



Frequent flash floods in southern Switzerland: Why?

Luca Panziera (1,2), Curtis James (3), and Urs Germann (2)

(1) Department of Civil, Environmental and Mechanical Engineering, Atmospheric Physics Group, University of Trento, Italy, (2) MeteoSwiss, Locarno Monti, Switzerland, (3) Embry-Riddle Aeronautical University, Prescott, Arizona

This study investigates the causes of frequent flash floods observed in the Maggia River catchment, a 900 km² watershed located in southern Switzerland. During the heaviest floods, river discharge rates can increase by as much as 1400 m³/s in less than 3 hours!

High-resolution volumetric radar data and sounding profiles are extensively used to investigate the environmental conditions and mesoscale precipitation mechanisms producing floods for the last 8 years in the catchment.

The events causing the highest discharge rates in the river are typically due to orographic convection, which is absent from storm events that produce lower peak flow rates. During the heaviest floods, individual convective cells are repeatedly advected over the Maggia watershed, producing excessive rainfall and river discharge rates. At larger temporal scales, precipitation patterns assume the form of quasi-stationary, elongated bands of rainfall.

The results of this work provide a conceptual model for orographic convection development in sheared flows, depicting a mechanism which is likely to be observed over other mountainous chains of the world.