

Characterizing the Effects of Irrigation in the Middle East and North Africa Using Remotely-Sensed Vegetation and Water Cycle Observations

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A majority of the countries in the Middle East and North Africa (MENA) region suffer from water scarcity due in part to widespread rainfall deficits, unprecedented levels of water demand, and the inefficient use of renewable freshwater resources. Since a majority of the water withdrawal in the MENA is used for irrigation, there is a desperate need for improved understanding of irrigation practices and agricultural water use in the region. Here, satellite-derived irrigation maps and crop-type agricultural data are applied to the Land Data Assimilation System for the MENA region (MENA LDAS), designed to provide regional, gridded fields of hydrological states and fluxes relevant for water resources assessments. Within MENA-LDAS, the Catchment Land Surface Model (CLSM) simulates the location, timing, and amount of water applied through agricultural irrigation practices over the region from 2002-2012. In addition to simulating the irrigation impact on evapotranspiration, soil moisture, and runoff, we also investigate regional changes in terrestrial water storage (TWS) observed from the Gravity Recovery and Climate Experiment (GRACE) and simulated by CLSM.