



Variability in rainfall frequency distribution in Cyprus

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The purpose of the present study is to investigate the variability in the annual precipitation for a number of recording stations in Cyprus with historical data, dating back to the beginnings of the 20th century. The study of the variability for stations with different geographical characteristics can expose whether any changes in the rainfall regime can justifiably be ascribed to geographic influences over a confined area or to any trends in climate change on regional or global scale. The island of Cyprus is suitable for such a study due to the diversity of its geographic characteristics and also because it has a long record of rainfall data from several stations, covering the country quite uniformly. In this respect, the Gamma distribution is fitted to these long-term climatic records; this distribution is characterized by two parameters, namely the size and shape parameters.

For this study, the time series of the annual precipitation at 29 climatological stations in Cyprus were used; for all the stations, the respective time series spans from 1917 to 2006. At first, a quality control of the rain gauge data was carried out, in order to remove stations with possible inconsistencies and inaccuracies. Such a homogenisation of the data is important for the extraction of any sound results and especially when these results are considered spatially. Indeed, when analysing rainfall series spanning over such long time periods in an attempt to assess non-climatic influences, it is likely that the data collected do not reflect uniform conditions and the performance of homogeneity testing on observed data is essential. Subsequently, the Gamma distribution was fitted to the rainfall time series of each of the 23 climatological stations in Cyprus, whose rainfall records were considered as homogeneous.

For these 23 stations, the variability in rainfall distributions was studied on the basis of (a) the annual rainfall time series; (b) the thirty-year running averages; (c) the Probability Density Function of annual rainfall for each of the three periods of 1917-1946, 1947-1976 and 1977-2006, and (d) the temporal change of the shape and size parameters. Also, an attempt was made to group stations with respect to similarities in the temporal changes of the distribution's characteristics.