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Compression of multiple drought indices for meteorological drought monitoring in the Eastern Mediterranean

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Abstract

Drought monitoring is an essential component of drought risk management. It is normally performed using several drought indices that are effectively continuous functions of rainfall and other hydrometeorological variables. We have calculated and compared many drought indices (DIs) to monitor meteorological drought conditions in the Eastern Mediterranean. Actually, this region has recently suffered one of the most extreme drought episodes (1998-2008) in the last decades. This calls for further study of drought variability in the Eastern Mediterranean. The DIs considered are as follows: Rainfall Decile based Drought Index (RDDI), statistical Z-Score, Modified China-Z Index (MCZI), Standardized Precipitation Index (SPI) and Effective Drought Index (EDI). The computation of these indices is based on monthly precipitation data for 103 stations and daily data over 70 stations over the 1961-2012 period. The results show that the SPI and EDI are the most suitable indices to detect the onset of the drought episode, its spatial and temporal variation consistently, and it may be recommended for operational drought monitoring. The EDI describes well the developing drought conditions (spatially and temporary). The SPI and MCZI are the most consistent indices in detecting drought episodes at all-time scales. This study shows that the use of an appropriate time scale is as important as the type of DI used to identify drought severity. The choice of indices for drought monitoring in a specific region should eventually be based on the quantity and spatial distribution of climate data available and on the ability of the index to consistently detect spatial and temporal variations during a drought episode.

Keywords: drought monitoring; drought indices; drought variability; Eastern Mediterranean.

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