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Comparison of different routing functions in the AIGA flood forecasting method for ungauged watersheds.

C. Fouchier, P. Javelle, P. Arnaud, and D. Defrance
IRSTEA, Hydrology Research Team, Aix-en-Provence, France (catherine.fouchier@irstea.fr)

We address in this study the routing of distributed hydrological information to the outlet of watersheds, in the fields of flood forecasting on ungauged watersheds in the French Mediterranean area.

Flood forecasting can benefit of rainfall data provided in real-time by radar networks. This data used as an input to rainfall runoff models gives access to flood anticipation on small ungauged watersheds prone to flash floods. Within the framework of the AIGA method, developed by IRSTEA (formerly Cemagref) and Météo-France (the French National Weather Service) to provide floods alerts, a rainfall-runoff model is implemented at the spatial resolution of the radar data, thus providing a map of the 1 km^2 pixel contributions to the runoff.

We have focused on the routing function of the rainfall-runoff model at the 1 km^2 cell scale, this scale being the first step of the runoff routing from the production area to the outlet of the catchment. We have then produced streamflow hindcasts for selected observed events using:
- two different kinds of routing functions within our rainfall-runoff model, the first being a uniform routing function, the second being distributed routing functions,
- two different hindcasts configurations, the first being a research configuration with the calibration of the production function of our rainfall-runoff model, the second being a configuration close to the real-time conditions of an operational flood warning service, i.e. with no possibility to calibrate the model parameters.

Results indicate that the AIGA method forecasting ability, assessed via a multicriteria analysis evaluating the forecasting lead-time, contingency statistics and the similarity between the calculated and observed hydrographs, can be enhanced (both in research and operational configurations) when implementing a distributed routing function.