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Occurrence of landslide events and the role of climate during the twentieth century (Calabria, Southern Italy)

O. Petrucci (1), M. Polemio (2)
(1) CNR-IRPI, Dept. of Cosenza, Italy, (2) CNR-IRPI, Dept. of Bari

Landslides occurred during or shortly after rainy events are considered in this paper. Long landslide-free periods can be abruptly interrupted by short catastrophic events, during which many concurrent phenomena are triggered. Different types of data and time series are considered using spatial analysis and time series analysis with a GIS system. The recurrence, the geomorphological and hydrogeological characterisation of the hit areas, the characterisation of induced damage, and extent of the affected area and of damages are considered for each hit area. The historical and climatic data analysis is based on daily and monthly time series of rainfall and temperature. The evaluation of triggering rainfall return period and duration is carried out together with the analysis of antecedent climatic conditions in terms of actual and net rainfall. The effect of climate change is assessed considering the combined effect of rainfall and temperature, using monthly data. The exceptionality of antecedent rainfall is assessed on the basis of daily rainfall time series. The approach was applied to a test site in Southern Italy (Calabria) for validation purposes. A database was set up including data from 24 events which have occurred during an 80 year period. The maximum frequency of hazardous rainfall events can be observed between October and December; they mainly affect the East or Ionian Side of the region. The trend of landslide occurrence does not seem to make worse during the latest decades. It seems due to the effect of the observed decreasing trend of rainfall of lasting duration also if the role of anthropic activities should be considered too.