CHARACTERISATION OF FLASH FLOODS IN EUROPE: IMPLICATIONS FOR FLOOD RISK MANAGEMENT

M. Borga

Department of Land and Agroforest Environment, University of Padova, Legnaro, Italy

Abstract

High-resolution data enabling identification and analysis of the hydrometeorological causative processes of flash floods have been collected and analysed for 25 extreme flash floods (60 drainage basins) across Europe in the frame of the HYDRATE EU project. Criteria for flood selection were high intensity of triggering rainfall and flood response and availability of high-resolution reliable data. Hydrometeorological data collected and collated for each event were checked by using a hydrological model. The derivation and analysis of summarising variables based on the data archive has made it possible to outline some characteristics of flash floods in various morphoclimatic regions of Europe.

Peak discharge data for more than 50% of the studied watersheds derive from post-flood surveys in ungauged streams. This stresses both the significance of post-flood surveys in building and extending flash flood data bases, and the need to develop new methods for flash-flood hazard assessment able to take into account data from post-event analysis.

Examination of data shows a peculiar seasonality effect on flash flood occurrence, with events in the Mediterranean and Alpine-Mediterranean regions mostly occurring in autumn whereas events in the inland Continental region commonly occur in summer, revealing different climatic

Corresponding authors:
Marco Borga – Department of Land and Agroforest Environment, University of Padova
c/o Agripolis, viale dell'Università 16 – 35020 Legnaro (PD), Italy
E-mail: marco.borga@unipd.it

forcing. Consistently with this seasonality effect, spatial extent and duration of the events is generally smaller for the Continental events with respect to those occurring in the Mediterranean region. Furthermore, the flash flood regime is generally more intense in the Mediterranean Region than in the Continental areas.

The runoff coefficients of the studied flash floods are usually rather low (mean value: 0.35). Antecedent saturation conditions have a significant impact on event runoff coefficients, showing the influence of initial soil moisture status even on extreme flash flood events and stressing the importance of accounting soil moisture for operational flash flood forecasting. The runoff response displays short lag times (mostly < 6 hours).

Examination of the triggering storm events and model analyses provides indications about the time resolution and the spatial density of the networks required for monitoring and forecasting flash flood events in Europe. Implications concerning flood risk management options will be also considered and discussed.