Enhancing R&D and Innovation of GPM-era Data at NOAA

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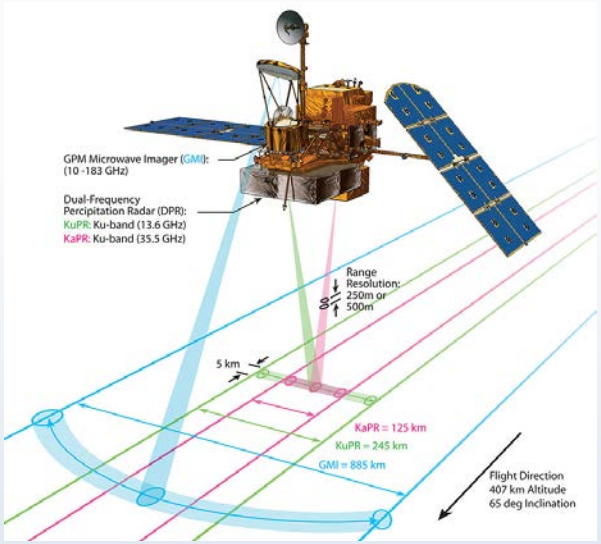
Integrated Precipitation Products

NASA Algorithm development is focused on *Core Satellite* retrievals and transferring this best estimate to improve and homogenize the constellation products around the globe.



Broad Opportunities exist in *Local* Merging of Multiple Observing Systems

- Surface radar & gauges (Stage IV, NMQ)
- Satellite & Gauges (GPCP)
- ***Gauge, Radars, Satellites & Models***

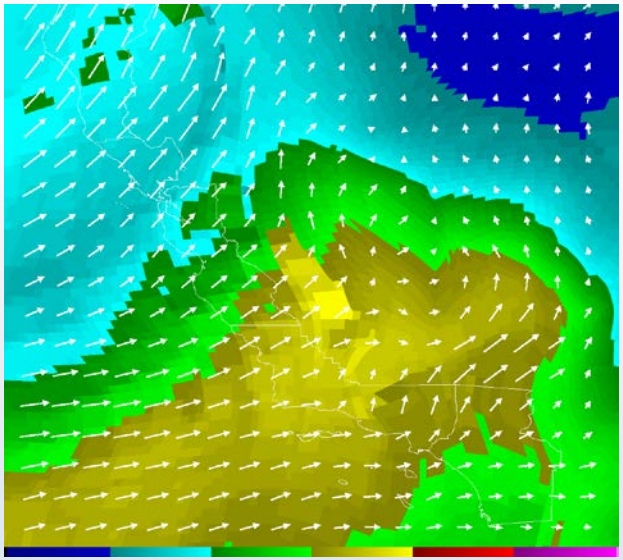
Data Assimilation of Cloudy Radiances

Data Assimilation of Precipitation

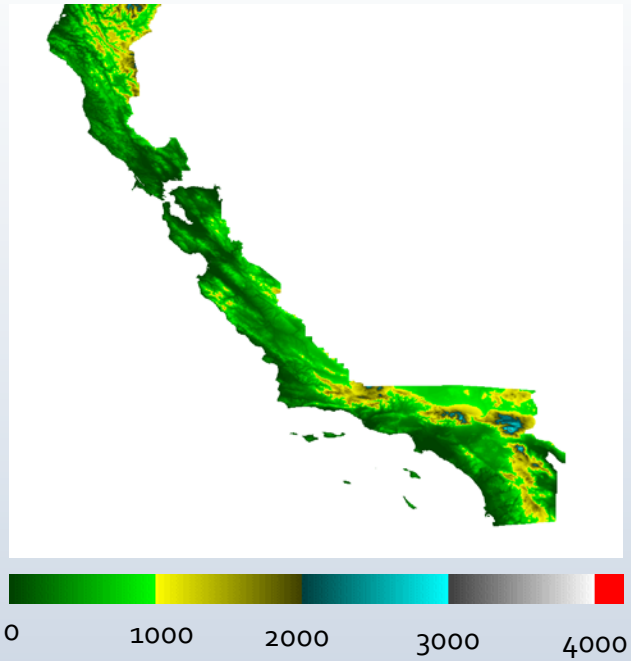
Improved error characterization not only of GPM observations but of surface observing systems and models underpins most if not all this research.

e.g. Orographic Precipitation

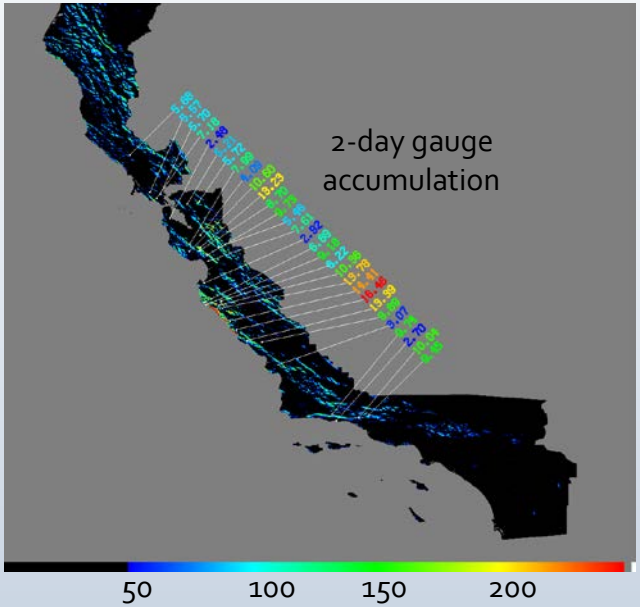
Blended TPW (mm) and 850 hPa GFS Winds



Elevation (m)



Orographic Precipitation Index



Neither models nor observations alone do particularly well but combinations can do much better. Understanding errors specific to orographically induced precipitation is key to combining information.

e.g. GEWEX Grand Challenge (DRAFT)

How to convey and improve understanding of the current climate predictions and their uncertainties? This question includes goals of improved consistency between net solar and infrared radiation and sensible and latent heat fluxes at the surface to reveal processes that in turn must be replicated in climate models. This question relates also to uncertainties introduced by incomplete understanding of clouds/ aerosols/precipitation interactions and their feedbacks on the climate system. ***Only through a better understanding of the uncertainties in observations and models will it be possible to discriminate natural variability from longer term trends of key variables such as temperature and precipitation***. Possibilities of new satellite-based measurements, combined with observations at the surface and in the ocean should enable improved reconciliation between observed changes in the radiative imbalance at the top-of-atmosphere and the inventory of changes in energy throughout the Earth system. Upgraded GEWEX datasets, global reanalyses of atmosphere and ocean, and improved modeling together with advanced diagnostics being planned throughout the GEWEX panels play key roles in advancing this topic. The result is improved tools and products for climate services.