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## Study on the correlation between meteorological and agricultural drought, based on remotely sensed indices

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In this study, long-term time series of precipitation data were used for determining the drought condition using the standard precipitation index (SPI) for 3, 6 and 12 month time scales. The indicators were calculated with two methods: a) using a gamma distribution and transforming the probability of occurrence to standard normal distribution, b) using the non-parametric plotting position method. Then, the SPI values for two consequent years 2013-14 and 2014-15 were extracted from data to study on meteorological drought. The SPI index calculations showed that the first year had near normal, whereas the second year had extreme drought condition. In parallel, 34 Landsat 8 satellite images were downloaded during the indicated time period to determine normalized difference vegetation index (NDVI) and vegetation condition index (VCI) as agricultural drought indices. The mean values of VCI for each month were considered as representative value for drought condition of the area. When the agricultural and meteorological drought indices were determined, the correlation coefficient ( $r$ ) were calculated for finding the relation between these types of droughts. the results show that the highest correlation between SPI-3,6 and 12-month time scales and VCI occurred in 4, 2 and 4 months lag time respectively, with corresponding  $r$  value of 0.67, 0.65 and 0.69. The best agreement between these indices with calculated lag time proves the hypothesis that agricultural drought occurs after meteorological drought. Therefore, the results could be applied by farmers to plan an appropriate irrigation scheduling for upcoming droughts, specially, in arid and semi-arid areas. It could be concluded that for having suitable planning in water scarcity condition, understanding the situation helps water planners have better insight about management polices to minimize the effects of this natural hazard on human. To sum up, finding a relation between different types of droughts is helpful for monitoring, predicting and detecting droughts to better prepare for drought phenomena and to minimize losses