

Cross-validation procedure for statistical trend analysis of monthly rainfalls

E. Ferrari, B. Sirangelo

Dipartimento di Difesa del Suolo, Università della Calabria, 87036 Rende (CS), Italy

(ferrari@dds.unical.it / Fax: +39-0984-494050 / Phone: +39-0984-496616)

The investigations into rainfall trend features provide results which often depend on specific physical and climatic characteristics of the area, though similar features could be identified for large regions, as in the case of Mediterranean areas. Many studies of the observed changes in climate variables were focused mainly on the mean values rather than on extremes, since a higher temporal resolution of the data is required for the latter variable.

In this work a cross-validation procedure has been applied for long duration rainfalls analysis on sets of rain gauges located in Calabria (Italy), covering a period of about eighty years. The spatially averaged monthly rainfalls aggregated at long time scale has been previously deseasonalized, by assuming the existence of deterministic components in the discrete domain through Fourier analysis. The correct standard normalization of the data has been proved by the statistical behaviour of the residuals both by means of non-parametric and parametric statistical tests, as the two-sample Kolmogorov-Smirnov test and the Anderson test. Finally, the reliability of the Fourier analysis on the interpretation of data series of decades not used for the model calibration has been assessed by means of a cross-validation procedure, which has shown evidence of trend variations in rainfall recorded in different decades. Particularly the reduction in rainfall amounts for decades 1981-1990 and 1991-2000 has proved to be a statistically significant non-stationary feature of the phenomena.