

Numerical Experiments of Solute Transport Prediction in Steady-state Flow via Ensemble Kalman filter

Chunlin Huang[1]; Bill Hu[2]; Xinya Li[2]

[1] Cold & Arid Region Envir. & Eng. Research Institute, CAS; [2] Florida-State Univ.

The properties of the subsurface media are one of the key factors to affect solute transport in ground water. Owing to our inability to measure aquifer properties at sufficient spatial resolution and dimensionality, spatial distributions of hydraulic parameters are generally uncertain, which lead to uncertain prediction to groundwater flow and solute transport predictions. In our study, we develop a data assimilation scheme for estimation of hydraulic conductivity field and improvement of solute transport prediction. The ensemble Kalman filter (EnKF) is used to update the model parameters (such as hydraulic conductivity) and model variables (such as solute concentration) when data are available. Two-dimensional numerical experiments were designed to assess the performance of EnKF on data assimilation in solute transport and analyze its sensitivity to various factors, such as ensemble size, measurement timings, and initial guesses. The study results indicate that the EnKF is an efficient approach for obtaining the satisfactory estimation of the hydraulic conductivity field with dynamic measurements of solute concentration.