Detecting spatial and temporal trends in annual rainfall in Crete

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A hydrological period of 30 years is examined for the island of Crete, Greece in the Eastern Mediterranean. Statistical and spectral analysis of rainfall data is performed to identify key hydrological years and return periods and to analyze the inter-annual behavior of the rainfall variability. Data analysis shows that, in contrast to Regional Climate Model estimations, rainfall rates have not decreased, while return periods vary depending on seasonality and geographic location. In addition, significant correlation of the island's rainfall variability with the North Atlantic Oscillation is identified for the examined period. The rainfall spatial distribution was also examined in detail because hydrological modeling studies require spatially distributed data of high accuracy. However, rainfall is usually measured at a limited number of locations. In particular, in areas of complex terrain, where topography plays a key role in the precipitation process, rainfall stations are usually sparse. Spatial interpolation techniques can be applied both to interpolate rainfall data and to combine rainfall data with explanatory information that may improve the results. Regression Kriging (RK) is an interpolation methodology that combines a regression approach with a geostatistical approach. RK is applied to represent the average annual rainfall spatial distribution on the island of Crete, with increased reliability.