Explore Earth Science Datasets for STEM with the NASA GES DISC Online Visualization and Analysis Tool, Giovanni

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NASA/Goddard EARTH SCIENCES DATA and INFORMATION SERVICES CENTER (GES DISC)

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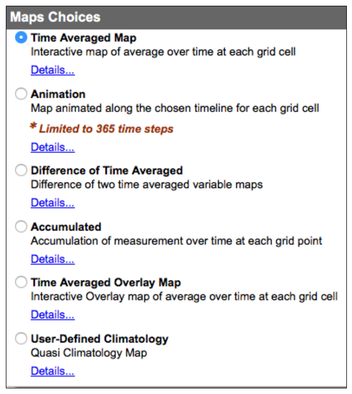
Abstract

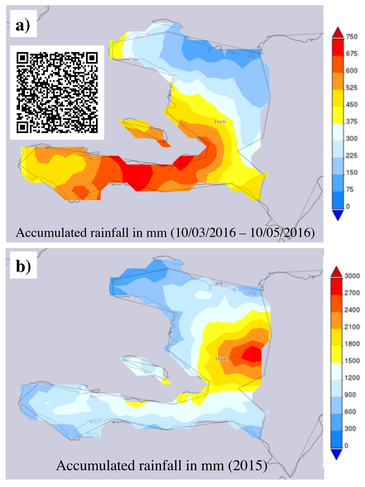
The NASA Goddard Earth Sciences (GES) Data and Information Services Center (DISC) is one of twelve NASA Science Mission Directorate (SMD) Data Centers that provide Earth science data, information, and services to users around the world including research and application scientists, students, citizen scientists, etc. The GES DISC is the home (archive) of remote sensing datasets for NASA Precipitation and Hydrology, Atmospheric Composition and Dynamics, etc.

To facilitate Earth science data access, the GES DISC has been developing user-friendly data services for users at different levels in different countries. Among them, the Geospatial Interactive Online Visualization ANd aNalysis Infrastructure (Giovanni, *http://giovanni.gsfc.nasa.gov/*) allows users to explore satellite-based datasets using sophisticated analyses and visualization without downloading data and software, which is particularly suitable for novices (such as students) to use NASA datasets in STEM (science, technology, engineering and mathematics) activities. In this presentation, we will briefly introduce Giovanni along with examples for STEM activities.

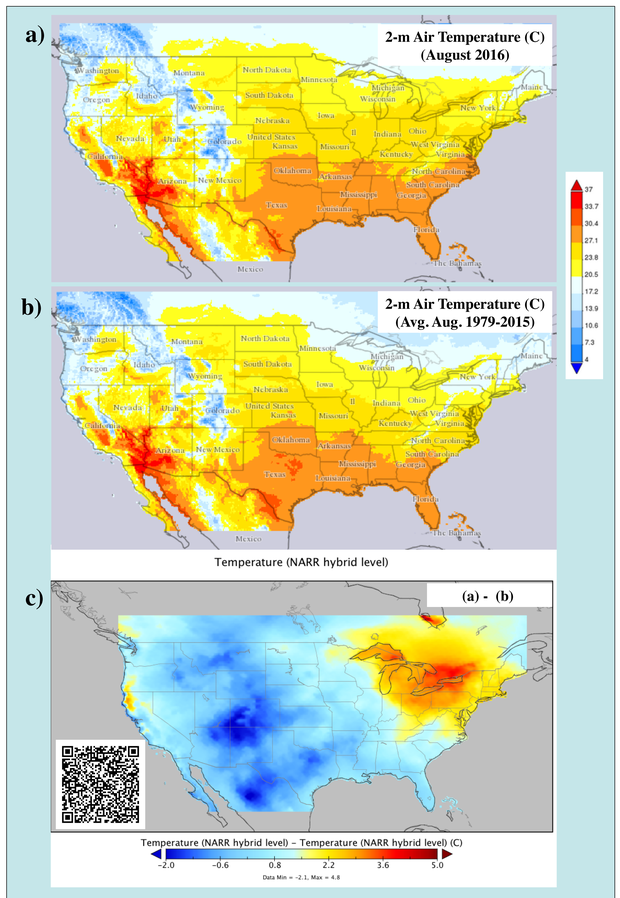
How can I use Giovanni in STEM



Map choices provide capabilities for different needs (see examples)



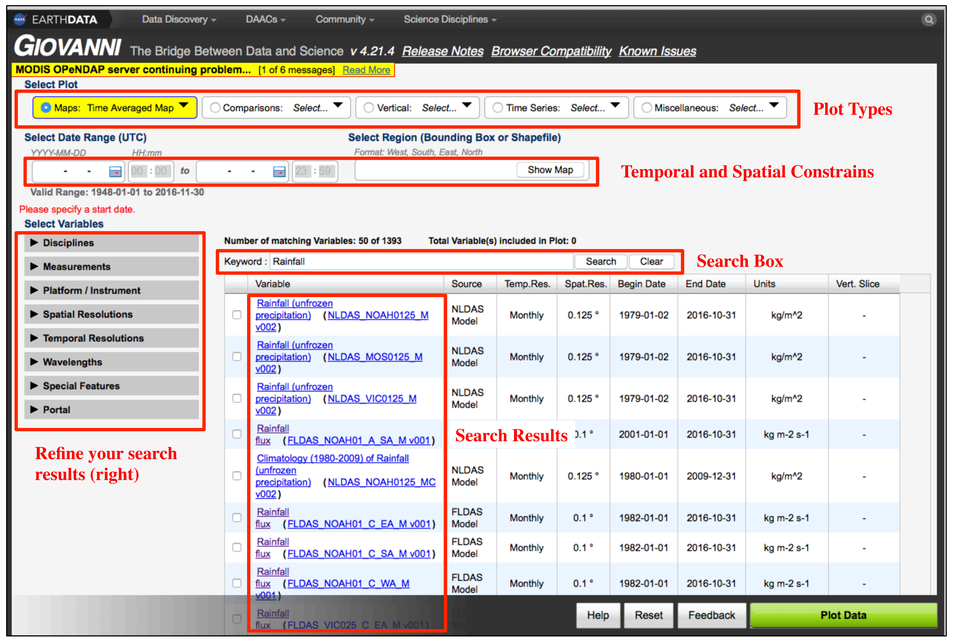
(a) Accumulated rainfall (mm) in Haiti from the passage of Hurricane Matthew in October 2016. (b) Accumulated annual rainfall in 2015 for comparison. "Accumulated" and the shapefile for Haiti were used to generate both maps. Use the QR code in (a) to access this example in Giovanni.



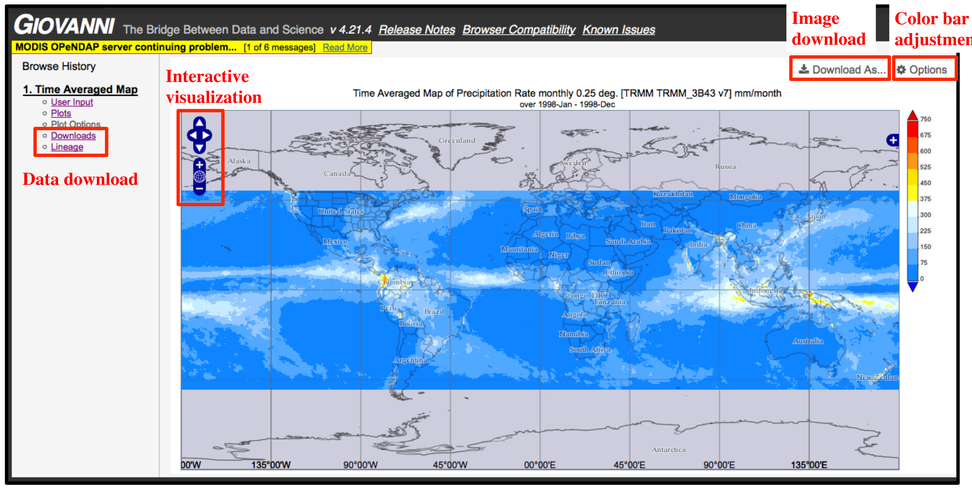
The global average temperature in August 2016 (a) ties July 2016 as the hottest month ever on record. With Giovanni, we can plot the map of air temperatures at 2-m height above the surface in August 2016 (a) for comparison with the average (1979 – 2015) temperatures in August (b). Use the QR code in (c) to access this example in Giovanni. First, use "Time Averaged Map" to generate (a), then use "User-Defined Climatology" to generate the August climatology in (b). Download a Panoply (free and available at NASA GISS: http://www.giss.nasa.gov/tools/panoply/). Download the data from Giovanni. Subtract (a) from (b) and the result is shown in (c).

Major Features in Giovanni

http://giovanni.gsfc.nasa.gov

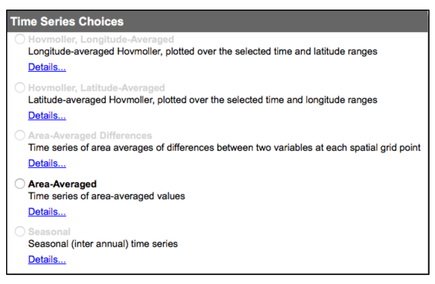


A landing page (portal) screenshot of the Giovanni showing plot types, temporal and spatial selections, keyword search, facets to refine search results, etc.



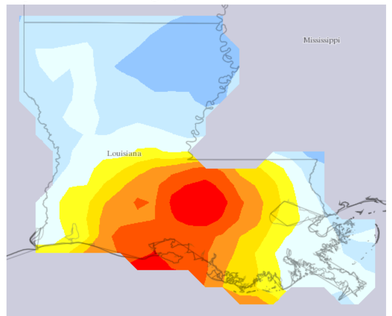
An output screenshot of Giovanni showing a result map, data downloads, lineage, browse history, image download, color bar adjustment, etc.

Explore Time Series in Your Area of Interest



Time series choices provide capabilities to explore temporal changes in your area of interest, especially with the use of shapefiles (countries, states in U.S., major watersheds in the world).

Monthly rainfall total (in mm) in August 2016 showing the Louisiana flood (QR code for Giovanni is provided on the right)

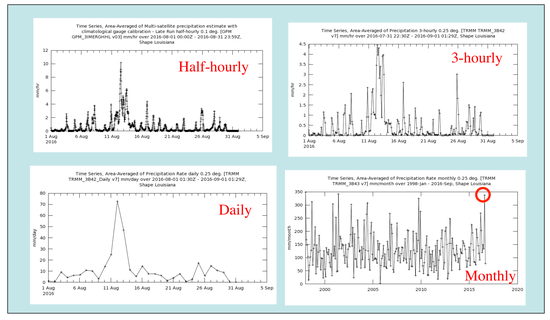


Basic Information about Giovanni

- ❑ 8 disciplines (Aerosols, Atmospheric Chemistry, Atmospheric Dynamics, Cryosphere, Hydrology, Ocean Biology, Oceanography, Water and Energy)
- ❑ 1393 variables (rainfall, temperature, wind, etc.)
- ❑ 22 plot types (analytical functions)
- ❑ Global coverage (for most variables). Spatial resolution: 0.05 – 1.25 deg.; Temporal: hourly – monthly and climatology
- ❑ Countries, 50 states in the United States, major watersheds, land and sea masks
- ❑ Over 1300 peer reviewed papers have been published with help from Giovanni
- ❑ Training materials (PPT, YouTube videos, etc.) available

Giovanni is an online tool for novices to access NASA datasets. No software and data download needed.

- ❑ Interactive visualization (maps, scatter plots, etc.)
- ❑ Map options (a large collection of color palettes, data range (min and max), smoothing, scaling (linear or log))
- ❑ Plot options (linear fitted line, data range, etc.)
- ❑ Graphic formats: PNG, KMZ (Google Earth), GeoTIFF
- ❑ Results available in ASCII (time series in CSV, Excel ready) and NetCDF
- ❑ Animation
- ❑ Result URLs can be shared with others



Time series of rainfall rate at half-hourly, 3-hourly, daily, and monthly for the Louisiana flood event (shown on the left). *With Giovanni, all these plots and data are at your fingertips.*

Suggestions: gsfc-help-disc@lists.nasa.gov