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Homogenization and analysis of monthly precipitation over Italy from 1961 to 2006

A. Toreti, F. Desiato, G. Fioravanti, W. Perconti

Agenzia per la Protezione dell'Ambiente e per i Servizi Tecnici

andrea.toreti@apat.it / Fax: +390650072657 / Phone: +390650072567

Data of 59 stations homogeneously distributed on the Italian territory, belonging to the Air Force Weather Service and some regional agencies for the protection of the environment (ARPA), were elaborated in order to detect changes in annual and seasonal precipitation over Italy. Data were collected and controlled through SCIA, a system for the collection, processing and diffusion of climatological data developed by the national environmental agency APAT (www.scia.sinanet.apat.it).

Monthly series, from 1961 to 2006, underwent an homogenization procedure divided in a few steps. The first step is the application of a so called 'absolute method', i.e the Kolmogorov-Zurbenko Adaptive (KZA) filter to the log series; KZA is an iterative moving average filter that dynamically adjusts its moving length. This method gives a good indication of the behaviour of the series. Then the Standard Normal Homogeneity Test (single shift version) is applied, with a moving window approach. In the last step the significance of the detected shifts using the non parametric Multi Response Permutation Procedure (MRPP) is checked. The significant shifts were corrected with monthly correction factors when there is a strong evidence of sesonality of the adjustment and a large number of data, or with one correction factor for all months. Finally, missing data were reconstructed.

Homogenized and reconstructed series were aggregated into three geographical area (Northern, Central and Southern Italy), and the standardised anomaly series were calculated (with the reference period 1971-2000). The analysis of these series reveals that the annual and seasonal series do not show significant changes, except for the winter

series of Northern and Central Italy, that show a decreasing trend for the entire period, and a positive trend since 1989, respectively.