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Development of a Regional Ocean Reanalysis System in the China Seas

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A regional ocean reanalysis system in the China seas and the adjacent sea area has been developed recently. The regional ocean model used is a parallel version of Princeton Ocean Model with generalized coordinate system (POMgcs) with a domain covering an area extending from 10˚S to 52˚N in latitude and from 99˚E to 150˚E in longitude. A global version of the MIT general circulation model (MITgcm) is employed to provide open boundary conditions for the regional ocean model. A sequential three-dimensional variational (3DVAR) analysis scheme has been designed and implemented in both the regional and global model, using a multi-grid framework. Such sequential 3DVAR analysis scheme can be performed in three dimensional spaces which is totally different from the traditional 3DVAR which is performed on each model level with the vertical correlations ignored. This sequential 3DVAR analysis scheme can retrieve resolvable information from longer to shorter wavelengths for a given observation network and yield multi-scale, inhomogeneous analysis. The ocean model is forced by National Centers for Environmental Prediction (NCEP) reanalysis surface wind stress (combining QuikSCAT observing wind fields), heat, and water flux. By assimilating the oceanic observation data into the model, including satellite remote sensing sea surface temperature (SST), altimetry sea surface height (SSH), temperature and salinity profiles taken from Argo and World Ocean Database 2005 (WOD05) maintained by National Oceanographic Data Center (NODC), the reanalysis fields of sea surface height, temperature, salinity and current in the China seas and the adjacent sea area are produced which spans 20 years from 1986 to 2005.