COCONet and TLALOCNet: Providing the Intra-Americas Seas Region with Enhance Atmospheric Observational Capacity

John J. Braun
Project Scientist, COSMIC Program Office

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September 10, 2015

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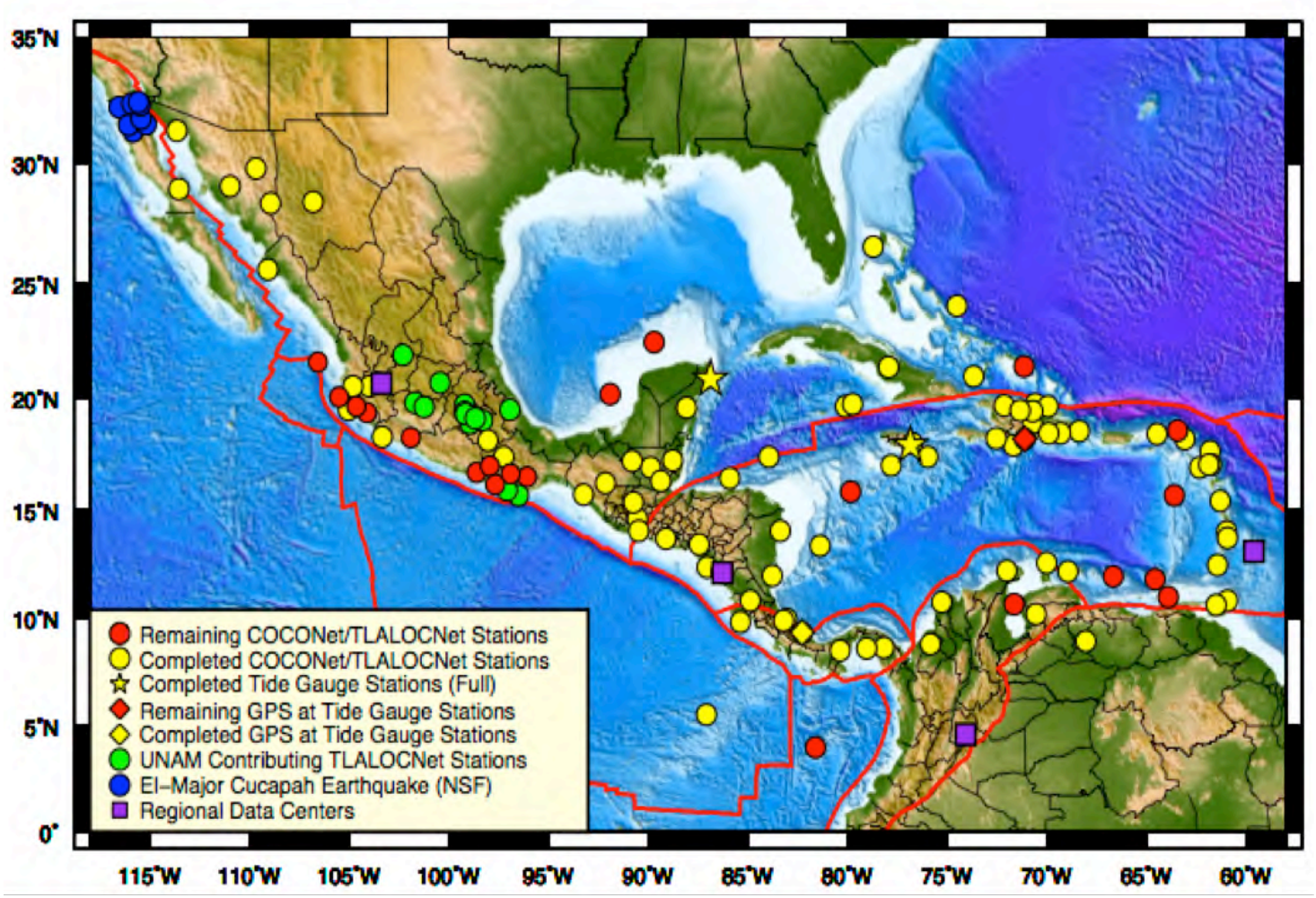
What are COCONet and TLALOCNet?

- COCONet: Continuously Operating Caribbean Observational Network.
- TLALOCNet: Trans-boundary Land and Atmosphere Long-term Observational and Collaborative Network. Named after the Aztec God of rain, fertility, and water.
- Both are multidisciplinary research project focused on improving our understanding and ability to prepare for and predict natural hazards in region.
  - Natural hazards – basic geo-dynamic + atm-dynamic processes
  - Earthquake hazards, tectonic deformation, climate variability, severe weather
  - Provide data and data products through a shared and open process (advancing this concept throughout the region).
  - Provide "synoptic-scale" observations to support multiple research efforts.
  - Build capacity – develop international partnerships

COCONet and TLALOCNet Network



COCONet:
75 new/refurbished
9 remaining

TLALOCNet:
12 new/refurbished
12 remaining

Regional data centers:
Mexico (UNAM),
Nicaragua (INETER),
Barbados (CIMH)
Colombia (SGC)

Example Stations

Station: CN28
Location: Panama
Installed: 2012

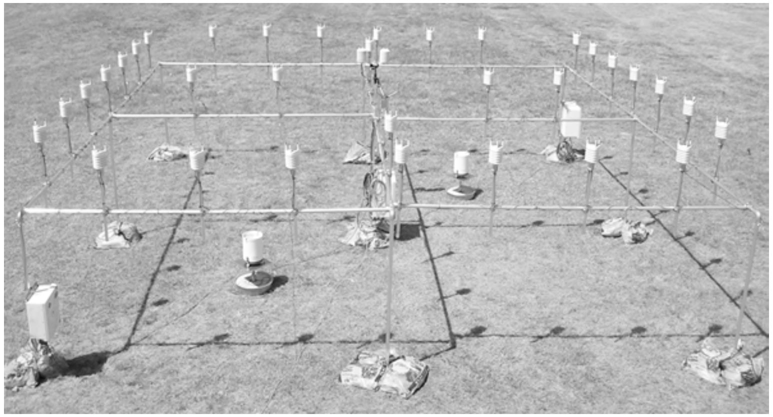
Station: CN11
Location: Jamaica
(Pedro Cay)
Installed: 2011

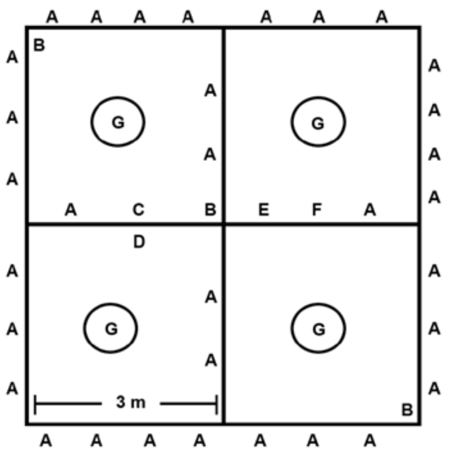
Station: CN18
Location: Honduras
(Swan Island)
Installed: 2014

Specifications of Met Sensor

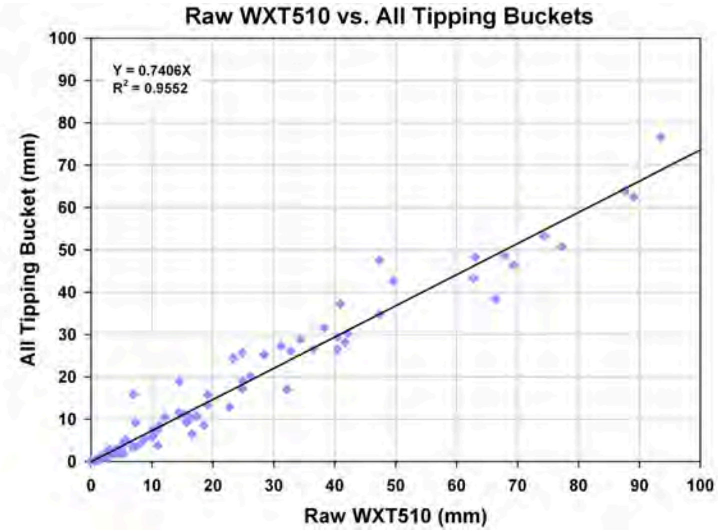
Measurement	Accuracy
Pressure	±0.5 hPa at 0...+30 °C (+32...+86 °F)
Temperature	±0.3 °C (±0.5 °F)
Relative Humidity	±3 %RH within 0...90 %RH ±5 %RH within 90...100 %RH
Winds (u,v)	± 0.3 m/s or ±2% whichever is greater
Rain	5%* (*does not account for wind induced error)

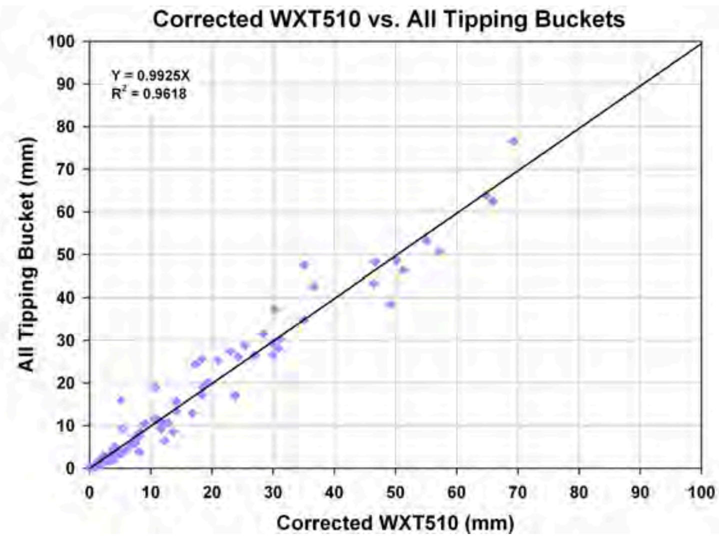
Performance of WXT Precipitation Sensor





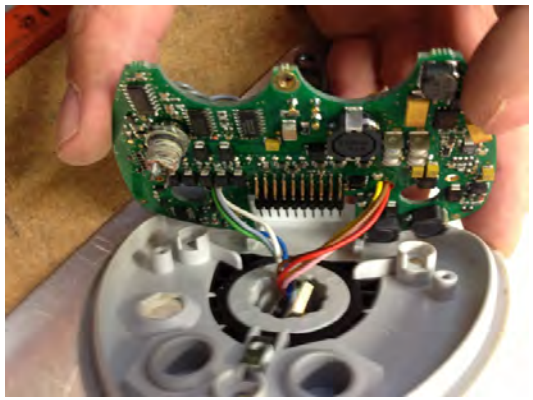
Key
- A - WXT510
- B - Data Logger
- C - FastTherm
- D - HMP45C
- E - Cup Anemometer
- F - 2-D Sonic Anemometer
- G - Tipping Bucket Rain Gauge





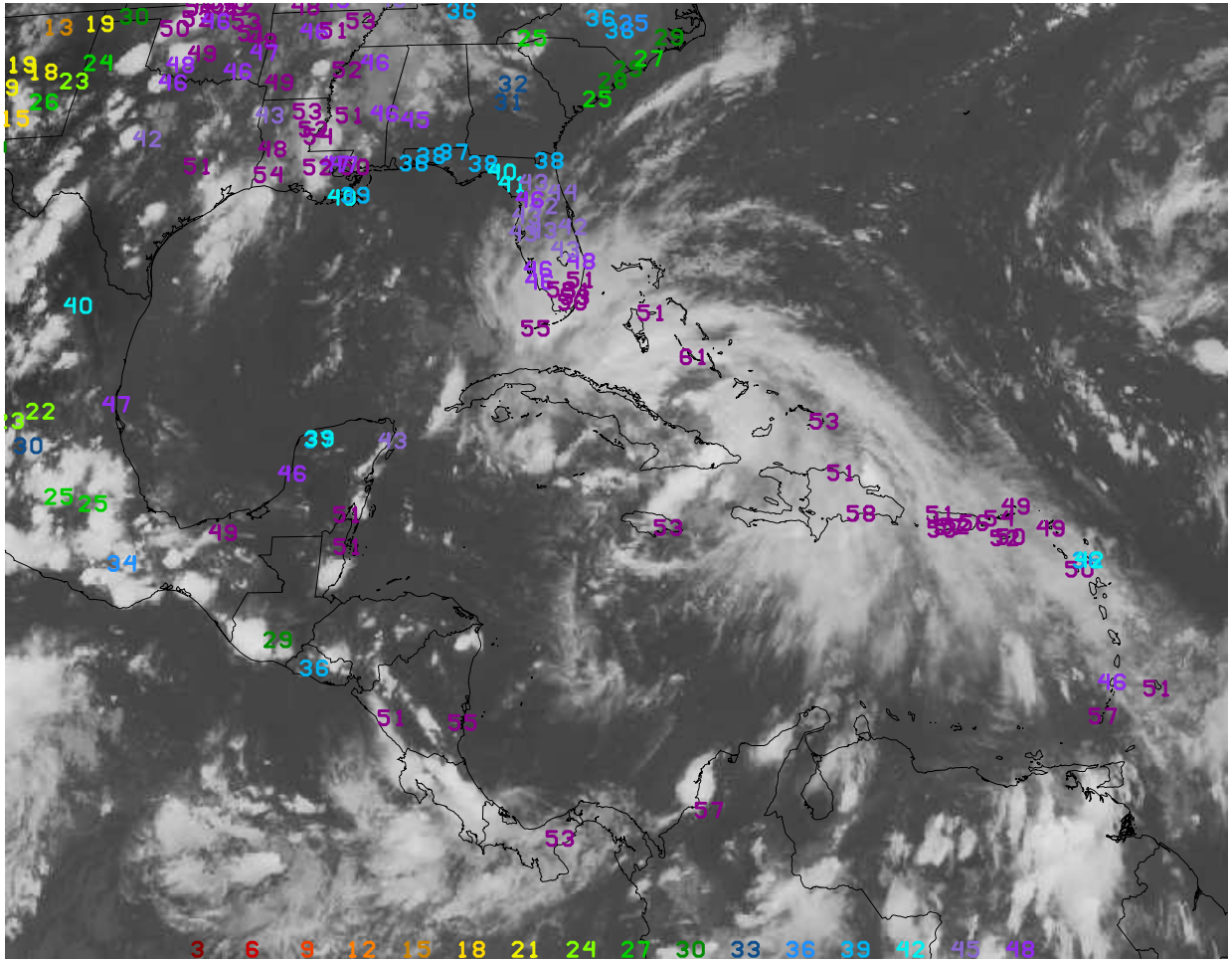
Basara, J. B., B. G. Illston, T. E. Winning, and C. A Fiebrich, 2009: **Evaluation of Rainfall Measurements from the WXT510 Sensor for use in the Oklahoma City Micronet.** ***The Open Atmospheric Science Journal, 3, 39-45.***

Corrosion Problems in Some Locations



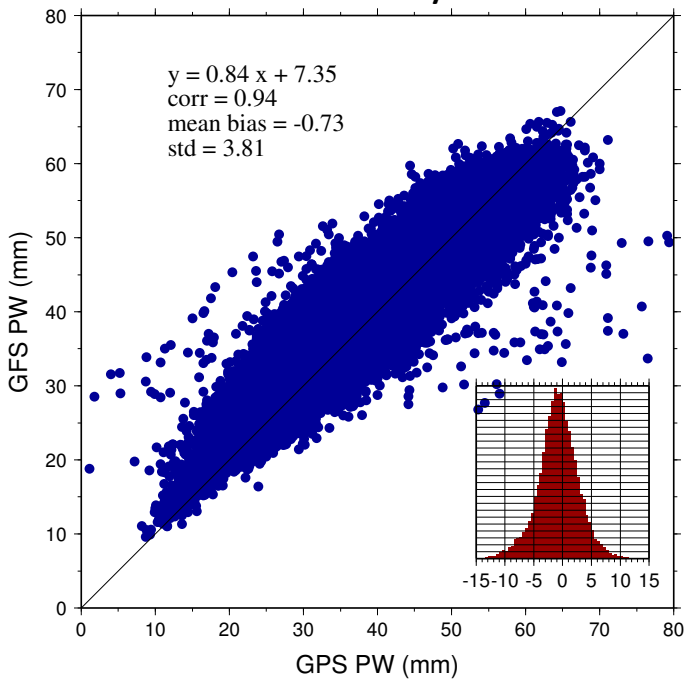
Photos courtesy of J. Sandru, J. Normandeau, and Vaisala

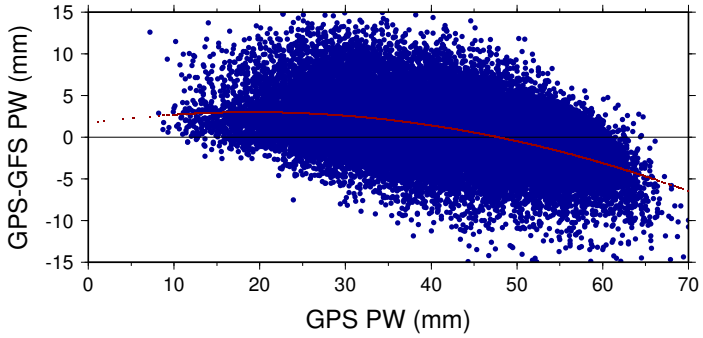
Suominet/COCONet PW



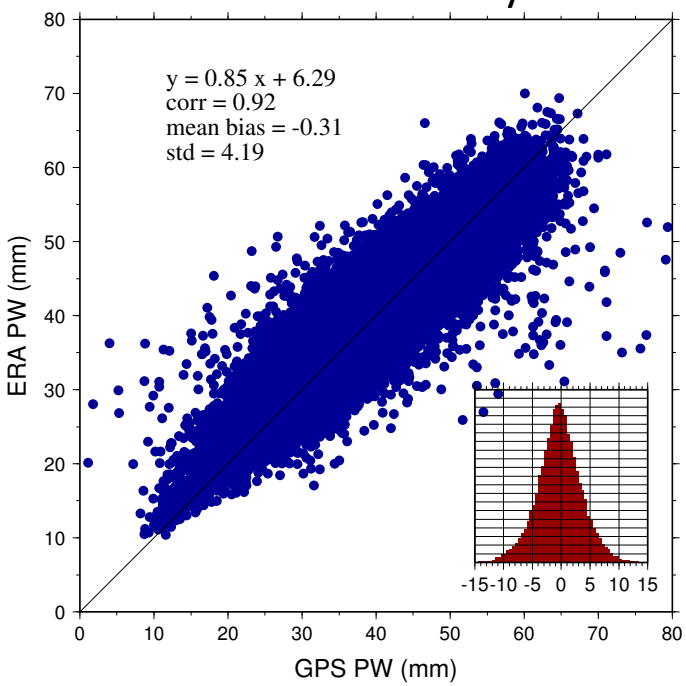
COCONet PW and Model Analysis PW

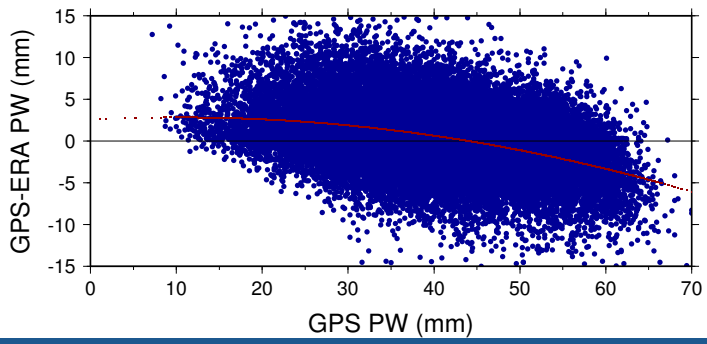
GFS Analysis



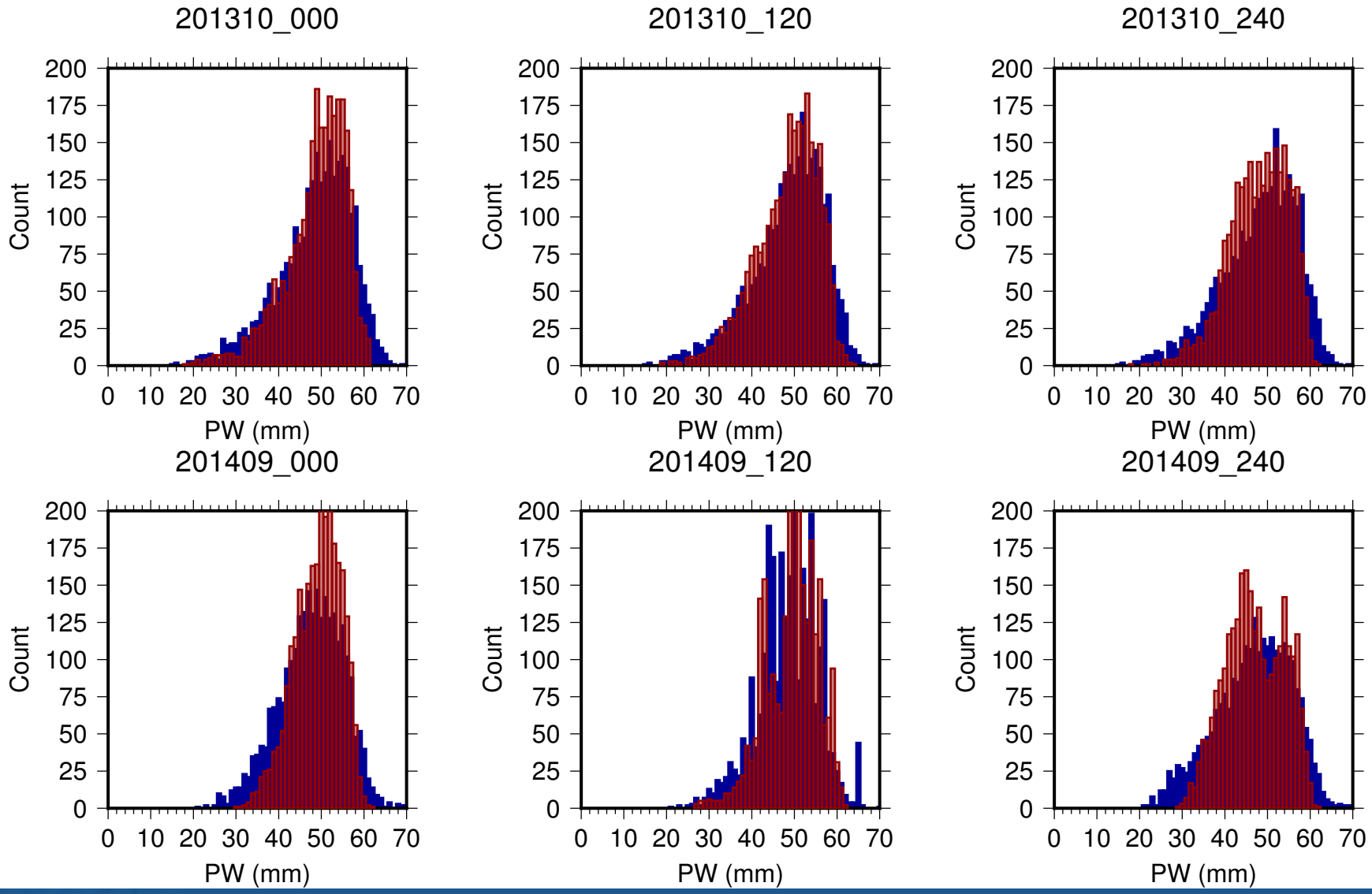


ERA-Interim Analysis



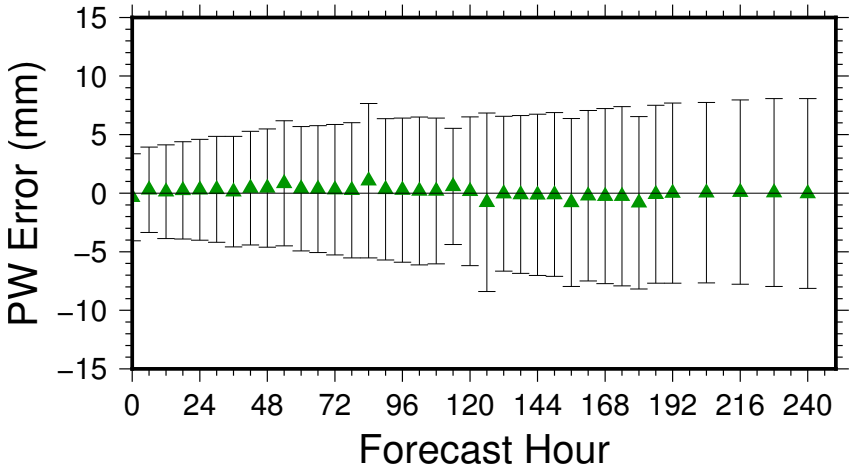


GPS and GFS PW Distribution

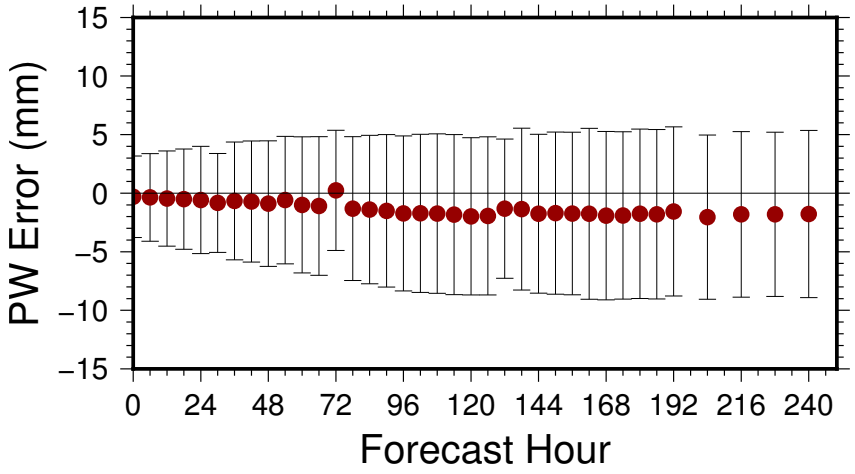


PW Differences (Bias and RMS) vs FCST Length

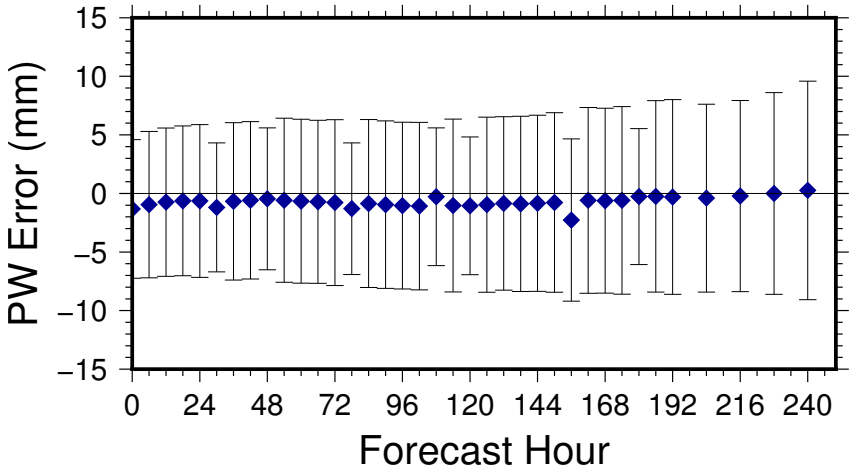
201310

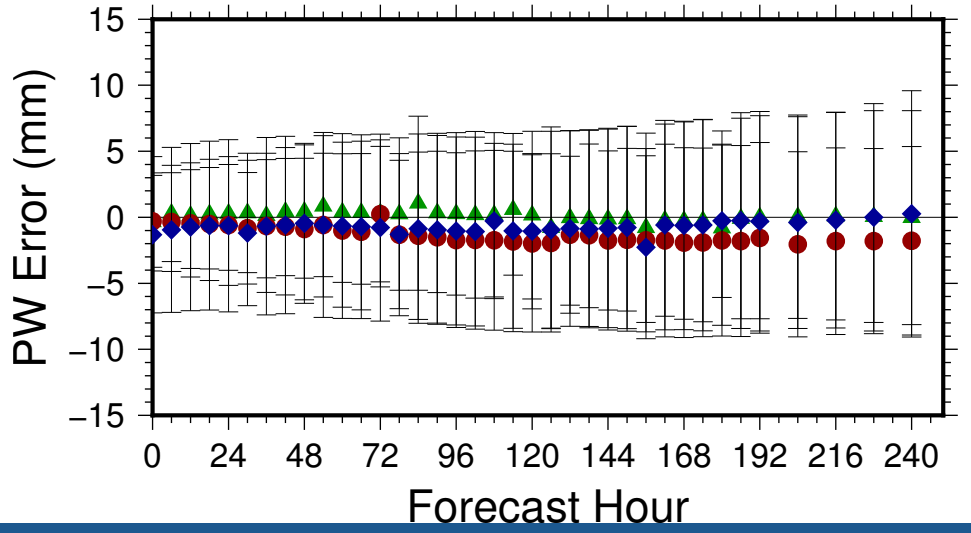


201401

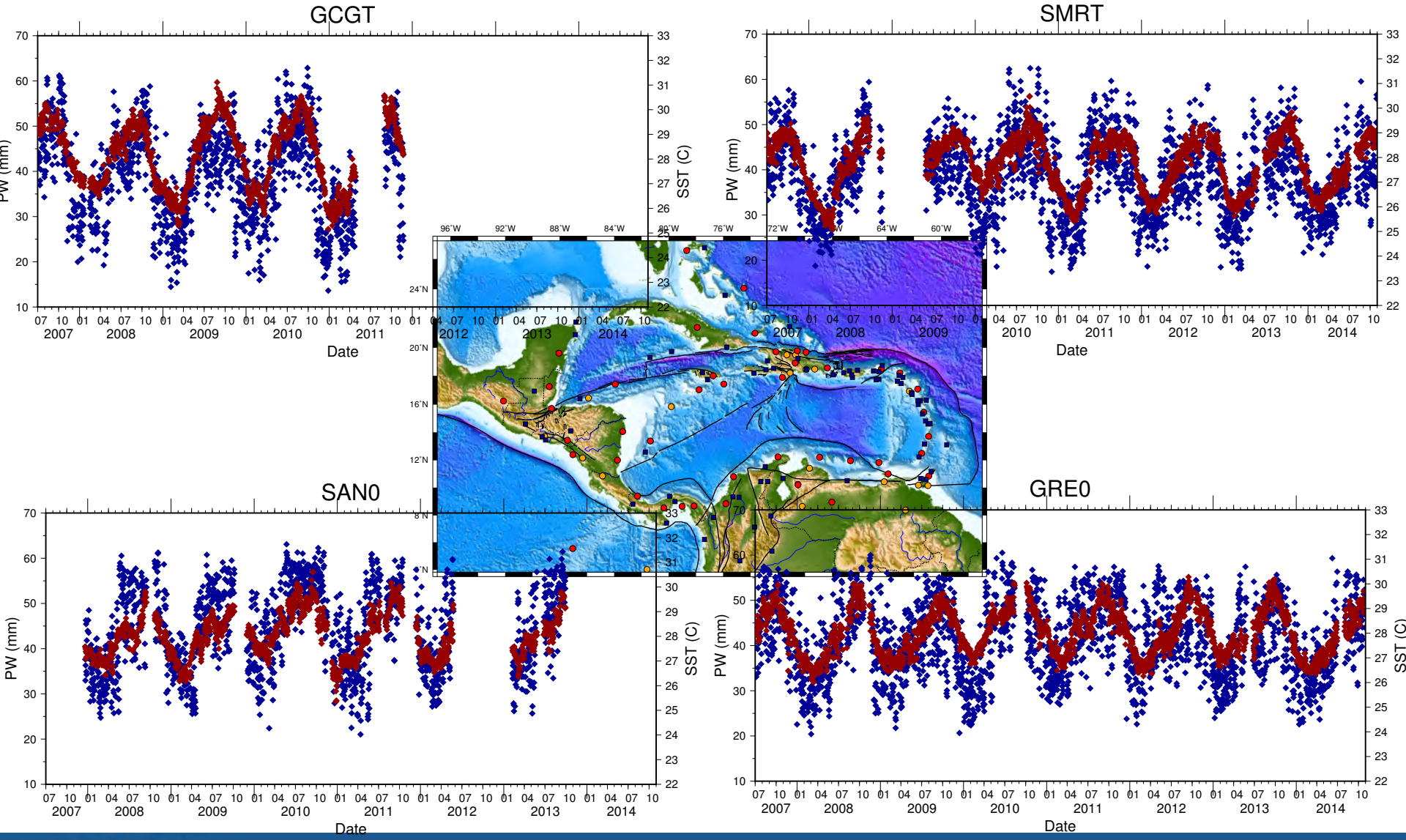


201409

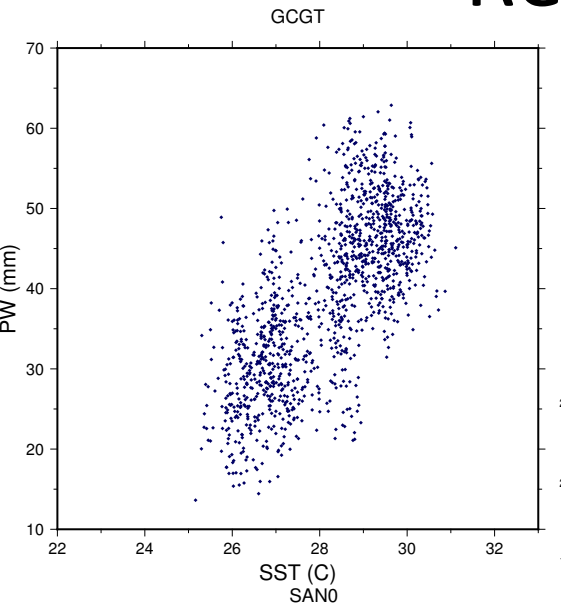


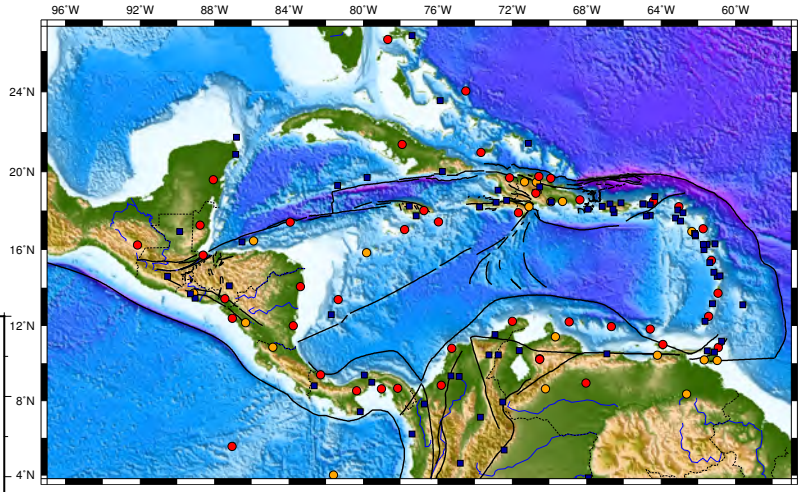


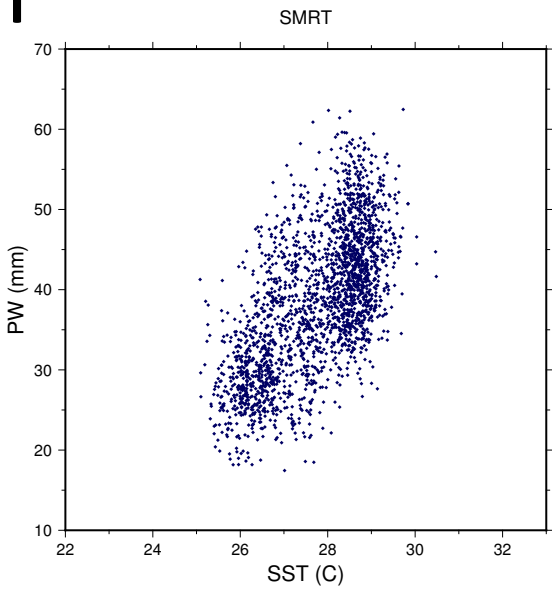
SST and PWV Across Caribbean

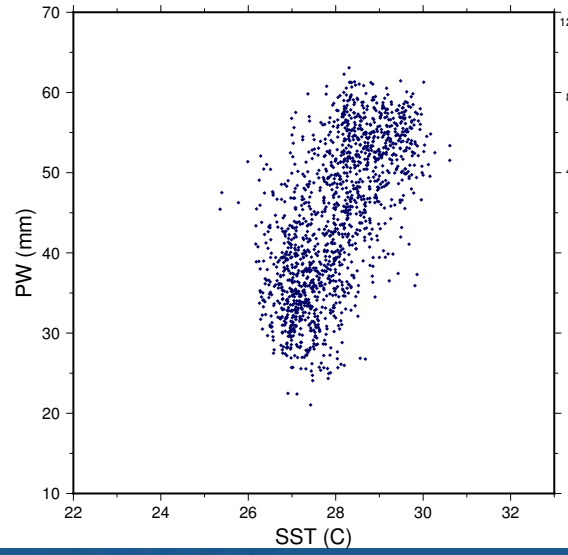


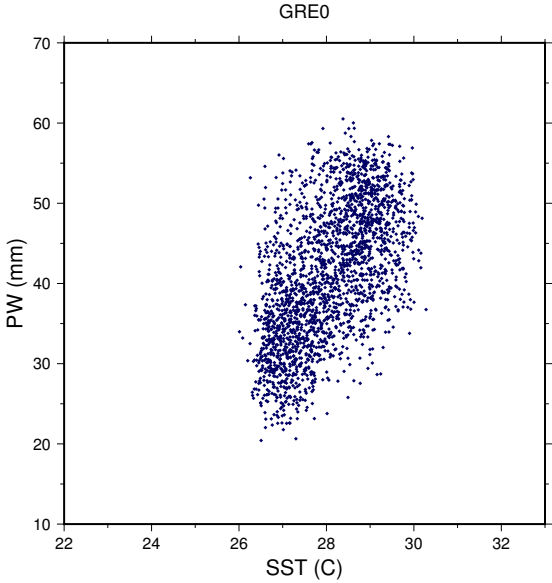
Regression of PW to SST



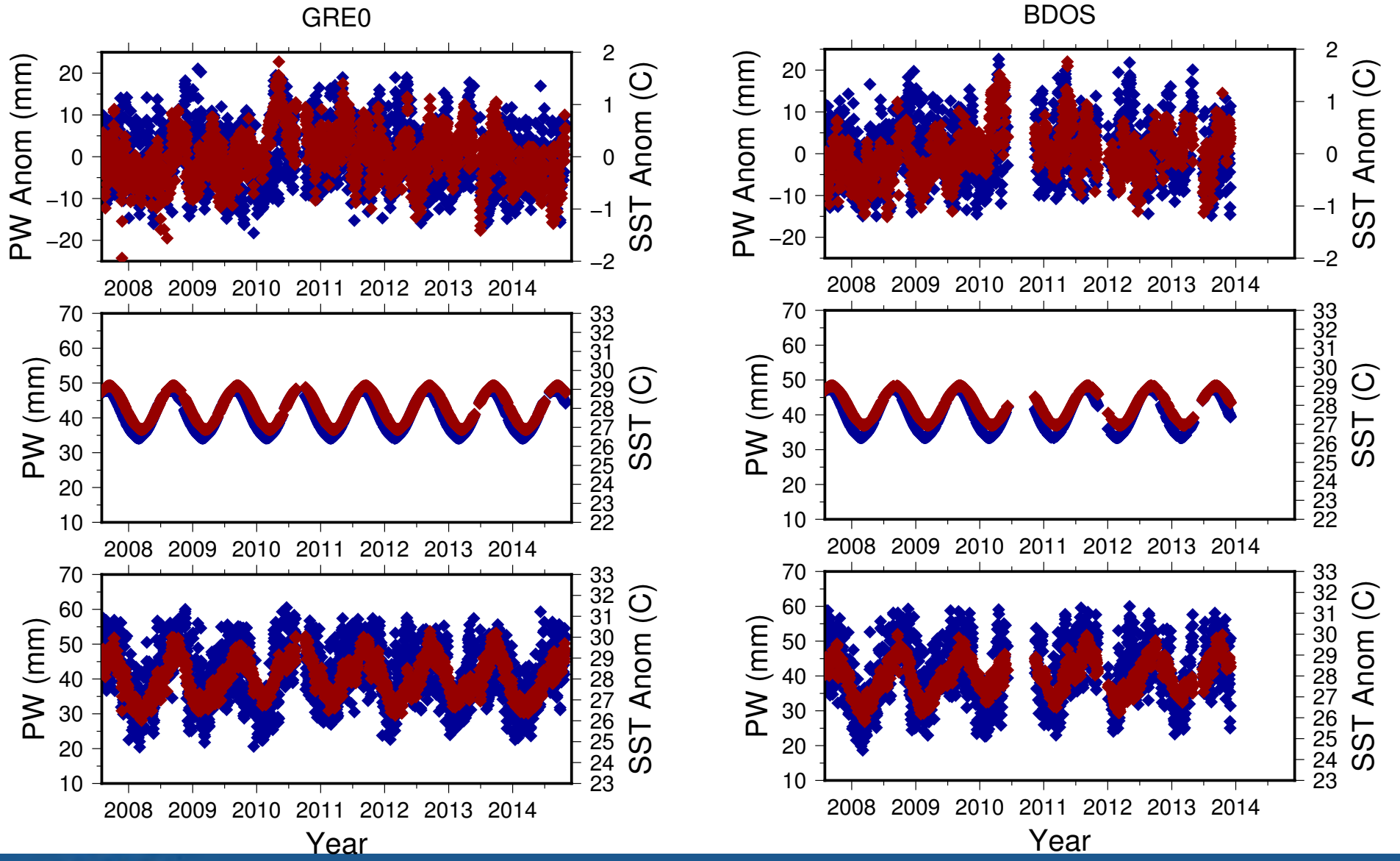




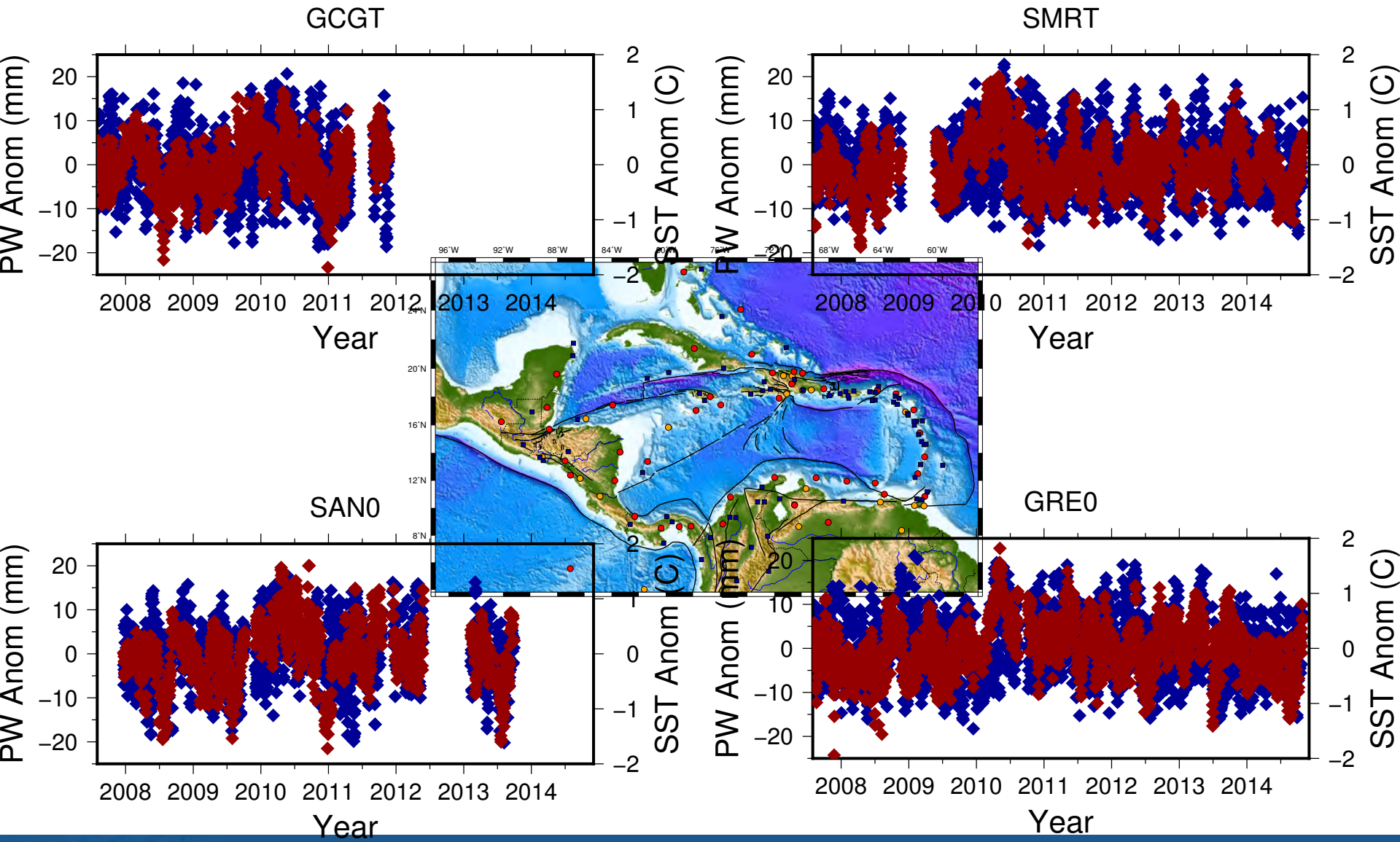




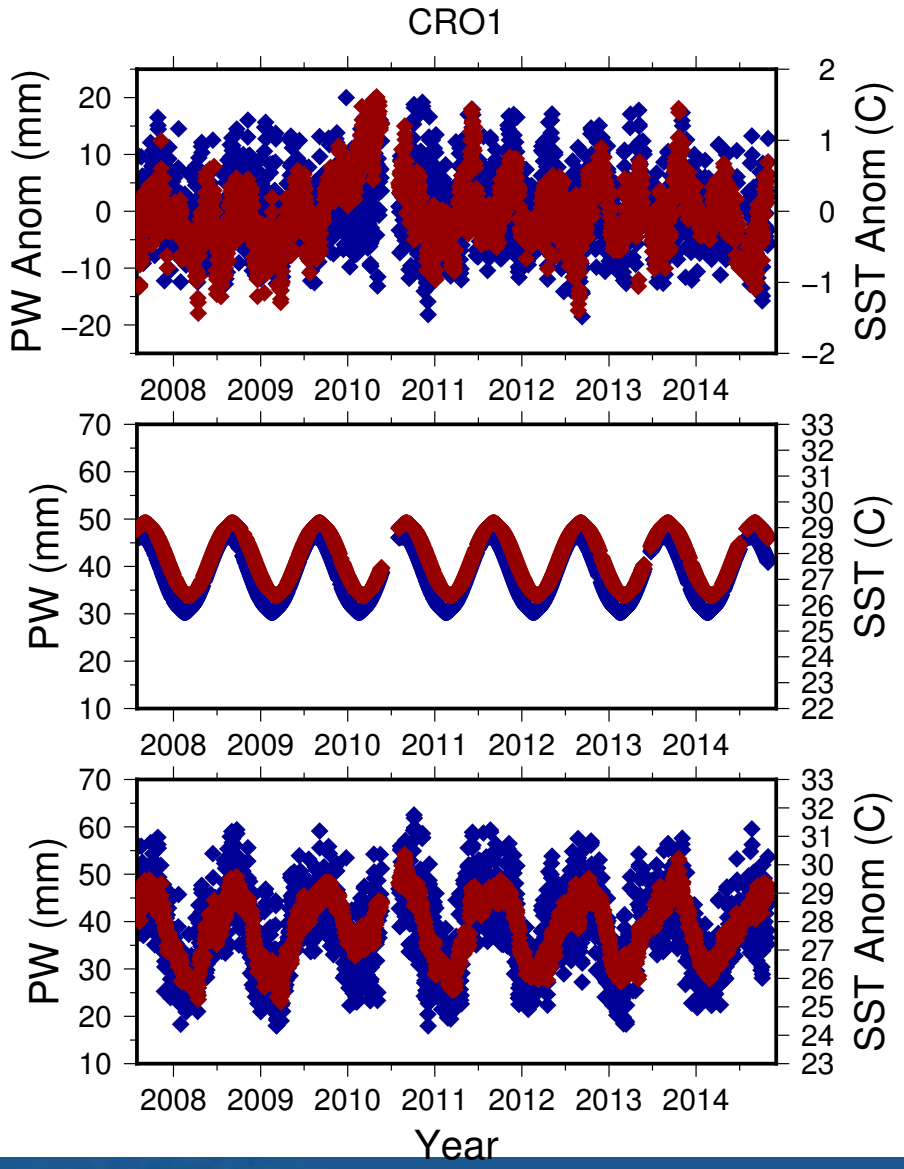
Removal of Seasonal Signals

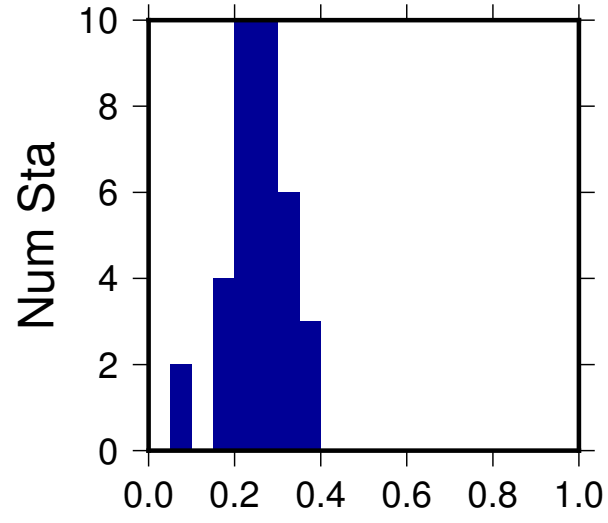


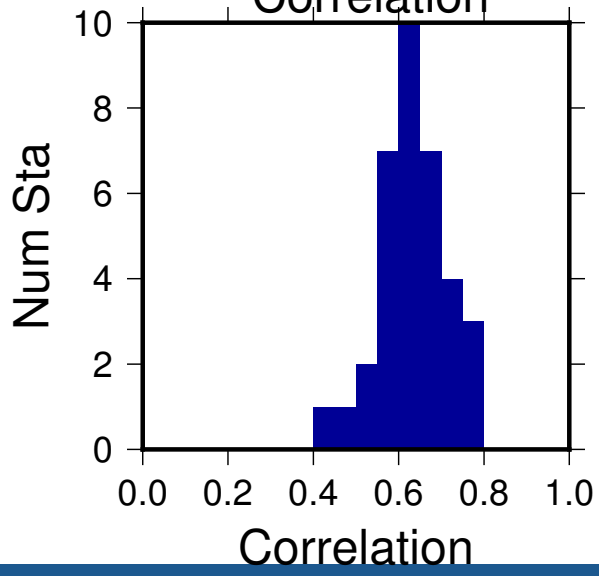
SST and PWV Across Caribbean



SST and PWV Across Caribbean







Data Access and Availability

- All atmospheric data products related to COCONet and TLALOCNet are available through Suominet project within the UCAR/COSMIC program.

- PW and half hour mean of surface observations are available in either ascii or netCDF format.

- Data can be accessed with LDM or through the web interface.
  - LDM Data Stream, http://www.unidata.ucar.edu/software/ldm, Primary name = GPS, Feedtype = FT18
  - http://www.suominet.ucar.edu/data.html

- Hourly updates of raw (5 minute) surface meteorology data are available on NOAA GTS under data type SXCA51 (http://weather.noaa.gov/pub/data/raw/sx/sxca51.kwbc..txt)

Summary

- Data from COCONet project now have a record of sufficient length so that they can be used for both process and model evaluation studies.
- The comparison of GPS PW to analysis fields (GFS) reveal two primary features
  - Model analysis fields appear to wet for PW values <40 mm
  - Model analysis transitions to a dry bias for PW values > 40 mm
- PW fields within GFS forecast output extending out to 240 hours have been evaluated with COCONet PW.
  - Model rms error generally grows from ~3-4mm to almost 8-10 mm
  - GFS PW tends to be more homogenous from the analysis, extending through the forecast.
- From an annual view, SST and PW are highly correlated
- An anomaly analysis reveals that the majority of the SST/PW correlation is related to the seasonal variability in both data sets.
  - Things such as the persistent zonal flow and CLLJ act to quickly transport moisture
- Need to extend this analysis to evaluate parcels of air that pass across the Caribbean basin.

Collaborative Partners

COCONet
CONTINUOUSLY OPERATING CARIBBEAN GPS OBSERVATIONAL NETWORK

UCAR COMMUNITY PROGRAMS

UNAVCO

Plus more than 25 international partners throughout Caribbean and Latin America