

Applications of GPM IMERG¹ Reanalysis for Assessing Extreme Dry and Wet Periods

Amita Mehta and Sean McCartney

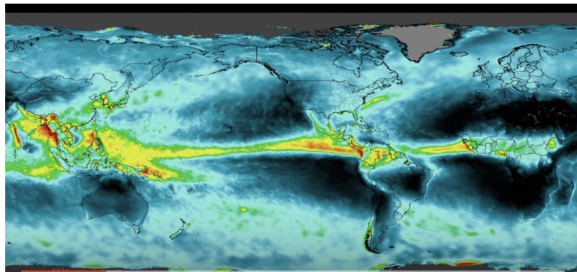
February 4, 2020

¹IMERG: Integrated Multi-satellite Retrievals for Global Precipitation Measurements (GPM)

Training Outline



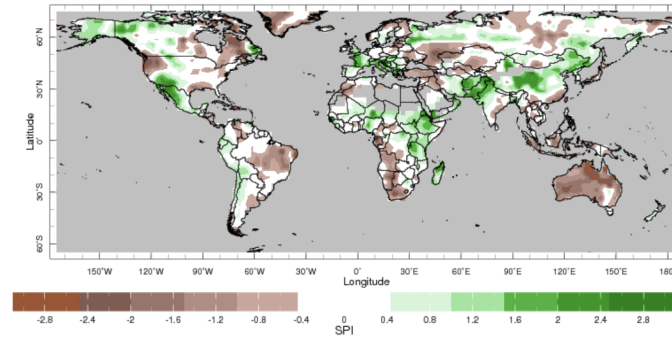
January 28, 2020



Calculation of Precipitation Statistics Using IMERG

https://www.youtube.com/watch?time_continue=9&v=qNIRQgACTFg&feature=emb_title

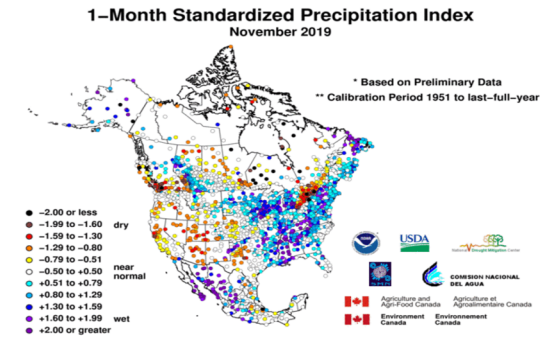
January 30, 2020



Calculation of SPI based on IMERG to Monitor Wet and Dry Conditions

<https://iridl.ldeo.columbia.edu/maproom/Global/Precipitation/SPI.html>

February 4, 2020



Flood and Drought Risk Assessment Based on IMERG Statistics and SPI

<https://www.ncdc.noaa.gov/monitoring-content/temp-and-precip/drought/nadm/indices/spi/maps/ghcnd-na-1mon-spi-dot-pg.gif>



Training Certification

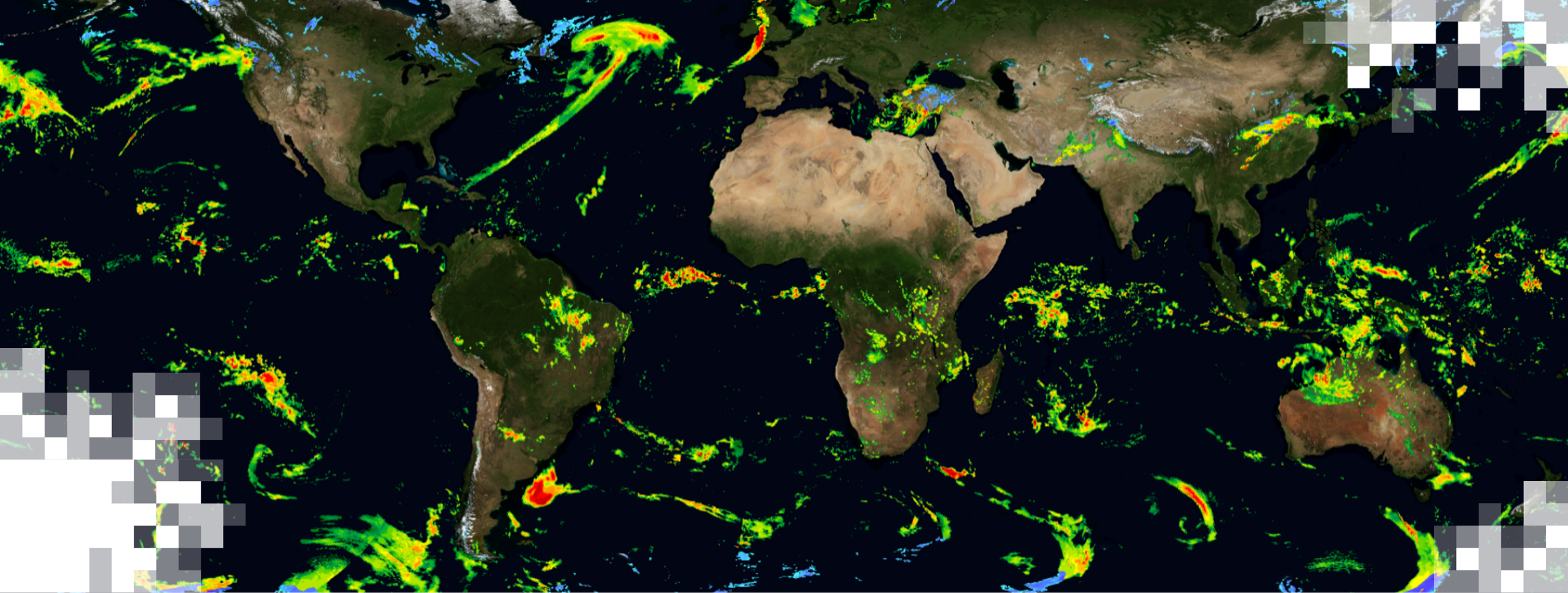
- Homework Assignments are available for all three sessions from: <https://arset.gsfc.nasa.gov/water/webinars/IMERG-2020>
Answers must be submitted via Google Form
 - Due dates: February 11, 18, and 25
- Certificate of Completion will be awarded to those who:
 - Attend all webinars
 - Complete all homework assignments
- You will receive a certificate approximately two months after the completion of the course from: marines.martins@ssaihq.com



Part-3 Outline

- Demonstration: Flood and Drought Risk Assessment
 - Case study: Mozambique → Maputo
- Summary and Concluding Remarks
- Exercise: Calculation of precipitation statistics and Standardized Precipitation Index (SPI) for **an area of your interest**





Demonstration: Flood and Drought Risk Assessment
Case study: Mozambique → Maputo

Summary

- This webinar series focuses on access and analysis of long-term IMERG precipitation data for detection of dry and wet periods over a geographic region
- Demonstrations and step-by-step instructions were provided to:
 - Download IMERG seasonal and monthly data for a selected region using Giovanni (<https://giovanni.gsfc.nasa.gov/giovanni/>) and GES DISC <https://disc.gsfc.nasa.gov/>
 - Calculate maps and time series of precipitation mean, standard deviation, and anomalies using QGIS and Excel
 - Calculate SPI using Bash and Python
 - Display and analyze precipitation anomalies and SPI using Panoply and QGIS
 - Access, display, and analyze IMERG precipitation and socioeconomic data from SEDAC (<https://sedac.ciesin.columbia.edu/>)



Concluding Remarks

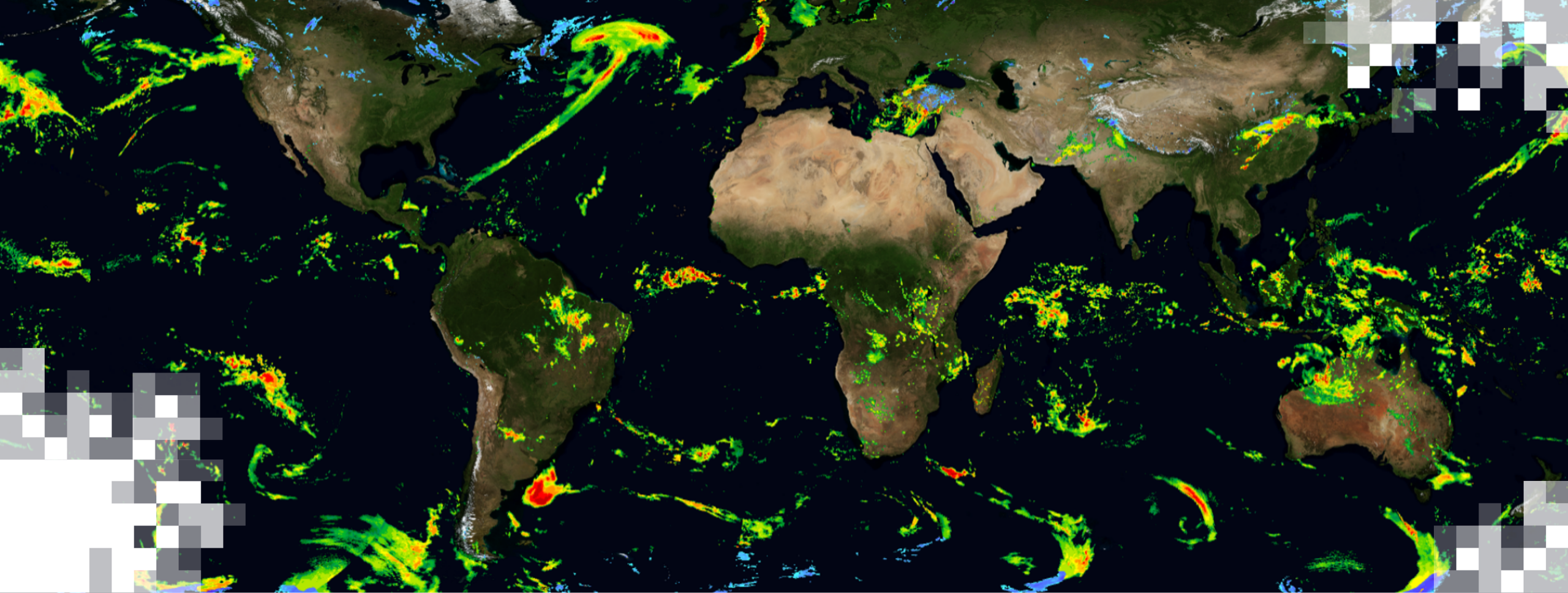
- For long-term mean precipitation and for SPI calculations, a 30-year climatology (or longer) is ideal, but should be consistently derived
- Global IMERG data provide state-of-the-art precipitation observations for 20 years with new data being added daily
- As seen in the Texas and Mozambique case studies, the SPI and precipitation anomalies show similar patterns of dry/wet conditions



Concluding Remarks (cont.)

- SPI has an advantage in that the same SPI values indicate the same strength of dry/wet events as it is based on probability of precipitation
- Precipitation anomalies indicate dry/wet conditions relative to mean precipitation and are more useful in estimating amount of water excess or deficit
- Along with socioeconomic data, past and current precipitation anomalies and SPI facilitate flood/drought risk assessment





Exercise: Calculation of precipitation statistics and Standardized Precipitation Index (SPI) for an **area of your interest**

Exercise 3a: IMERG Regional and Local Statistics

- **Select a geographic region of your interest** (i.e. any country, state, city, or watershed)
- Follow the directions given in Exercise 1 to select and download IMERG seasonal mean data using Giovanni for the region you selected and note the main rainy season.
 - If you are choosing a region for which a standard shapefile is not available in Giovanni, use a bounding box on the map to select the region.
- For the rainy season in the region you chose, download individual seasonal data from 2000 to 2019 and calculate precipitation anomalies in QGIS following the steps provided in Exercise 1.
- Save the QGIS project for analysis and for answering questions in Homework 3.



Exercise 3b: IMERG Regional SPI

- Follow the directions given in Exercise 2 to download monthly IMERG data for the region you selected using GES DISC.
- Calculate 3-monthly SPI using the Python script and directions provided in Exercise 2.
- Display the SPI in Panoply **or** QGIS.
- Analyze and compare the patterns of precipitation anomalies and SPI.
- You will share these results in Homework 3.



Upcoming Training

- In April ARSET will be hosting a webinar on **Remote Sensing Applications for Agriculture and Food Security**. Stay tuned for more information pertaining to this training and all upcoming trainings on our website:

<https://arset.gsfc.nasa.gov/>



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Thank You!

