

Visualizing the Performance of Satellite Precipitation Data

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Motivation:

- Precipitation rates are estimated indirectly from satellite-based sensors measurements and are prone to errors.
- NOAA Satellite Precipitation Validation System (<https://precip-val.umd.edu/>) evaluates the outputs of satellite precipitation products using ground radar observations from the Multi-Radar/Multi-Sensor product.

Objective :

- This project aims to extend the capabilities of NPreciSe to provide monthly statistics on the performance of satellite products.
- We aim to develop an interactive web-based visualizations for displaying long-term performance of the satellite data.

Data:

- The developed visualizations are tested for the IMERG data.

Technology Stack :

- Python – Plotly, NumPy, Pandas, Flask
- Plotly maps offer interactive features like hover functionality, zooming, and dynamic updates, making it different from other static maps.

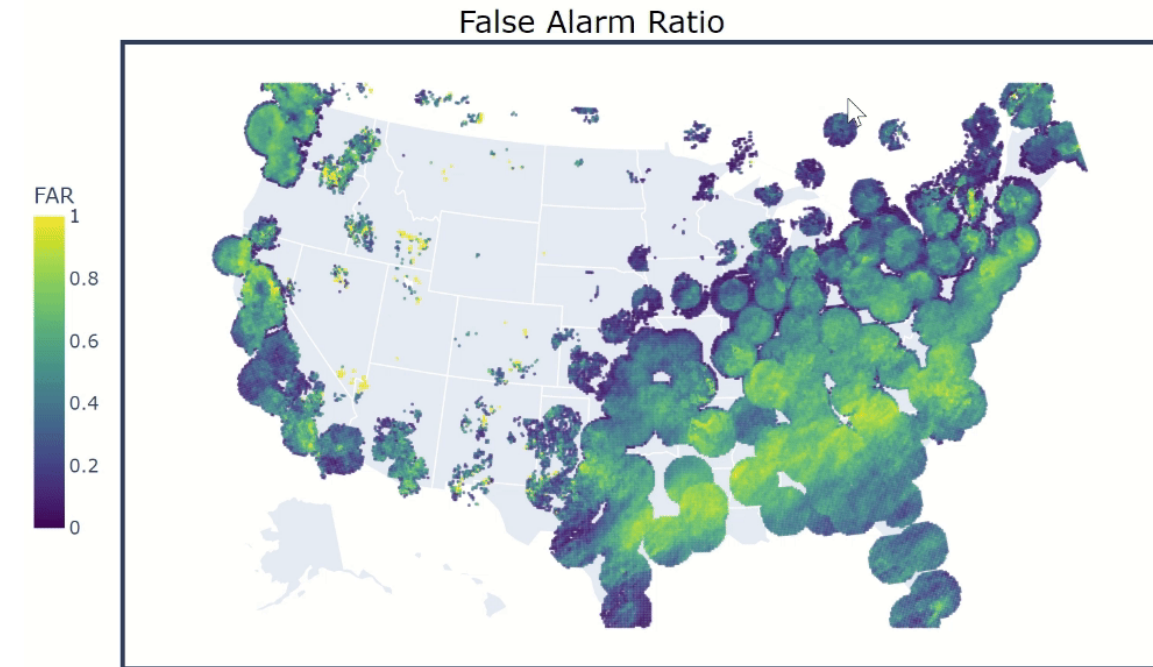
Methods:

- In NPreciSe, IMERG data are compared with 1 hour precipitation data from MRMS – we have a validation file every hour.
- The code accumulates data from every file to daily and monthly scale to calculate statistical metrics.
- Metrics Calculated:
 - Probability of Detection = hits / (hits + misses)
 - False Alarm Ratio = false alarms / (hits + false alarms)
 - Heidke Skill Score
- The code developed is fully generalizable, thereby producing the corresponding figures and visualizations for any entered data in terms of product, month and/or year, without requiring additional modifications.

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Results :

- The visualizations efficiently display the accuracy of the satellite predictions.
- They are interactive and users can hover over them to get further information about the data.

Future Work:

- Include these results to the NPreCiSe webpage.