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An Evaluation of Drought Indices in Different Climatic Regions

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Drought has become a recurrent phenomenon in Iran in the last few decades. Significant drought conditions were observed during years of late 2000s and the trend continued up to now. The country's agricultural sector and water resources have been under severe constraints from the recurrent droughts. In this study, spatial and temporal dimensions of meteorological droughts in Iran have been investigated from vulnerability concept.
The Standardized Precipitation Index (SPI) was developed to detect drought and wet periods at different time scales, an important characteristic that is not accomplished with typical drought indices. More and more users employ the SPI to monitor droughts. Although calculation of the SPI is easier than other drought indices, such as the Palmer Drought Index, it is still relatively complex. Two indices called the China-Z Index (CZI) and Modified China-Z Index (CZI) have been used by many scientists to monitor moisture conditions across their country or their case study area. The calculations of these indices are easier than the SPI. Another indices, the statistical Z-Score and percent of normal (PN), can also be used to monitor droughts. This paper evaluates the SPI, CZI, MCZI, Z-Score and PN on 1-, 3-, 6-, 9- and 12-month time scales using monthly precipitation totals for six climatic regions in Iran from January 2000 to December 2005 as a sever dry period and representing six climatic regions include: mountain, semi mountain, desert, semi-desert, coastal desert and coastal wet. Advantages and disadvantages for the application of each index are compared. Study results indicate that the CZI, MCZI, Z-Score and PN can provide results similar to the SPI for all time scales, and that the calculations of these indices are relatively easy compared with the SPI, possibly offering better tools to monitor moisture conditions.
KEY WORDS: drought monitoring, drought indices, soil moisture, climatic regions.