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A methodological approach to identify rainfall causing damaging hydrogeological events

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The paper deals with Damaging Hydrogeological Events (DHEs), defined as periods of severe weather affecting wide regions for several days, and during which landslides and floods cause economic damage and victims. The great variability of DHEs, in both space and time, is the cause of one of main problems to solve in performing the analysis of these events. Dealing with events affecting wide areas for several days, it is challenging to isolate the rainy days that can be considered as triggering factors of the observed damaging phenomena.
In this paper we consider 30 catastrophic DHEs which occurred in Calabria (southern Italy) between 1981 and 2010, and we develop a methodological approach aiming to both select and analyze rainfall events that triggered damage.
The performed analysis allows highlighting some seasonal characteristics of Calabrian DHEs. More in general, the proposed approach can be used in regions affected by DHEs for which damage and rainfall data are available. Practical results that could be obtained concern: a) individuation of rainfall thresholds for the triggering of DHEs, at both regional and sub-regional scale; b) individuation of relationships between temporal distribution of rain and types of phenomena triggered; c) individuation of rain/damage relationships at sub-regional scale; and d) analysis of the pattern of rainy days which triggered a long historical series of DHEs, in order to highlight if the most recent events affecting the study area were mainly caused by short and intense rain, as it seems the tendency related to the climate change.