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The impact of drought on water resources of Kermanshah Province, Iran by using TRMM satellite imagery

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The effects of drought on water resources in mountainous areas in Iran, is very difficult, due to lack of proper distribution of the station as well as lack of long-term data. The main objective of this study is to investigate the droughts in Kermanshah province and its effects on water resources by using TRMM data and also to evaluate their accuracy against the data of synoptic stations in Kermanshah province. To achieve this purpose, statistical methods and remote sensing data were used. The data used included the precipitation data of 42 points of the TRMM model with a spatial accuracy of 0.25×0.25 degrees, precipitation data of ground stations for the 15-year period (2014-2000) and the discharge of karst springs. The accuracy of data from two databases was evaluated by using R, R2, EF, IA, Slope, NRMSE and Bias statistics in the MATLAB software. The evaluation of the TRMM model's accuracy in comparison with the recorded rainfall data of ground stations on a monthly scale showed that the satellite data is very accurate and 70 to 80 percent of the precipitation data variance is explained by satellite rainfall data. Also, the amount of satellite data deviation from the station data is negligible and less than 10 mm. Drought monitoring using TRMM data and SPI index in monthly, seasonal and annual measurements showed that the frequency of drought in this province is usually more than wet, but the severity of the dry periods is less than wet periods and some dry periods are compensated by a wet period. The time distribution of SPI showed that wet and dry periods are more concentrated at the beginning and the end of the study respectively. Therefore, rainfall is decreasing and the contribution of spring rainfall is rising relative to fall and winter rainfall. Investigating of the effects of drought on water resources shows that there is a very strong relationship between rainfall and discharge in Kermanshah province, and severe hydrological droughts are strongly influenced by the reduction of precipitation.