



## Questions & Answers Session 1

Question 1: Has there been validation of satellite rain data with local rain gauge data? E.g. in the Caribbean there is a sparse gauge network so was wondering how validated the satellite data will be.

Answer 1: Yes, there has been a lot of work with ground validation for both NASA's TRMM and GPM missions. I'm not sure about the Caribbean specifically, but you can search the TRMM and GPM Rain Gauge Data Archive here:

<https://gpm-gv.gsfc.nasa.gov/Gauge/>

You can also search more information from the GPM Ground Validation Data Archive following this link: <https://gpm-gv.gsfc.nasa.gov/>

IMERG data - the final version has rain gauge data merged into it. 1 month of rain gauge data is collected from GPCC and they are assimilated with satellite merged data. So over land rain gauges included for IMERG final. Early and late versions do not have rain gauges. You can get validation information from the websites above.

Question 2: Is there a way to automate and schedule the download of IMERG GPM data files; and are they compressed files?

Answer 2: To automate and schedule download you have to have programming scripts (e.g. Unix or Linux scripts) that way you can get compressed data also. Have you looked at the data access page on [pmm.nasa.gov](http://pmm.nasa.gov)? Click the "get data" button on the main page, then click the GPM data hot link. It opens to IMERG by default. This includes hot links to the documentation and all the different formats of IMERG that are provided by NASA/GSFC archives.

These data are available in near real time and you can write a script to download them. If you go to the PMM site and the data access site that Erika showed, all the servers for data download are listed there.

Question 3: Any global storm surge model available?

Answer 3: See Q 9.

Question 4: Is there a wind data product available for Asian countries?

Answer 4: GEOS-5 data that Erika just demonstrated - they are global wind data, so they are available for Asian countries.



Question 5: Are these archived data available for African countries too?

Answer 5: Yes! These data are available globally.

Question 6: Is IMERG precipitation forecasts based on specific meteo model, etc ECMWF, GFS?

Answer 6: IMERG is not a forecast. It's a near real-time product that blends data from a number of national/international satellites. And then, IMERG final version data are calibrated with rain gauge data. They are not available as forecasts and have a latency of 4-5 hours for NRT and almost 3 months for the final product. The forecasts that Erika showed are from GEOS-5, it's a NASA forecast model.

Question 7: Can these datasets be published in another web platform for local use?

Answer 7: Yes they can because they are open source data. If you go and check on the website, you can acknowledge where you got the data and modify and place it for your own region.

Question 8: Can you tell me if the products you've shown have information for the entire world?

Answer 8: Other than the National Hurricane Center that Erika showed, most of the products that Erika showed are global. So sea level pressure, precipitation, winds, are all globally available.

Question 9: Is it possible to get the data of storm surge monitoring for the South Asian Region?

Answer 9: There is a European model that provides global storm surge -- the introductory webinar we did last year on Monitoring Tropical Storms had that information. For example see

<http://www.gdacs.org/resources.aspx?eventid=1000552&episodeid=24&eventtype=TC>

For storm surge animation for Cyclone Idai.

Also see the following document for details:

[http://publications.jrc.ec.europa.eu/repository/bitstream/JRC110518/2017\\_jrcstormsurgesystems\\_final.pdf](http://publications.jrc.ec.europa.eu/repository/bitstream/JRC110518/2017_jrcstormsurgesystems_final.pdf)

Question 10: Is there a storm surge forecast model for the Western Pacific that particularly covers the Philippines?

Answer 10: See the previous answer.



Question 11: What are some of the ways in which remote sensing data is currently being used for disaster preparedness? Examples of local projects?

Answer 11: Here in the U.S. the Federal Emergency Management Association (FEMA) use some of the remote sensing data for preparedness. Also, the red cross uses RS data for disaster preparedness. Again, if you go to our introductory webinar on Monitoring Tropical Storms, there are some examples where RS data are used.

Question 12: Can we get information about storms in real time?

Answer 12: The satellite-based information is almost real time in the sense that NOAA and other geostationary satellite images are available every 10-15 minutes during a storm. Other data might have different latencies because of the time it takes for data to be downloaded and processed. If you look at the IMERG animation, it's every half hour. But the latency may be about 4-5 hours. This still gives a good idea of where the storm is heading. Experimentally, there have been unmanned vehicles flying above hurricanes to get NRT data, but it's still in the research domain and not available operationally. Best data sources for 'real time' would be to use forecast model outputs.

Question 13: Is there a list of term definitions (glossary) for the products and their contents?

Answer 13: All the websites provide info about each product. Some of that information you will find in our webinars, also.

Question 14: How are NASA's products developed? Does NASA assign researchers to develop the simulation models or do they refer to certain scientists to produce the forecasting model for example, taking in mind the uncertainty that comes with each model?

Answer 14: There's usually a group of scientists working on model or algorithm development, simulation, and validation. There are organizations like ECMWF, NOAA, and JAXA that have their own models. There are publications about intercomparisons of these models that address the issue of uncertainty.

Question 15: I note that TRMM has changed in methodology within the recent past. Do you suggest it as a suitable source of satellite rainfall moving forward?

Answer 15: In the near future - later this year - there will be a new dataset that will be a combined TRMM/GPM dataset. Going forward in the future, that will be good data to use. This data set will start from Jan 1998 with the TRMM era and continue with GPM. That entire data record will have the same methodology.



Question 16: What is about the forward and backward propagation for late run GPM IMERG data? Why is it not incorporated in the early run?

Answer 16: I assume you are asking about morphing when you say forward and backward propagation. The morphing requires sequence of data in time. For late data the latency is ~12 hrs so images(orbital) for multiple times are available for morphing. This is not possible for the early runs as there may not be enough data available for morphing.

Question 17: How compatible is IMERG 2014- data with the 1998-2014 TRMM data?

Answer 17: We recently did this comparisons in two different river basins in a recent training, and found that IMERG and TMPA were pretty close. Because TMPA has lower resolution in space and time, there are some differences. They aren't identical, but they're pretty close. For your own region, it's a good idea to compare both and Giovanni be used to do that.

Question 18: Is there any plan to establish extreme value statistics by grid from the historic merged TRMM-IMERG rain dataset? Is there an archive for rainfall data for Africa? If yes, which period does it cover? Does projected rainfall data by GMAO also cover Africa?

Answer 18: Not sure about plan to establish extreme value statistics by grid. But yes - rainfall data for Africa is archived from 1998 onwards. If you're interested in lower resolution dataset and GPCP - that is available since 1980, I believe. And GEOS-5 covers Africa as well.

Question 19: Are data of precipitation available as ogc compliant service? (wms,wfs,etc.)?

Answer 19: If you go to NASA GESDISC - these data are available as OpenDAP, GDS, and THREDDS.

Question 20: Is the SLOSH model is open source? Is it available for downloading? Can it be used for Asia?

Answer 20: Yes - I think SLOSH is available for download. This is the NOAA model, focused on the US. There is a model (see Q 9) that can be used for global storm surge.

Question 21: Are there R/Python/Matlab plugins available for accessing the url to download the data? Are there any triggers for new data notifications?

Answer 21: I don't think those plugins are there on the sites that we showed. For a data trigger -- for GPM precipitation yes there are notifications for new data or newer



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version of data. Please register as a user at <https://pmm.nasa.gov/data-access/downloads/gpm> site. For precipitation data you can contact <https://pps.gsfc.nasa.gov/> through this website, and they might have some R/Python plugins. For other data sets you will have check their websites.

Question 22: Is there a planned lifetime for GPM, and will it be replaced with something similar?

Answer 22: Important question - GPM's lifetime was actually 3-5 years, so it's already been 4 years now- at least. There is a new mission under consideration that will follow GPM. Precipitation measurements from space will continue after GPM.

Question 23: Is GPM comparable to CMORPH or PERSIAN data? Which of them do you suggest to use in data sparse context with few validation points on soil?

Answer 23: Yes - it's comparable. They're all using multi-satellite data. Which one you use depends on the area you're in - your geographical region. We recommend you take all these products, and if you have 1-2 rain gauges, compare with this in situ data and come up with an answer. GPM data are validated, but not everywhere. The best thing would be to take all these products and see what works the best in your region. You also have to consider what applications you're using them for and how accurate your info needs to be.

Question 24: What is the best way to combine observed surface data and GPM-IMERG data products to produce a finer scale precipitation estimation at basin scale?

Answer 24: You can use statistical downscaling if you have high resolution data. This has been done at a research level in the US using high resolution radar data within the GPM grid. You may want to search the literature for that.