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Discussions

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Interactive comment on "Data Assimilation of Argos profiles in North-west Pacific Model" *by* Z. Wang et al.

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General comments:

Thanks for reviewers' comments of our manuscript. The background error covariances are not clearly shown in the manuscript. We will give a detailed introduction of it in the new manuscript. Some necessary figures will also be provided. Moreover, we will pay more attention on the writing approaches to fulfill the requirements of publishing. The assimilation process will be provided in the new manuscript. We use almost one year observation of Argo profiles in our experiment, but the assimilated observations are not presented in the manuscript, which will be added. Some other quantitative methods will be used to validate the performance of model. Because the Argo hasn't been assimilated in the model when computing the misfits between simulation and observation, we

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believe that the observation of Argo profiles can be used independently.

Detail comments:

Line 44: The quality of initial conditions has a great influence on simulation results. A good initial conditions can improve the accuracy of numerical simulation. We know the surface forcing and boundary condition are also important. So the CFSR and SODA datasets, which are widely used reanalysis datasets in the world, have been used in the model.

Line 57: We notice that some operational forecast tests about 4dvar has been applied, but 3dvar can save more computation amount, and is more suitable for operational forecasting than 4dvar. The operational data assimilation system based on 4dvar scheme maybe our next work.

Line 75: "multivariate properties" here means validation of temperature and salinity.

Line 89: ROMS uses terrain-following coordinates. In order to reduce the influence of the seamount on the model stability, the bathymetry should be smoothed. In our model, there are used three parameters to smooth the bathymetry: the slope parameter (r=grad(h)/h) maximum value for topography smoothing, the number of pass of a selective filter to reduce the isolated seamounts on the deep ocean, and the number of pass of a single hanning filter at the end of the smoothing procedure to ensure that there is no 2DX noise in the topography. We selected the most effective parameters, which are not only maintain stability of model, but also close to the real topography to the greatest extend.

Line 91: The temperature and salinity are also provided by SODA.

Line 106: The formulation of the background term of the cost function has been described in Dobricic and Pinardi (2008). The background-error covariance matrix is decomposed into horizontal correlations and vertical covariances, which are assumed to be independent of each other. The horizontal correlations are supposed to satisfy

Gauss distribution with a constant correlation radius which is given as a parameter. The repeated application of Laplacian operator can model isotropic Gaussian spatial correlations. A first-order recursive filter with horizontally homogeneous is applied to the Laplacian operator for calculating the horizontal covariances. For the vertical component of the background-error covariance matrix, the Empirical Orthogonal Functions (EOFs) is used to represent. The EOFs are calculated from the model daily simulations, which contain three variables of sea surface height, temperature and salinity from 1995-2005 at full model resolution. Meanwhile, the strong constrain has been used in the model.

Line 154: We will consider to use more datasets for the validation of the model results.

Line 175: The difference maps for AF and SF will be plotted in Fig.3.1. At the same time, we will collect some new in-situ observations for validation.

Line 178: The word "very similar" isn't suitable in this paper. We will provide the actual values to show how close the model to the observations.

Line 180: The Japan Meteorological Agency has long time observations for the section of 137°E, but we can't download the observations in 2006. We believe the section of 137°E would be more suitable here, So the section of 137°E will be used to instead of section of 137°E. Furthermore, the location of the 137°E section will be shown in the Fig. 2.1.

Line 183-184: The phrase shall be deleted if no sense.

Fig3.3 and 3.4: Both figures will be re-plot to show the difference between AF and SF.

Line 199 and Fig 3.5: The Argo profiles haven't been assimilated into the model when comparison. We believe that the Argo profiles can be valid validation in the experiment. The mean profiles and standard deviations will be stated in the new manuscript.

Section 3.2: Because the Argo profiles are independent observations, the section 3.2 maybe is valid.

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