Land Use/Cover Changes in Al-Jouf, KSA in Response to Water Management Strategies Using Multi-Sensor/-Temporal Data in Google Earth Engine.

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Abstract

The water resources are limited and need to be managed in different demand areas. As agriculture consumes the major quantity of water, thus water management is an essential process. In KSA, new regulations have been issued to manage the water consumption in agriculture. This led to a shift within agriculture use from the more consumption crops to the lower ones in some areas, apart from the areas that stopped cultivation activity. This study aims at evaluating the land use/cover changes within an agricultural area in Al-Jouf region, KSA. Therefore, multi-temporal Sentinel-1 (S-1) and Sentinel-2 (S-2) data were analyzed with the aid of the valuable capabilities of the cloud-based platform Google Earth Engine (GEE). The cultivated area during the period 2017 to 2021 was calculated based on monthly normalized difference vegetation index (NDVI). The results revealed a significant decrease in the annual average of cultivated area from 121,161 to 74,468 ha in 2021, with a high variation between winter and summer cultivated area. On the other hand, the multi-sensor/-temporal classification of S-1 and S-2 data showed a decrease in the agriculture area, and the shift to orchards. The orchards area increased by 84.0% (from 9,202 to 16,929 ha), the crops area decreased by 24.3% (from 125,512 to 95,016 ha), while the bare land increased by 9.7% (from 235,009 to 257,779 ha) as comparing areas in 2017 and 2021, respectively. The proposed approach provides near-real-time tracking of the changes in land use/cover for updating the water management strategies.