



Multi-temporal water extent analysis of a hypersaline playa lake using Landsat Imagery

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Distinguishing inland water bodies from satellite imagery has always been one of the main practices of remote sensing. In some cases this differentiation can directly be obtained by visual interpretation. However, in case of hyper-saline playa lakes, presence of high albedo salt crust in the lake bed hampers visual interpretation and requires further attention. Lake Tuz is a hypersaline playa lake which is ranked as the second largest lake in Turkey. Spatio-temporal changes in lake water extent are important both economically and hydrologically including salt production, lake water balance, drought and over-exploitation issues. This study investigates the spatiotemporal changes in Lake Tuz water extent during the last decade using single-band thresholding and multi-band indices extracted from the multi-temporal Landsat 5 TM and Landsat 7 ETM+ images. The applicability of different satellite-derived indices including Normalized Difference Water Index (NDWI), Modified NDWI (MNDWI), Automated Water Extraction Index (AWEI) and Tasseled Cap Wetness (TCw) were investigated for the extraction of lake water extent from Landsat imagery. Our analysis indicated that, overall, NDWI is superior to other tested indices in separating wet/dry pixels over the lake bottom covered with salt crust. Using a NDWI thresholding procedure, the annual and seasonal variation in the Lake Tuz water extent were determined and further linked to hydro-meteorological variables such as precipitation.