



Impacts of the resolution of initial soil moisture conditions for flash flood modeling in the Mediterranean region

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The French Mediterranean zone is particularly exposed to flash flooding. Initial soil moisture conditions are a key issue for hydrological modeling in this region, both at the event scale and for continuous modeling. The Soil Water Index (SWI) simulated by the SIM model (SAFRAN ISBA MODCOU, Habets et al., 2008) at a 8-km resolution is used to provide initial soil moisture conditions for many hydrological models in France.

In the frame of the collaborative work between the French weather service Météo-France and the hydrological service SCHAPI, the impact of enhanced initial soil moisture conditions for Mediterranean flash floods modeling is studied. The modeled catchments are located in the Cevennes region and in the South-East coast of France, for several flash flood events.

The ISBA-TOP coupled model (Bouilloud et al., 2010) and the MARINE hydrological model (Garambois et al., 2015) are used to simulate the hydrological response of these catchments. To initialize these models, three kinds of soil moisture maps are used: (A) SIM data at 8-km resolution; (B) fine-resolution soil moisture maps (from 1 km to 300 m) derived from ISBA-TOP simulations forced with radar observations for precipitation; and (C) soil moisture maps simulated through the ISBA-ags model assimilating vegetation data (Albergel et al., 2017). The ISBA-TOP fine-resolution soil moisture maps lead to a soil moisture state quite close to SIM at the catchment-scale except when precipitation happens the days before the flood event.

Moreover, to estimate the sensitivity of simulations to the resolution of the soil moisture conditions, a perturbation method developed at the CNRM (Edouard et al., 2017) is used. Ensemble of perturbed soil moisture maps are generated and used as initial condition for both models. Ensemble of simulated discharges are then computed. Performance scores computed on simulated discharges for the three types of initial conditions help to evaluate the sensitivity.