



Soil moisture assimilation using a modified ensemble transform Kalman filter with water balance constraint

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The shallow soil moisture observations are assimilated into Common Land Model (CoLM) to estimate the soil moisture in different layers. The forecast error is inflated to improve the analysis state accuracy and the water balance constraint is adopted to reduce the water budget residual in the assimilation procedure. The experiment results illustrate that the adaptive forecast error inflation can reduce the analysis error, while the proper inflation layer can be selected based on the $-2\log$ -likelihood function of the innovation statistic. The water balance constraint can result in reducing water budget residual substantially, at a low cost of assimilation accuracy loss. The assimilation scheme can be potentially applied to assimilate the remote sensing data.