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Assimilation of GRACE data into a hydrological model over Iran by means of domain localization in an Ensemble-Based Kalman Filter (EnKF) approach

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The Gravity Recovery and Climate Experiment (GRACE) data is used to assimilate and thereby improving terrestrial water storage (TWS) outputs of hydrological models. In this study, monthly GRACE-derived TWS anomalies are assimilated into SWAT model over Iran using a domain localization method thorough an Ensemble-based Kalman Filter (EnKF) approach. The localization is applied to modify the error covariance matrices for the effect of distant observations. This study, particularly investigates the impact of localization in two different ways. Within the first approach, a Schur product is applied on the background error covariance matrix elements to reduce the correlations between grid points that are far apart from the study region. As the second approach, the observation error covariance matrix is multiplied by a distance-dependent function, so that infinite errors are introduced for far away observations. Numerical investigations include 8 sub-basins (out of total 30 sub-basins all around Iran) that are located in the south-western part of Iran. The assimilation results are evaluated using in-situ groundwater observations. We expect that the investigated approaches perform well for assimilating GRACE data into local hydrological models.