



Space and time rainfall sampling required for analysis of flash flood dynamics

D. Norbiato and M. Borga

Department of Land and Agroforest Environments, University of Padova, Agripolis, viale dell'Università 16, 35020 Legnaro (PD), Italy

The objective of the paper is to provide recommendations on the temporal and spatial resolution of rainfall measurements required for flash flood applications. These recommendations are based on quantitative investigations of the space-time scales of rural catchments response and rainfall. First the rainfall–runoff dynamics is studied by applying an analytical geomorphological framework, based on simple dynamical assumptions and data collected from a post flash flood survey on the eastern Italian Alps (Fella river flash flood, August 29, 2003). The Fella 2003 event is deemed to represent a typical, albeit very intense, flood event in this mountainous setting. Then the temporal and spatial structure of rainfall is analysed with high resolution rain gauge and radar measurements, using data from the same flash flood event. Finally the required space-time resolution of rainfall is estimated as a function of the surface of the catchments. According to the results, hydrological applications for rural urban catchments of the order of 10 km² require a temporal resolution of about 20 min and a spatial resolution of about 4 km. For catchments of the order of 50 km², the temporal resolution increases to 40 min, and the spatial resolution to about 6 km. These results complement some recommendations on resolution of rainfall for flash flood analysis reported in the literature and show clearly the need of radar monitoring for the hydrological analysis of these events.