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Numerical simulation of tidal response in the South China Sea

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A regional scale ocean model SEAOM (South East Asian Ocean Model), which is based on the Princeton Ocean Model (POM), has recently been developed at Tropical Marine Science Institute for sea water simulation in South China Sea, the adjoining seas and shelf waters. The governing equations consist of the hydrostatic and the Boussinesq Navier-Stokes equations. The hydrostatic assumption and the Boussinesq approximation are used with the assumption that the horizontal extent is much larger than the vertical extent. In this study the open boundaries of the computational domain (about 22^0 x 34^0 in longitude and latitude respectively) are fed with tidal elevation data, the domain's tidal forcing. The study applies Artificial Neural Network (ANN) to generate the required tidal elevation data at the model's boundary grid points. ANN is first trained with tide elevation data obtained from TOTAL TIDE database. Tidal stations scattered in the vicinity of considered boundary of the computational domain are used to train and validate the ANN. Upon satisfactory training and cross validation, the trained ANN generates tidal elevation data at the required boundary grid points. SEAOM is then run for 9 simulation days to generate the tidal elevations at 22 stations scattered within the domain. The simulated results are compared with the respective tidal elevation data from the TOTAL TIDE database. A sample of the comparisons, Figure 1, shows a very high degree of agreement between the simulated and the 'observed' tidal elevations. SEAOM requires about 1 simulation day to become stabilized, as shown in Figure 1. The ability to generate high degree of agreement in tidal elevations in the computational domain raise the confidence in the ability of SEAOM to simulate other data (i.e. velocity, sea temperature, etc) equally well. Further study is being carried out.

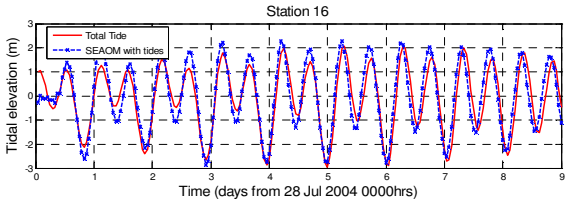

Figure 1 Comparison between SEAOM simulated and 'observed' (from Total Tide) tidal elevations