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Oral

Temperature (T) and salinity (S) data provided by the southwest portion of the PIRATA array along with the island-based observation sites were used in conjunction with the REMO (in Portuguese, Rede de Modelagem e Observação Oceanográfica) Ocean Data Assimilation System (RODAS) (Tanajura et al., Ocean Dyn. 2020) and the Hybrid Coordinate Ocean Model (HYCOM) to perform an Observing System Experiment (OSE) over the Atlantic Metarea V. RODAS is based on the ensemble optimal interpolation scheme, in which the ensemble members consider seasonal variability. The model configuration has approximately 0.08° of horizontal resolution (HYCOM 1/12) and 21 vertical layers over the domain 45°S to 10°N and from 18°W until the South American coast. It was nested into another HYCOM run with 0.25° of horizontal resolution and 21 layers. The model was forced each 6 hours with atmospheric fields from the Climate Forecast System Reanalysis (CFSR) produced by the National Centers for Environmental Prediction (NCEP/NOAA).

The OSE was performed from 1 January to 31 December 2012 employing a 3-day assimilation cycle. One run (RODAS) assimilated UK MetOffice OSTIA sea surface temperature (SST) analysis, sea level anomalies from AVISO, T from 701 XBTs and 2,329 vertical T/S profiles from Argo. The other run (RODAS_PIR) assimilated all these data plus T data from 7 PIRATA buoys in the model domain. Synthetic S data produced by a 5th order polynomial (Dorfschäfer et al., JGR 2020) were also assimilated along with the XBT and some PIRATA data. A free model run (FREE) was also employed to assess the impact of the assimilation.

Preliminary results indicate that RMSD of T with respect to PIRATA data evaluated at the PIRATA locations for the RODAS_PIR was about 0.4°C in the top 500 m, and for RODAS was about 0.65°C. Considering S, RSMDs in the top 500 m were about 0.12 and 0.21 for both RODAS_PIR and RODAS. This indicates that at the PIRATA locations, PIRATA data was able to reduce the error in about 50%. However, considering RMSDs with respect to Argo data, the impact of XBT and PIRATA data

was small. The T and S RMSDs in the top 2000 m were about 0.78°C and 0.15, respectively, for both RODAS_PIR and RODAS. In general, assimilation of PIRATA and XBT data produced a positive local impact, but when considering the whole model domain, small impact was obtained. Changes in the model circulation and heat content are under investigation and may be presented in the event.

Presentation file

tanajura-presentation.pdf

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