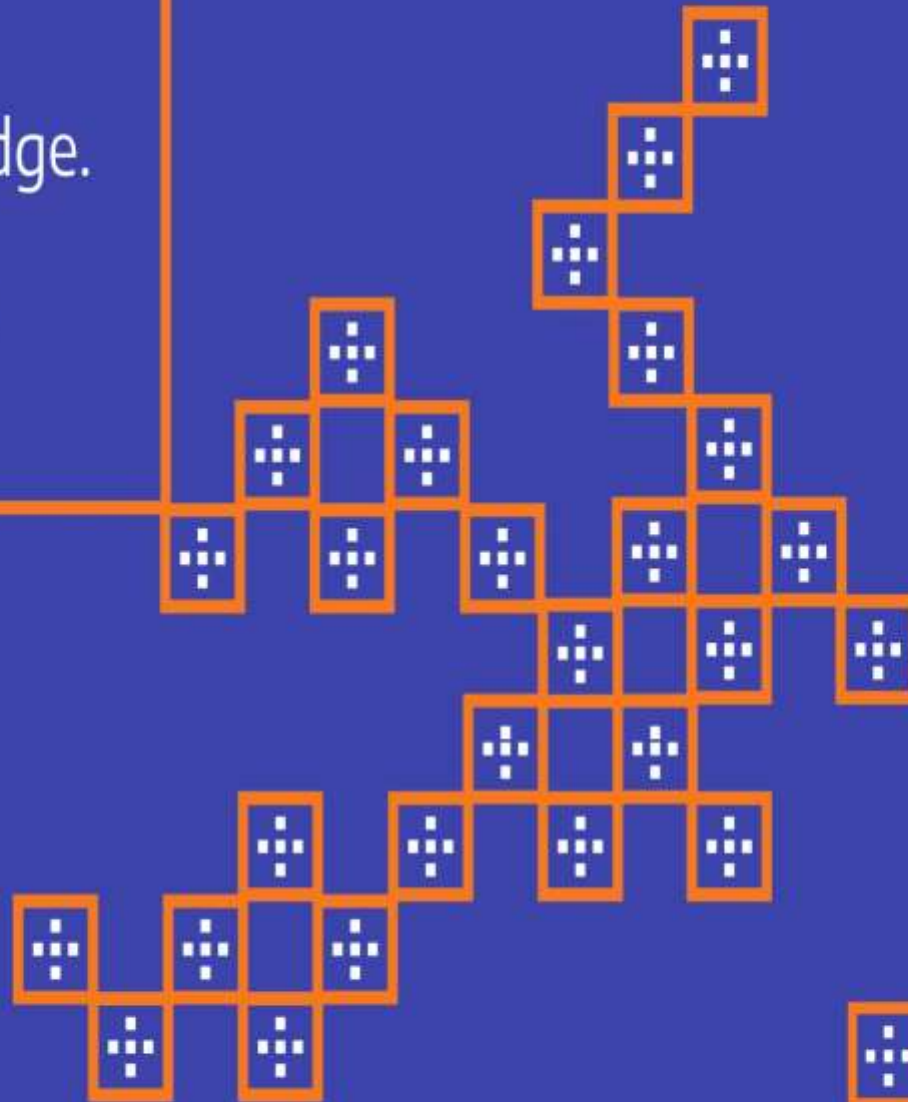


Create
knowledge.
Foster
change.





Satellite-based Global Precipitation Data and Services at NASA GES DISC (Part II)

Zhong Liu

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Services Center (DISC)

CSISS, George Mason University



Outline

- Data services
- Giovanni (easy-to-use online tool without downloading data and software)
- Live demo
- Summary



Data Services (How to find data?)

The screenshot displays the NASA Earth Data GES DISC website. The top panel features a large background image of Earth from space, with a central 'Explore...' search bar. Below the search bar, there are links for 'Data Collections', 'Data Search', and 'Browse Data by Category'. The bottom panel is divided into three columns: 'Projects & Missions' (listing Cloud Absorption Radiometer (CART), MEASURES, and SORCE), 'Featured Gallery Images' (showing two satellite images), and 'News' (listing recent releases). The footer contains navigation links for 'NASA's Most Used Data', 'Science Focus Areas', 'Tools', 'Resources', and 'About Us'.

*A three-panel design
for searching data and
information*



Data Services (cont.)




- TRMM, GPM, NLDAS, GLDAS, MERRA-2
- precipitation, soil moisture, temperature, etc.

The screenshot shows the NASA GES DISC website. The header includes the NASA logo, the text 'GES DISC', and the subtitle 'Atmospheric Composition, Water & Energy Cycles, and Climate Variability'. In the top right corner, there are links for 'Feedback', 'Help', and a user greeting 'Hi, Zhong'. A central 'Explore...' menu is open, displaying a list of options: 'Data Collections' (selected), 'Data Documentation', 'Alerts', 'FAQs', 'Glossary', 'How-To's', 'Image Gallery', 'News', and 'Tools'. The background of the website is a high-resolution image of Earth from space. At the bottom left, statistics are provided: 'Archive Size: 2,200,827 TB', 'Archived Data Files: 115,035,250', 'Files Distributed*: 2,340,660,955', and 'Data Volume Distributed*: 22,197,155 TB'. The bottom right corner features the 'GES DISC Earth Sciences Data Information Services Center' logo.



Data Services (cont.)

Explore...

Data Collections ▼ TRMM   

Browse Data by Category ▼

Subject	Aerosols	Infrared Wavelengths	Sea Ice
Measurement	Air Quality	Ionosphere/Magnetosphere	Sea Surface Topography
Source	Altitude	Dynamics	Sensor Characteristics
Processing Level	Atmospheric Chemistry	Land Surface/Agriculture	Snow/Ice
Project	Atmospheric Phenomena	Indicators	Soils
Temporal Resolution	Atmospheric Pressure	Land Use/Land Cover	Solar Activity
Spatial Resolution	Atmospheric Radiation	Microwave	Solar Energetic Particle Flux
	Atmospheric Temperature	Natural Hazards	Solar Energetic Particle Properties
	Atmospheric Water Vapor	Ocean Chemistry	Solid Precipitation
	Atmospheric Winds	Ocean Heat Budget	Sun-Earth Interactions
	Atmospheric/Ocean Indicators	Ocean Optics	Surface Radiative Properties
	Clouds	Ocean Pressure	Surface Thermal Properties
	Cryospheric Indicators	Ocean Temperature	Surface Water
	Ecological Dynamics	Ocean Winds	Topography
	Ecosystems	Paleoclimate Indicators	Ultraviolet Wavelengths
	Frozen Ground	Platform Characteristics	Vegetation
	Glaciers/Ice Sheets	Precipitation	Visible Wavelengths
	Ground Water	Protists	
		Radar	

Radio O

is an airborne multi-wave



Data Services (cont.)

GES DISC

Data Collections ▼ trmm

[Atmospheric Composition](#), [Water & Energy Cycles](#) and [Climate Variability](#)

Feedback Help ▼ Hi, Zhong ▼



Data Collections Showing 1 - 25 of 71 datasets associated with trmm

Refine By

Subject Sort ▼

- ☐ Aerosols (1)
- ☐ Air Quality (1)
- ☐ Atmospheric Radiation (11)
- ☐ Atmospheric Temperature (9)
- ☐ Atmospheric Water Vapor (8)

[More...](#)

Measurement Sort ▼

- ☐ 24 Hour Precipitation Amount (1)
- ☐ Atmospheric Heating (10)
- ☐ Attitude Characteristics (8)
- ☐ Brightness Temperature (2)
- ☐ Cloud Liquid Water/Ice (8)

[More...](#)

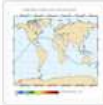


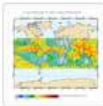


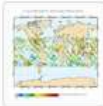


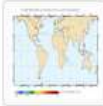
Source Sort ▼

- ☐ Aqua AMSR-E (4)
- ☐ DMSP 5D-2/F13 SSM/I (1)
- ☐ DMSP 5D-2/F14 SSM/I (1)
- ☐ DMSP 5D-2/F15 SSM/I (1)
- ☐ DMSP 5D-3/F16 SSM/I (1)

[More...](#)

Processing Level Sort ▼

- ☐ 1 (7)
- ☐ 1A (4)
- ☐ 1B (6)

Image	Dataset ▴	Source ▴	Temporal Resolution ▴	Spatial Resolution ▴	Process Level ▴	Begin Date ▴	End Date ▴
 Hover	GPM PR on TRMM Spectral Latent Heating Profiles L2 1.5 hours 5 km V06 (GPM_2HSLH_TRMM.06) - Atmospheric Temperature, Atmospheric Winds, Precipitation ▾	TRMM PR	90 minutes	5 km x 5 km	3	1997-12-07	2015-04-01
	 Get Data  Ingest Status						
 Hover	GPM TMI on TRMM (GPROF) Climate-based Radiometer Precipitation Profiling L3 1 month 0.25 degree x 0.25 degree V05 (GPM_3GPROFTRMMTMI_CLIM.05) - Atmospheric Water Vapor, Precipitation	TRMM TMI	1 month	0.25 ° x 0.25 °	3	1997-12-01	2015-04-08
	 Get Data  Ingest Status						
 Hover	GPM TMI on TRMM (GPROF) Climate-based Radiometer Precipitation Profiling L3 1 day 0.25 degree x 0.25 degree V05 (GPM_3GPROFTRMMTMI_DAY_CLIM.05) - Atmospheric Water Vapor, Precipitation	TRMM TMI	1 day	0.25 ° x 0.25 °	3	1997-12-08	2015-04-08
	 Get Data  Ingest Status						
 Hover	GPM PR on TRMM Gridded Orbital Spectral Latent Heating Profiles L3 1.5 hours 0.5x0.5 degree V06 (GPM_3GSLH_TRMM.06) - Atmospheric Temperature, Atmospheric Winds, Precipitation ▾	TRMM PR	1.5 hours	0.5 ° x 0.5 °	3	1997-12-07	2015-04-01

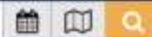
Recommended data collections +



Data Services (cont.)

GES DISC

Data Collections ▾ 3B43



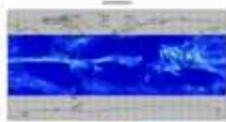
Feedback Help ▾ Hi, Zhong ▾



[Atmospheric Composition](#), [Water & Energy Cycles](#), and [Climate Variability](#)

[Go to Search Results](#)

TRMM_3B43: TRMM (TMPA/3B43) Rainfall Estimate L3 1 month 0.25 degree x 0.25 degree V7



[View Full-size Image](#)

The 3B43 dataset is the monthly version of the 3B42 dataset.

This product is created using TRMM-adjusted merged microwave-infrared precipitation rate (in mm/hr) and root-mean-square (RMS) precipitation-error estimates.

It provides a 7best7 precipitation estimate in a latitude band covering 50o N to 50o S, an expansion of the TRMM region, from all global data sources, namely high-quality microwave data, infrared data, and analyses of rain gauges. The granule size is one month.

Data Access

[Online Archive](#)

[Earthdata Search](#)

[Giovanni](#)

[Web Services ▾](#)

[Subset / Get Data](#)

[Product Summary](#)

[Data Citation](#)

[Documentation](#)

Shortname: TRMM_3B43

Longname: TRMM (TMPA/3B43) Rainfall Estimate L3 1 month 0.25 degree x 0.25 degree V7

DOI: 10.5067/TRMM/TMPA/MONTH/7

Version: 7

Format: HDF

Spatial Coverage: -180.0,-50.0,180.0,50.0

Temporal Coverage: 1998-01-01 to [2018-07-31](#)

File Size: 4.9 MB per file

Data Resolution

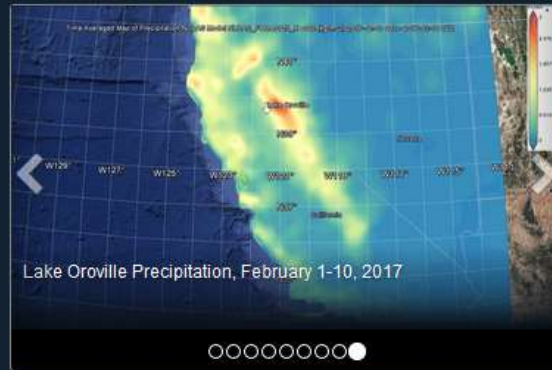
Spatial: 0.25 ° x 0.25 °

Temporal: 1 month

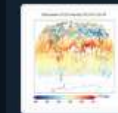


Data Services (cont.)

- 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)



Release of GPS Radio Occultation
Boundary Layer Depth Products
Oct 25, 2018



OCO-2 Releases Lite product V9r
Oct 17, 2018



New Version 01 TSIS-1 Level 3 Products
Released to Public
Oct 5, 2018

NASA Official: Long Pham
Web Curator: M. Hegde

Science Focus Areas

- Atmospheric Composition
- Water & Energy Cycles
- Climate Variability

Tools

- Giovanni
- MERRA Subsetter
- Data Rods for Hydrology
- DQViz
- AIRS NRT Viewer
- OGC Web Map Service
- OPeNDAP and GDS

Resources

- [HowTo](#)
- [Glossary](#)
- [FAQ](#)
- [News](#)
- [Gallery](#)
- [Alerts](#)

About Us

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

Monitor

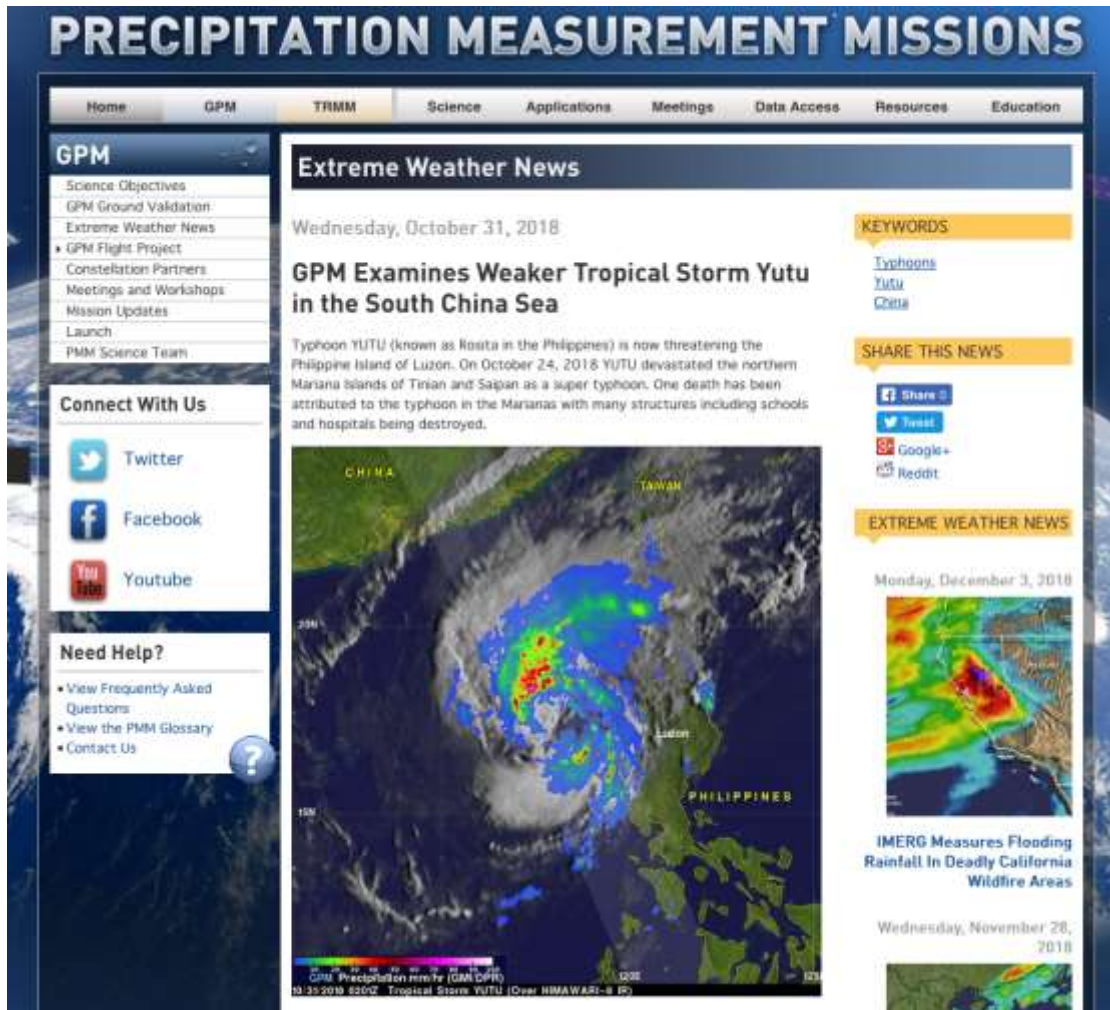
Console





Data Services (cont.)

- **New:** Level-2 GPM DPR subsetting service



Tropical Storm Yutu in the South China Sea near the Philippines on Oct. 31, 2018 (<https://pmm.nasa.gov>)



Data Services (cont.)

- Level-2 GPM DPR subsetting service

The screenshot displays the GES DISC website interface. At the top, the NASA logo is visible. The main header includes the text "GES DISC" and "Atmospheric Composition, Water & Energy Cycles and Climate Variability". A search bar shows "Data Collections" and "2adpr". The "Data Collections" section displays a table of datasets. A red arrow points to the "Subset / Get Data" link for the "GPM DPR Precipitation Profile L2A 1.5 hours 5 km V06 (GPM_2ADPR06)" dataset. Below the table, the "Estimated size of results" is shown as "1,748 days, 27,619 links, 422.47 GB". The "Refine Search" section includes filters for "Refine Date Range" (2014-03-08 to 2018-12-19) and "Refine Spatial Region" (-180, -70, 180, 70). The "Subset Options" section includes filters for "Spatial Subset" (-180, -70, 180, 70) and "Variables" (Get all variables). At the bottom, there are "Reset All" and "Get Data" buttons.

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

Data Collections Showing 1 - 1 of 1 datasets associated with 2adpr


Refine By

Subject Sort -

- ☐ Atmospheric Water Vapor (1)
- ☐ Precipitation (1)
- ☐ Radar (1)

Source Sort -

- ☐ GPM DPR (1)

Image	Dataset	Source	Temporal Resolution	Spatial Resolution	Process Level	Begin Date	End Date
 Hover	GPM DPR Precipitation Profile L2A 1.5 hours 5 km V06 (GPM_2ADPR06) - Atmospheric Water Vapor, Precipitation, Radar Subset / Get Data	GPM DPR	1.5 hours	5 km x 5 km	2	2014-03-08	2018-12-19

Get GPM DPR Precipitation Profile L2A 1.5 hours 5 km V06 data

Estimated size of results
1,748 days, 27,619 links, 422.47 GB

Refine Search

Refine Date Range: 2014-03-08 to 2018-12-19 [Reset]

Refine Spatial Region: -180, -70, 180, 70 [Reset]

Subset Options

Spatial Subset: -180, -70, 180, 70 [Reset]

Variables: Get all variables [Reset]

Reset All Get Data



Data Services (cont.)

- Level-2 GPM DPR subsetting service

Refine Search ?

▼ Refine Date Range: ✓ 2018-10-31 to 2018-10-31 Reset

From: To:

Available Range: 2014-03-08 to 2018-12-19 Default Range

< October 2018 >

Sun	Mon	Tue	Wed	Thu	Fri	Sat
30	01	02	03	04	05	06
07	08	09	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	01	02	03
04	05	06	07	08	09	10

< October 2018 >

Sun	Mon	Tue	Wed	Thu	Fri	Sat
30	01	02	03	04	05	06
07	08	09	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	01	02	03
04	05	06	07	08	09	10

▼ Refine Spatial Region: ✓ 113.467, 11.744, 123.047, 20.357 Reset




Subset Options ?


▼ Spatial Subset: ✓ 113.467, 11.744, 123.047, 20.357 Reset

Default Range

+

-



Available Range: -180, -70, 180, 70 Cursor Coordinates: 25.015, 139.922

- Area
- Circle
- Point

▼ Variables: ✓ 1 variable(s) selected Reset

NOTE: By default, ALL variables are sent in the subset request.

Expand Tree

- ☐ AlgorithmRuntimeInfo
- ☐ HS
- ☐ MS
- ☐ NS
 - ☐ CSF
 - ☐ DSD
 - ☐ Experimental
 - ☐ FLG
 - ☐ navigation
 - ☐ PRI
 - ☐ scanStatus
 - ☐ ScanTime
 - ☐ SLV
 - ☐ binEchoBottom
 - ☐ epsilon
 - ☐ flagSLV
 - ☐ paramDSD
 - ☐ paramNUBF
 - ☐ phaseNearSurface
 - ☐ plotFinal
 - ☐ precipRate
 - ☐ precipRateAve24
 - ☐ precipRateESurface
 - ☒ precipRateNearSurface
 - ☐ precipWaterIntegrated
 - ☐ qualitySLV
 - ☐ sigmaZeroCorrected
 - ☐ zFactorCorrected
 - ☐ zFactorCorrectedESurface
 - ☐ zfactorCorrectedNearSurface

- ☐ SRT
- ☐ VER

Reset All Get Data



Data Services (cont.)

- Level-2 GPM DPR subsetting service

📄 Data File Links for [GPM DPR Precipitation Profile L2A 1.5 hours 5 km V06](#)

Results (found 4 links in range from 2018-07-23 to 2018-07-23):

[Download links list](#) (This list is valid for 2 days) | [Instructions for downloading](#)

[README Document](#)

[ALGORITHM THEORETICAL BASIS DOCUMENT \(ATBD\)](#)

[2A.GPM.DPR.V8-20180723.20181031-S005717-E022950.026546.V06A.SUB.HDF5](#)

[2A.GPM.DPR.V8-20180723.20181031-S145027-E162300.026555.V06A.SUB.HDF5](#)

You have chosen to open:

📄 ...3.20181031-S005717-E022950.026546.V06A.SUB.HDF5

which is: HDF5 File (115 KB) 

from: <https://gpm1.gesdisc.eosdis.nasa.gov>

Would you like to save this file?

Cancel

Save File

You have chosen to open:

📄 ...80723.20181031-S005717-E022950.026546.V06A.HDF5

which is: HDF5 File (240 MB) 

from: <https://gpm1.gesdisc.eosdis.nasa.gov>

Would you like to save this file?

Cancel

Save File

Subset Vs. Full (everything)



- Create Plot

Combine Plot

Open Dataset

Datasets

Catalogs

Bookmarks

Name	Long Name	Type
2A.GPM.DPR.V8-20...	2A.GPM.DPR.V8...	Local File
nray_idx	Original index v...	1D
NS	NS	—
Latitude	Latitude	Geo2D
Longitude	Longitude	Geo2D
navigation	NS/navigation	—
nscan_idx	Original index v...	1D
SLV	NS/SLV	—
precipRate...	precipRateNear...	Geo2D

Variable "precipRateNearSurface"

In file "2A.GPM.DPR.V8-20180723.20181031-S005717-E022950.026546.V06A.SUB(6).HDF5"

Var full name: NS/SLV/precipRateNearSurface

```
float precipRateNearSurface(236, 49);
  :DimensionNames = "nscan,nray";
  :Units = "mm/hr";
  :units = "mm/hr";
  :_FillValue = -9999.9f; // float
  :CodeMissingValue = "-9999.9";
  :_ChunkSizes = 118U, 25U; // uint
```





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)



Giovanni (<https://giovanni.gsfc.nasa.gov>) - Data visualization and analysis without downloading data and software)

GIOVANNI The Bridge Between Data and Science v 4.28 Feedback Help Log out (zliu)

AIRS Project recommends not to use total column CO and CH4 ... [1 of 1 messages] [Read More](#)

Select Plot
☒ Maps: Time Averaged Map ☐ Comparisons: Select... ☐ Vertical: Select... ☐ Time Series: Select... ☐ Miscellaneous: Select...

Select Date Range (UTC)
YYYY-MM-DD HH:mm
- - 00:00 to - - 23:59
Valid Range: 1948-01-01 to 2018-10-26
Please specify a start date.

Select Region (Bounding Box or Shape)
Format: West, South, East, North

Select Variables
▼ Disciplines
☐ Atmospheric Dynamics (17)
☐ Cryosphere (1)
☐ Hydrology (105)
☐ Water and Energy Cycle (90)
▼ Measurements
☐ Atmospheric Moisture (1)
☐ Cloud Properties (1)
☐ Precipitation Anomaly (3)
☐ Precipitation (107)
☐ Snow/Ice Anomaly (1)
☐ Snow/Ice (10)
► Platform / Instrument
► Spatial Resolutions
► Temporal Resolutions
► Wavelengths
► Special Features
► Portal

Number of matching Variables: 119 of 1932 Total Variable(s) included in Plot: 0
Please select at least 1 variable
Keyword:

<input type="checkbox"/>	Variable	Units	Source	Temp.Res.	Spat.Res.	Begin Date	End Date	Vert. Slice
<input type="checkbox"/>	Cloud Ice (TRMM_3A12 v7)	g/m ³	TRMM	Monthly	0.5 °	1997-12-01	2015-03-31	0.5 km
<input type="checkbox"/>	Rain Rate (TRMM_3A12 v7)	mm/hr	TRMM	Monthly	0.5 °	1997-12-01	2015-03-31	-
<input type="checkbox"/>	Precipitation Rate (TRMM_3A12 v7)	mm/hr	TRMM	Monthly	0.5 °	1997-12-01	2015-03-31	-
<input type="checkbox"/>	Precipitation (Snow) (TRMM_3A12 v7)	g/m ³	TRMM	Monthly	0.5 °	1997-12-01	2015-03-31	0.5 km
<input type="checkbox"/>	Precipitation (Rain) (TRMM_3A12 v7)	g/m ³	TRMM	Monthly	0.5 °	1997-12-01	2015-03-31	0.5 km
<input type="checkbox"/>	Graupel (TRMM_3A12 v7)	g/m ³	TRMM	Monthly	0.5 °	1997-12-01	2015-03-31	0.5 km
<input type="checkbox"/>	Precipitation (TRMM_3B42 v7)	mm/hr	TRMM	3-hourly	0.25 °	1997-12-31	2018-07-31	-
<input type="checkbox"/>	Near-Real-Time Precipitation Rate (TRMM_3B42RT_Daily v7)	mm/day	TRMM	Daily	0.25 °	2000-03-01	2018-10-26	-
<input type="checkbox"/>	Precipitation Rate (TRMM_3B42_Daily v7)	mm/day	TRMM	Daily	0.25 °	1998-01-01	2018-07-31	-
<input type="checkbox"/>	Precipitation Rate (TRMM_3B43 v7)	mm/hr	TRMM	Monthly	0.25 °	1998-01-01	2018-07-31	-
<input type="checkbox"/>	Surface Convective Precipitation Rate (TRMM_3A12 v7)	mm/hr	TRMM	Monthly	0.5 °	1997-12-01	2015-03-31	-
<input type="checkbox"/>	Near-Real-Time Precipitation Rate (TRMM_3B42RT v7)	mm/hr	TRMM	3-hourly	0.25 °	2003-03-01	2018-10-26	-
<input type="checkbox"/>	Snow water-equivalent (accumulated) (NLDAS_NOAH0125_H	ka/m ²	NLDAS	Hourly	0.125 °	1979-01-02	2018-10-21	-

Responsible NASA Official: [Angela Li](#) Web Curator: [M. Hegde](#) Powered By Contact Us



Giovanni (cont.)

GIOVANNI

The Bridge Between Data and Science v 4.28

[Feedback](#) [Help](#) [Log out \(zliu\)](#)**Select Date Range (UTC)**

YYYY-MM-DD

HH:mm

 - to - **Select Region (Bounding Box or Shape)**

Format: West, South, East, North



Valid Range: 2014-03-12 to 2018-10-25

Please specify a start date.

Select Variables▼ **Disciplines**☐ Hydrology (11)▼ **Measurements**☐ Precipitation (11)▶ **Platform / Instrument**▶ **Spatial Resolutions**▶ **Temporal Resolutions**▶ **Portal**

Number of matching Variables: 11 of 1932

Total Variable(s) included in Plot: 1

Keyword:

	Variable	Units	Source	Temp.Res [▲]	Spat.Res.	Begin Date	End Date
<input type="checkbox"/>	Multi-satellite precipitation estimate with gauge calibration - Final Run (recommended for general use) (GPM_3IMERGHH v05)	<input type="text" value="mm/hr"/>	GPM	Half-Hourly	0.1 °	2014-03-12	2018-06-30
<input type="checkbox"/>	Random error for gauge-calibrated multi-satellite precipitation - Final Run (GPM_3IMERGHH v05)	mm/hr	GPM	Half-Hourly	0.1 °	2014-03-12	2018-06-30
<input type="checkbox"/>	Multi-satellite precipitation estimate with climatological gauge calibration - Early Run (GPM_3IMERGHHE v05)	<input type="text" value="mm/hr"/>	GPM	Half-Hourly	0.1 °	2014-03-12	2018-10-26
<input type="checkbox"/>	Multi-satellite precipitation estimate with climatological gauge calibration - Late Run (GPM_3IMERGHHL v05)	<input type="text" value="mm/hr"/>	GPM	Half-Hourly	0.1 °	2014-03-12	2018-10-26
<input type="checkbox"/>	Random Error for multi-satellite precipitation with climatological gauge calibration - Late Run (GPM_3IMERGHHL v05)	mm/hr	GPM	Half-Hourly	0.1 °	2014-03-12	2018-10-26
<input type="checkbox"/>	Random Error for multi-satellite precipitation with climatological gauge calibration - Early Run (GPM_3IMERGHHE v05)	mm/hr	GPM	Half-Hourly	0.1 °	2014-03-12	2018-10-26
<input type="checkbox"/>	Daily accumulated precipitation (combined microwave-IR) estimate - Final Run (GPM_3IMERGDF v05)	mm	GPM	Daily	0.1 °	2014-03-12	2018-06-30
<input type="checkbox"/>	Daily accumulated precipitation (combined microwave-IR) estimate - Early Run (GPM_3IMERGDE v05)	mm	GPM	Daily	0.1 °	2014-03-12	2018-10-25
<input checked="" type="checkbox"/>	Daily accumulated precipitation (combined microwave-IR) estimate - Late Run (GPM_3IMERGDL v05)	mm	GPM	Daily	0.1 °	2014-03-12	2018-10-25
<input type="checkbox"/>	Random error for merged satellite-gauge precipitation - Final Run (GPM_3IMERGM v05)	mm/hr	GPM	Monthly	0.1 °	2014-04-01	2018-06-30
<input type="checkbox"/>	Merged satellite-gauge precipitation estimate - Final Run (recommended for general use) (GPM_3IMERGM v05)	<input type="text" value="mm/hr"/>	GPM	Monthly	0.1 °	2014-04-01	2018-06-30

Responsible NASA Official: [Angela Li](#)
Web Curator: [M. Hegde](#)Powered By ▲ [Contact Us](#)



Example (Hurricane Maria)



Source: NASA Worldview

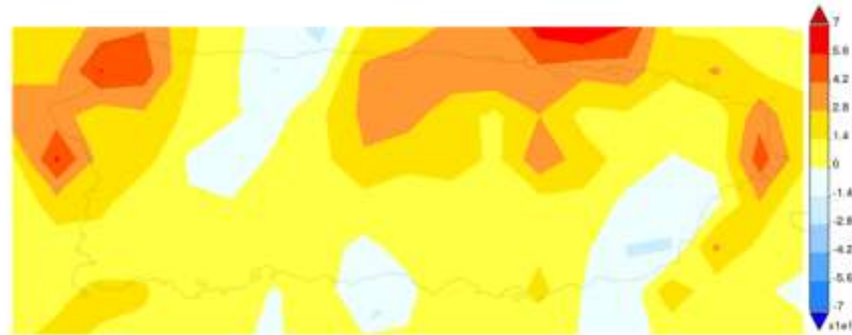
Total IMERG-Final rainfall map (in mm) in Puerto Rico (top right) and difference maps (in mm) between IMERG-Early and IMERG-Final (middle) and between IMERG-Early and IMERG-Late (bottom) on September 20, 2017.

Time Averaged Map of Daily accumulated precipitation (combined microwave-IR) estimate - Final Run daily 0.1 deg. [GPM GPM_3IMERGDF v05] mm over 2017-09-20, Region 67.4341W, 17.8235N, 65.5444W, 18.6365N



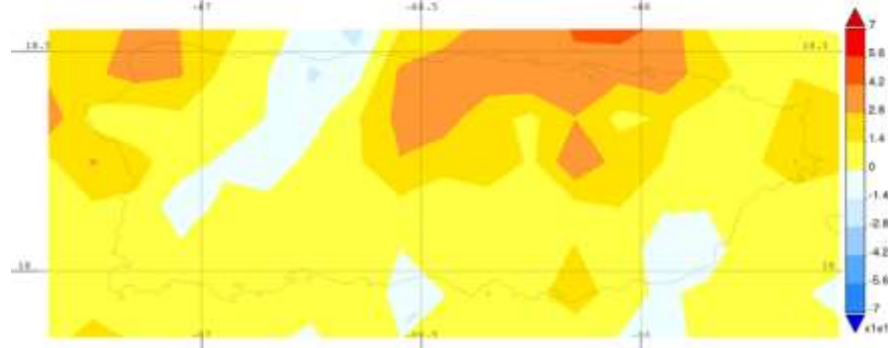
Total

Map, Difference of Time Averaged over 2017-09-20, Region 67.4341W, 17.8235N, 65.5444W, 18.6365N
Daily accumulated precipitation (combined microwave-IR) estimate - Early Run daily 0.1 deg. [GPM GPM_3IMERGDE v05] mm minus
Daily accumulated precipitation (combined microwave-IR) estimate - Final Run daily 0.1 deg. [GPM GPM_3IMERGDF v05] mm



Early -
Final

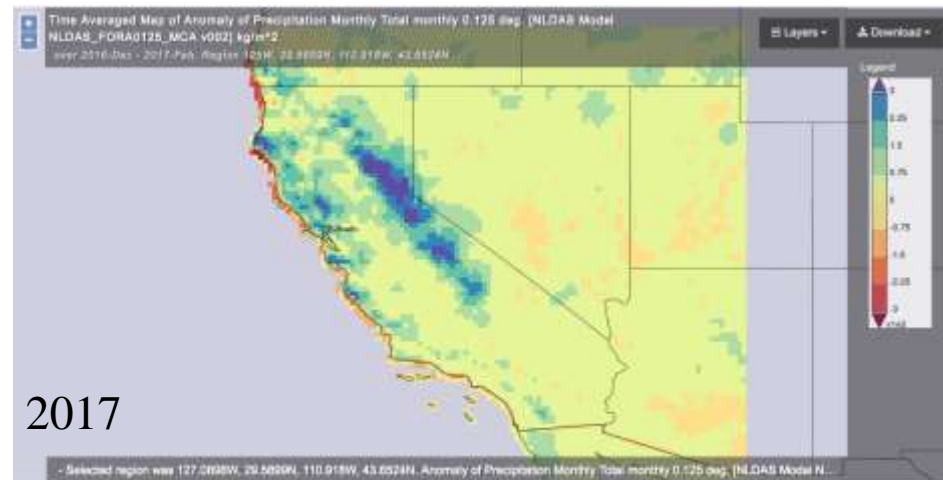
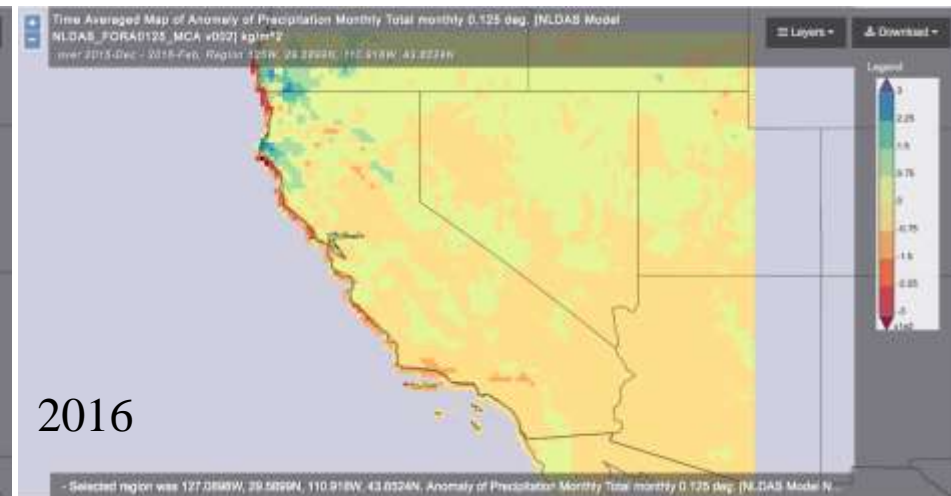
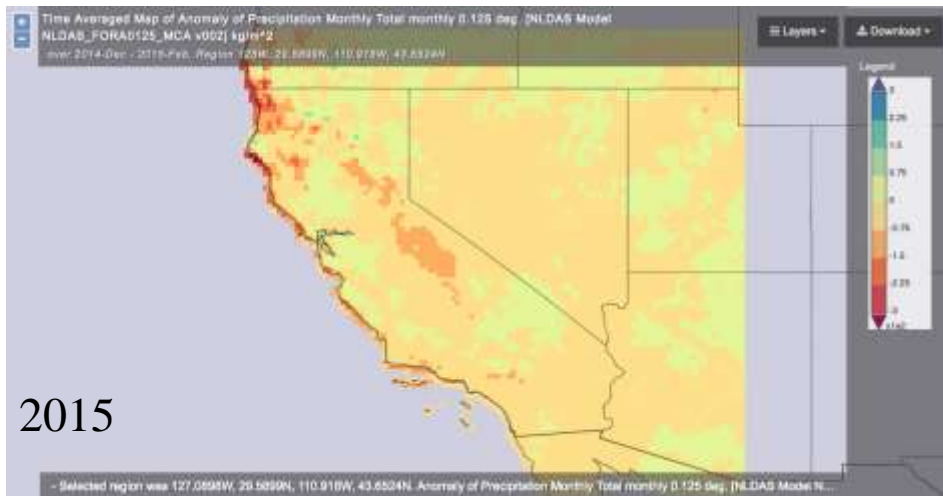
Map, Difference of Time Averaged over 2017-09-20, Region 67.4341W, 17.8235N, 65.5444W, 18.6365N
Daily accumulated precipitation (combined microwave-IR) estimate - Early Run daily 0.1 deg. [GPM GPM_3IMERGDE v05] mm minus
Daily accumulated precipitation (combined microwave-IR) estimate - Late Run daily 0.1 deg. [GPM GPM_3IMERGDL v05] mm



Early -
Late



Example (California Droughts)



NLDAS Total Precipitation
Anomaly in Giovanni



Summary

- Data services (search, subsetting, format conversion, GIS, etc.)
- Giovanni (online tool for visualization, analysis, evaluation, etc.)



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Information

- Data information and services:
<https://disc.gsfc.nasa.gov/> Search for: TRMM (GPM, TRMM, IMERG, NLDAS, GLDAS, MERRA)
- Giovanni: <https://giovanni.gsfc.nasa.gov> or Google search “NASA giovanni” Search for “GPM”, “TRMM”, “MERRA”, “GLDAS”
- Comments and suggestions: gsfc-help-disc@lists.nasa.gov