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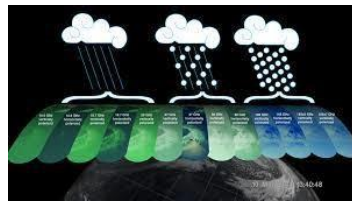
Global Precipitation Measurement Mission

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From Satellites to Your Backyard Updated 11/2023



Did you know that NASA has a satellite that is able to observe rain and snow all over the world? By following some easy directions, you can access NASA data to see how much precipitation was observed by satellites for your location any time from June 2000 to the present time!

NASA's [Global Precipitation Measurement \(GPM\) mission](#) is an international satellite mission in collaboration with the Japan Aerospace Exploration Agency (JAXA) that uses multiple satellites orbiting Earth to collect rain, snow, and other precipitation data worldwide every thirty minutes. The GPM Core Observatory was launched from Japan in 2014. GPM is a follow up mission to the [Tropical Rainfall Measurement Mission](#) (TRMM), which launched in 1998. Thus, we have a detailed dataset of global precipitation observations that span almost two decades. These observations are available for most of the world. We are going to be working with the [Integrated Multi-satellitE Retrievals for GPM](#), or IMERG, data from the TRMM and GPM satellite missions.

In this activity, you will be guided to download seasonal IMERG liquid accumulation equivalents which you can use to see how much precipitation was observed for your location. As the spatial resolution (the area covered by each data point) for IMERG data is an approximately 10-kilometer/~6-mile square region, the amount of precipitation that you will see from the data you get may differ from exactly how much fell at your specific location. Because it can rain heavily on one block, while right down the street the ground is still dry, inaccuracies in processing the satellite observations can cause differences as well.

These data are available from June 2000 to nearly the present time. This data product has a 3-month latency, which means it takes about 3 months from the time the data is collected to it being processed and made available for download. While in this activity we will work with seasonal data, it is also very easy to look at monthly data as well. For more advanced users, there are IMERG datasets available with a much faster latency, and you can see how to access that data [here](#).



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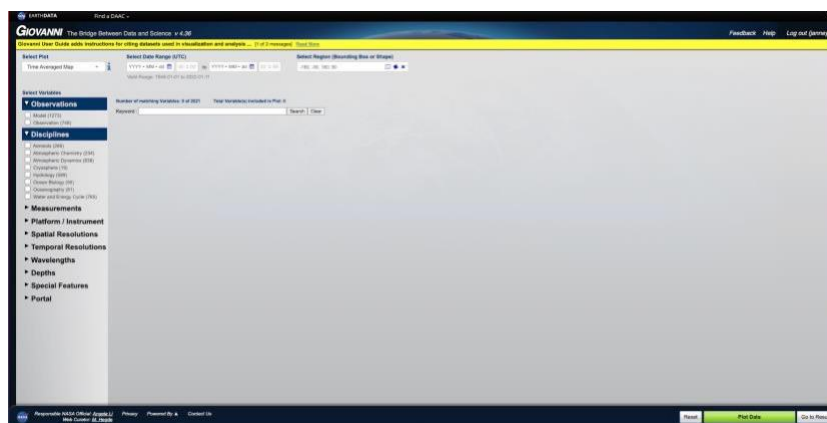
[Giovanni](#) is a powerful web application for viewing, analyzing, and downloading multiple Earth science data sets. You will be prompted to [register](#) the first time you open Giovanni. It is a free website and you will need to create a user account to do this activity as it allows you to visualize larger datasets and save data.

Getting the GPM data

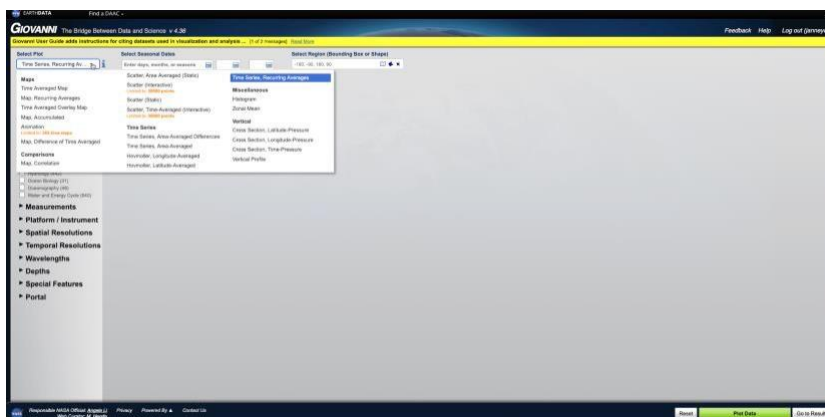
The data from the GPM mission comes in many formats, depending on what the end-user (in this case, you) want to do with the data. For this activity, you will be working with IMERG data.

To see an animation showing the last week of IMERG data, click [here](#).

1. To begin, click [here](#) to open the Giovanni tool (Login - Remember to [register](#) for the free account as that will enable you to view data over a period of longer than 4 years and to download and save the data).

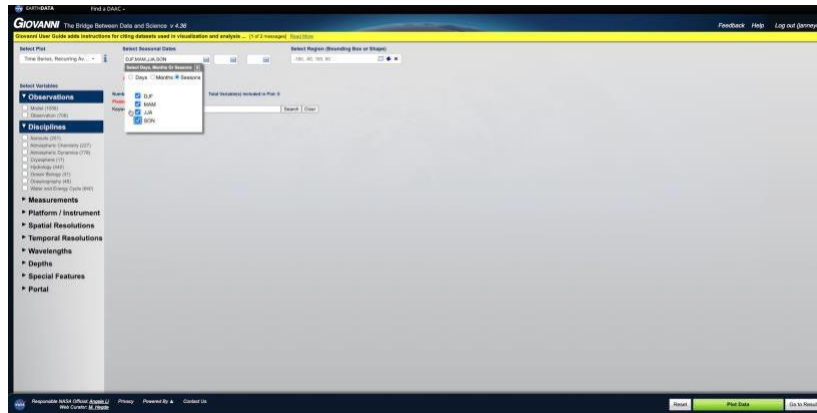


2. At the top of the page, under the "Select Plot" option, click on "Time Series, Recurring Averages".

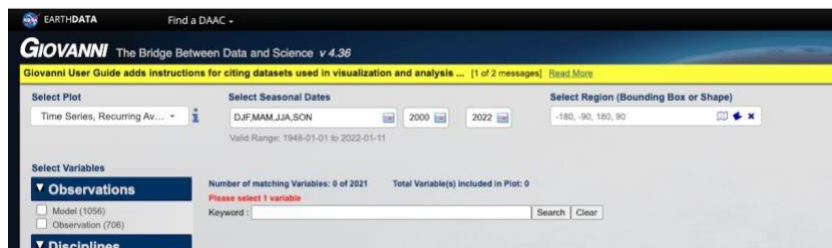


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- Under “*Select Seasonal Dates*”, I chose seasons for this demonstration. I clicked on “*seasons*”, then selected all four seasons. (DJF= Dec., Jan., Feb. and so on)

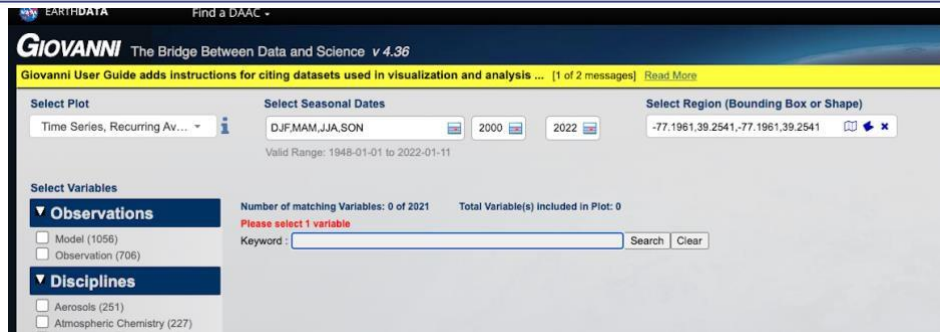


- Next, select the years for which you would like to view precipitation data. The IMERG data range from June 2000 through the present time. (There is a 3 month "lag" in this level of data, which means you will only get data up to about 3 months from today.) For this example, I put in 2000 to 2022 for my dates. You may need to type in the years by hand as this box area can jump around.

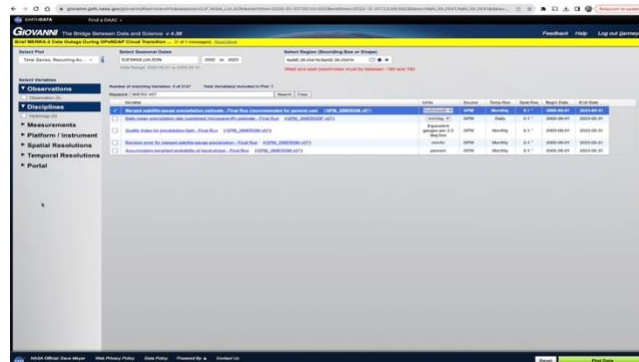


- You will select the location that you want observations to cover. In the “*Select Region*” box, you must put the **longitude first**, no space, a comma, no space, and latitude. Here is my example with my longitude first “-77.1961,39.2541”. You can find the longitude and latitude of any location [here](#). (This platform uses decimal coordinates. After you input the coordinates in the “*Select Region*” box, it will then repeat these values to show you are selecting just one specific location. Giovanni also lets you measure across larger regions defined by a “*bounding box*”. Keep in mind as you analyze your data that precipitation is quite variable and each IMERG data point covers ~10km square region.)

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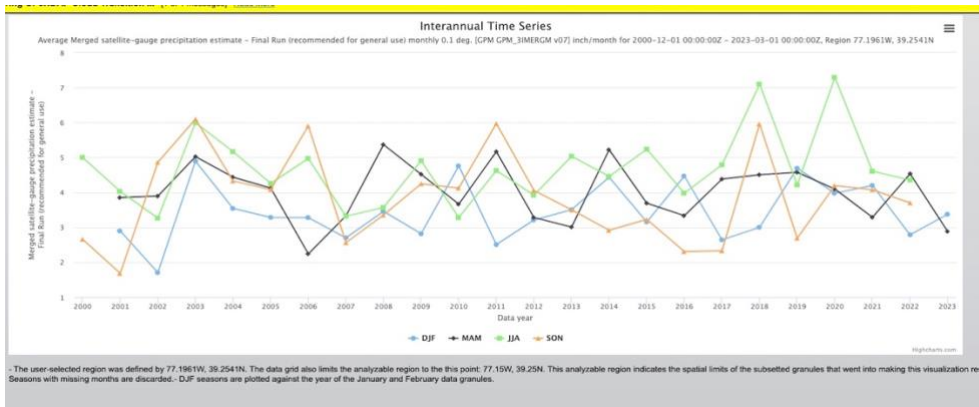


- In the box that says in red "Please select 1 variable" - type "IMERG V07" and press "search".
- Click on "Merged satellite-gauge precipitation estimate- Final Run (GPM_3IMERGM_v7)" and be sure to go to the box that says "units" and select either "inch/month" or "mm/month" based on your preference. For this example, I chose inches/month.



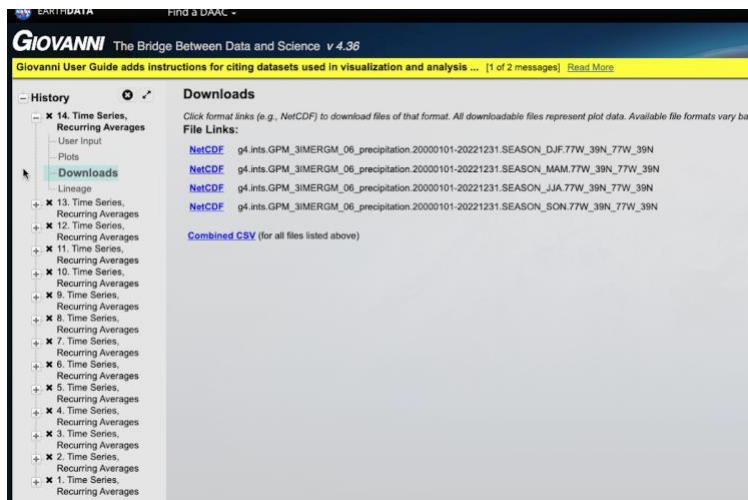
- Go down to the bottom right of the screen and click on the green box: "Plot Data". Click it and wait for your data to be processed. As you wait for your data request to be processed, you should see a box that says "launching workflow" in the top left-hand corner and other information will come up telling you the status of your request. Note that the data may take a while to download depending on your bandwidth and the amount of data you have requested.

If you have done everything correctly, you will now see a line graph with four different colored lines. The key at the bottom tells you the colors that match to each season.



You can see how the amount of precipitation changes over time and compare the amount of rain between seasons and over the years. If you hover over a point on the interactive online graph, the exact measurement will be displayed, as seen in the example above for June/July/August 2004.

Save and download the graph by clicking on the three lines to the right near the top of the box. You can also view the data in a spreadsheet. For a spreadsheet, click on the far-left menu bar option that says "Downloads" and then select the bottom choice that is titled "Combined CSV". You will need to be logged into your Earthdata account to use these features.



Additional Resources

In case you want to learn more, here are some great resources:

- Find out how to access TRMM and GPM Precipitation data sets [here](#).
- Learn how to use GPM precipitation data at our "[How to Use GPM Data](#)" page.
- Watch "[Getting the Big Picture](#)" video (2:39) to learn about the uses and advantages of remote sensing
- Read "[Understanding Earth: What's Up with Precipitation?](#)" to learn how and why NASA satellites observe global precipitation.
- See the wide array of education and outreach resources on the "[Precipitation Education](#)" website.
- Discover the many ways in which these data are being used in real-world applications at "[Whose Using GPM Data?](#)"
- Watch "[The Data Downpour](#)" video (4:17) to learn how IMERG data is gathered and processed.
- Join the "[Telling Your Water Story](#)" or "[Telling Your Tree Story](#)" joint NASA-GLOBE projects and share your data with others around the world!

