EGU2020-1870
https://doi.org/10.5194/egusphere-egu2020-1870
EGU General Assembly 2020

Prediction of Chlorophyll and Phosphorus in Lake Ontario by Ensemble of Neural Network Models

Youyue Sun[1], Yu Li[1,2], Jinhui Jeanne Huang[1], and Edward McBean[2]
[1]Nankai University, College of Environmental Science and Engineering, China (sunyouyuecn@163.com)
[2]School of Engineering, University of Guelph, N1G 2W1, Canada

Chlorophyll-a (CHLA) and total phosphorous (TP) are key indicators for water quality and eutrophication in lakes. It would be a great help to water management if CHLA and TP could be predicted with certain leading time to ensure water quality control measures could be implemented. Since eutrophication is the results of a complex bio-chemical-physical processes involving in pH, temperature, dissolved oxygen (DO) and many other water quality parameters, the discover of their internal correlations and relationships may help in the predication of CHLA and TP. In this study, a long term (20 years) water quality data including CHLA, TP, total nitrogen (TN), turbidity (TB), sulphate, pH, and DO collected in Lake Ontario by the Environment and Climate Change Canada agency were obtained. These data were analyzed by using a group of Neural Network (NN) models and ensemble strategies were evaluated in this study. One particular ensemble of the following NN models, namely, back propagation, Kohonen, probabilistic neural network (PNN), generalized regression neural network (GRNN), or group method of data handling (GMDH) were selected which has higher goodness of fit and shows robustness in model validation. Comparing with one single NN model, the ensemble model could provide more accurate predictions of CHLA and TP concentration in Lake Ontario and the predication of CHLA and TP would be helpful in lake management, eco-restoration and public health risk assessment.