Monitoring Water Resources from Space in an Arid Watershed of Al Ain City

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Closing water balance is very crucial on laying effective Water Resources Management strategies. The goal of this study is to assess the potential of satellite imagery to close the water budget over the region of Al Ain city in the Emirate of Abu Dhabi, in the UAE. Water storage variation over the study area was determined from 2005 to 2014 by calculating the difference between inflows and outflows of the system. The outflow included evapotranspiration and discharged wastewater after treatment. The study area comprises Zakher Lake where the treated wastewater is discharged. A series of Landsat images were used to monitor the changes in the lake extent and infer total water volume using a high resolution (15m) digital elevation model. Evapotranspiration was estimated from NCEP reanalysis data over agriculture and green areas in the watershed delineated using Landsat images. The inflow included precipitation, desalinated water supply, and water reuse. Precipitation was obtained from Al Ain airport observations. Water supply from desalination plants and water reuse reported by local authorities were also used. Time series of GRACE observation over the study area were used to assess the inferred water storage variation. The inferred water storage and GRACE anomalies were in agreement as the obtained correlation coefficient was 0.53. Both time series showed a significant decreasing trend suggesting that water storage in the study area is being depleted.