

Non-stationary analysis of POT occurrence for daily rainfalls in Southern Italy

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Assessments on trends in frequency and magnitude of extreme values of hydrological variables, if correctly verified, can greatly improve accuracy of results of procedures currently used for civil protection, for example by simulating more reliable design rainfalls for rainfall-runoff transformation models. On the other side non-stationary features of extreme events are particularly difficult to assess because they are highly irregular and the analysis often copes with the scarcity of long data series, providing high uncertainty in determining if trends actually affect extremes.

In the last years, attention of researchers has been focused on the stochastic analysis of the occurrences of values over thresholds by means of temporal homogeneous Poisson process. In this work, a non-homogeneous Poisson model explaining the temporal variation of storm occurrences has been successfully fitted to accumulated rainfalls observed in some areas of Southern Italy. POT rainfalls analysis has been performed on a set of rain gauges covering a period of about eighty years. Observed data have shown to be strictly influenced by climatic perturbations coming from Atlantic Ocean, though peculiar geographical features could produce different rainfall regimes and extreme values. Stochastic analysis of the occurrence of accumulated rainfalls exceeding prefixed values has been performed adopting a non-homogeneous approach derived from point process theory, proved to be able in modelling adequately the seasonal behaviour of daily rainfalls. Particular attention has been devoted on the capability of the point process to reproduce the main characteristics of time series with the variation of the threshold value.