4.7 FLASH FLOOD EARLY WARNINGS BASED ON RADAR: COMPARISON OF THE ERICHA FLASH FLOOD INDICATOR WITH A CONTINUOUS DISTRIBUTED HYDROLOGICAL MODEL IN THE FLASH FLOOD CASES OF AUTUMN 2014 IN LIGURIA (ITALY)

D. SEMPERE-TORRES[1], C. CORRAL[1], M. BERENGUER[1], L. POLETTI[2], F. SILVESTRO[2], N. REBORA[2]

[1] Centre de Recerca Aplicada en Hidrometeorologia. Universitat Politcnica de Catalunya (CRAHI-UPC). Barcelona. Spain. [2] CIMA Research Foundation. Savona. Italy
sempere@crahi.upc.edu

The anticipation of flash flood events is crucial to issue warnings to mitigate their impact. They usually affect steep and small to medium catchments (up to few hundreds of square kilometres), and are typically induced by heavy rainfalls in the upstream area. The response time between the rainfall (the cause) and that the flash flood takes place (the effect) depends primarily on the features of the catchment, ranging from the order of tens of minutes to a few hours in the larger basins. In this context, the capacity of the meteorological radars to provide high resolution QPEs and QPFs are of crucial interest for any Flash Flood Early Warning System. In the last ten years, several developments have been made to transform radar-based QPEs and QPFs into indicators able to anticipate flash flood occurrence. From the FF-EWS concept first proposed by CRAHI and operationally implemented in Catalonia in 2006, to the ERICHA system running over the OPERA radar data composite (operationally integrated in the European Flood Awareness System, EFAS, since March 2017), many promising advancements have been made.

In the framework of the H2020 Innovation Action ANYWHERE (www.anywhere-h2020.eu) a comparison of two early warning systems for real-time flash flood hazard assessment and forecasting at regional scale is presented: the ERICHA FF-EWS (directly using the concept of basin-aggregated rainfall as indicator) and the Continuum rainfall runoff model developed by CIMA, a continuous distributed hydrological model computing river flows based on a geomorphological approach. These two systems are based on a gridded drainage network and they use the same meteorological radar QPE inputs to assess the flash flood hazard level in different points of the study area, considering the probability of the event (expressed in years of return period) as a good indicator to assess the flash flood hazard. The essential difference between the systems is that one is a rainfall-based system, only using the upstream basin-aggregated rainfall as the variable to determine the flash flood hazard level, while the other simulates streamflows with a distributed rainfall-runoff model. The comparison has been done for three rainfall events in the autumn of 2014 that resulted in severe flooding, over 100-year return period in the event of 9 October 2014, in the Liguria region (Northwest of Italy).

The results obtained by the two systems show many similarities, particularly for catchments over 50 km2 and for large return periods (extreme floods). They allow the verification of the usefulness of the ERICHA indicator for the anticipation of flash floods over 20-year return period, and its suitability to be combined with vulnerability and exposure cartographies to provide Flash Flood Impact forecasting to

support decision making during emergencies in the framework of the ANYWHERE Innovation Action.