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Catchment dynamics and social response during flash floods

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The objective of this study is to examine how the current techniques for flash-flood monitoring and forecasting can meet the requirements of the population at risk to evaluate the severity of the flood and anticipate its danger. To this end, we identify the social response time for different social actions in the course of two well studied flash flood events which occurred in France and Italy. We introduce a broad characterization of the event management activities into three types according to their main objective (information, organisation and protection). The activities are also classified into three other types according to the scale and nature of the human group involved (individuals, communities and institutions). The conclusions reached relate to i) the characterisation of the social responses according to watershed scale and to the information available, and ii) to the appropriateness of the existing surveillance and forecasting tools to support the social responses. Our results suggest that representing the dynamics of the social response with just one number representing the average time for warning a population is an oversimplification. It appears that the social response time exhibits a parallel with the hydrological response time, by diminishing in time with decreasing size of the relevant watershed. A second result is that the human groups have different capabilities of anticipation apparently based on the nature of information they use. Comparing watershed response times and social response times shows clearly that at scales of less than 100 km2, a number of actions were taken with response times comparable to the catchment response time. The implications for adapting the warning processes to social scales (individual or organisational scales) are considerable. At small scales and for the implied anticipation times, the reliable and high-resolution description of the actual rainfall field becomes the major source of information for decision-making processes such as deciding between evacuations or advising to stay home. This points to the need to improve the accuracy and quality control of real time radar rainfall data, especially for extreme flash flood generating storms.