Operational water quality forecasting with EnKF data assimilation in the Yeongsan river basin, Korea

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National institute of environmental research(NIER) have been operating the water quality forecasting to prevent water quality deterioration for the major rivers in South Korea through WQFS-NIER(Water Quality Forecasting System) which developed based on Delft-FEWS system by the international joint research with NIER and Deltares from 2011 to 2013

The coupled the Hydrologic Simulation Program Fortran(HSPF) and the Environmental Fluid Dynamic Code(EFDC) models are being used to quantitatively predict the water quality.

HSPF watershed model are used to generate the flows and water quality loads of the major tributaries which are used as the boundary conditions for EFDC model.

The uncertainties in water quality forecasting are contributed by various factors such as input uncertainty, model structure uncertainty, parametric uncertainty, initial conditions uncertainty, of which to reduce uncertainty on the initial conditions is relatively effective in improving accuracy of short term water quality forecast.

To reduce initial conditions uncertainties, ensemble Kalman filter(EnKF) data assimilation(DA) techniques are applied to the EFDC models. DA is to condition the model state on the observations to get a better estimate of state. Model error is assumed to come from uncertainties of the boundary conditions of EFDC model. The case study for Yeongsan river demonstrate that EnKF is successful in bringing the algae concentrations closer to the observations.