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Precipitation concentration patterns in Tuscany (central Italy) 1955-2010

B. Gozzini (1), G. Bartolini (2), and T. Torrigiani (2)

(1) Institute of Biometeorology, CNR-IBIMET, Sesto Fiorentino (Firenze), Italy (gozzini@lamma.rete.toscana.it, 0039 055444083), (2) Laboratory of Monitoring and Environmental Modelling for the Sustainable Development (LAMMA consortium)- Sesto Fiorentino- Florence, Italy.

In the last decades, in central–western Mediterranean Basin, recent evidences indicate a decrease in precipitation, especially at annual time scale. Compared with temperature change patterns, modifications in precipitation regimes in this area were not yet found so spatially and temporal coherent. Also in Italy, a region characterized by a very complex climate and orography, recent precipitation trends were found very heterogeneous depending by the sum of different regional climates.
Because of this variability and, as one of the most noticeable consequence of global atmospheric warming is a water cycle modification, it follows that is very important to deeply analyse precipitation patterns also at a regional level. Modifications in precipitation regimes (not only in total amount but also in temporal distribution) may indeed affect social and economic sectors and ecosystems; regions like Tuscany (central Italy), characterized by a somewhat marked seasonality of precipitation, could be also very vulnerable (in terms of water availability) to these changes.
The main aims of this study is to characterize Tuscany region in terms of spatial and temporal distribution of rainfall by means of the analysis of annual and seasonal Precipitation Concentration Index (PCI) from 1955 and 2010, to look for changes in mean values of PCI concerning the two independent sub-periods (1955-1982 and 1983-2010), but also to search for modifications in interannual variability of this temporal distribution of precipitation. The main results, derived from the analysis of data from 25 rain gauges as representative as possible for the whole region, indicated seasonality of the precipitation over the year, especially in the southern part of Tuscany; in spite of a prevalence of slight increasing signals, no strong evidence of PCI temporal change between 1955-1982 and 1983-2010 were detected, while interannual variability analysis showed instead an increase especially in the north of the region. Further analyses would be recommended in order to characterize and to look for change in precipitation regime in this Mediterranean area, already indicated especially responsive and thus vulnerable to climate change. To look for spatial and temporal modifications in annual and seasonal precipitation distribution could be very crucial for water supply activity and, in particular, in the context of basin water storages planning, displacement and management.