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Global Precipitation Measurement Mission

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How Does Your Precipitation Data Measure Up?



Have you ever wondered how your measurements compare to those taken by Earth observing satellites? By following these simple directions, you can compare and contrast your monthly precipitation data to that of NASA's [Global Precipitation Measurement \(GPM\) mission](#).

GPM is an international satellite mission 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.

GPM is celebrating the merging of the TRMM and GPM data sets into one data product during our Fall GPM IMERG campaign, which will run from Oct. 13th through 20th. We are inviting CoCoRaHS members to do this activity to compare and contrast their data with that of these missions- just for fun. We realize these data won't match up perfectly, but it is interesting to explore these data sets.

In this activity, you will be guided to download monthly [IMERG](#) liquid accumulation equivalents, which you can use to compare and contrast to the data you are collecting with your rain gauge. We will be comparing monthly precipitation data for this activity as is the easiest to work with using the *Giovanni* tool and it helps smooth out the errors that will occur due to variances in the time period during which your precipitation data is collected. GPM data is measured at the beginning of each day using [UTC](#) time, but these changes should not be too noticeable when increasing the number of days over which we are gathering the precipitation data. At the current time, these data are available from 2014 to the present time. As this data product has a two-and-a-half-month lag time (meaning you won't be able to get data from the most recent two to three months, as it is being processed for this level 3 product. We do have data with a much faster temporal resolution, and you can see how to access that data from a link at the end of this document.)

[Giovanni](#) is a powerful web application for viewing, analyzing, and downloading multiple Earth science data sets. It is a free site, and it is a good idea to create a log in as you are able to access more data, and download it. This activity culminates with downloading data, so please create a login when you begin.



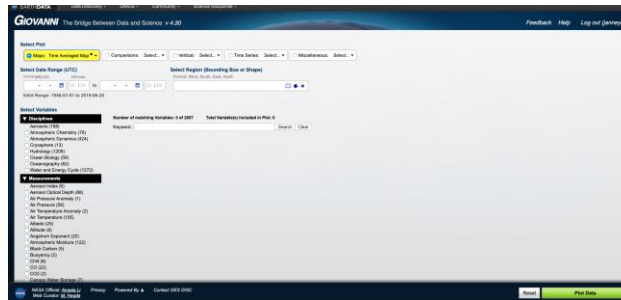
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Getting the GPM data

The data from the GPM mission comes in many formats, depending on what the end-user (in this case, you!) is doing with the data. We are going to be working with the Integrated Multi-satellite Retrievals for GPM (IMERG) data. The global IMERG dataset provides precipitation rates for the entire world every 30 minutes. To see an animation showing the last week of IMERG data, click [here](#).

1. To begin, click [here](#) to open the Giovanni tool.



2. At the top of the page, under the "Select Plot" option, click on "Time Series"
3. Scroll down and click on "Seasonal" under the options.
4. Go into the "Select Seasonal Dates" and this will open a smaller box with months that you can click. For this example, I will click on all of the all of the months

Maps: Select...
 Comparisons: Select...
 Vertical: Select...
 Time Series: Seasonal*

Select Seasonal Dates
 Month or Season and YYYY range.
 October, November, December, January to

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

Number of matching Variables: 0 of 2007
Please select 1 variable
 Keyword:

Select months or seasons

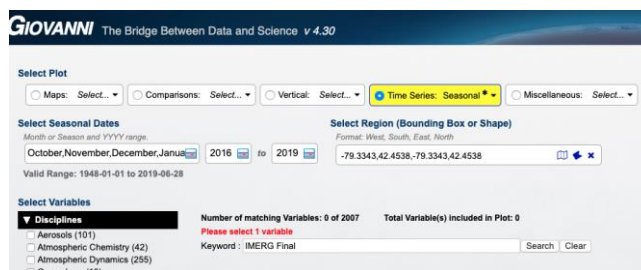
Months Seasons

| | |
|--|---|
| <input checked="" type="checkbox"/> January | <input checked="" type="checkbox"/> July |
| <input checked="" type="checkbox"/> February | <input checked="" type="checkbox"/> August |
| <input checked="" type="checkbox"/> March | <input checked="" type="checkbox"/> September |
| <input checked="" type="checkbox"/> April | <input checked="" type="checkbox"/> October |
| <input checked="" type="checkbox"/> May | <input checked="" type="checkbox"/> November |
| <input checked="" type="checkbox"/> June | <input checked="" type="checkbox"/> December |

5. Next, we will add the years that we want to see the GPM data. At the current time, you can access data from 2014 to the present. In a few months, our data

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- will extend back to 1998. The IMERG data that we are using has a lag time of about 2.5 months, which means that it takes about that long for the data to be processed and added to this site. For my example, I will just use the years 2016 through 2018 and look at every month during those two years.
- In the "Select Region" box, **we will add the longitude first** and put a comma, and then add the latitude. It will look like this "-79.3343, 42.4538" (You only need to add four digits after the decimal point for this data). After you enter your coordinates, the field will automatically repeat the same coordinates to create a 'box', even though the coordinates you entered is for a point on the map – your CoCoRaHS location. The 'select region' will now look like this: "-79.3343, 42.4538, -79.3343, 42.4538". You can find your coordinates in decimal degrees here: <https://www.latlong.net/>
 - In the box that says in red "Please select 1 variable"- place "IMERG Final" in the "Keyword" box, and then select "Search".



GIOVANNI The Bridge Between Data and Science v 4.30

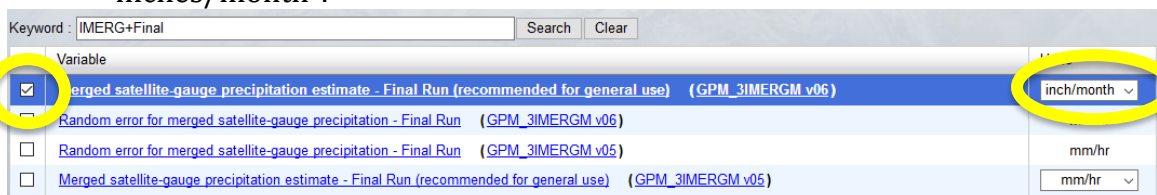
Select Plot
 Maps: Select... Comparisons: Select... Vertical: Select... Time Series: Seasonal* Miscellaneous: Select...

Select Seasonal Dates
 Month or Season and YYYY range: October, November, December, January 2016 to 2019
 Valid Range: 1948-01-01 to 2019-06-28

Select Region (Bounding Box or Shape)
 Format: West, South, East, North
 -79.3343, 42.4538, -79.3343, 42.4538

Select Variables
 Disciplines: Aerosols (101) Atmospheric Chemistry (42) Atmospheric Dynamics (285) Crosssphere (13)
 Number of matching Variables: 0 of 2007 Total Variable(s) included in Plot: 0
 Please select 1 variable
 Keyword: IMERG Final Search Clear

- Another box will open up below this box that has several options. Click on "Merged satellite-gauge precipitation estimate- Final Run (GPM_3IMERGM_v6) and be sure to go to the box that says "units" and select "inches/month".



Keyword: IMERG+Final Search Clear

| Variable | units |
|---|------------|
| <input checked="" type="checkbox"/> Merged satellite-gauge precipitation estimate - Final Run (recommended for general use) (GPM_3IMERGM v06) | inch/month |
| <input type="checkbox"/> Random error for merged satellite-gauge precipitation - Final Run (GPM_3IMERGM v06) | |
| <input type="checkbox"/> Random error for merged satellite-gauge precipitation - Final Run (GPM_3IMERGM v05) | mm/hr |
| <input type="checkbox"/> Merged satellite-gauge precipitation estimate - Final Run (recommended for general use) (GPM_3IMERGM v05) | mm/hr |

- Go down to the bottom right of the screen and click on the green box that says "Plot Data".
- As you wait for your data request to be processed, you should see a box that says "launching workflow" and other information will come up telling you the status of your request.

If you have done everything correctly, you will now see a line graph with lots of different colored lines. Take a look at this, although we will be collecting the data in spreadsheet form. You might want to save the graph by clicking on the three lines to

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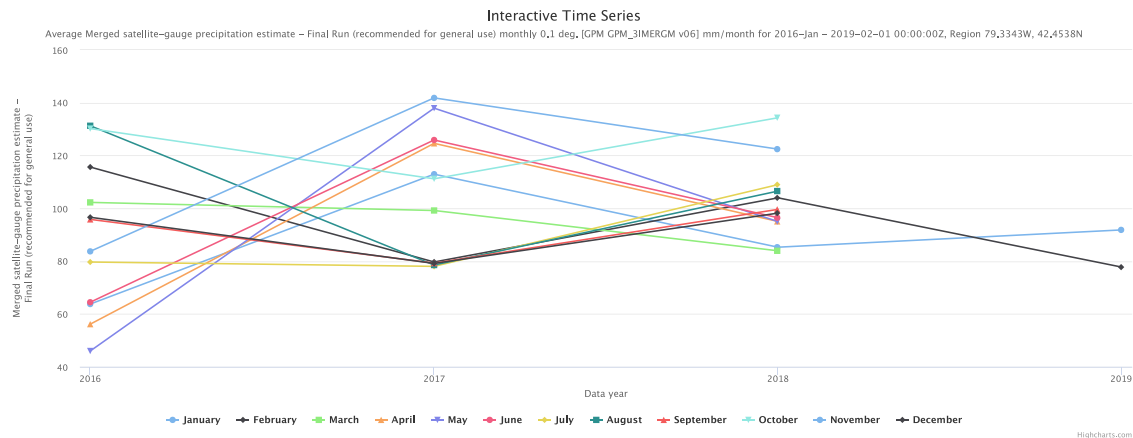
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the right near the top of the box and download the image to use later in a report or poster.



As you look over this data, you will see that each month has a different color line. You can see how the amount of precipitation changes over time and compare and contrast the amount of rain between months and over years. This data will be available from 1998 to the present time in the next few months.

11. To save this data into a spreadsheet, click on the far-left menu bar option that says "Downloads" and then select the bottom choice that is titled "Combined ASCII". Your computer may ask if you want to open the file in excel, but you may need to download the data to your computer first, and then open the file with excel.

CoCoRaHS Community-

We would love to see you compare and contrast the data you collect with that of GPM's IMERG data. We are planning a media campaign to share the newly released Version 6 IMERG product to align with Earth Science Week from Oct. 13th through 18th. The theme for this Earth Science Week is "[GeoScience Is for Everyone](#)" and we would love to feature a few CoCoRaHS members who have compared and contrasted their data to that of the GPM data. If you create a spreadsheet with the GPM data and your data, you can receive a digital certificate of appreciation from the GPM mission! Follow the additional instructions below to add your CoCoRaHS data and send it to NASA for your certificate. Please get [me](mailto:dorian.w.janney@nasa.gov) (dorian.w.janney@nasa.gov) your data by Oct. 1st so I can reach out to you if we happen to select your data for our NASA social media and communications efforts.

Instructions for finding monthly totals for your CoCoRaHS station:



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- 1.) The High Plains Regional Climate Center has an excellent tool for finding CoCoRaHS data and providing monthly totals. Please go to <http://climod.unl.edu/> or [click here](#) to begin.
- 2.) In the left-hand menu – under “Product Selection” and “Single Station”, select “Monthly Summarized Data”.
- 3.) In the “Options selection”, choose “Precipitation” and “Sum”, and then select the year range (2016 and 2018 for this activity). Enter “30” for allowable missing days and ‘uncheck’ the selection to “Include missing days count”. This will allow you to view your total even if you have missing data.
- 4.) In the “Station/Area selection” enter your zip code and click on ‘search’. A map will pop up and you can zoom in and click on your station.
- 5.) Click “Go” in the left-hand menu and your data will populate on the screen.
- 6.) Copy/paste your data into the excel file with the GPM data and see if you can create a graph comparing your data with GPM data.
- 7.) If you create a spreadsheet with the GPM data and your data, please send it to dorian.w.janney@nasa.gov to request a digital certificate of appreciation

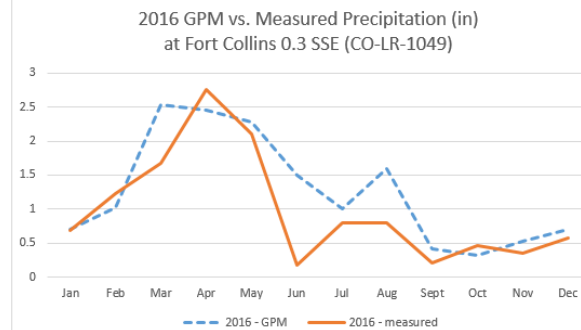
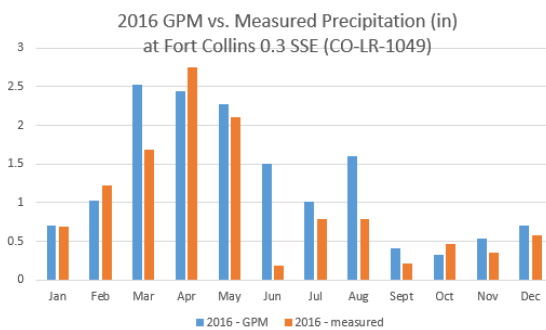
Monthly Total Precipitation for FORT COLLINS 0.3 SSE, CO (CoCoRaHS)

[Click column heading to sort ascending](#), [click again to sort descending](#).

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|------|------|------|------|------|------|------|------|------|------|------|------|------|--------|
| 2016 | 0.69 | 1.23 | 1.68 | 2.75 | 2.10 | 0.18 | 0.79 | 0.79 | 0.21 | 0.46 | 0.35 | 0.58 | 11.81 |
| 2017 | 0.99 | 0.50 | 0.78 | 2.22 | 4.85 | 0.18 | 1.38 | 2.80 | 2.20 | 1.63 | 0.71 | 0.34 | 18.58 |
| 2018 | 0.48 | 0.79 | 0.72 | 0.82 | 4.40 | 1.12 | 1.67 | 0.33 | 0.54 | 1.12 | 0.54 | 0.12 | 12.65 |

from the GPM mission. Be sure to submit it by Oct. 1st if you

wish to be included in the NASA social media and communications campaign



between Oct. 13th and 19th!

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Additional Resources

- [Learn more about how to access and use GPM data](#)
- [Video](#) on the uses and advantages of using remote sensing
- [Video](#) describing how data from the GPM mission is gathered and turned into data products
- You can see many more educational resources [here](#).
- We have also developed a *Speaker's Toolkit* and suggestions for working with school groups for [Freshwater Availability](#) and for the [Water Cycle](#).

