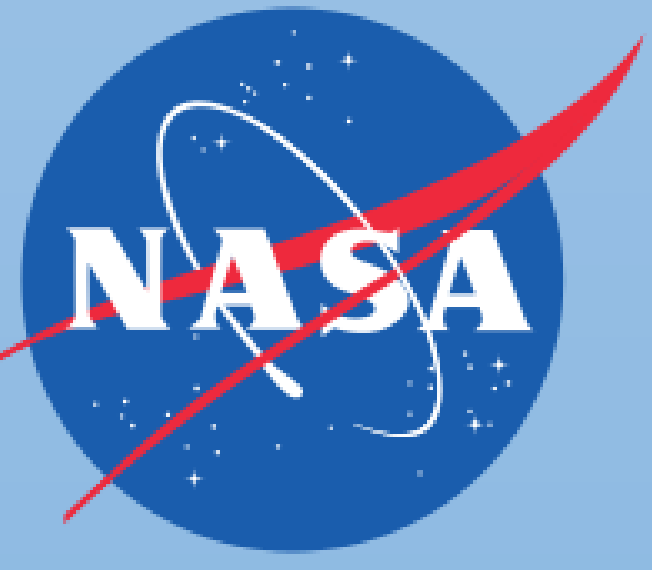


GPM Precipitation Data for Water Resources Applications



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GPM Applications Coordinator

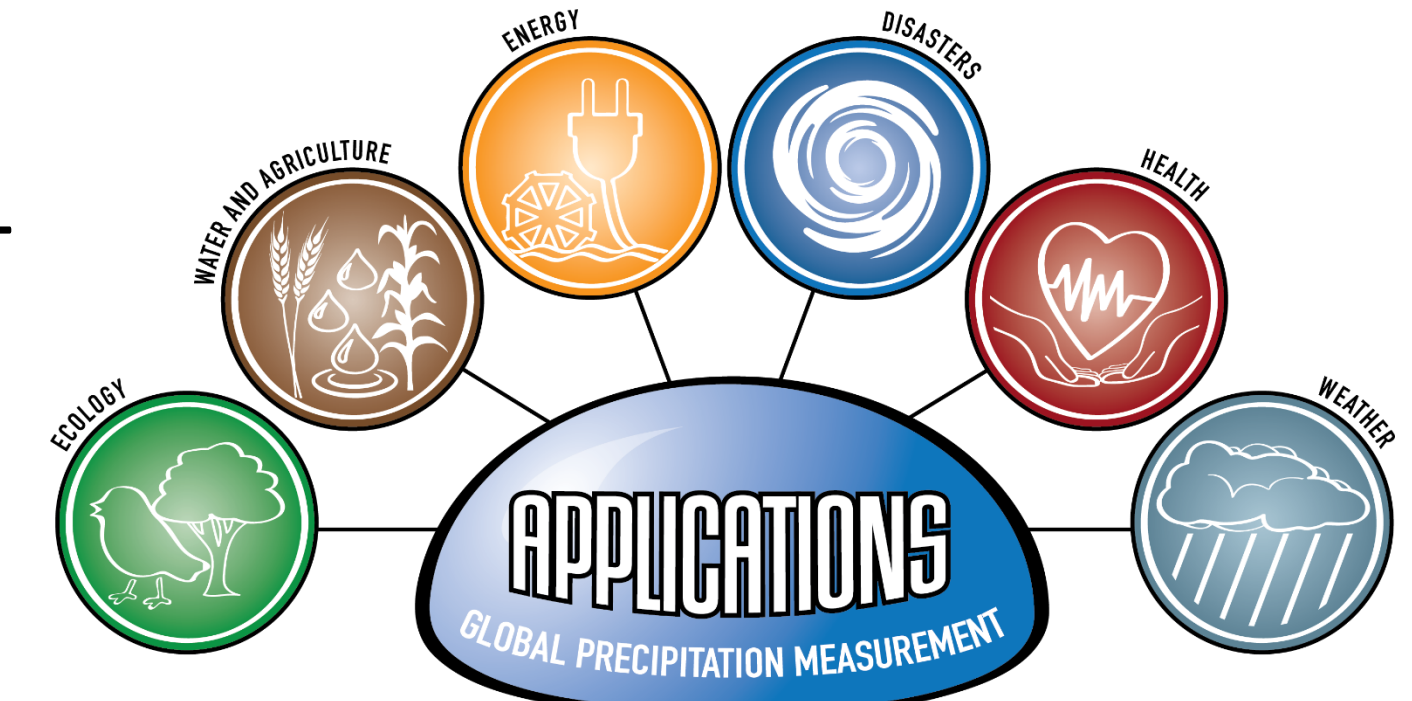


GLOBAL PRECIPITATION MEASUREMENT MISSION

Mission: The GPM mission, initiated by NASA and JAXA, is an international network of satellites that provide the next-generation global observations of precipitation from space. Building upon the success of TRMM, the GPM concept centers on the deployment of a “Core” satellite carrying an advanced radar/radiometer system to measure precipitation ranging from light rain to heavy rain and snow over the latitude band 65°N–65°S. The GPM Core Observatory serves as a reference standard to unify precipitation measurements from a constellation of satellites and ground systems from partner agencies around the globe. These measurements provide high-quality merged data on rain and snow worldwide every 30 minutes and at 0.1°.

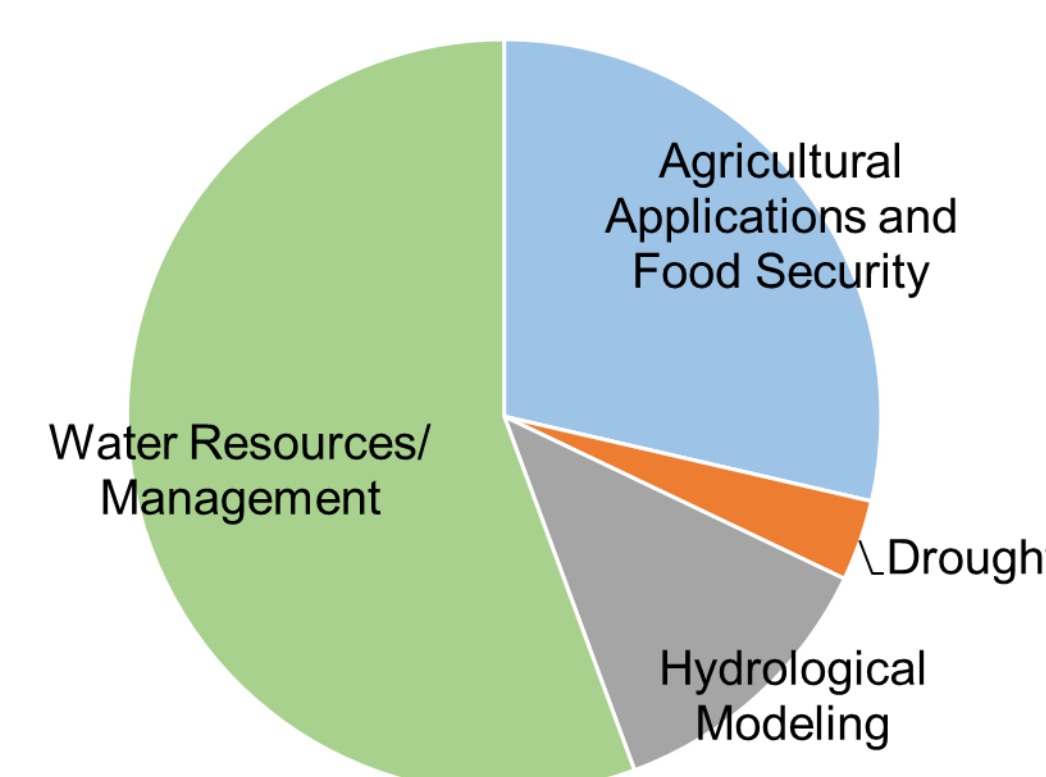
Applications Objective:

- Understand and quantify how GPM data products are applied within different communities of end users for decision-making as well as promote and educate potential users about GPM data.
- Engage user communities with trainings and workshops, increase awareness of GPM data products, and improve data access and visualization of core GPM products for rapid ingestion and analysis.
- GPM’s Water Resources, Agricultural Forecasting, and Food Security applications focus area encourages the use of GPM satellite precipitation data to analyze and forecast changes that affect water resources and its subsequent impact on agricultural productivity.



GPM Applications focus areas

GPM Water Resources Breakdown:



| Example Users | |
|---------------|--|
| USDA FAS | Uganda's National Emergency Coordination and Operations Centre (NECOC) |
| Agvesto | Navajo Nation via U. of Georgia |
| VanderSat | EU's DAFNE Project |

GPM DATA PRODUCTS

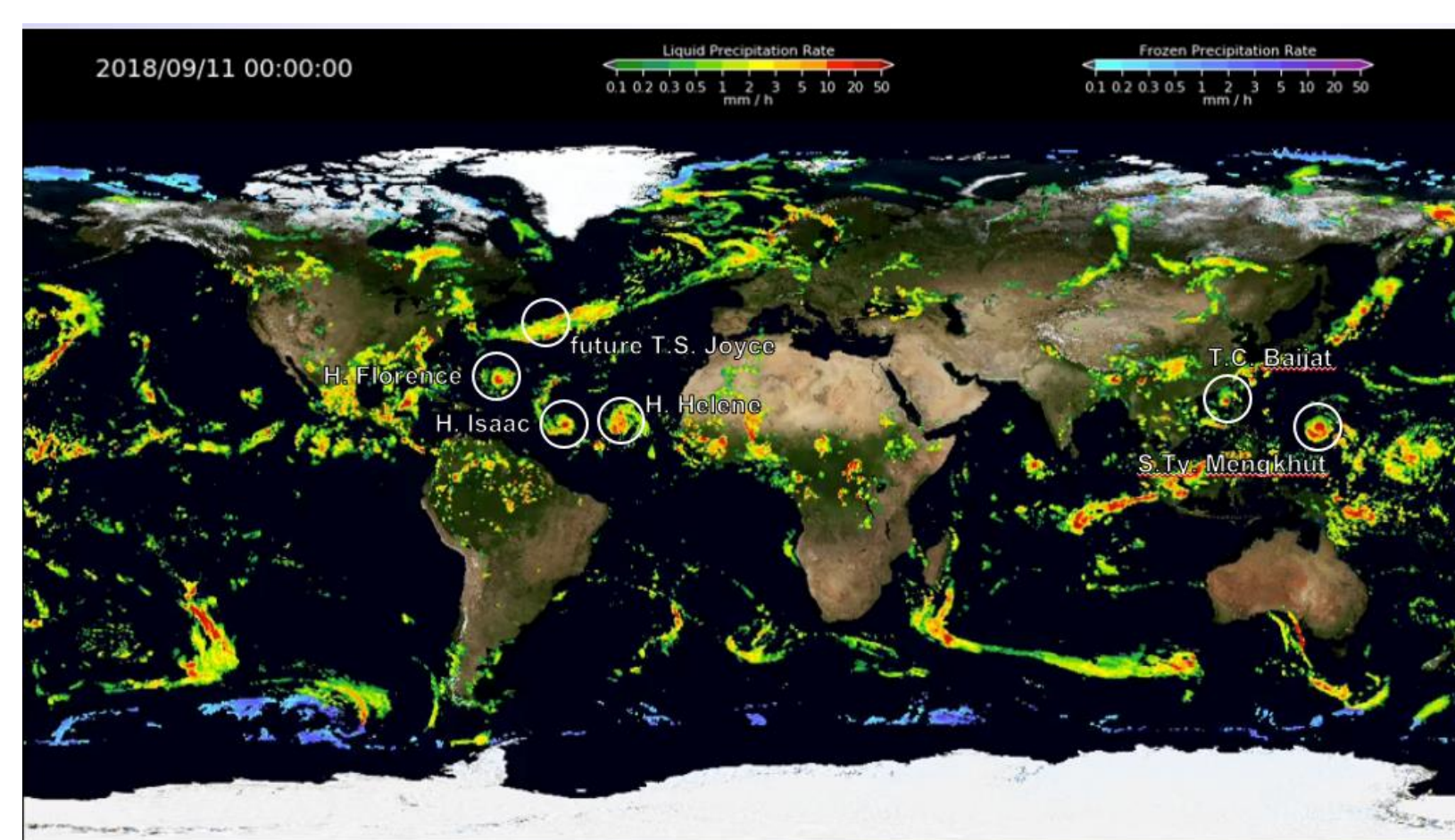
- GPM products are available in near-real-time (NRT) and/or production (prod.) versions.
- Table below shows GPM’s most commonly used Level 1-3 products.

| Level | Name | Description | Resolution | | Coverage | Latency |
|-------------|--------|--|---|-------------------|--|---|
| | | | Space | Time | | |
| GPM Level 1 | 1B-GMI | GMI T ₀ | Varies by channel | 16 orbits per day | Latitudes 70°N-70°S, past week (NRT) | 1 h (NRT); 6 h (prod.) |
| GPM Level 2 | 2A-DPR | DPR Ka and Ku single-orbit rainfall estimates | 5km x 5km (at nadir), 125-m vertical resolution | 16 orbits per day | Latitudes 67°N-67°S, Mar 2014- present | 20-120 min (NRT); 24 h (prod.) |
| | 2B-CMB | Combined GMI + DPR single orbit rainfall estimates | 5km x 5km (at nadir), 250-m vertical resolution | 16 orbits per day | Orbital 67°N- 67°S | 3 h (NRT); 40 h (prod.) |
| GPM Level 3 | IMERG | Integrated Multi-satellite Retrievals for GPM, includes precipitation phase, Quality Index, and other intermediate data fields | 0.1° x 0.1° | 30 min | Gridded 60°N- 60°S | 4-5 h (NRT/Early run) 14-15 h (NRT/Late run) |
| | | | | | | 3 months (prod./Final run) |

GPM IMERG Latest Product Update:

IMERG upgrades to V06

- Extension back to June 2000
- Available now through PPS
- Provides more higher-latitude coverage (in snow/ice-free areas)
- New source for morphing vectors
- Improved Quality Index

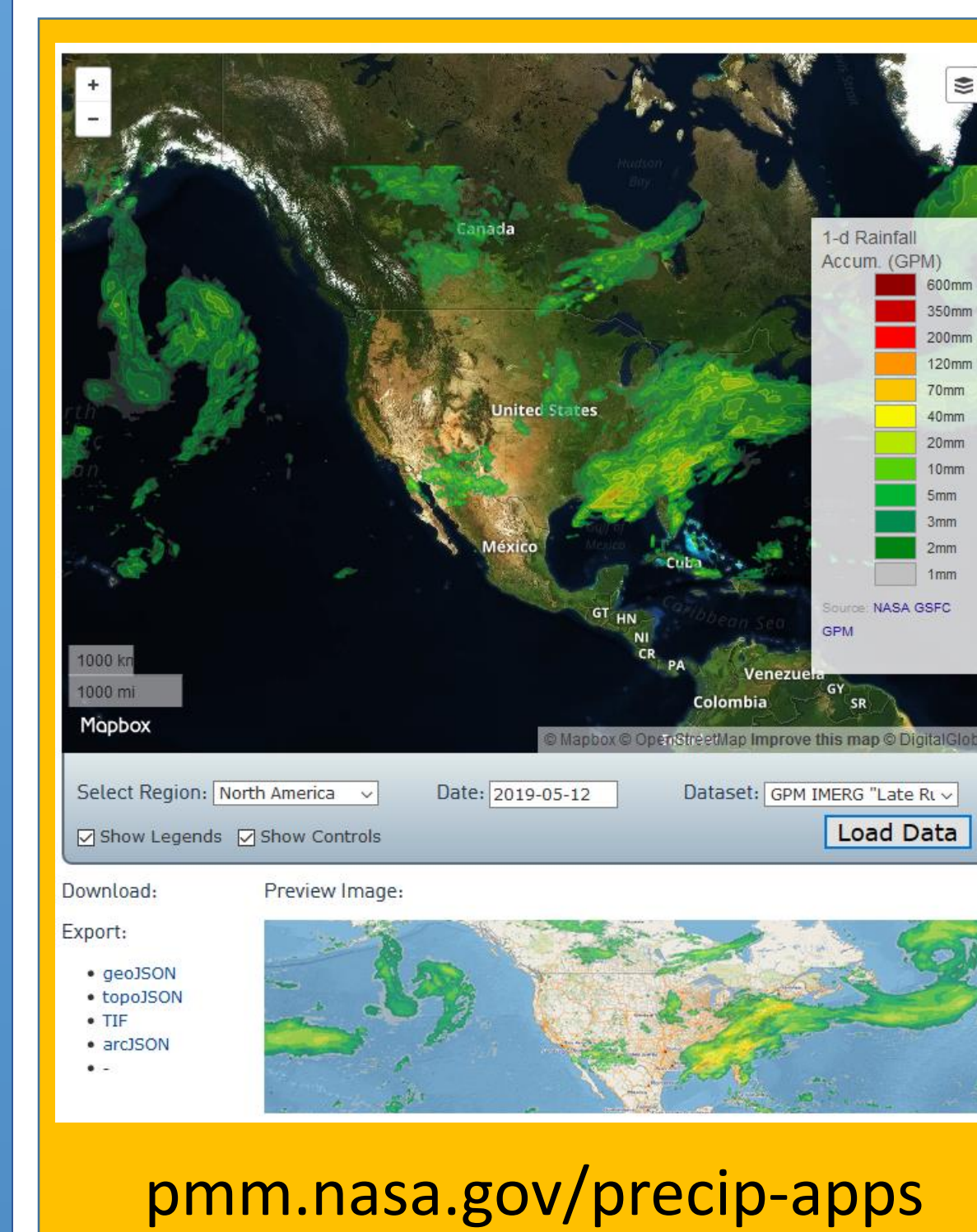


See <https://svs.gsfc.nasa.gov/cgi-bin/details.cgi?aid=4285>

J. Tan (USRA, GSFC)

DATA VISUALIZATION TOOLS

NASA (and GPM) provides multiple visualization tools to view precipitation data including **Giovanni**, **Worldview** and **GPMViz**. Below are a few examples to quickly upload and view GPM data:

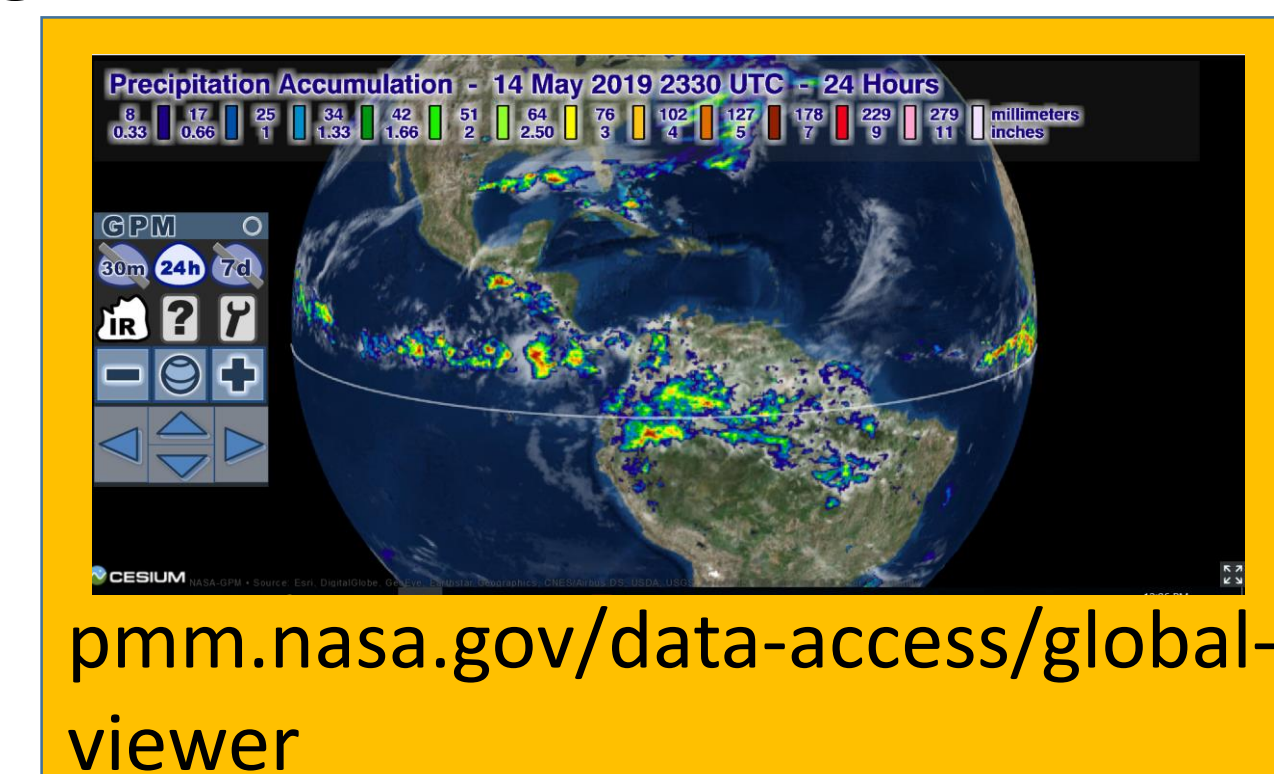


pmm.nasa.gov/precip-apps

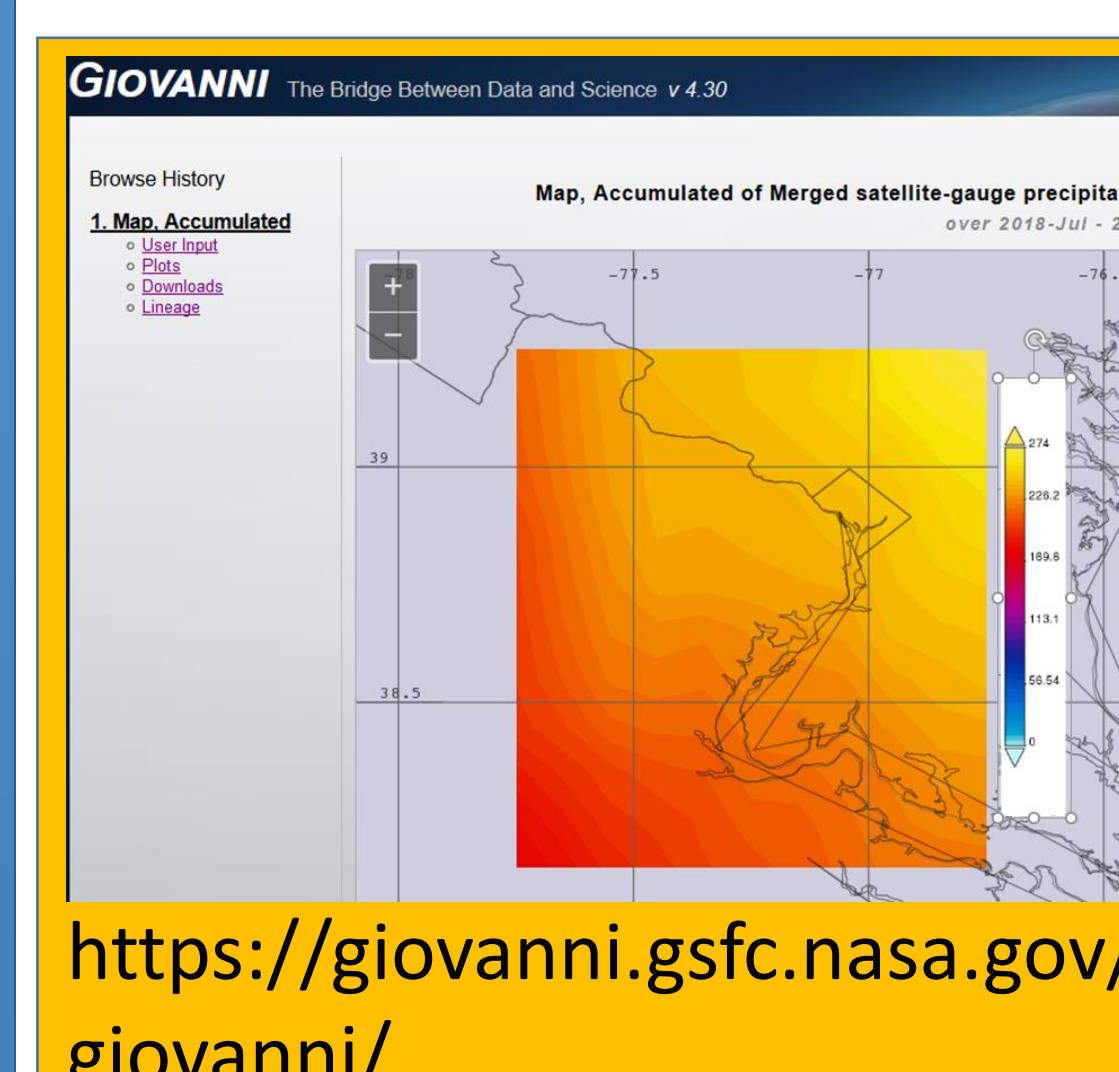
(Left) The **GPM Precipitation & Applications Viewer** allows for quick visualization and download of NRT IMERG datasets and flood and landslide products. A Javascript API allows for automated data retrieval.

Global Viewer allows users to view the latest NRT GPM IMERG

datasets on an interactive 3D globe in your web browser.



pmm.nasa.gov/data-access/global-viewer



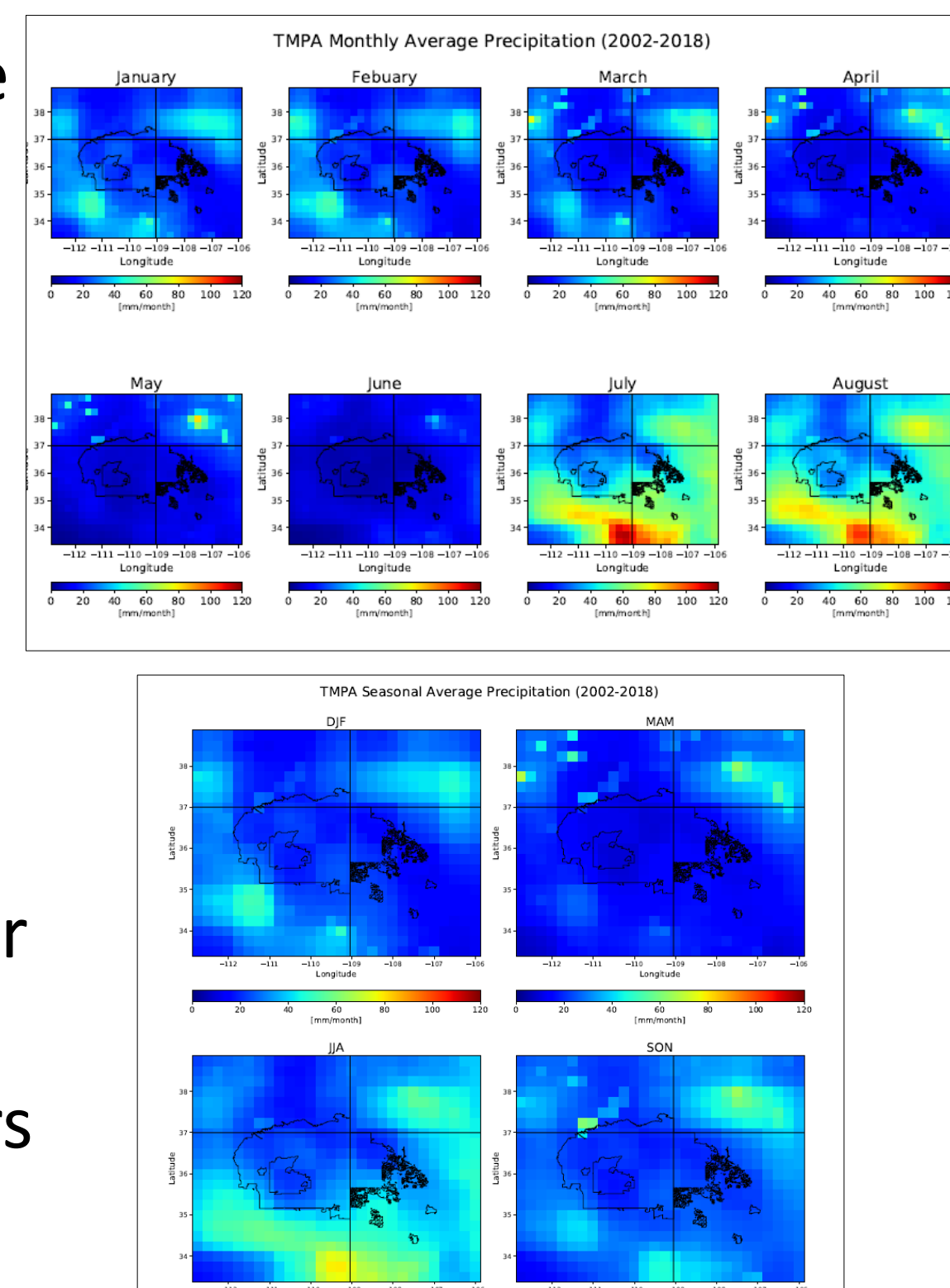
<https://giovanni.gsfc.nasa.gov/giovanni/>

(Left) GES DISC’s online visualization and analysis tool, **Giovanni**, enables users at different levels to access, explore, and evaluate NASA satellite-based data, including GPM/TRMM, products without downloading either data and software, or requiring coding.



GPM CASE STUDIES IN WATER RESOURCES

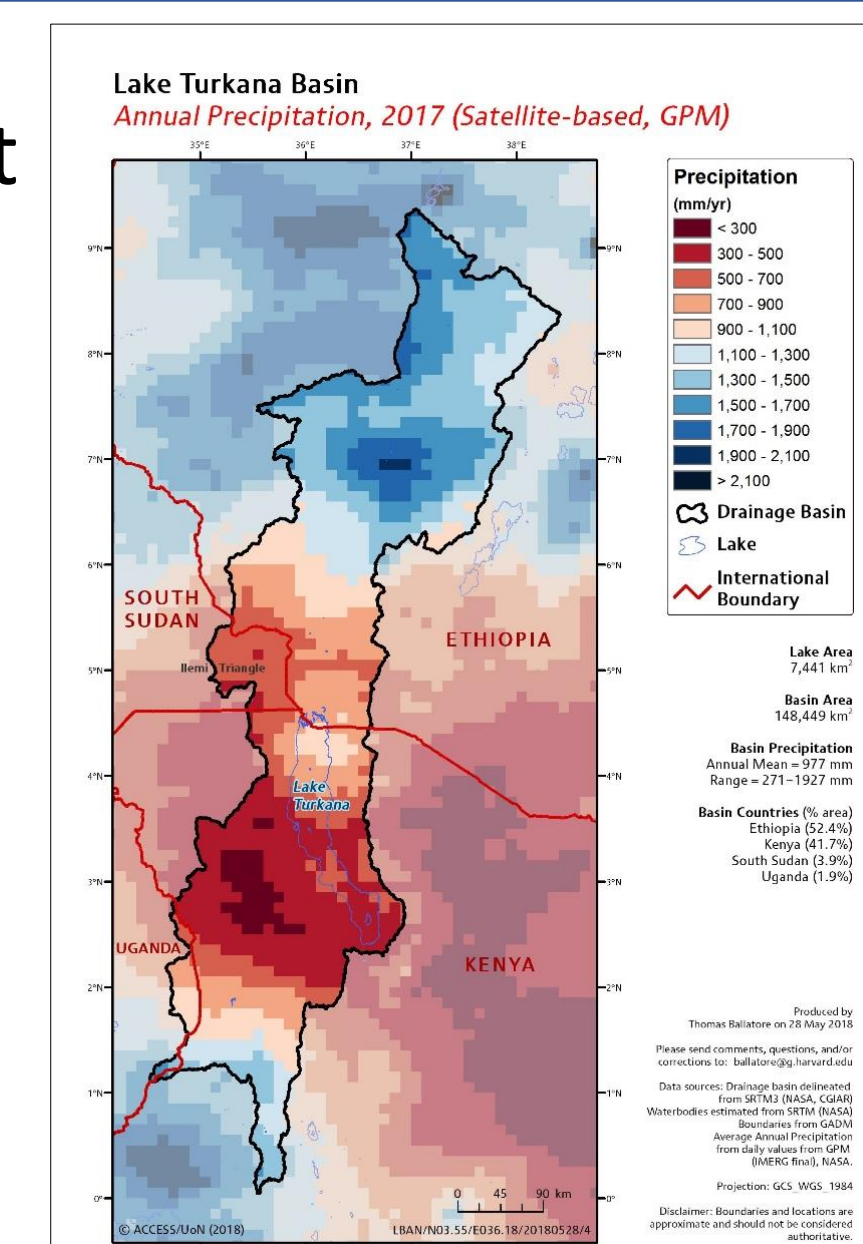
TRMM and GPM data are used to create precipitation climatologies and water budget assessments for the Navajo Nation in the US. These climatologies will shed light on the region’s hydroclimate vulnerability and aid in the assessment of potential freshwater resource mitigation strategies, such as rainwater harvesting. This work aims to improve freshwater resource security for the Navajo Nation to enhance the synergistic relationships between sectors of the EWFN.



Credit: (Katherine) Ansley Long, University of Georgia, kalong@uga.edu



Ethiopia’s hydropower development upstream from Lake Turkana altered the natural flow and sediment regime of the Omo-Turkana basin. The DAFNE project, an EU-funded project which explores the water-energy-food Nexus in complex transboundary water resource systems of fast developing countries, is identifying sustainable solutions analyzing the trade-offs among the key water uses for hydropower, irrigation and the environment around Lake Turkana. To support this effort, GPM monthly and annual GPM precipitation maps are used to assess the region’s water budget.



GPM Annual precipitation. Maps were used for the DAFNE General Assembly in October 2018. Credit: Tom Ballatore, LBAN, <http://www.lakebasin.org/>.



GET INVOLVED?
HAVE IDEAS?

The GPM Applications team is always looking for case studies to expand our portfolio and provide examples of how GPM data are supporting decision making. Please contact us at gpm.nasa.gov/contact.