

Time Series Analysis of Total Water Storage using GRACE data over Iran

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Abstract

Climate change variables influence biophysical factors, such as plant and animal growth, water cycles, biodiversity and nutrient cycling, and the ways in which these are managed through agricultural practices and land use for food production. Arable land is likely to be lost owing to increased aridity (and associated salinity), groundwater depletion and sea-level rise. Water resource of the Islamic Republic of Iran is under pressure due to population growth, urbanization and its related consequences. Since March 2002, however, the Gravity Recovery and Climate Experiment (GRACE) is routinely providing satellite-based estimates of changes in total water storage (TWS) within the Earth's system. We used GRACE data for time series analysis of TWS from 2002 to 2017 over Iran. Non-parametric Mann-kendall test was used for trend analysis. According to the results, Z value shows decreasing trend in whole of Iran. Higher decreasing trend was observed in eastern Iran more than west. P value showed the most provinces of Iran have faced significant decreasing trend. Theil-sen slope showed TWS change rate in west, center, east, south and south –east of Iran is higher than north and north-west of Iran. The water resources in Iran as a part of the Middle-East region are inherently scarce as a result of naturally arid climatic conditions. Population increase and economic growth have spurred higher demands for the limited water resources. According to the results of this research and climate condition in Iran, provinces are located in east, central and southern Iran will be subjected to food insecurity in terms of waters scarcity and agricultural land abandonment.

Keywords: Food security, Drought, Climate change