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Flash flood modeling using radar rainfall data in Mediterranean catchments in Israel

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Flash floods are one of the most severe natural hazards causing much damage and casualties in Europe in general and the Mediterranean region in particular. The ability to better predict flash floods can greatly assist and benefit society. In this work, as a part of the FLASH project (EU) aimed to improve the understanding and forecasting of flash floods, we analyzed and modeled four flash flood events in catchments of sizes 50-500 km^2. The catchments are divided into sub-catchments and their hillslope and channel units are defined based on DEM layers. As rainfall input we use radar-based data calibrated by adjustment to storm gauge rain depth data. The Soil Conservation Service Curve Number method (SCS-CN) is used to determine the approximate amount of runoff over the sub-catchments in each time step of the model. The CN values are determined based on soil type and land-use data and using parameters from published tables. No calibration procedure has been performed. Runoff flow over the hillslope and through the channel network toward the catchment outlet is computed using the Kinematic wave model. Observed data are derived from both direct measurements of flow gauges along the watershed and at watershed outlets, and indirect measurements conducted immediately after the flood event. Peak discharges for the different cases vary between 10-120 m^3/s. Computed and observed flood discharge demonstrate a good agreement of flood starting times and relatively good correlations in peak discharge, with r^2 between 0.55 and 0.73. We conclude that this model, which requires no calibration, proves to be reliable in determining whether a flash flood will

occur. Current studies focus on implementing this model using long term continuous radar data and rainfall data derived from weather models, in order to identify past flash flood events. This may serve as a tool for nowcasting flash flood events in the future.