Evaluation of the Middle East and North Africa Land Data Assimilation System

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The Middle East and North Africa (MENA) region is dominated by dry, warm deserts, areas of dense population, and inefficient use of fresh water resources. Due to the scarcity, high intensity, and short duration of rainfall in the MENA, the region is prone to hydroclimatic extremes that are realized by devastating floods and times of drought. However, given its widespread water stress and the considerable demand for water, the MENA remains relatively poorly monitored. This is due in part to the shortage of meteorological observations and the lack of data sharing between nations. As a result, the accurate monitoring of the dynamics of the water cycle in the MENA is difficult. The Land Data Assimilation System for the MENA region (MENA LDAS) has been developed to provide regional, gridded fields of hydrological states and fluxes relevant for water resources assessments. As an extension of the Global Land Data Assimilation System (GLDAS), the MENA LDAS was designed to aid in the identification and evaluation of regional hydrological anomalies by synergistically combining the physically-based Catchment Land Surface Model (CLSM) with observations from several independent data products including soil-water storage variations from the Gravity Recovery and Climate Experiment (GRACE) and irrigation intensity derived from the Moderate Resolution Imaging Spectroradiometer (MODIS). In this fashion, we estimate the mean and seasonal cycle of the water budget components across the MENA.