Geophysical Research Abstracts
Vol. 12, EGU2010-14898, 2010
EGU General Assembly 2010

Neural Networks Application For Current, Salinity And Temperature Forecasting In Osaka Bay

Sandra G. Aguilar and Ghada Y. El Serafy
Deltares, Rotterdamseweg 185, Postbus 177, 2600MH Delft, The Netherlands (Email: Sandra.Gaytan@deltares.nl)

Artificial neural networks (ANNs) have been wide used in hydraulic applications. The main advantage of this method lies in its ability to represent both linear and non-linear relationships that are present in the processes and thus in the measured data. The artificial neural network is a well established technique for representing and predicting the dynamic state of water systems and environmental systems. In comparison to more conventional model techniques and complicated softwares, the ANN is specifically an attractive technique for operational forecasting systems that are focusing on forecasting few state variables at few essential locations.

In this paper, an application of ANN for Osaka bay in Japan is presented. The human activities in the bay have an influence in the deterioration of regional seawater quality giving an importance to assess the behavior of water quality variables at three essential monitoring points. Those points are located in the northwest part of the bay and considered in this paper to be the locations of interest for operational forecasting.

Moreover, in the presence of spatial and temporal variability of the dynamic state, the selection of appropriate set of input variables during the ANN development is important and rather difficult. In this study, a correlation analysis was used to help in defining the most important input variables and lag time in the recursive ANN here presented. Different ANN structures are presented to show that spatial and temporal correlations patters found in the correlation analysis have an impact in the performance of the ANN when choosing inputs and outputs.

The results show that ANNs have great potential to simulate salinity, temperature and velocity field at locations of interest. Finally, a comparison with a numerical model (Osaka Bay Forecasting System) is presented to show the efficiency and accuracy of the ANN. The results were also compared to a simple data assimilation scheme that is also available for the area of interest. The accuracy of the ANN represent in some cases above 70 %.error reduction of the current Forecasting System while using a data assimilation technique can reduce the error nearly 30%.The accuracy of the ANN is decreasing while increasing forecasting time but until 12 hrs forecasting the ANN presents a good performance.