



Assimilation of soil moisture observations in the OPE³ field with horizontal information propagation in the Community Land Model

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A major shortcoming of the Community Land Model (CLM2.0) for small scale soil moisture simulation is the independent treatment of the individual land columns covering the spatial area of interest. It was studied whether adaptive ensemble Kalman filtering could overcome this problem. An analysis of the innovation statistics obtained through assimilation of all possible available soil moisture data for the small agricultural field of the Optimizing Production inputs for Economic and Environmental Enhancement (OPE³) project showed that the error structure is very complicated and difficult to relate to spatial distances or terrain features. However, as the error structure remains relatively constant in time, a drastical reduction in the number of observations to determine a flow-dependent covariance matrix can be realized. Results are discussed which show the horizontal propagation of soil moisture profile information, using a time-invariant estimate of the state error covariance matrix deduced from the innovation statistics before the start of the assimilation cycle. The major remaining problem is that the model deficiency generates an important systematic error rather than random error, so that bias estimation should be included. This causes that in addition to the estimation of the random state and model error covariance matrix, it is necessary to estimate the bias error covariance matrix.