Questions & Answers Session 2

Please type your questions in the Question Box. We will try our best to get to all your questions. If we don't, feel free to email Amita Mehta (amita.v.mehta@nasa.gov) or Sean McCartney (sean.mccartney@nasa.gov).

Question 1: Is the daily IMERG product from 12UTC to 12 UTC or 00 UTC to UTC?
Answer 1: The daily IMERG product is from days since 1970-01-01 00:00:00 UTC.

Question 2: Why are we using the ncpdq operator? Is it to rearrange the dimensions of each file?
Answer 2: Yes, we are using the ncpdq operator to rearrange the dimensions from **time, lat, lon** to **lat, lon, time**. This allows the NetCDF file to run using the software provided by the National Integrated Drought Information System.

Question 3: When will the videos of the last session and this one be available?
Answer 3: All videos of the training and PDF of the presentation can be found on the ARSET website: https://arset.gsfc.nasa.gov/water/webinars/IMERG-2020

Question 4: Why use SPI when there are a plethora of other indices?
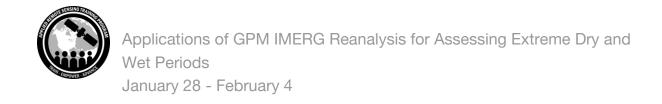Answer 4: We are using SPI because it:
- Uses precipitation only, which makes it relatively easy to calculate compared to other climate indices
- More comparable across regions with different climates than the Palmer Severity Drought Index (PDSI)
- Less complex to calculate than the PDSI

Question 5: How does IMERG compare to PRISM?
Answer 5: Wood_Caleb_2019_AMS_AnnualMeeting.pdf
https://developers.google.com/earth-engine/datasets/tags/precipitation
In high elevation and slope regions PRISM and IMERG differ. Also in light rain cases there may be differences. In Google Earth Engine (GEE) PRISM and IMERG are available and you may want to conduct a comparison in your region of interest.

Question 6: Can we install the NetCDF4 and the NCO package from the Anaconda Prompt or is it necessary to use Bash?
Answer 6: You can install the NetCDF4 and the NCO package from either the Anaconda Prompt or the Bash shell.

Question 7: Can the ncks program be installed through **conda install -c conda-forge nco**?
Answer 7: Yes, the ncks program along with all the NCO operators are installed when you install NCO (e.g. conda install -c conda-forge nco)
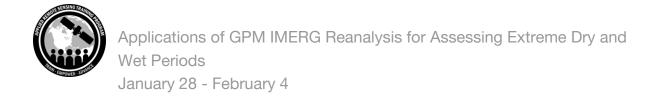
Question 8: I noticed that the latency (temporal availability) of IMERG products is about 2-3 months? if it's right we can encounter some challenges in operational use
Answer 8: For this demonstration we are using the "Final" run product which comes out ~3.5 months after the observational month. For operational use there is a half-hourly and daily "Early" and "Late" run product which are released ~4 hr after observation time and ~14 hours after observation time respectively.

Question 9: The Grass tool r.series is not available in my QGIS. What can I do to calculate Standard Deviation of seasonal Precipitation?
Answer 9: You may want to consult your IT section to get help with Grass installation in QGIS. If r.series is not available then you will have to use some other programing language (Python or R) to calculate Standard Deviation. For the exercise you can skip that step if you do not have r.series.

Question 10: If I have a case study where the precipitation is happening only during three months of the year (e.g March, April, and May), would I calculate SPI for only those months? Then how to calculate the duration of the consecutive drought and other drought characteristics? Would annual SPI be indicative in that case?
Answer 10: If you have a case study where precipitation only falls for 3 months of the year, it is advised to calculate SPI at multiple time steps (e.g. monthly, 3-month, 6-month, and annual) and focus only on those months with precipitation. That will show the *duration* of the anomaly for wet or dry periods.

Question 11: Is step 8 on slide 18 a necessity for windows users?

Answer 11: Step 8 on slide 18 is provided to help Windows users who are having issues setting the path to the Anaconda and Python environments on their machine.

Question 12: Is it possible to download the same data from Giovanni or only from NASA GES DISC?

Answer 12: You can download the data in Giovanni but will take much longer to do so. You can go to the 'Lineage' link under Downloads and after downloading a .txt file of URLs, use WGET or CURL to bulk download the data.

Question 13: NASA NEX-GDDP can be downloaded from NASA GES DISC following a similar protocol as with IMERG?

Answer 13: https://developers.google.com/earth-engine/datasets/catalog/NASA_NEX-GDDP

Question 14: Are the IMERG "Early" and "Late" runs (latency of 4 & 14 hours) available from the GES DISC site? The https://search.earthdata.nasa.gov/ does not work?
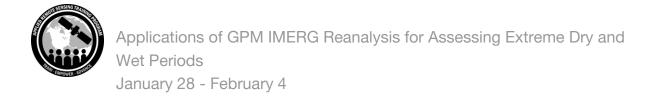
Answer 14: Yes they are.

Question 15: Can we download IMERG data for a particular watershed using a shapefile of that area?

Answer 15: There are several standard watershed and river basins one can select by shapefile. But for your own shapefile you will have to use QGIS or other image processing software to clip data to your shapefile.

Question 16: What is the difference between GEE and NASA EarthData?

Answer 16: GEE is a cloud-based service for both image acquisition and analysis and has many other datasets in addition to NASA data.

Question 17: What are the relative effects of short- and long-term drying trends in satellite-based rainfall products? Spatial resolution?

Answer 17: One can observe inter-annual variability (such as related to ENSO) in the IMERG 20-year record -- this is relatively short term variability. For long-term trends this time series is a bit short of course so any trend we see can be due to decadal or multi-decadal climate variability and/or climate change.

Question 18: What is the starting date of the IMERG data?
Answer 18: June 1, 2000 is the starting date of IMERG data.

Question 19: How can I estimate the range of standard deviation? (This is regarding homework 1.)
Answer 19: If you run r.series and get a map of standard deviation it will show minimum and maximum values -- that is the range of standard deviation.

Question 20: Which other parameters other than precipitation can be used for drought monitoring and mapping?
Answer 20: Evapotranspiration and soil moisture are two important parameters for drought monitoring and mapping.

Question 21: Can you please expand on duration of drought instead of intensity? I assume duration is the number of months or years while intensity is the volume of precipitation? Any additional information I should look at?
Answer 21: The duration of dry conditions, and potential meteorological drought, are the number of months or years characterized with moderate or extreme dryness or wetness. It refers specifically to time.
Intensity refers to how moderate or extreme the SPI values are, either positive or negative, referring to wetness and dryness respectively. SPI is essentially a Z-score of standard deviations from the mean precipitation in your climatology.
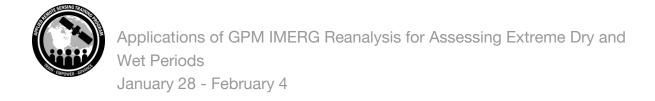https://climatedataguide.ucar.edu/climate-data/standardized-precipitation-index-spi

Question 22: I had trouble using the r.series tool in QGIS...get the following error...
This algorithm cannot be run.
The specified GRASS 7 folder "C:\PROGRA~1\QGIS3~1.10\bin\bin" does not contain a valid set of GRASS 7 modules. Please, go to the Processing settings dialog, and check that the GRASS 7 folder is correctly configured
Answer 22: You will have to consult your IT person to get help with getting GRASS working in your QGIS. For now you can go on to calculating anomalies and if we find any solution for r.series we will share with everyone.

Question 23: How does one combine IMERG data and in situ data for doing calculations of SPI? Has the IMERG product ever conducted correction for their bias?

Answer 23: If you have in situ data from weather stations in your area of interest, you can calculate SPI for both the weather stations and from IMERG and see how well they are correlated. The benefit of using IMERG is it's a global product, and most parts of the world do not have in situ data.

To learn more about how IMERG conducts corrections for bias, we recommend that you read the manual that comes downloaded with the NetCDF files from NASA GES DISC. This manual explains how IMERG is created and how the product is tested for bias.

https://docserver.gesdisc.eosdis.nasa.gov/public/project/GPM/IMERG_ATBD_V06.pdf

Question 24: What is the smallest time resolution of IMERG data? Is it available for timescales less than a month?

Answer 24: Yes, you can acquire IMERG in half hourly resolution, daily, and monthly. For near real time (NRT) analysis (within 24 hours) you would look for "Early" or "Late" run products.