



The role of on meteorological and climatic conditions on the occurrence of damaging hydro-geologic events (Southern Italy)

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Damaging Hydro-geologic Events (DHEs), are defined as the complex of landslide and flood phenomena induced by heavy or prolonged rainfall, represent a source of economic damages for wide areas of the Earth. Defined the time series of the DHEs historically recorded over more than 50 years in Calabria, a wide Italian region, the characteristics of antecedent meteorological framework, rainfall and climate conditions are analysed. The analysis distinguishes features as 1) types of failures triggered; 2) geographical sectors hit; 3) seasons of occurrence; 4) meteorological antecedent conditions; 5) return periods and critical duration of triggering rainfall; 7) magnitude of damage. 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. Calabria (Fig. 1), the Italian peninsular southern-most region, is one of the strongly hit by DHEs. The recurrent hydro-geologic events strongly affect the socio-economic development of the region, inducing losses of human life, damages to urban settlements, road network and lifelines. Between 1921 and 1995, 64 widespread hydro-geologic events occurred in Calabria causing hundreds of casualties. 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, triggering landslides and floods. The analysis carried out show that, for almost all the principal damaging cases, specific meteorological conditions, observed up to 6 days before DHEs, are able to induce damaging hydro-geologic events in the selected study area if the antecedent rainfall creates favourable conditions. In these particular cases, a repetitive sequence of winds directions, field of

atmospheric pressure, temperature and associate rainfalls has been observed. For these reasons it seems supported the thesis that these elements can be reasonably assumed as precursors of DHEs in the study area. They can then be considered useful elements for the construction of event-scenarios aiming to help in the foreseen and prevention of catastrophic events.