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Long-term analysis of Damaging Hydrogeological Events in Calabria (Southern Italy)

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Damaging Hydrogeological Events (DHEs) are episodes of severe weather conditions during which meteorological phenomena -such as rainfall, wind, hail and snow- trigger damaging landslides, floods, and sea storms. During storms, these phenomena can be triggered almost simultaneously, and may amplify economic damage and harms to people, often delaying emergency management actions.
The long-term series of DHEs affecting a region throughout the centuries can be compared to long-term territorial evolution phenomena. Firstly, it can be used to detect rainfall trend, or, more in general, the effects on the region of climate change. Secondly, it can be used to compare long-term modifications in urbanisation causing temporal/spatial increases in vulnerability in sectors where urbanization increased throughout the time. Moreover, the historical series of DHEs can highlight vulnerability variations occurred throughout the decades and related to defensive measures undertaken (or abandoned) in order to prevent damage caused by either landslides or floods, such as i.e. levees.
This work presents the historical series of DHEs that occurred in Calabria (Southern Italy), collected in NEW-ASICal, the database of DHEs that occurred in the region since 1800. ASICal is the Italian acronym of "historically flooded areas in Calabria". We have been started to build this database at the beginning of 2000 and, since then, we continuously update it. We obtain data on current DHEs by the systematic review of regional daily newspapers and using a series of daily Google alerts concerning rainfall-related phenomena. Moreover, we regularly perform specific historical research in local archives in order to fill data gaps affecting older epochs.
The results allow us to divide the region in some main districts showing the occurrence of similar types of DHEs and with similar frequency and seasonality. The frequency of severest events has decreased since 1971, while, in recent decades, the medium-severity events are increasing. According to literature, we also noticed an important decreasing trend in the number of victims per event. In general, the events are more frequent in autumn season, but the winter cases affect the largest regional sectors. Landslides are the most frequent type of damaging phenomenon in all the seasons. In autumn cases, landslides cause the majority of damage, besides to relevant damage caused by flash floods and floods. The eastern side of the region is the most frequently and heavily damaged.
This kind of analysis can be reproduced in different study areas, and the results can be proficiently used in planning emergency management, in prioritising remedial works and in the definition of civil defence plans.