Geophysical Research Abstracts
Vol. 15, EGU2013-9798-1, 2013
EGU General Assembly 2013

Analysis of heavy rainstorms in the Mediterranean climate area

Oreste Terranova and Stefano Luigi Gariano

National Research Council, Research Institute for Geo-hydrologic Protection, Rende (CS), Italy (terranova@irpi.cnr.it, ++39 984 841414)

In recent decades, violence and frequency of torrential rain events are increased in the Mediterranean basin context, despite the decrease of the annual rainfall, because of climate change. In particular, in Italy both annual precipitation and the number of wet days show a decrease, while the precipitation intensity increases. When severe rainfall events hit small basins, the damage of flash floods is notable also due to the high content of solid material from soil slips and mud/debris flows that take place on the slopes. The direct measurement of the parameters for the physical processes of interest are rarely available, then, special attention must be given to the study of spatial and temporal variability of rainfall at the sub-hourly scale. The availability of a large number of observations with high temporal detail has made it possible analysing the spatial and temporal variability of heavy rainstorms occurred in the last two decades in Calabria that, because of its climatic peculiarities can be considered as representative of many areas of the Mediterranean basin.

The present study aims to improve, from a statistical point of view, the understanding, at sub-hourly scale, of the structure temporal and spatial of short duration ($<$ 24 h) and intense rainfall events that have hit Calabria (southern Italy), causing flash floods. For this purpose, a rainfall event was classified as heavy rainstorm if its amount, P_{EV}, is greater than a given threshold (i.e. 100 mm d^{-1}). The spatial analysis regards the heavy rainstorms that have hit, totalizing more than 50 mm d^{-1} at each other rain gauge present in an area $>$ 500 km^2. In this way, the heavy rainstorms are classified as extended or localized.

To describe the structure of the storms, the use of standardized rainfall profiles, SRP, to compare them, by simplifying analyses and presentation of data, is adopted in this study. Besides, a new criterion is adopted to identify the shape of the profiles, based on the comparison between the areas A_1, A_2, A_3, A_4 – related to the quartiles of the SRP – and the corresponding four values of the uniform SRP.

In order to analyze the spatial and temporal characteristics of heavy rainstorms, a further selection is conducted, to identify those having the greatest potential to produce a strong social impact and increase the perception of risk associated with the interaction between nature and society. In this regard, it is assumed that the following constraints were met: P_{EV} $>$100 mm; I_{30} $>$50 mm h^{-1}; E_J $>$30 J. In the case study, 902 events were detected characterized by P_{EV} $>$100 mm, 604 by I_{30} $>$50 mm h^{-1}, 369 by E_J $\geq$30 J.

The location – classified according to elevation, distance to the coast, homogeneous sub-regions, etc. – of the rain gauges with the highest number of events characterized by high values of P_{EV}, I_{30} and E_J allowed to identify the sectors of the territory more frequently affected by heavy rainstorms and their spatial and temporal structure.