



Artificial neural network spatiotemporal drought interpolation

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This study evaluates the suitability of artificial neural network based techniques for spatiotemporal monthly drought mapping using the Standardized Precipitation Index (SPI). These techniques use artificial neural networks (ANNs) and account for possible non-linear orographic effects at different spatial scales and allow for regionally and seasonally varying relief-climate relationships. Various input uncorrelated variables were considered such as spatial coordinates, elevation data, significant factors derived from principal components of precipitation analysis, representative site data, and runoff data. The developed techniques were applied and evaluated at Pinios River Basin, Greece. Pinios River basin has an area of about 9500 km², is located in Thessaly, an agricultural plain region surrounded by mountains. Monthly precipitation data for the period October 1960 to September 2002 from sixty six (66) precipitation stations were used to calculate the Standardized Precipitation Index (SPI). A previous study (Loukas & Vasiliades, 2005) has shown that the 6-month SPI is representative of hydrological drought for the study river basin and this SPI time scale was used for further analysis. The spatial and temporal validity of the interpolation techniques were checked using supervised split sample test. Seventy percent (70%) of the database was used for the development of the techniques and thirty percent (30%) of the remaining data were used for the spatial and temporal validation of the methodology. The results showed that the proposed techniques gave satisfactory spatiotemporal interpolation results in the study basin and could be used for drought assessment and monitoring.