Assessing Regional Coastal Modelling using CariCOOS Observations

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Objective

Provide criteria for the identification of strategies towards enhancing regional model predictive performance through evaluation of models pertinent to the region, AmSEAS, C-ROMS & HyCOM, against data acquired by CariCOOS buoys, historical data (CaTS) climatological (WOA 2009) and glider data.

Regional network of observing assets

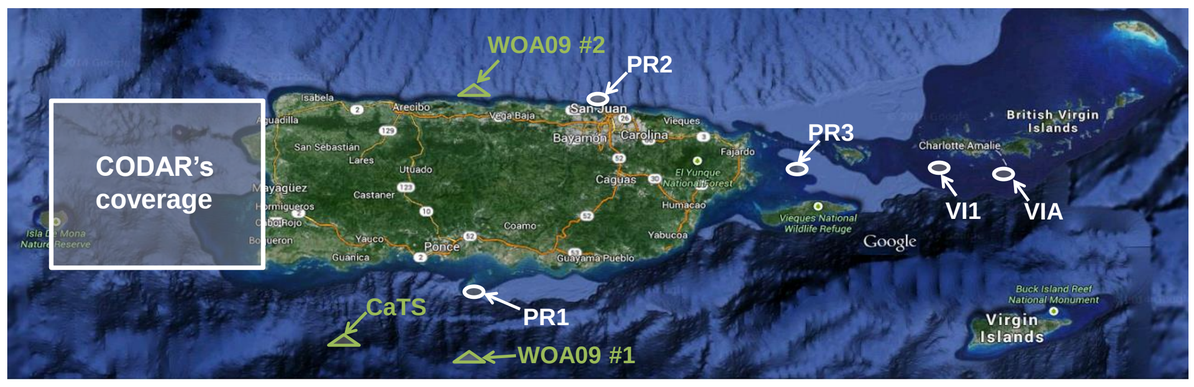

Fig.1. Map shows the CariCOOS assets used for assessing coastal modeling. White markers represent operational real time assets and green historical data provided by CaTS and WOA09.

Observations:

- In-situ measurements of temperature (T) and salinity (S) from 1993 to 2005 at the Caribbean Time Series Station (CaTS) (averaged per month).
- Climatological data from the World Ocean Atlas 2009 (WOA09).
- S, T, and current data from CariCOOS assets.

Models to be evaluated:

- HyCOM, ROMS and AmSEAS

Model validation using vertical profiles

Caribbean offshore @ CaTS (17.63N, 67W)

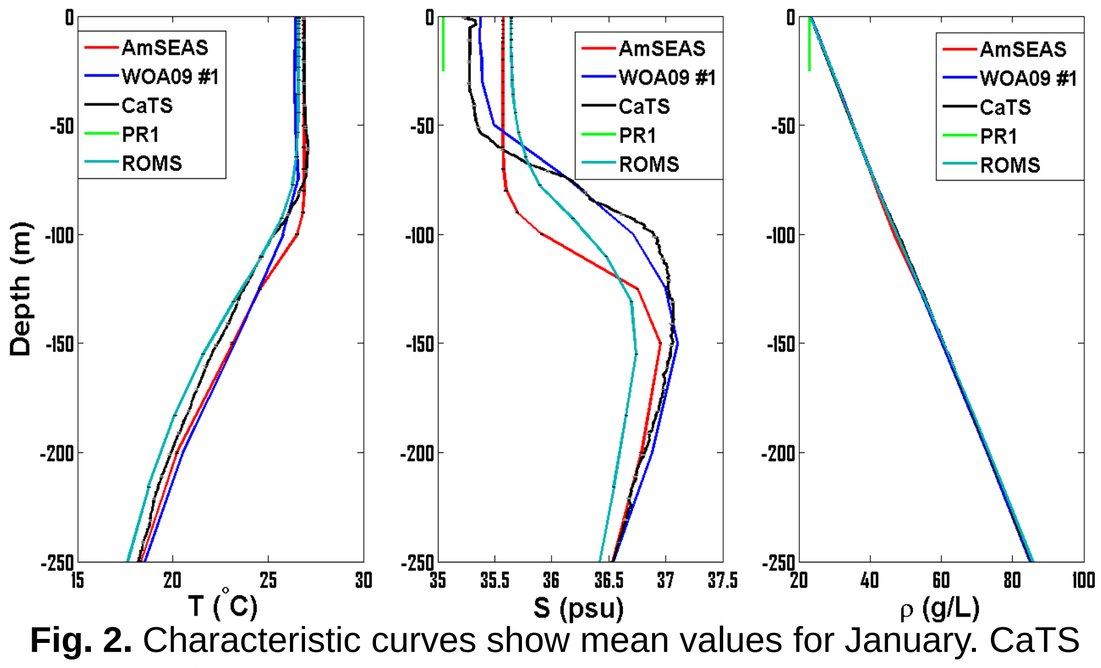

Fig. 2. Characteristic curves show mean values for January. CaTS and WOA09 #1 values are compared against the models best aggregated forecast.

- Significant resemblance in T.
- Models are seem to overestimate the mixed layer S (0-60m) by ~0.4.
- Models disagree in SUW core depth
- Small variation in ρ due to changes in S.

Atlantic coast offshore @ WOA09 #2 (18.5N, 66.5W)

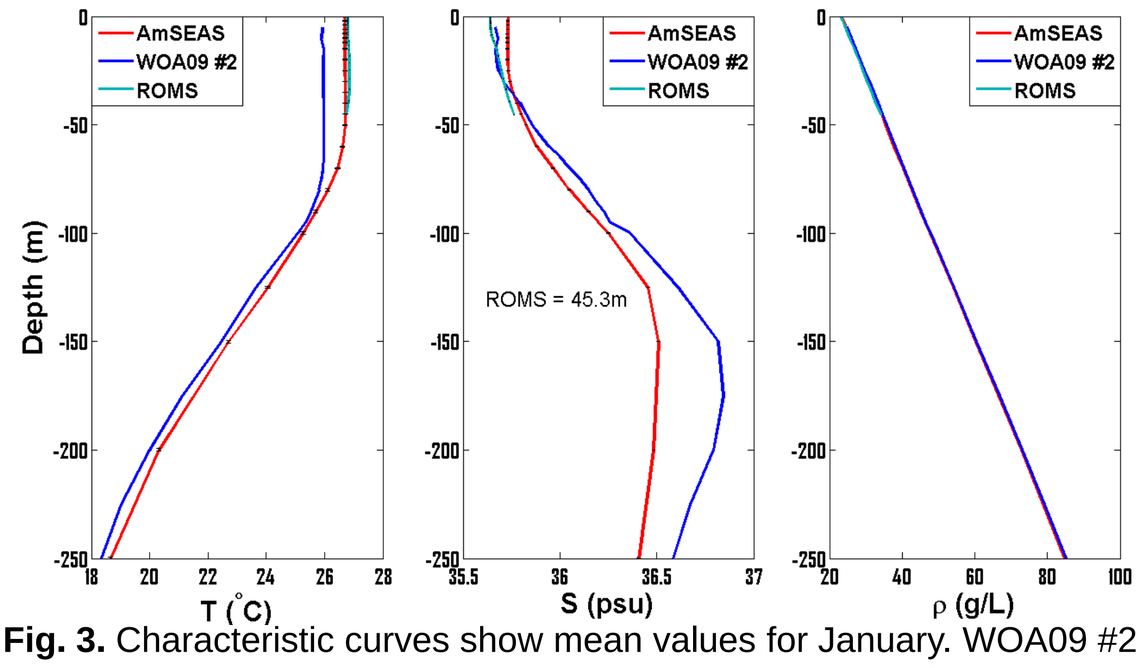

Fig. 3. Characteristic curves show mean values for January. WOA09 #2 values are compared against the models best aggregated forecast.

- Models are significantly over estimating T by ~0.75 at the mixed layer (0-80m).
- AmSEAS underestimates S at ~100-250m.
- ROMS has a significant resemblance in S.
- Models have significant resemblance in ρ.
- ROMS bathymetry for SJ buoy needs to be revised

Model validation using HF Radar surface current data

Mean Currents (m/s) AmSEAS-3km
Mona Passage, PR

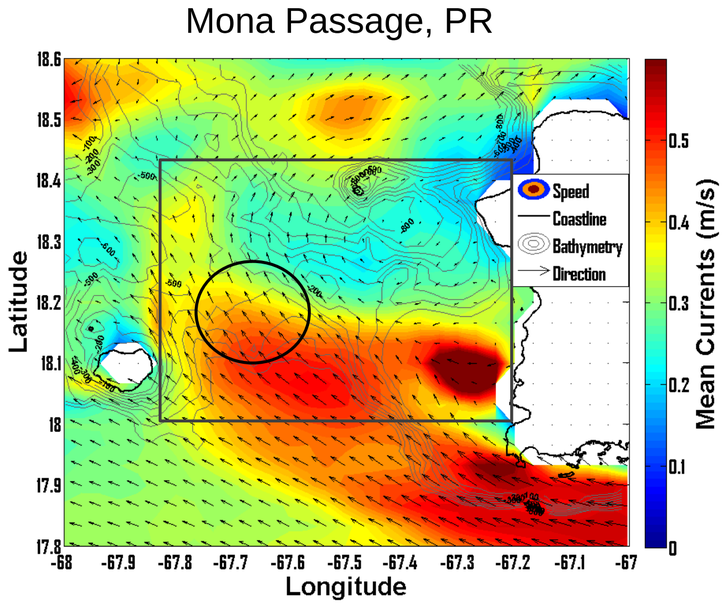

Fig. 4. Mean speed values for May 2013. Strong currents coming in from the Caribbean Sea head north along the passage.

Mean Currents (m/s) HF Radar-6km
Mona Passage, PR

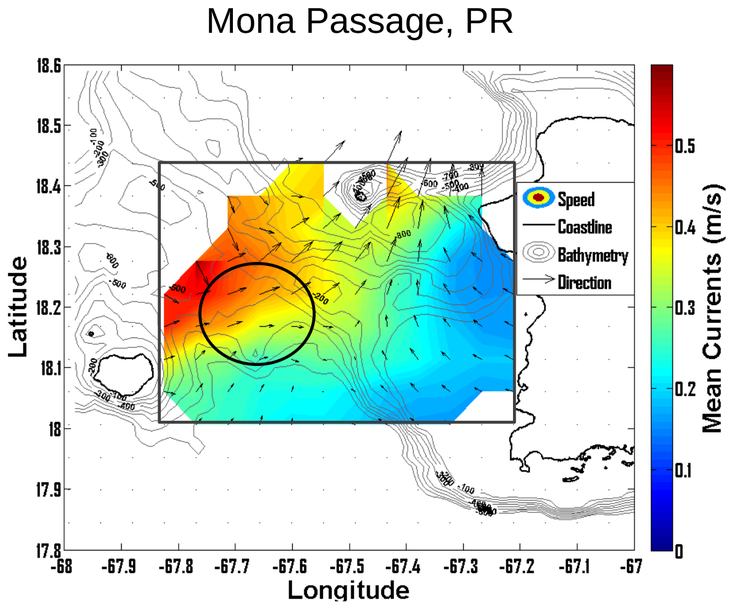

Fig. 5. Mean speed values for May 2013. The middle west of the passage experiences strong currents going north-east.

CODAR HF radar data is used for the surface current mapping in this spatial analysis.

- Differences on the speed values and local(circle area) directions of the currents.
- Net flow(rectangle area) direction along the passage points to the North for both products.

Future Work

- Our efforts will focus on developing a spatial and temporal analysis with the objective of doing a complete assessment of the accurateness of these models forecasts.
- Include data from additional sources including ADCP and CTD and Glider profiles as well as geostrophic current data derived from satellite altimetry