

## **Climate-driven abrupt changes in plant communities of desert and semi-desert region**

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### **Abstract**

Abrupt changes are referred to as fundamental changes in the mean of a system's variable or its variability which occur in a short term. Abrupt changes in climatic factors may, especially in arid lands, lead to the transition of plant communities as their response to such disturbing elements. However, such a relationship (between factor and response) which helps develop more sustainable policies for ecosystem management has so far been underresearched. This study, therefore, set out to identify the abrupt changes occurred in plant communities and their relationship with the sudden variations of climatic factors in Sirjan desert and semi-desert region, located in Kerman, Iran, from 2000 to 2019. To this end, first, the meteorological data were collected from the region's representative station (Sirjan synoptic Station) and the plant communities' maps were extracted based on field operations. Then, the Moderate Resolution Imaging Spectroradiometer's (MODIS) monthly data from 2000 to 2019 were used to extract Normalized Difference Vegetation Index (NDVI) and the Enhanced Vegetation Index (EVI) whose maps were limited to the community's maps under zonal statistic survey, using Arc-GIS 10.4.1 package. Finally, the sequential Mann–Kendall (SMK) test was administered to identify the abrupt changes in climatic factors and those of each plant communities. The abrupt changes in yearly total precipitation (YTP) in 2002, 2008, 2014, and 2018 occurred concurrently with the responses made by plant communities including the *Artemisia sieberi-Zygophyllum atriplicoides*, *Ephedra intermedia-Cousinia multilobe*. In this regard, the cumulative effect of the abrupt change of the winter precipitation (WP) factor in 2002 and 2014 and the abrupt increase of the average yearly temperature (YAT) factor in 2018 was highly effective in the intensification of the stimulating role of total yearly precipitation (YTP) in making the plant communities respond as a result. Despite the concurrent responses observed in the vast majority of plant communities, the reason behind some of their responses in 2006, 2011, 2013, and 2016 remained unknown, requiring more investigations in terms of other environmental variables.