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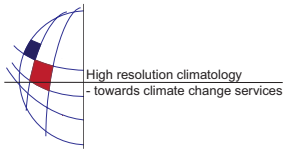

Analysis of Precipitation Pattern from two Long-Term Hourly Dataset in Central Italy

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In the last decades worldwide many studies revealed modifications in precipitation regime and a general increase in frequency and/or severity of extreme rainfall events that can have large impacts on society and environment. In central-northern Europe many evidences showed a tendency to increase in mean annual rainfall and in the occurrences of extreme daily precipitation events during the last five decades. Concerning Mediterranean area, despite a decrease in mean annual rainfall, an increase in the fraction of heavy events was also highlighted, in particular over Italy. In the last decades much effort has been expended by different research groups to provide regional to global datasets. Recently, an European high-quality daily rainfall dataset (ECA dataset), from a dense network of meteorological stations, have been made available to the public and the scientific community. Many studies used this dataset to document the long-term trends of climatic and extreme climatic indices. However very few researches investigated precipitation patterns by making use of long-term hourly dataset because of the difficulty to find data with a sufficiently long measuring periods, few missing or non reliable data and, especially, in a digital form. Investigating extreme events of precipitation at hourly rather than daily time scale is much more important in terms of social, agriculture and hydrological impacts.
Long-term hourly rainfall dataset were derived from two stations located in Tuscany, central Italy, Viareggio (1948-2009) and Vallombrosa (1930-2009), respectively on coastal and mountainous area. The data were digitalized and then used to investigate trends in annual, seasonal precipitation regime and extreme event occurrences. A detailed analysis of consistency and quality control has been performed, time series were subjected to logical filters, checked for internal consistency and spatial coherency among suitable neighbouring stations. In order to analyze patterns of precipitation change, some climatic and extreme climatic indices, for the greatest part recommended by the Expert Team on Climate Change Detection, Monitoring and Indices (ETCCDMI) were investigated at hourly and daily time scale. Appropriate non-parametric statistical tests and methods were performed for evidence of statistically significant trends and modifications in precipitation regimes in different sub-periods. The main results highlighted a slight decrease in annual rainfall over the whole period in spite of an increase in extreme events, in the hourly average intensity of rain and hence in the proportion of total rainfall from extremes.