Satellite altimetry observations

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Several satellite altimetry missions have been continuously providing sea height anomaly (SHA) fields for more than ten years. Although their individual spatial and temporal coverage varies, they provide global observations that comprise sufficient accuracy and precision to study the oceanic variability on a wide range of space and time scales. Most of the oceanic heat content in the tropical Atlantic (and the rest of the tropical oceans for that matter) is found in the upper layer, for which variations in the depth of the thermocline are directly linked to sea level height. Superimposed on this larger steric signal, mesoscale processes also produce clear deviations of the sea height. In the tropical Atlantic (TA), these processes include the North Brazil Current, its retroflection and rings, westward propagating Rossby and eastward propagating Kelvin waves, tropical instability waves, and westward flowing surface currents and eastward flowing countercurrents and undercurrents. The importance of altimetric observations is that when they are blended with hydrographic data or assimilated in computer models, they have shown to improve estimates of the variability of mass and heat transport.

Current Work:

Our efforts are oriented towards estimating and monitoring:

- Upper ocean heat content. When altimetry observations are blended with hydrographic data, their 2D SHA fields may be used to make estimates of the upper ocean (<1000m) vertical temperature and density structure. The fairly good correlation between the altimetry and hydrographic estimates allows extending back in time the PIRATA array time series (Figure).
- Surface currents, by investigating the sea surface signal that characterizes each of the zonal current and undercurrent in the region.

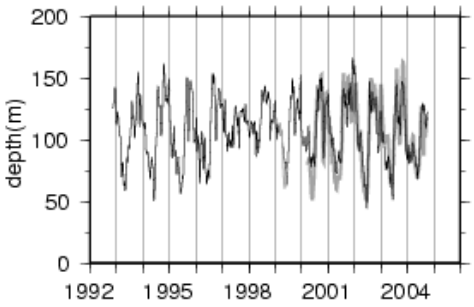

Figure. Time series of the depth of the 20ºC isotherm obtained from the PIRATA mooring located at 38ºW,4ºN (black) and the alitmetry derived estimate (gray).

Future work will include investigating the hypothesis that instabilities in the tropical currents produce eddy fluxes of heat that significantly impact heat content and sea surface temperature (SST) anomalies. Results will aid the modeling community by assessing the role of the upper ocean heat content in driving SST in coupled atmosphere-ocean dynamics.

Data Distribution:

We are currently monitoring the upper ocean heat content relative to the depth of the 20C and 26C isotherms, which have been shown to be critical for hurricanes studies. Daily fields in real-time are posted daily on the web at http://www.aoml.noaa.gov/phod/cyclone/data/. Geostrophic currents derived from satellite altimetry are also estimated and posted daily in near-real time at
http://www.aoml.noaa.gov/phod/dataphod/work/trinanes/INTERFACE/index.html
Regional indexes for the TA region were also created using altimeter-derived parameters and will be start being distributed soon through our web pages.

It is crucial that altimetric observations continue as they provide the best tool available at this moment to monitor in real-time mass and heat transport on the global scale.

Acknowledgments: parts of this work are done in collaboration with William Johns and Carlos Fonseca (University of Miami).