Using Multimodel Predictions for Groundwater Management

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Summary

Groundwater management decisions can benefit from numerical modelling, but due to the large number of unknowns in the subsurface many subjective decisions need to be made in order to build a numerical model. These subjective decisions can include the subdivision of rock or sediments into hydrostratigraphic units or facies, the extent and variability of the selected hydrostratigraphic units, the selection of physical processes that will be simulated, the selection and weighting of calibration targets, and the selection of boundary conditions. Due to the subjective decisions that are necessary to build a numerical model, deterministic modelling predictions may have considerable error and could lead to poor decision making. This fundamental problem has led to an increased interest in the use of multimodels where alternative conceptualizations, boundary conditions, calibrations, and future stresses can be taken into account when making decisions. If they are well thought out, the predictions from an ensemble of multimodels may include (or bound) an accurate prediction of the future state of groundwater. This presentation considers the use of multimodel predictions for groundwater management and addresses the challenge of discriminating between model realizations. A management approach that leverages expert knowledge through a graphical interface is proposed.