



NASA Giovanni: Global Meteorological Datasets at your Fingertips

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Outline

I. Introduction to GES DISC (Distributed Active Archive Center- DAAC)

II. Resources for agricultural studies at GES DISC

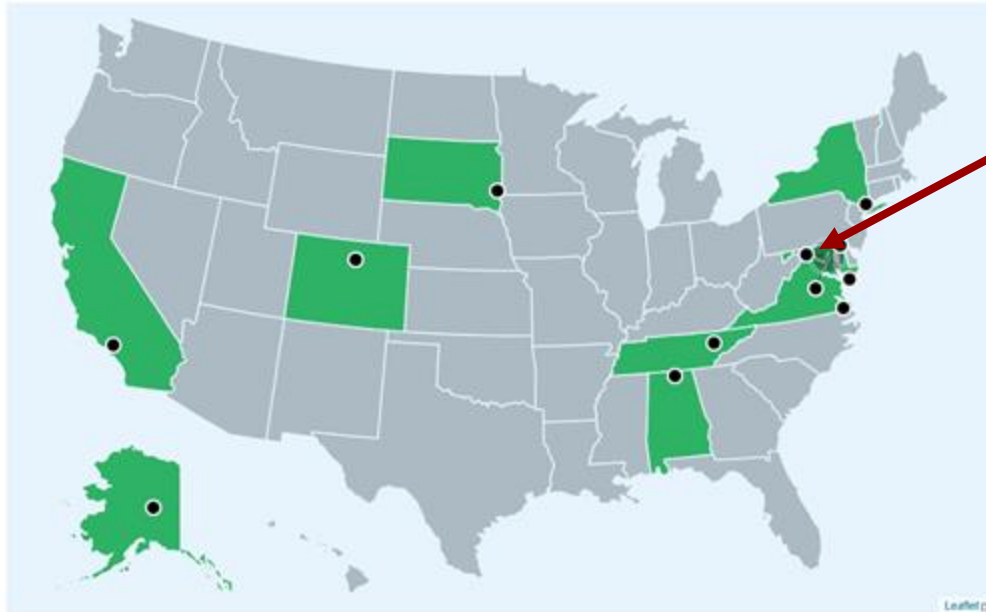
- Data holding
- Data access, services and tools
- Giovanni

III. Information

- User support
- Learning resources
- Links



12 NASA Distributed Active Archive Centers (DAACs)



GODDARD EARTH SCIENCES DATA AND INFORMATION SERVICES CENTER (GES DISC)

Greenbelt, MD

Atmospheric composition,
atmospheric dynamics, global
precipitation, solar irradiance

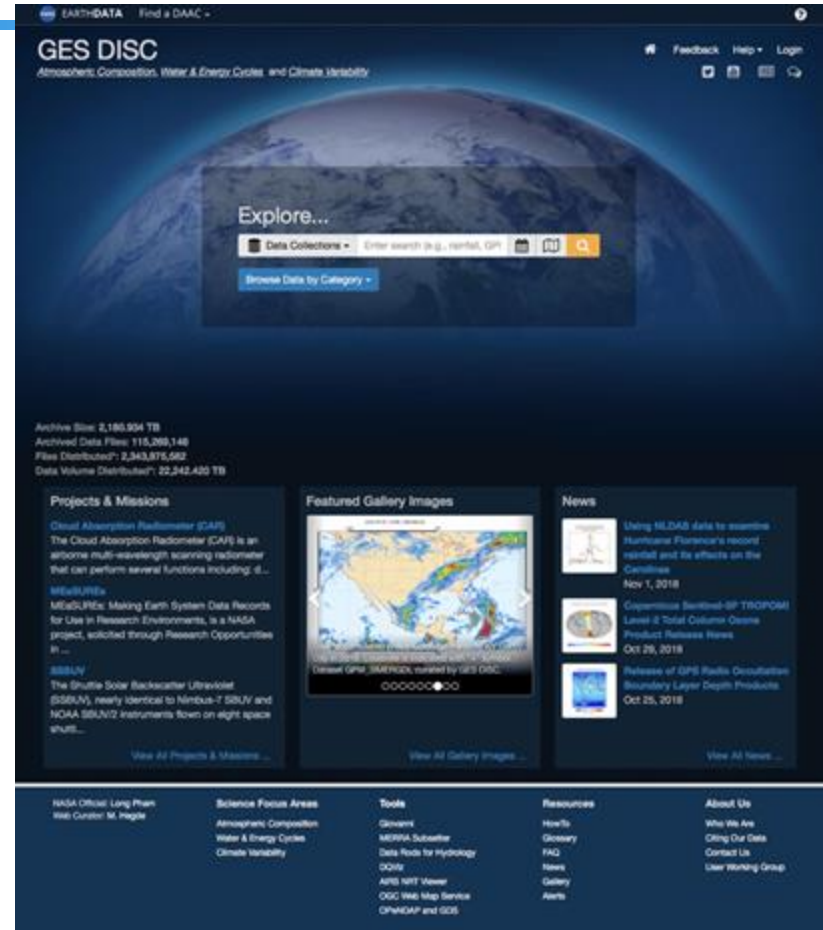
<https://www.earthdata.nasa.gov/centers>



The GES DISC: Who We Are

The Goddard Earth Sciences Data and Information Services Center (GES DISC) is one of the 12 **NASA Distributed Active Archive Centers (DAACs)** that manages, archives and distributes data as part of NASA's Earth Observation Systems Data and Information System (EOSDIS). We provide the support for the **archive and distribution** of the data from a range of **satellite observations, models, ground measurements, and field campaigns**.

- Archives total volume > **7.4 Petabytes** consisting of ~**250 million data files** covering >**3000 public and restricted collections**.
- Multi-disciplinary data holdings include observations and model data of:
 - **atmospheric composition**
 - **weather, water/energy cycles**
 - **carbon cycle, climate variability**
- Through various available tools and services, the GES DISC provides users with **multi-sensor and model visual comparisons** and data access for a number of **projects spanning several disciplines**. <https://disc.gsfc.nasa.gov>



GESDISC



Agriculture related datasets at GES DISC

- **Global Precipitation Measurement (GPM) mission and Global Precipitation Climatology Project (GPCP)**
 - Integrated Multi-satellite Retrievals for Global Precipitation Measurement (GPM) (IMERG) (global, half-hourly, daily and monthly, 0.1 deg. 1998 - present)
 - GPCP precipitation (global, daily, monthly, 0.25 deg. 1983 - 2024)
- **Land data assimilation systems** (NLDAS (hourly and monthly, 0.125 deg., 1979-present), GLDAS (3-hourly and monthly, 0.25 deg. 1948-2014, 2000-present), FLDAS (daily and monthly, 0.01 deg. (daily) and 0.1 deg. (monthly), 2000-present)
 - Soil moisture, ET, LAI, Runoff
 - Soil temperature, air temperature
 - Precipitation (total, liquid, frozen, SWE)
 - Solar Radiation, wind
- **Modern-Era Retrospective analysis for Research and Applications version 2 (MERRA-2)** (global, hourly and monthly, 0.5 x 0.625 deg. 1980-present)
 - Soil moisture, evaporation, surface skin temperature, air temperature, precipitation, solar radiation, wind, runoff, etc.

Additional resources (datasets/tools/limitations): NASA Earthdata (<https://www.earthdata.nasa.gov/>)



Resources for agricultural studies at GES DISC

- Data and information access
- Data services and tools
- Learning resources:
 - Seasonality
 - Extreme events: floods, flash floods, heat waves, droughts
 - Data recipes (How-To)



Data and information access: GES DISC Portal (<https://disc.gsfc.nasa.gov>)

GES DISC
Atmospheric Composition, Water & Energy Cycles, Climate Variability

Feedback Cloud Migration Help Login My Dashboard

Explore...

Data Collections: Enter search (e.g., remote, GPM, TRMM, 3042)

Browse Data by Category Visualize Data Access GIS

The GES DISC migration to the cloud is happening now. [Learn more about it!](#)

Archive Size: 3,375,368 TB
Archived Data Files: 149,675,662
Files Distributed: 3,198,849,061

Projects & Missions

- [LPRM](#)
The LPRM Level 2 (swath) and LPRM Level 3 (gridded) data products contain land surface parameters, surface soil moisture, land surface area...
- [MEASURE](#)
MEASURE: Making Earth System Data Records for Use in Research Environments, is a NASA project, solicited through Research Opportunities in...
- [MERRA](#)
The Modern-Era Retrospective analysis for Research and Applications (MERRA) is a NASA atmospheric reanalysis for the satellite era using the...

[View All Projects & Missions](#)

Featured Gallery Images

2023-07-07 - 05PM - 08B-03EE

[View All Gallery Images](#)

News

- [Look up in the sky by the GDRP](#)
Data in Action, Oct 7, 2022
- [Reanalysis2022 global surface air temperature and precipitation](#)
News, Oct 2, 2022
- [GPM Level 1B Radiation Products Subversion 4 \(v4.0\) Public Release](#)
Data Release, Sep 20, 2022

[View All News](#)

Science Focus Areas

- Atmospheric Composition
- Water & Energy Cycles
- Climate Variability

Tools

- Client
- GIS
- Data Tools for Hydrology
- DOIs
- API
- Web Map Service

News

- General
- Data Release
- Service Release
- Alerts

Resources

- Earthdata Forum
- Help
- Data in Action
- Publications
- Connect
- FAQ




About Us

- Who We Are
- Using Our Data
- Contact Us
- User Working Group





Data and information access: GES DISC Portal (cont.)

Explore...

Data Collections ▾ Enter search (e.g., rainfall, GPM, TRMM_3B42)   

Data Collections

- Data Documentation
- Alerts
- Data in Action
- Data Release
- FAQs
- Glossary
- How-To's
- Image Gallery
- News
- Publications
- Service Release
- Tools

[Visualize Data](#)  [Access GIS](#) 

...on to the cloud is happening now. [Learn more about it!](#)

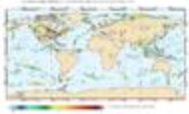


Data and information access: GES DISC Portal (cont.)

[Back to search results](#)

Global Precipitation Measurement

GPM IMERG Final Precipitation L3 Half Hourly 0.1 degree x 0.1 degree V06 (GPM_3IMERGHH)



Cloud Enabled

[View Full-size Image](#)

The Integrated Multi-satellite Retrievals for GPM (IMERG) is the unified U.S. algorithm that provides the multi-satellite precipitation product for the U.S. GPM team.

Minor Version 06B is the current version of the data set. Older versions will no longer be available and have been superseded by Version 06B.

The precipitation estimates from the various precipitation-relevant satellite passive microwave (PMW) sensors comprising the GPM constellation are computed using the 2017 version of the Goddard Profiling Algorithm (GPROF2017), then gridded, intercalibrated to the GPM Combined Ku Radar-Radiometer Algorithm (CORRA) product, and merged into half-hourly 0.1°x0.1° (roughly 10x10 km) fields. Note that CORRA is adjusted to the monthly Global Precipitation Climatology Project (GPCP) Satellite-Gauge (SG) product over high-latitude ocean and tropical land to correct known biases.

The half-hourly intercalibrated merged PMW estimates are then input to both the Climate Prediction Center (CPC) ...more

Data Access

[Online Archive](#)

[Earthdata Search](#)

[Giovanni](#)

[Web Services](#) ▾

[Subset / Get Data](#)

[Product Summary](#) [Data Citation](#) [Documentation](#) [References](#) [Data Calendar](#)

Shortname: GPM_3IMERGHH

Longname: GPM IMERG Final Precipitation L3 Half Hourly 0.1 degree x 0.1 degree V06

DOI: 10.5067/GPM/IMERG/3B-HH/06

Version: 06

Format: HDF5

Spatial Coverage: -180.0,-90.0,180.0,90.0

Temporal Coverage: 2000-06-01 to 2021-09-30

File Size: 2.8 MB per file

Data Resolution

Spatial: 0.1° x 0.1°

Temporal: 30 minutes



Data services and tools

- Dataset and information search
- Subsetting (spatial and parameter)
- Format conversion (netCDF, ASCII)
- Time series (Data Rods)
- Machine to machine (OPeNDAP, https, THREDDS, GDS)
- GIS support (in-house GIS specialists)
- Online visualization and analysis (explore and evaluate datasets without downloading software and data) - Giovanni



The Geospatial Interactive Online Visualization ANd aNalysis Infrastructure (Giovanni) provides the means to perform 22 visualizations on ~2000 variables from six different DAACs.

With Giovanni's assistance, researchers around the world have published more than 3,000 peer-reviewed papers in a wide range of Earth science disciplines and other areas.

- Aerosols (268)
- Atmospheric Chemistry (232)
- Atmospheric Dynamics (774)
- Cryosphere (16)
- Hydrology (607)
- Ocean Biology (56)
- Oceanography (81)
- Water and Energy Cycle (754)



Finding a variable

Select Plot
Time Averaged Map

Select Date Range (UTC)
YYYY - MM - dd 00 : 00 to YYYY - MM - dd 23 : 59

Select Region (Bounding Box or Shape)
-180, -90, 180, 90

Valid Range: 1948-01-01 to 2022-03-04

Please specify a start date.

- Select Variables
- ▼ Observations
 - Model (101)
 - Observation (49)
 - ▼ Disciplines
 - Atmospheric Dynamics (46)
 - Cryosphere (1)
 - Hydrology (106)
 - Oceanography (2)
 - Water and Energy Cycle (68)
 - Measurements
 - Platform / Instrument
 - Spatial Resolutions
 - Temporal Resolutions
 - Special Features
 - Portal

Number of matching Variables: 150 of 1970 Total Variable(s) included in Plot: 0
Please select at least 1 variable
Keyword: precipitation Search Clear

Variable	Units	Source	Temp.Res.	Spat.Res.	Begin Date	End Date	Vert. Slice
<input type="checkbox"/> Fraction of total precipitation that is convective (NLDAS_FORA0125_H v2.0)	fraction	NLDAS Model	Hourly	0.125 °	1979-01-01	2022-02-01	-
<input type="checkbox"/> Convective Precipitation (NLDAS_FORA0125_M v2.0)	kg m-2	NLDAS Model	Monthly	0.125 °	1979-01-01	2022-01-31	-
<input type="checkbox"/> Precipitation Rate (TRMM_3B42_Daily v7)	mm/day	TRMM	Daily	0.25 °	1998-01-01	2019-12-31	-
<input type="checkbox"/> Near-Real-Time Precipitation Rate (TRMM_3B42RT v7)	mm/hr	TRMM	3-hourly	0.25 °	2003-03-01	2020-01-01	-
<input type="checkbox"/> Near-Real-Time Precipitation Rate (TRMM_3B42RT_Daily v7)	mm/day	TRMM	Daily	0.25 °	2000-03-01	2020-01-01	-
<input type="checkbox"/> Precipitation (TRMM_3B42 v7)	mm/hr	TRMM	3-hourly	0.25 °	1997-12-31	2019-12-31	-
<input type="checkbox"/> Total precipitation (NLDAS_FORA0125_H v2.0)	kg m-2	NLDAS Model	Hourly	0.125 °	1979-01-01	2022-02-01	-
<input type="checkbox"/> Total precipitation (NLDAS_FORA0125_M v2.0)	kg m-2	NLDAS Model	Monthly	0.125 °	1979-01-01	2022-01-31	-
<input type="checkbox"/> Total precipitation rate (GLDAS_CLSM025_D v2.0)	kg m-2 s-1	GLDAS Model	Daily	0.25 °	1948-01-01	2014-12-30	-



Select an area of interest

Select Date Range (UTC) Select Region (Bounding Box or Shape)

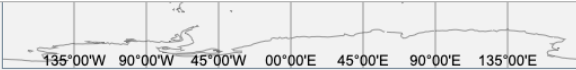
YYYY - MM - dd 00 : 00 to YYYY - MM - dd 23 : 59
Valid Range: 1983-01-01 to 2020-12-31
Please specify a start date.

US States Florida;

Number of matching Variables: 106
Keyword : precipitation

Florida

- Countries and Areas (source: [US State Department](#))
- Land Only file (source: [GES DISC](#))
- Sea Only file (source: [GES DISC](#))
- US States (source: [TIGER/Line](#), [US Census Bureau](#))**
- Watersheds (source: [Major Hydrological Basins](#), [FAO \(United Nations\)](#))
- World_Regions (source: [ESRI](#))



Variable	Units	Source	Temp.Res.	Spat.Res.	Begin Date	End Date	Vert. Slice
<input type="checkbox"/> Multisatellite precipitation							
<input type="checkbox"/> Probability of liquid precipitation							
<input type="checkbox"/> Wind-loss adjusted gauge precipitation							
<input type="checkbox"/> Wind-loss adjusted gauge precipitation							
<input type="checkbox"/> Probability of liquid precipitation							
<input type="checkbox"/> Multisatellite precipitation							
<input type="checkbox"/> Wind-loss adjusted gauge precipitation							
<input type="checkbox"/> Probability of liquid phase							
<input type="checkbox"/> Multi-satellite precipitation (GPCPMON v3.0)	mm/day	AIRS,SSM	Monthly	0.5 °	1983-01-01	2016-12-31	-
<input type="checkbox"/> Combined satellite-gauge precipitation (GPCPMON v3.0)	mm/day	AIRS,SSM	Monthly	0.5 °	1983-01-01	2016-12-31	-
<input type="checkbox"/> Quality index (GPCPMON v3.1)	-	AIRS,SSM	Monthly	0.5 °	1983-01-01	2019-12-31	-
<input type="checkbox"/> Combined satellite-gauge precipitation (GPCPMON v3.1)	mm/day	AIRS,SSM	Monthly	0.5 °	1983-01-01	2019-12-31	-
<input type="checkbox"/> Combined satellite-gauge precipitation random error (GPCPMON v3.0)	mm/day	AIRS,SSM	Monthly	0.5 °	1983-01-01	2016-12-31	-
<input type="checkbox"/> Satellite source index (GPCPMON v3.0)	index value	AIRS,SSM	Monthly	0.5 °	1983-01-01	2016-12-31	-
<input type="checkbox"/> Gauge relative weighting (GPCPMON v3.1)	percent	AIRS,SSM	Monthly	0.5 °	1983-01-01	2019-12-31	-
<input type="checkbox"/> Satellite source index (GPCPMON v3.1)	index value	AIRS,SSM	Monthly	0.5 °	1983-01-01	2019-12-31	-
<input type="checkbox"/> Combined satellite-gauge precipitation random error (GPCPMON v3.1)	mm/day	AIRS,SSM	Monthly	0.5 °	1983-01-01	2019-12-31	-
<input checked="" type="checkbox"/> Combined satellite-gauge precipitation (GPCPMON v3.2)	mm/day	AIRS,SSM	Monthly	0.5 °	1983-01-01	2020-12-31	-



Select a plot type

Select Plot **Select Date Range (UTC)** **Select Region (Bo**

Time Averaged Map *i* 1983 - 01 - 01 00 : 00 to 2020 - 12 - 31 23 : 59 US States Florida;

Maps

- Time Averaged Map**
- Map, Recurring Averages
- Time Averaged Overlay Map
- Map, Accumulated
- Animation
Limited to: 365 time steps
- Map, Difference of Time Averaged

Comparisons

- Map, Correlation

Scatter, Area Averaged (Static)

Scatter (Interactive)
Limited to: 30000 points

Scatter (Static)

Scatter, Time-Averaged (Interactive)
Limited to: 30000 points

Time Series

- Time Series, Area-Averaged Differences
- Time Series, Area-Averaged
- Hovmoller, Longitude-Averaged
- Hovmoller, Latitude-Averaged

Time Series, Recurring Averages

Miscellaneous

- Histogram
- Zonal Mean

Vertical

- Cross Section, Latitude-Pressure
- Cross Section, Longitude-Pressure
- Cross Section, Time-Pressure
- Vertical Profile



Select a plot and time range

Select Plot i
Time Averaged Map

Select Date Range (UTC)
1983 - 01 - 01 00 : 00 to 2024 - 09 - 30 23 : 59
Valid Range: 1983-01-01 to 2024-09-30

Select Region (Bounding Box or Shape)
Countries and Areas India;

Select Variables
Number of matching Variables: 0 of 2054 Total Variable(s) included in Plot: 1

Keyword :

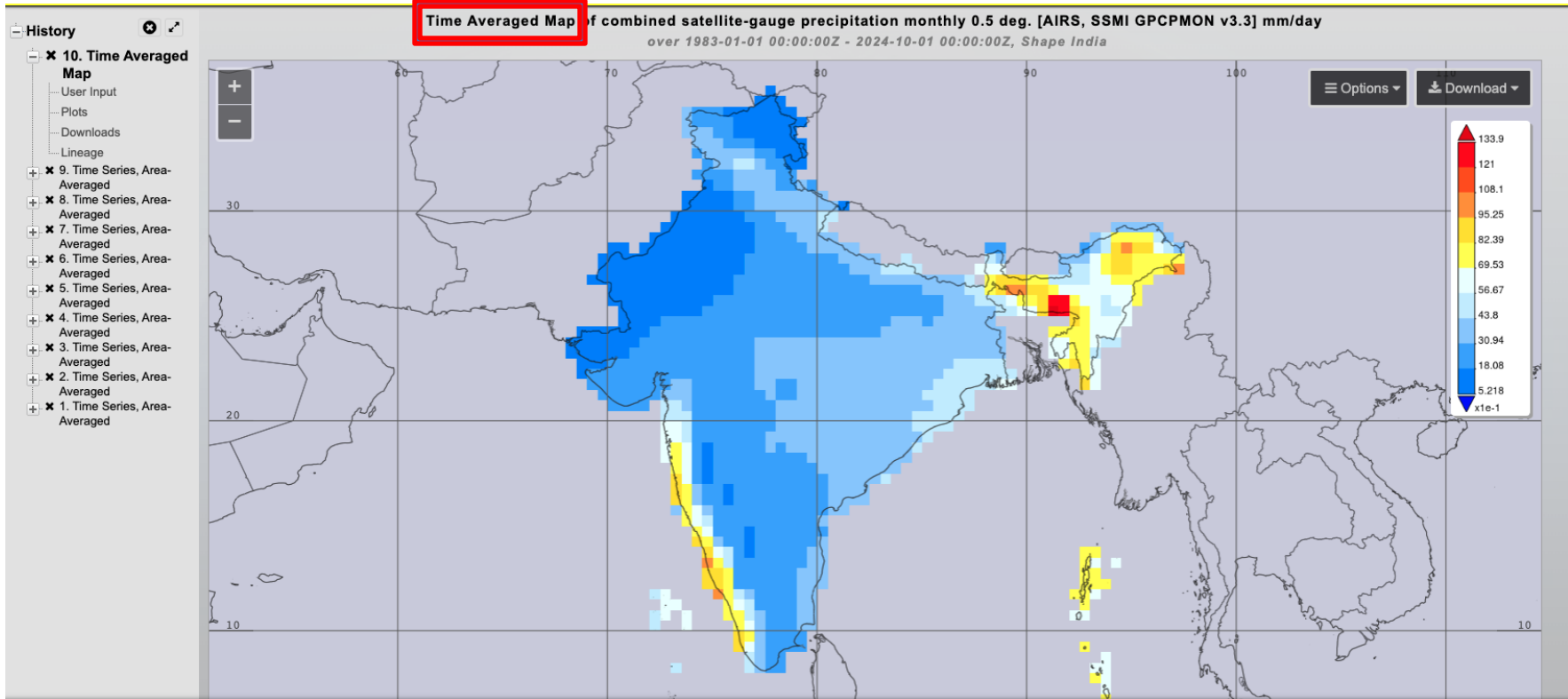
Variable	Units	Source	Temp.Res.	Spat.Res.	Begin Date	End Date
<input checked="" type="checkbox"/> combined_satellite-gauge_precipitation (GPCPMON v3.3)	mm/day	AIRS,SSMI	Monthly	0.5 °	1983-01-01	2024-09-30

Observations
 Model (560)
 Observation (764)
 Reanalysis (730)

Disciplines
 Aerosols (274)

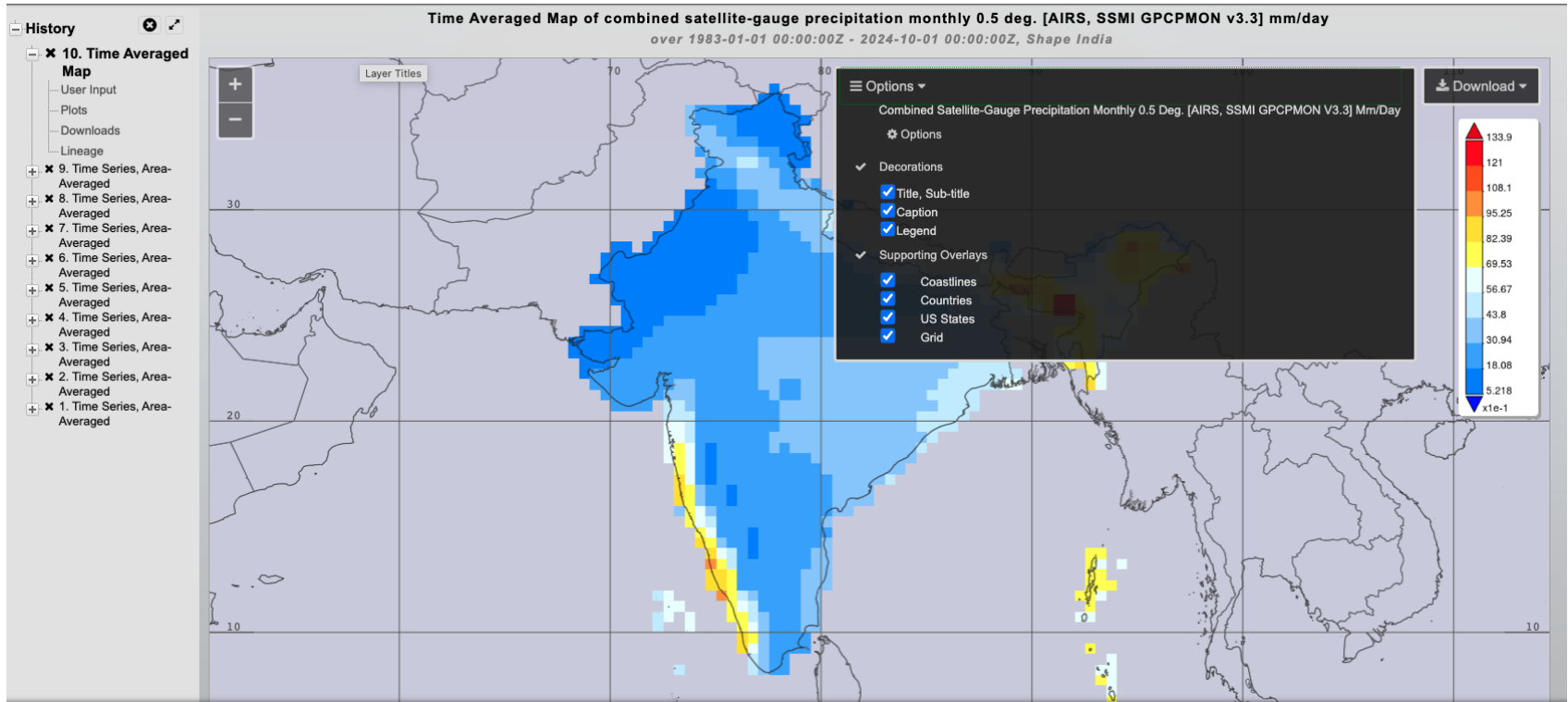


Visualization and output





Visualization and output (cont.)





Visualization and output (cont.)

History

- 10. Time Averaged Map
 - User Input
 - Plots
 - Downloads
 - Lineage**
- 9. Time Series, Area-Averaged
- 8. Time Series, Area-Averaged
- 7. Time Series, Area-Averaged
- 6. Time Series, Area-Averaged
- 5. Time Series, Area-Averaged
- 4. Time Series, Area-Averaged
- 3. Time Series, Area-Averaged
- 2. Time Series, Area-Averaged
- 1. Time Series, Area-Averaged

Giovanni now requires a login for data access. Please read the helpful [Data Access How-To](#) document for more information.

Total Elapsed Time: 53.04 s

Waiting for System Resources (Time taken: 2.19 s)

Catalog Query (Time taken: 0.07 s)

Output

Metadata from data catalog [mfst.data.field.info+dGPCPMON_3_3_sat_gauge_precip.xml](#)

[Download list of all URLs in step](#)

Data File Search (Time taken: 16.33 s)

Output

Data URL	https://measures.gesdisc.eosdis.nasa.gov:443/opendap/GPCP/GPCPMON.3.3/1983/GPCPMON_L3_198301_V3.3.nc4.nc?sat_gauge_precip[0:0][0:359][0:719].lat[0:359].lon[0:719].time[0:0].time_bnds[0:0][0:1]
Data URL	https://measures.gesdisc.eosdis.nasa.gov:443/opendap/GPCP/GPCPMON.3.3/1983/GPCPMON_L3_198302_V3.3.nc4.nc?sat_gauge_precip[0:0][0:359][0:719].lat[0:359].lon[0:719].time[0:0].time_bnds[0:0][0:1]
Data URL	https://measures.gesdisc.eosdis.nasa.gov:443/opendap/GPCP/GPCPMON.3.3/1983/GPCPMON_L3_198303_V3.3.nc4.nc?sat_gauge_precip[0:0][0:359][0:719].lat[0:359].lon[0:719].time[0:0].time_bnds[0:0][0:1]
Data URL	https://measures.gesdisc.eosdis.nasa.gov:443/opendap/GPCP/GPCPMON.3.3/1983/GPCPMON_L3_198304_V3.3.nc4.nc?sat_gauge_precip[0:0][0:359][0:719].lat[0:359].lon[0:719].time[0:0].time_bnds[0:0][0:1]
Data URL	https://measures.gesdisc.eosdis.nasa.gov:443/opendap/GPCP/GPCPMON.3.3/1983/GPCPMON_L3_198305_V3.3.nc4.nc?sat_gauge_precip[0:0][0:359][0:719].lat[0:359].lon[0:719].time[0:0].time_bnds[0:0][0:1]
Data URL	https://measures.gesdisc.eosdis.nasa.gov:443/opendap/GPCP/GPCPMON.3.3/1983/GPCPMON_L3_198306_V3.3.nc4.nc?sat_gauge_precip[0:0][0:359][0:719].lat[0:359].lon[0:719].time[0:0].time_bnds[0:0][0:1]
Data URL	https://measures.gesdisc.eosdis.nasa.gov:443/opendap/GPCP/GPCPMON.3.3/1983/GPCPMON_L3_198307_V3.3.nc4.nc?sat_gauge_precip[0:0][0:359][0:719].lat[0:359].lon[0:719].time[0:0].time_bnds[0:0][0:1]
Data URL	https://measures.gesdisc.eosdis.nasa.gov:443/opendap/GPCP/GPCPMON.3.3/1983/GPCPMON_L3_198308_V3.3.nc4.nc?sat_gauge_precip[0:0][0:359][0:719].lat[0:359].lon[0:719].time[0:0].time_bnds[0:0][0:1]
Data URL	https://measures.gesdisc.eosdis.nasa.gov:443/opendap/GPCP/GPCPMON.3.3/1983/GPCPMON_L3_198309_V3.3.nc4.nc?sat_gauge_precip[0:0][0:359][0:719].lat[0:359].lon[0:719].time[0:0].time_bnds[0:0][0:1]
Data URL	https://measures.gesdisc.eosdis.nasa.gov:443/opendap/GPCP/GPCPMON.3.3/1983/GPCPMON_L3_198310_V3.3.nc4.nc?sat_gauge_precip[0:0][0:359][0:719].lat[0:359].lon[0:719].time[0:0].time_bnds[0:0][0:1]

Too many URLs to display. [Download list of all URLs in step](#)

Data File Staging (Time taken: 0.34 s)



Output

Output file	scrubbed.GPCPMON_3_3_sat_gauge_precip.19830101.nc
Output file	scrubbed.GPCPMON_3_3_sat_gauge_precip.19830201.nc
Output file	scrubbed.GPCPMON_3_3_sat_gauge_precip.19830301.nc
Output file	scrubbed.GPCPMON_3_3_sat_gauge_precip.19830401.nc
Output file	scrubbed.GPCPMON_3_3_sat_gauge_precip.19830501.nc
Output file	scrubbed.GPCPMON_3_3_sat_gauge_precip.19830601.nc
Output file	scrubbed.GPCPMON_3_3_sat_gauge_precip.19830701.nc
Output file	scrubbed.GPCPMON_3_3_sat_gauge_precip.19830801.nc
Output file	scrubbed.GPCPMON_3_3_sat_gauge_precip.19830901.nc
Output file	scrubbed.GPCPMON_3_3_sat_gauge_precip.19831001.nc

Too many URLs to display. [Download list of all URLs in step](#)



Visualization and output (cont.)

History  

- [-] **x 10. Time Averaged Map**
 - User Input
 - Plots
 - Downloads**
 - Lineage
- [+] **x 9. Time Series, Area-Averaged**
- [+] **x 8. Time Series, Area-Averaged**
- [+] **x 7. Time Series, Area-**

Downloads

Click format links (e.g., NetCDF) to download files of that format. All downloadable files represent plot data. Available file formats vary based on plot type.

File Links:

[NetCDF](#) [PNG](#) [GeoTIFF](#) [KMZ](#) g4.timeAvgMap.GPCPMON_3_3_sat_gauge_precip.19830101-20240930.180W_90S_180E_90N



User services

- FAQs, How-To (recipes), Glossary, etc.
- Social media (Twitter, YouTube, User Forum)
- Help desk (phone, email, online feedback)
- Training materials (ARSET => Applied Remote Sensing Training)



Learning resources:

- Studying seasonality
- Studying extreme events: floods, flash floods, heat waves, droughts
- Data recipe (How-To)



Information

- Data information and services: <https://disc.gsfc.nasa.gov/> Search for: TRMM (GPM, TRMM, IMERG, NLDAS, GLDAS, FLDAS, MERRA)
- Giovanni: <https://giovanni.gsfc.nasa.gov> or Google search “NASA giovanni” Search for “GPM”, “NLDAS”, “MERRA”, “GLDAS”, “FLDAS”
- NASA Applied Remote Sensing Training (**ARSET**): <https://appliedsciences.nasa.gov/what-we-do/capacity-building/arset>
- Comments and suggestions: gsfc-dl-help-disc@mail.nasa.gov