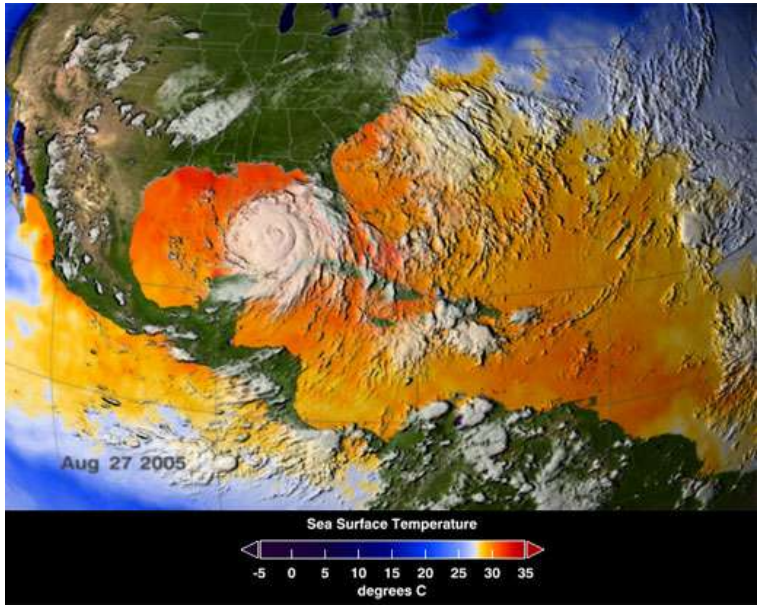
The Continuously Operation Caribbean Observational Network: COCONet



Meghan Miller(1), Eric Calais(2), Mike Jackson(1), Guoquan Wang(3), John Braun(4)

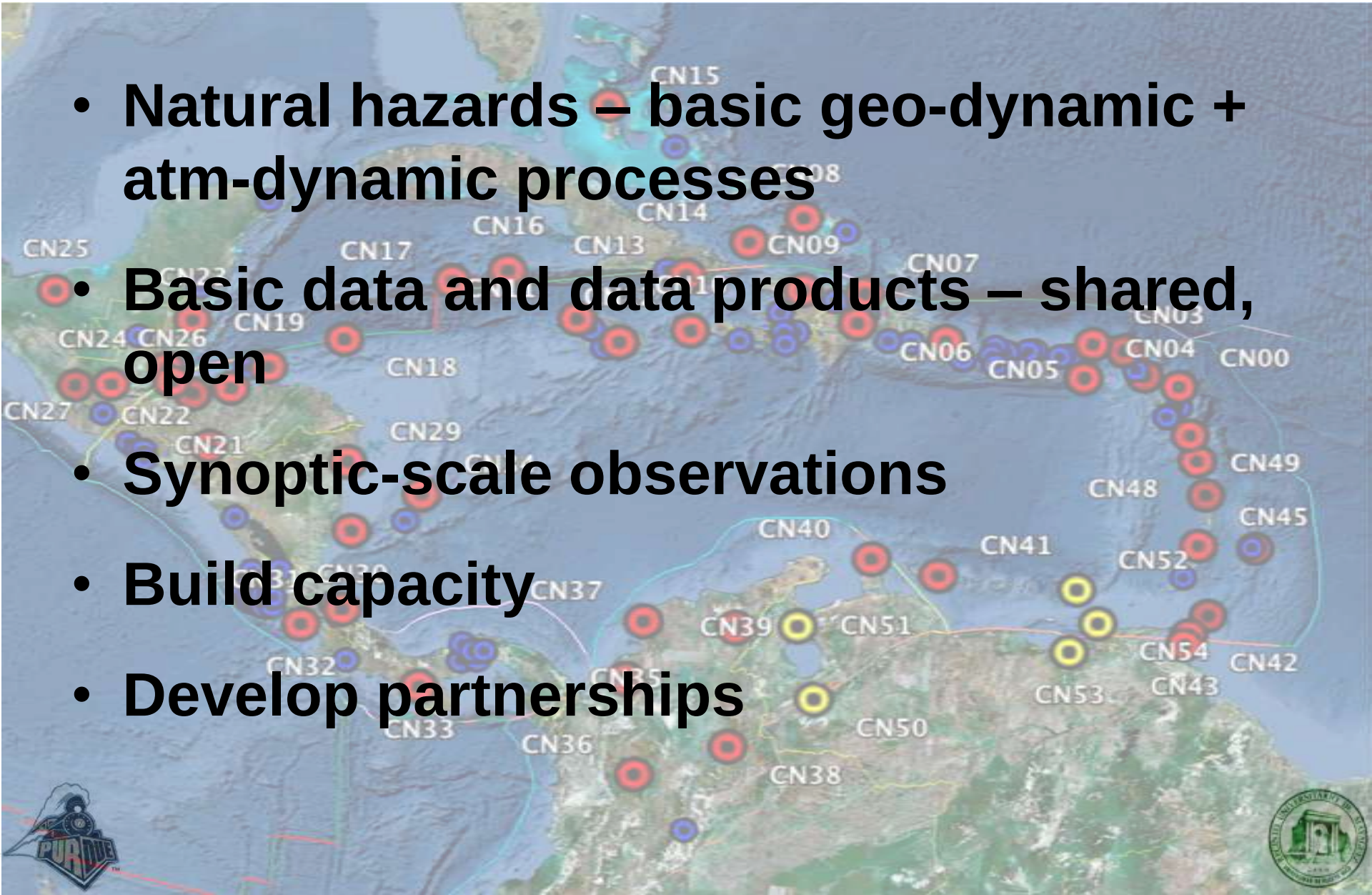
(1) UNAVCO

(2) Purdue University

(3) University of Puerto Rico at Mayaguez

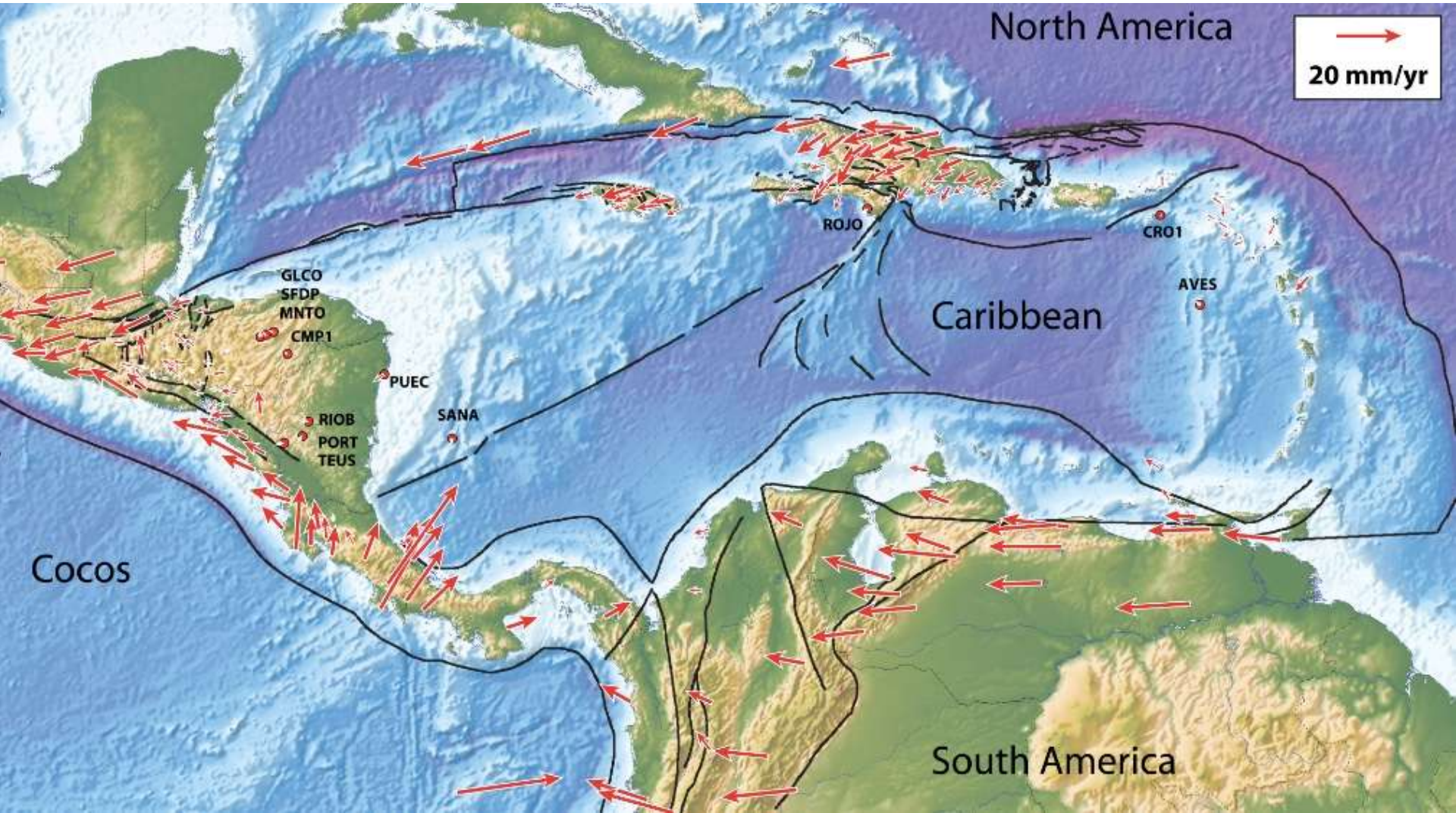
(4) COSMIC/UCAR

“Boundary conditions”



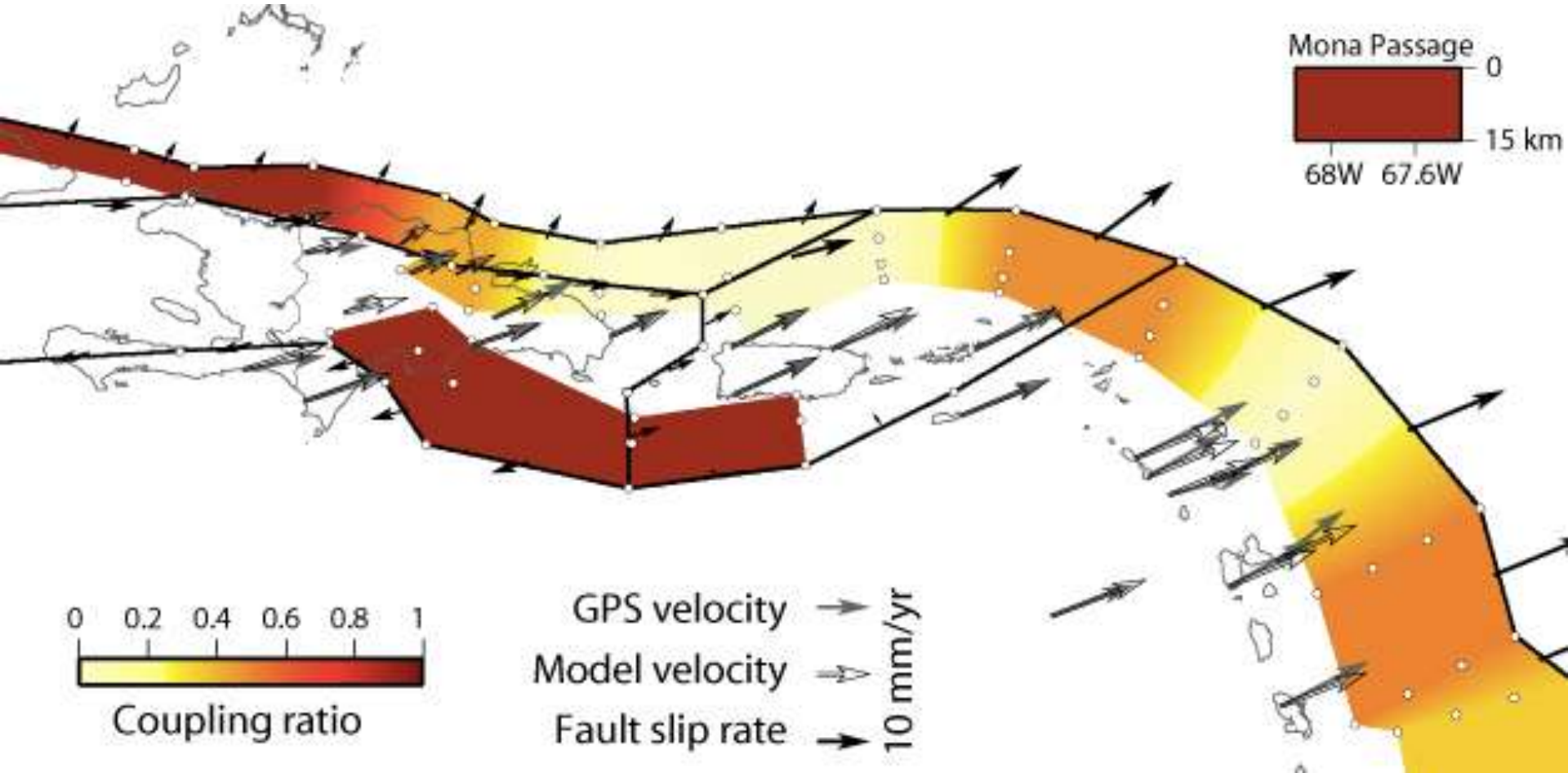
- Natural hazards – basic geo-dynamic + atm-dynamic processes
- Basic data and data products – shared, open
- Synoptic-scale observations
- Build capacity
- Develop partnerships

What are the kinematics of the Caribbean domain? How rigid is the Caribbean plate? What Caribbean reference frame is appropriate for tectonic studies?

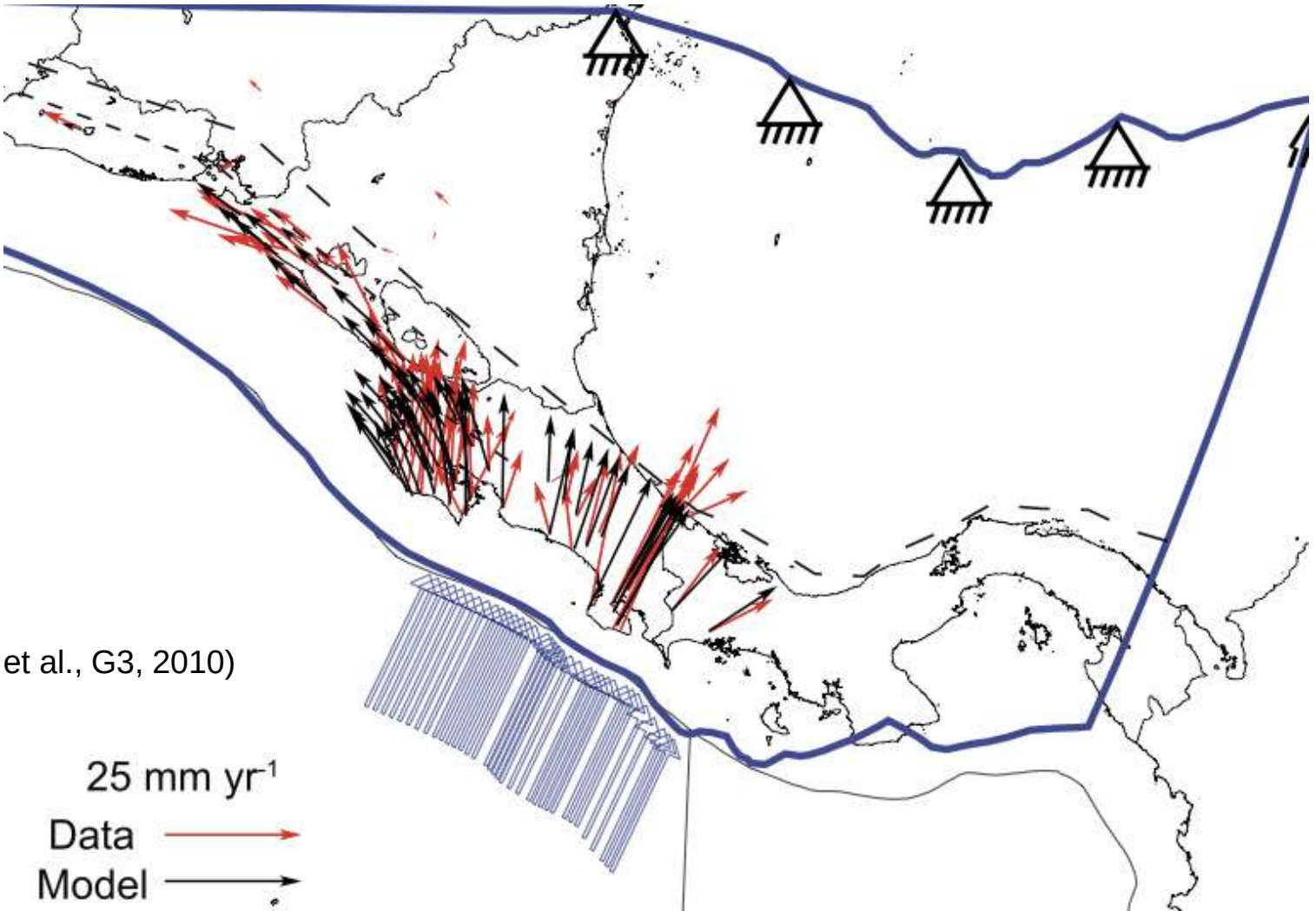


How is stress released at convergent plate boundaries? What controls interplate coupling? How does interseismic plate coupling change along strike?

(Manaker et al., GJI, 2008)

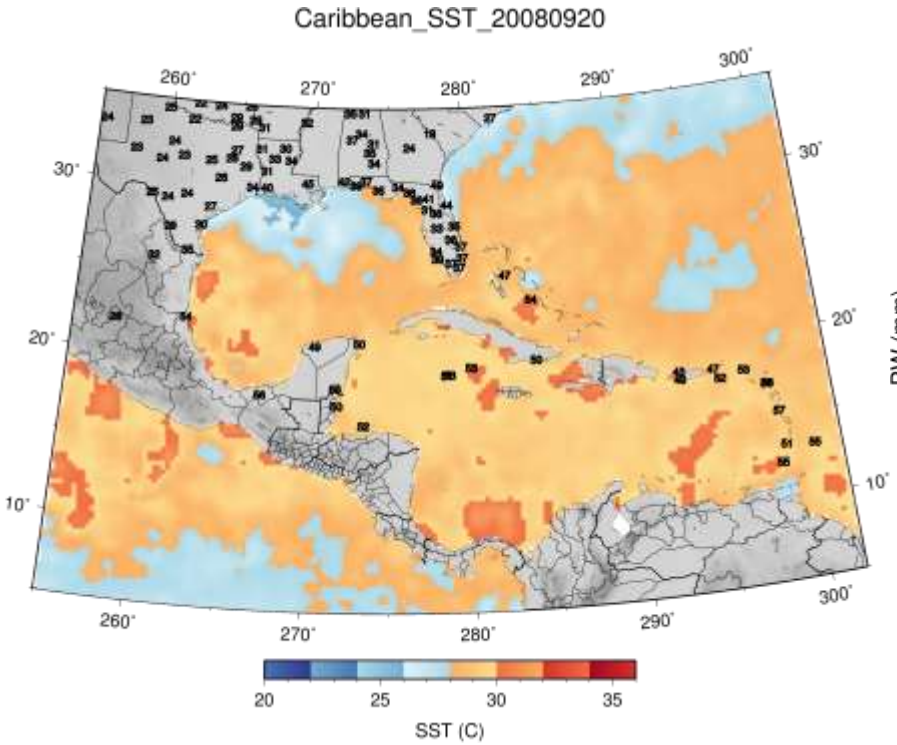


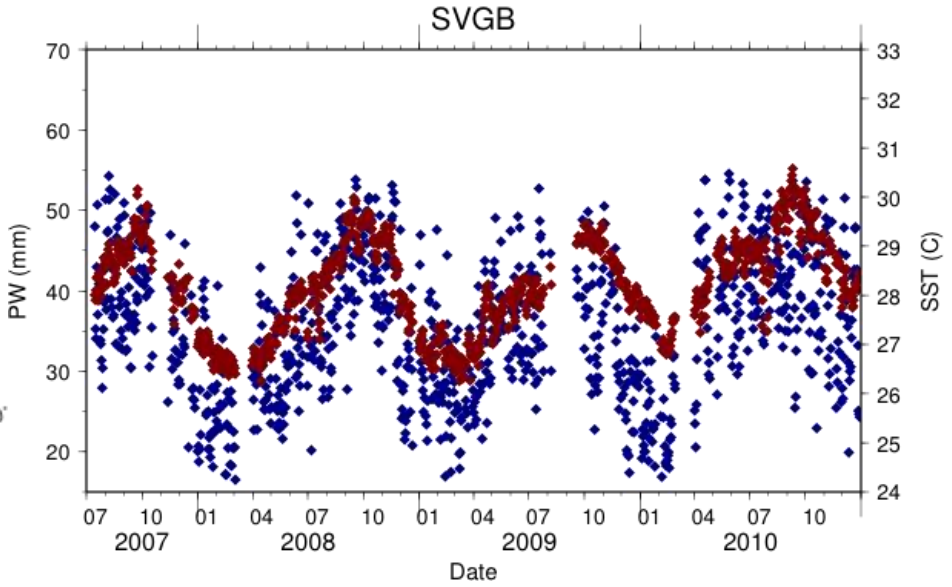
What controls strain partitioning at convergent margins? How is stress transferred across plate boundaries?

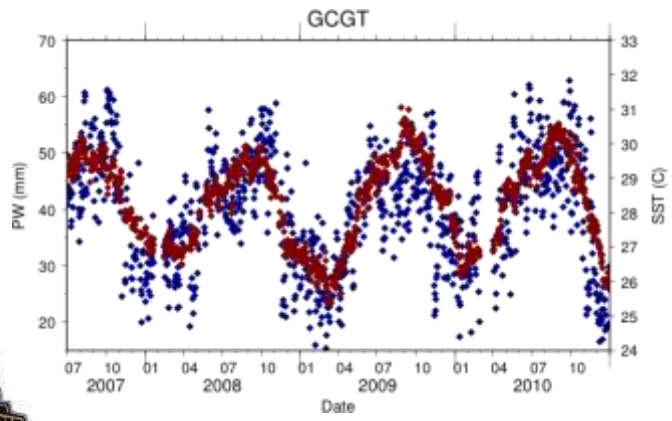


(LaFemina et al., G3, 2010)

What are the physical mechanisms for the coupling between sea surface temperatures and atmospheric water vapor?



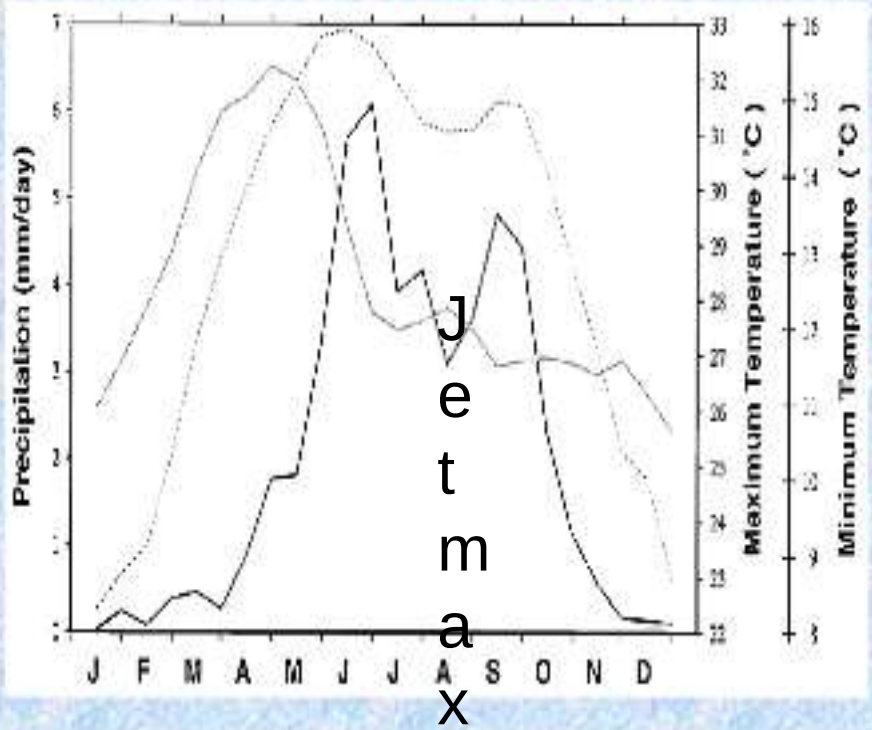




PW estimates from network show high correlation between SST and total column water vapor (not just surface humidity).

These results show the strong link between sea-surface temperature and atmospheric water vapor.

Can severe precipitation forecasts that are not related to hurricanes be improved in the region?

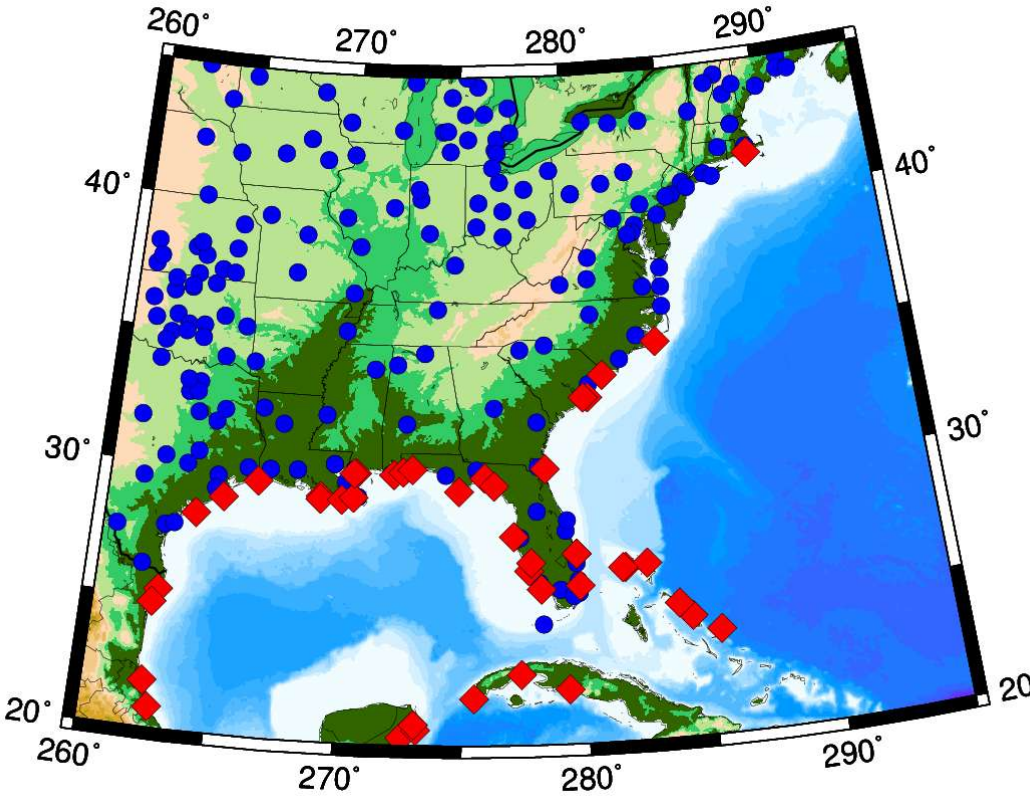


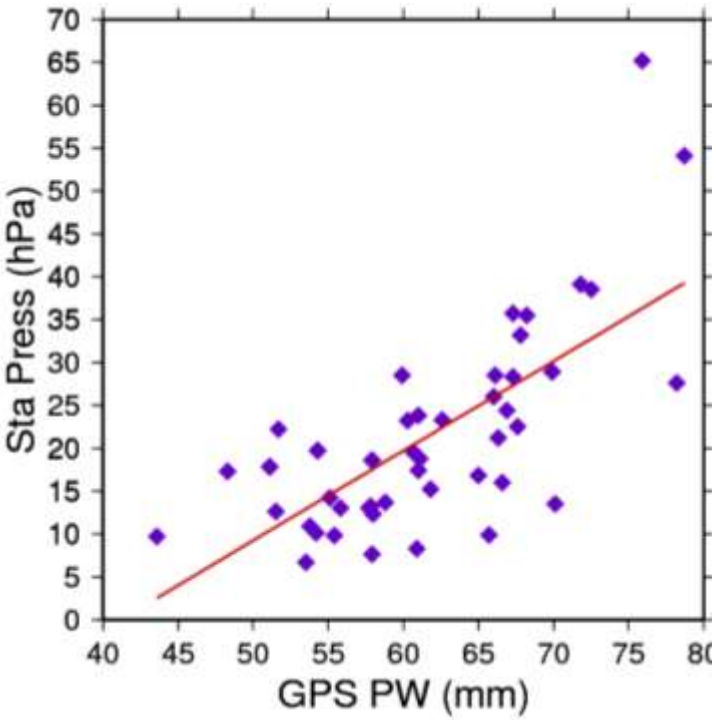
(a) *What are the relative importance of NASH, ITCZ, SST, IALLJ, land effects, and related local atmospheric circulation in the MSD and its interannual variability?*
(b) *What are the typical errors in global and regional models in their simulation and prediction of the MSD?*

Biweekly climatology of precipitation (black solid line), maximum temperature (gray solid line), and minimum temperature (dotted line) for Oaxaca, Mexico (17.8°N, 97.8°W). (From Magana et al. 1999)

The Caribbean Low Level Jet Strongly Modulates Mid-Summer Drought/Canicula Events in the IASCLIP Domain

What is the impact of continuous estimates of PW on hurricane intensity forecasts?

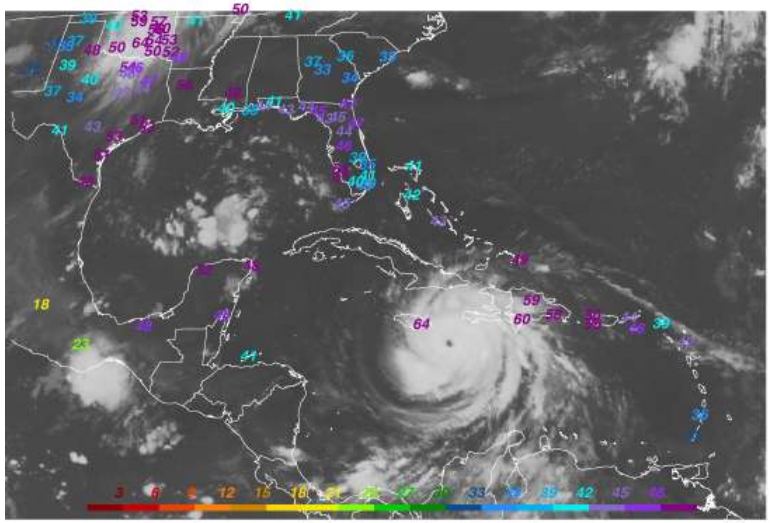




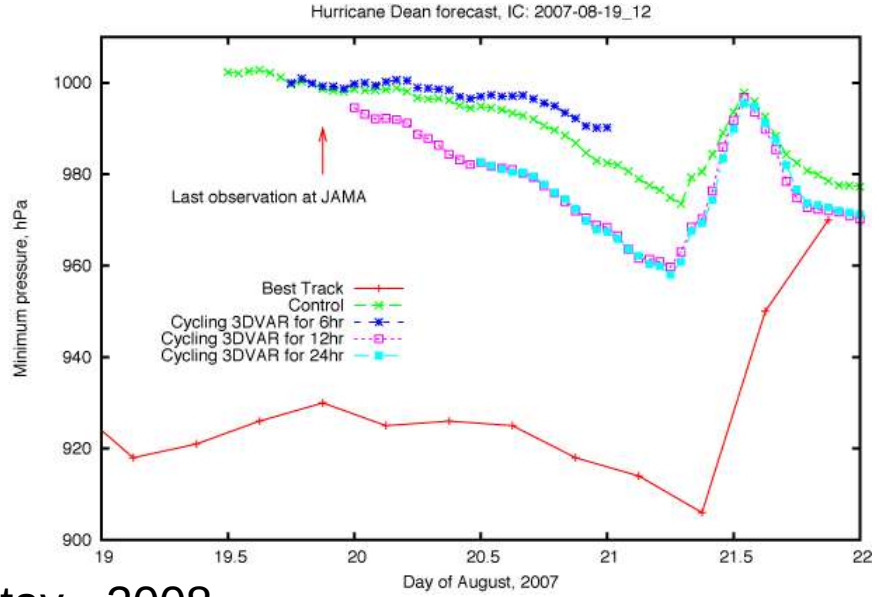
The map on the left shows GPS stations (in blue), and locations of hurricane landfall. The scatterplot on the upper right shows the correlation between GPS PW and drop in surface pressure (1013 - Surf_Press) for stations within 200km of hurricane landfall.
The correlation between PW and surface pressure is -0.71. This high correlation is a positive sign that GPS PW can be used to improve intensity forecasts.

GPS PW Improves Hurricane Intensity Forecasts

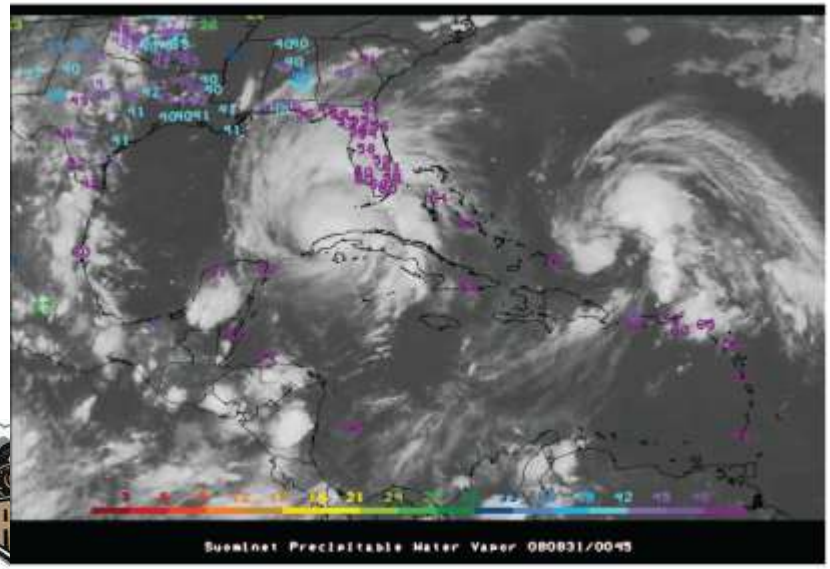
Dean - 2007

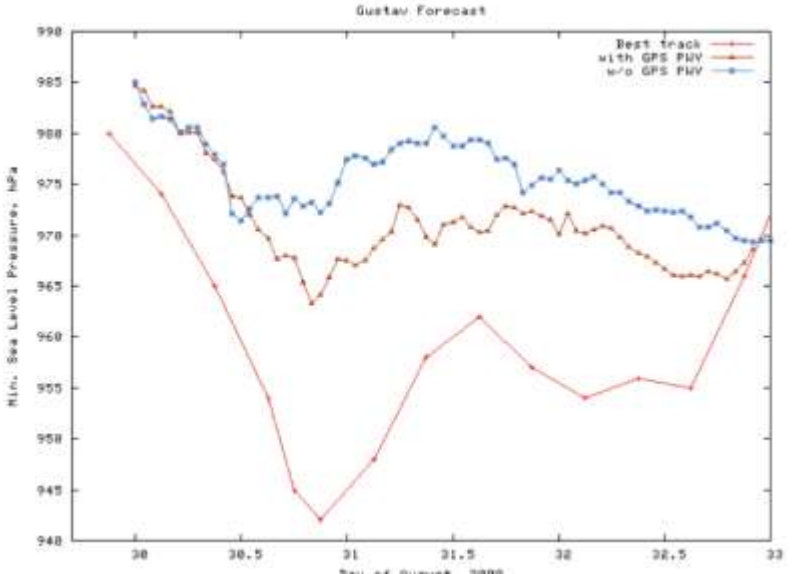


Suominet Precipitable Water Vapor 070819/1345

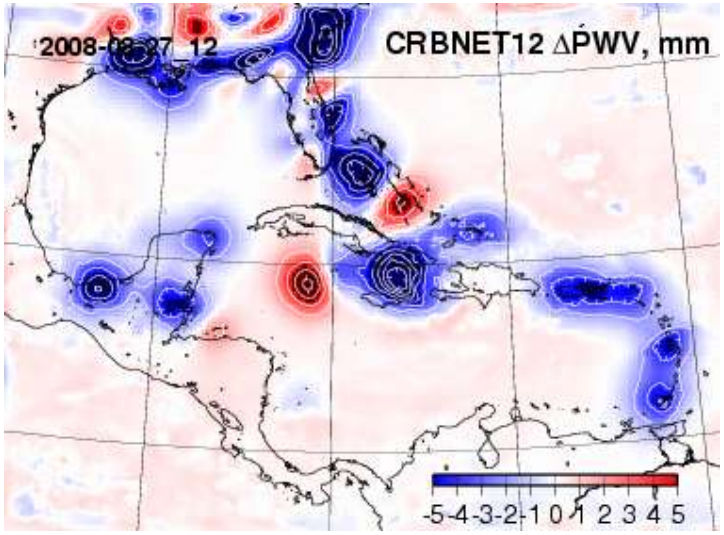


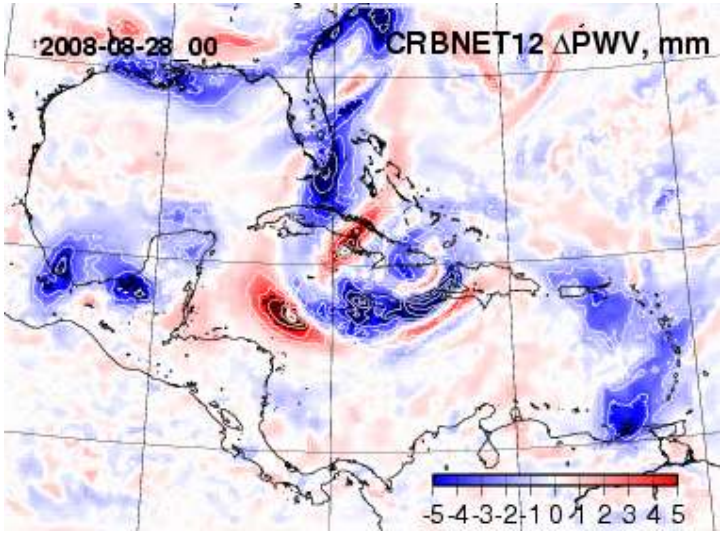
Gustav - 2008

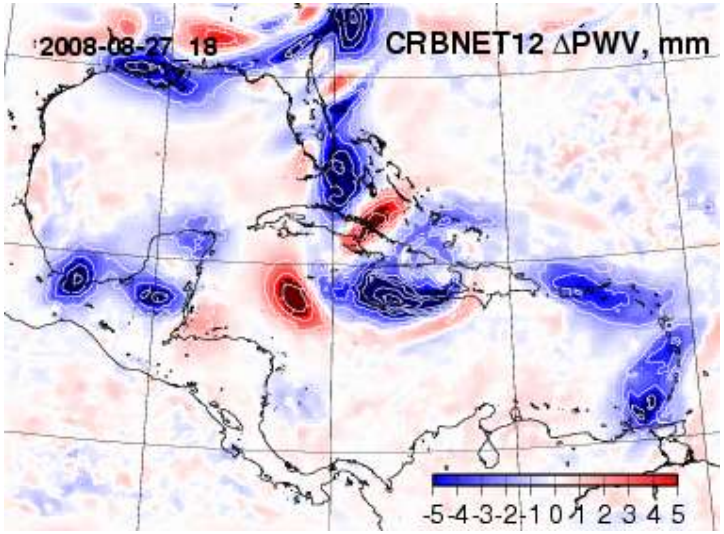


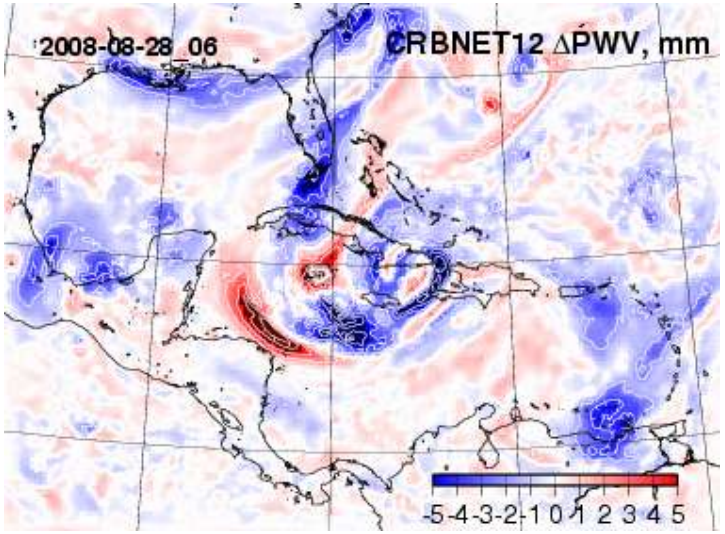


Hurricane Gustav - 2



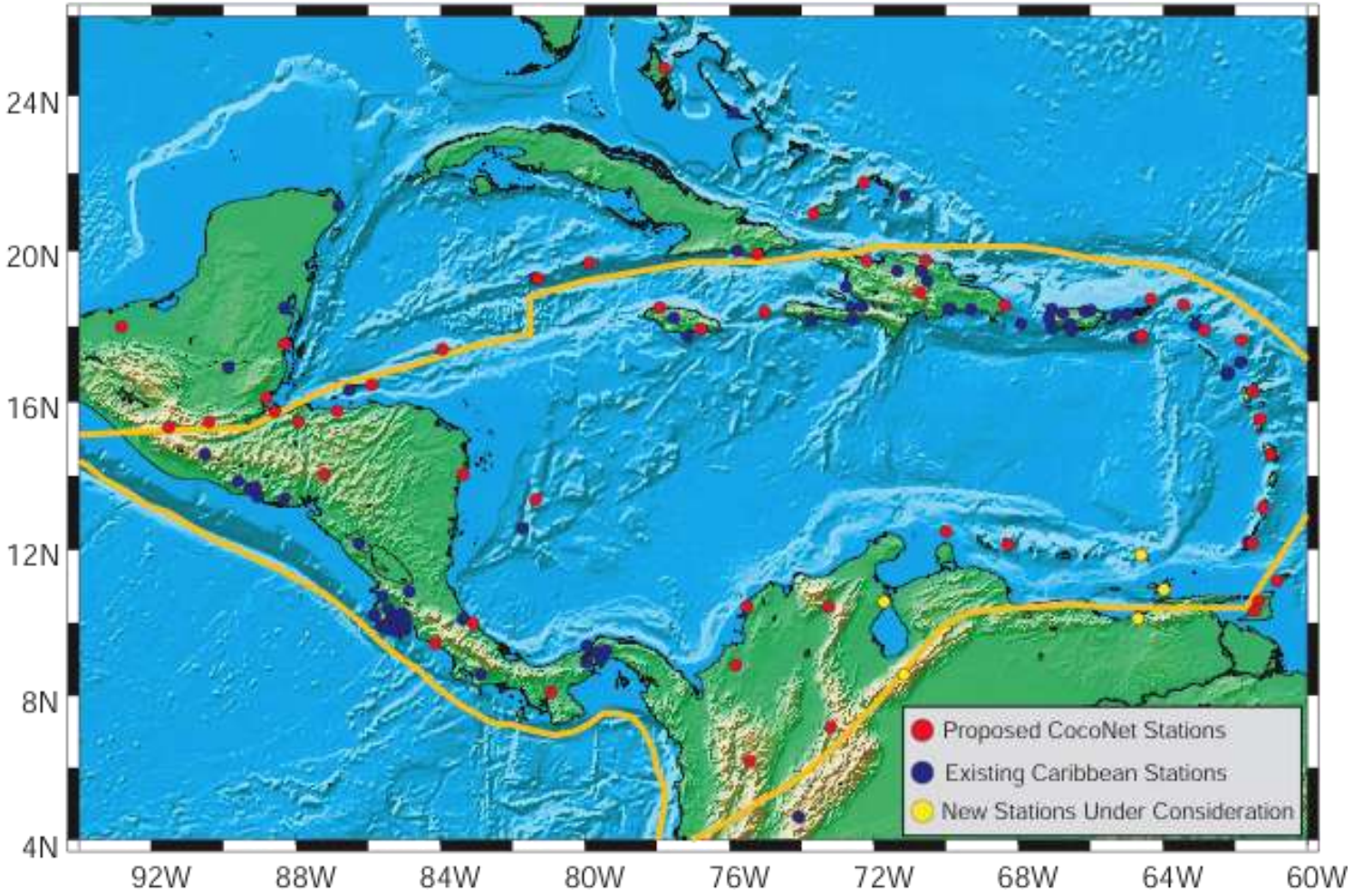






Acknowledgements to Ted Iwabuchi, COSMIC for WRF assimilation

Proposed COCONet Stations

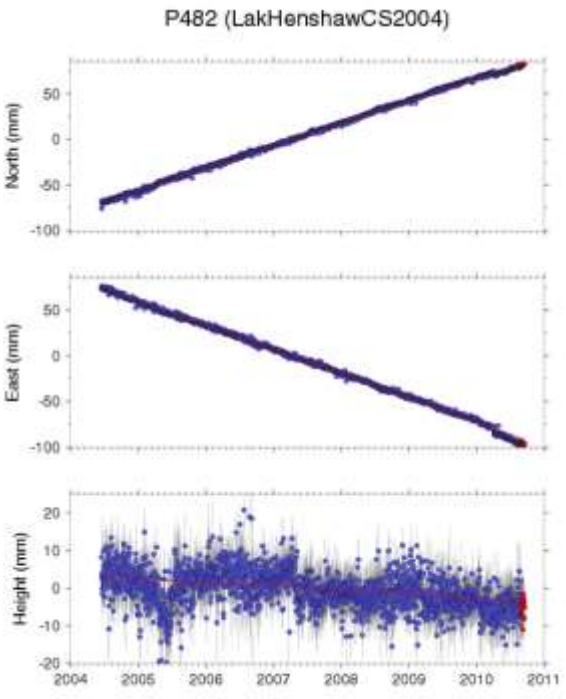


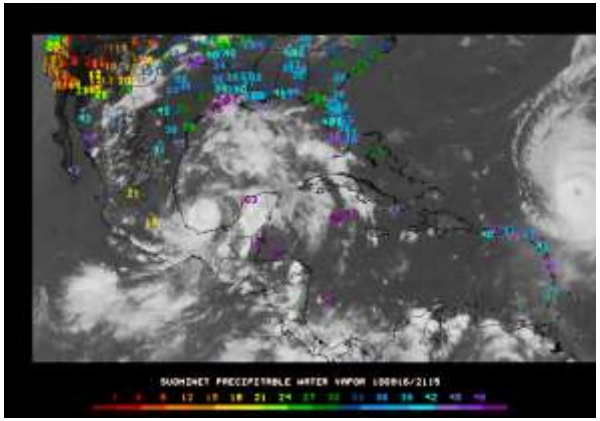
Community Building

- **This is an international and interdisciplinary project**
  - **Need input regarding design and active participation from the Caribbean community.**
- **Ultimate measure of success will be if Caribbean collaborators feel that COCONet is their network.**
- **Engage local scientists, government agencies, and community in Caribbean.**
- **COCONet will build scientific, technical and educational capacity in the region and serve as a successful model for regional cooperation and community building.**

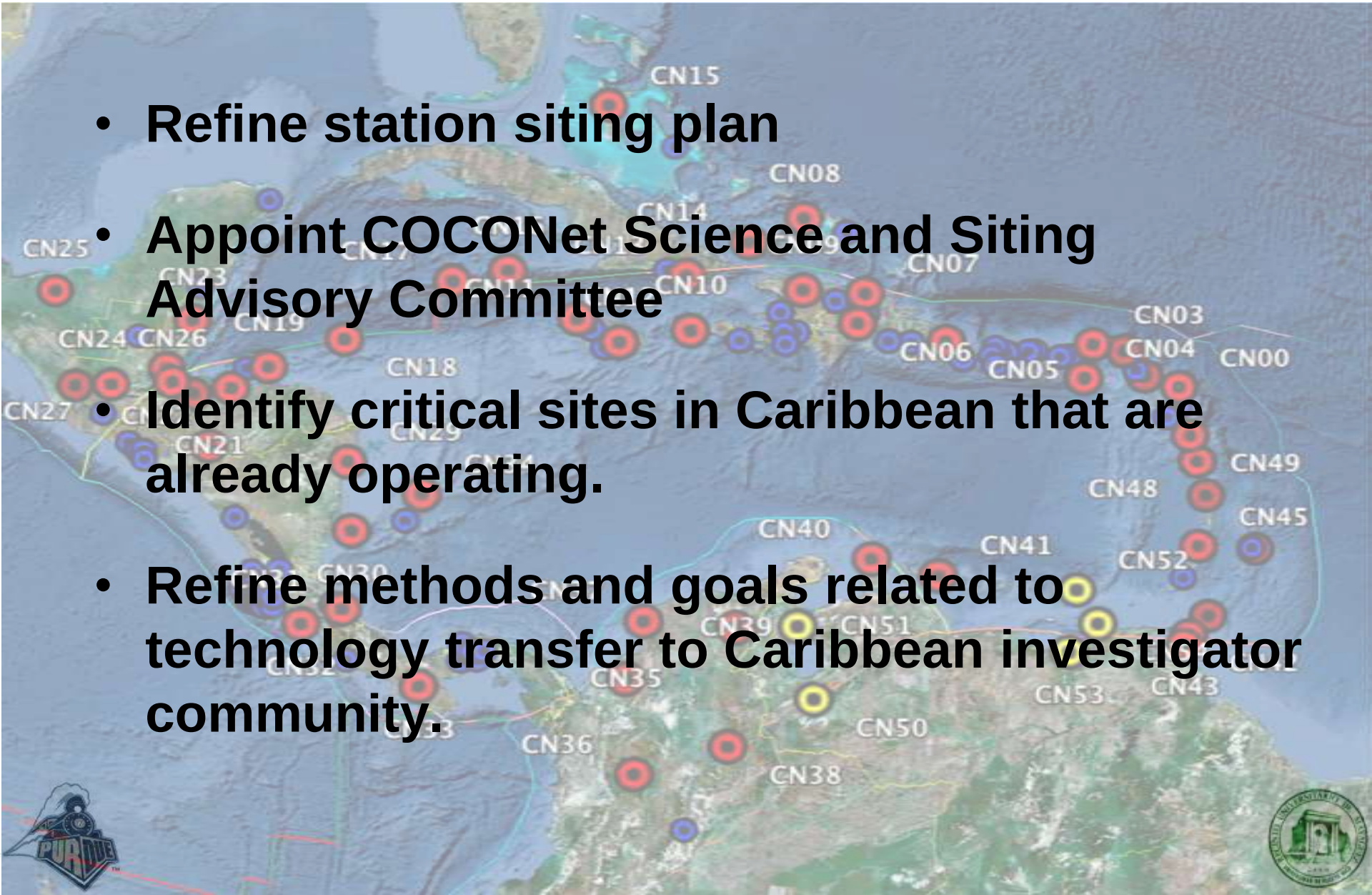
COCONet: Network Elements

- cGNSS station
- Surface meteorology station
- Geodetic quality monument
- Robust power system
- Communications infrastructure (cellular, satellite, local ISP)
- PBO-style data products (raw data, daily positions, linear velocities)
- Real-time positioning (10 sites)
- Atmospheric data products (PW, Ps, T, RH, u and v winds, precip)
- All data will be available for free and open dissemination





Project Kickoff Community Meeting



- Refine station siting plan
- Appoint COCONet Science and Siting Advisory Committee
- Identify critical sites in Caribbean that are already operating.
- Refine methods and goals related to technology transfer to Caribbean investigator community.