Abstract View

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Initialization and Data Assimilation in Models of the Indian Ocean

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ABSTRACT

Numerical experiments have been conducted to investigate the effect of updating models of the Indian Ocean using simulated temperature (mass) and velocity data. Two models are used: a linear reduced gravity model with one active layer, and a nonlinear 12-level general circulation model (GCM). In both cases an “identical twin” approach is adopted, in which the same model is used to generate the “observed” data in a “truth run”, as is used in the assimilation run.

Temperature data is found to be better than velocity data for initializing both models. However, further experiments with the layer model showed that increasing the model diffusion and decreasing the eddy viscosity results in velocity data being better for initializing. These results are ascribed to the energy distribution, with the proportion of kinetic energy being greater in the later experiments.

Simulated data from the proposed TOGA Indian Ocean XBT network were also assimilated into both models using a successive correction interpolation scheme. It is found that for the layer model, which had smooth horizontal variations in thermocline depth, the errors fall to zero within a couple of months. However, in the experiments with the GCM there is little reduction in the assimilation error after the first model update, due to the data analysis scheme not being able to resolve the horizontal temperature structure in the GCM.