



Detection and analysis of severe dry hydrological phenomena in southern Italy (Calabria region)

Tommaso Caloiero (1), Roberto Coscarelli (2), and Ennio Ferrari (3)

(1) National Research Council of Italy – Institute for Agricultural and Forest Systems in Mediterranean (CNR-ISAFOM), (2) National Research Council of Italy – Research Institute for Geo-Hydrological Protection (CNR-IRPI), (3) University of Calabria – Department of Computer Engineering, Modeling, Electronics, and Systems Science (DIMES)

Although people usually do not think of droughts in the same way as other natural disasters, such as floods or hurricanes, drought phenomena are one of the greatest damaging climate events. In fact, the economic, social, and environmental costs and losses associated with drought are increasing dramatically, even though it is difficult to quantify this trend precisely because of the lack of reliable historical estimates of losses. The detection of several drought features, such as its intensity, duration, recurrence probability and spatial extent, is thus necessary also in order to alleviate the impacts of droughts. In this study, drought, expressed using the Standardized Precipitation Index (SPI), has been analyzed in a region of southern Italy (Calabria) using a homogeneous database of 24 monthly rainfall series in the 1951-2016 period. First, both the short-term (3 months) and the long-term (24 months) SPI were estimated and, in order to identify the worst events, the percentages of rain gauges falling within severe or extreme dry conditions have been evaluated. Indeed, it is generally agreed that the SPI on short-term scales describes drought affecting vegetation and agricultural practices, while on long-term scales it is a broad proxy for water resource management. The occurrence frequencies of severe/extreme droughts have been then evaluated for each rain gauge and, finally, possible trends in the SPI values have been detected by means of the Innovative Trend Analysis (ITA), which allows the trend identification of the low, medium and high values of a series. As a result, considering the 3-month SPI an increase in the occurrence frequency of severe and extreme drought events has been detected from the late 1970s to the early 2000. As to what concerns the 12-month SPI, droughts resulted more frequent throughout the 1980s and the 1990s and at beginning of this century. Results of the trend analysis showed a general reduction of the SPI values, thus evidencing a tendency towards heavier droughts and weaker wet periods.