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Alluvial fan flooding scenarios in southern Italy

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This paper deals with the problem of alluvial fan flooding in some piedmont areas of the Southern Apennines chain (Campania, southern Italy) aiming at defining their effective alluvial hazard conditions. As a matter of fact this kind of hazard is not yet considered as important as it should, being piedmont areas widespread all over the region and presenting a high development of urban settlements.

The study have interested wide portions of the region (more than 50 basin/fan systems, covering an area of hundreds square km). The methodology adopted to define the hazard conditions is based on a detailed geomorphological and morphometrical analysis of the basin / fan system, on a historical research of alluvial events and takes also into account the presence/absence and the efficiency of hydraulic works both in the river basin and in the fan area.

The geomorphological analysis allowed the recognition and delimitation of active alluvial fans while the main morphometrical parameters (area, gradient, Melton index) of the basin/fan system were used to obtain information related to the main erosive and depositional processes (stream, mixed or debris flow dominated) and to calculate the basin concentration time. At the same time the historical analysis pointed out the state of activity of the fans during the last century.

On the basis of preliminary data it is possible to state that the main “hazard scenario” is depicted by hydrographic basins with high relief energy and with very short concentration time (lower than some hours) which feed fans with mean gradient relatively

low, generally dominated by mixed or debris flow processes. The “return time” of the main detected flooding events is more than 50 years and they produced several damages and victims. In some cases it was possible to obtain precipitation data related to historical events, showing that heavy hourly precipitations (flash floods) were the main responsible for flooding.

Unfortunately, the urban areas development in the last decades did not take into account the presence of these alluvial fans, probably due to the relative long “return time” of floods events with consequent loss of their historical memory. For this reason serious conditions of high hazard and risk exist in many of the studied area. This paper want to outline the distribution of these situations spread all over the region, furnishing a first step to face the problem of alluvial fan flooding control and mitigation in Campania.