The Regional Ocean Modeling System (ROMS) model has been implemented in the Equatorial Oriental Pacific Ocean (EOP) to produce a hindcast of its thermohaline structure, with the purpose of investigating the accuracy of its prediction on temperature and salinity variables in the EOP region. Thus, the validation of the forecast is necessary to determine the areas with the better and worse bias. This analysis was done from the continental coast of Ecuador to the Galapagos Islands, and from the surface to 75m in the water column.

The model has the capability to predict salinity with better accuracy than water temperature, and the bias increased as we leave the surface towards deeper waters, it’s due to the time of spin up. And the least bias was for the cruise that made more oceanographic stations. It means that the number of measurements of temperature and salinity influence the hindcast analysis. The preliminary results show the potential of using the ROMS model in this area of the Tropical Pacific for a series of applications at the seasonal time scales.

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Results

The results show that the temperature forecasted by ROMS produces zonal mean biases of less than +/-1°C at the surface level, +/-2°C from 10m to 30m and a larger bias for deeper layers (50-75m). In general, the temperature is overestimated in all the CO and deep levels (fig. 6-a,b,e). By latitude, larger biases are found between 1°S and 1.5°S, where is located the Equatorial Front (fig. 6-d). By longitude, a larger bias is found towards the Ecuadorian coast and west of Galápagos Islands (fig. 7).

The better CO correlated was for September/2002 with 0.9, followed by October/2005 with 0.8 and October/2009 with 0.4 for the surface level. The root mean square is less in the upper levels.

By longitude, a larger bias is found towards the Ecuadorian coast and west of Galapagos Islands (fig. 9). The better CO correlated was for September/2002 with 0.9, followed by October/2005 with 0.8 and October/2009 with 0.5 for the surface level. The root mean square is less in the upper levels.

Our results reveal the importance of using a numerical model and the need to have more density in the oceanographic cruisers for improving the interpolation.

Conclusion

ROMS has the capability to forecast better the salinity than the temperature. ROMS overestimate the temperature with less than +/-1°C in the upper layers and underestimate the salinity with at least -1psu. ROMS reach the stabilization after 30 days. Despite of larger biases are calculated in deeper layers, an inter-annual simulation of three months permit acceptable forecasts for the 30 first meters. The Cressman-Poisson Technique smoothes the isotherm and isohalines more than observed.

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Methodology

We have validated the model in base of the better and worse bias. This analysis was done from the continental coast of Ecuador to the Galapagos Islands, and from the surface to 75m in the water column.

The study area

The simulated domain: 10°N to 15°S and 79°W to 179°W.

The topography: ETOPO2 dataset.

Atmospheric surface forcing dataset: NCEP

Oceanic boundary and initial dataset: ECCO

ROMS has the capability to forecast better the salinity than the temperature.

Validation of Numerical Model (ROMS) in equatorial region between Ecuadorian coast and Galapagos Islands

Escarobar M. G. (1); Santos I. (2); Munoz A. (3)

Escuela Superior Politécnica del Litoral (ESPOL) (1) (2), Guayaquil - Ecuador

Centro de Modelado Científico (CMC), Universidad de Zulia (LUZ) (3), Zulia - Venezuela

Contact details: magaemgo@gmail.com (1), jsantos@espol.edu.ec (2) agmunoz@cmc.org.ve (3)