A simple distributed model for flood forecasting

Catherine Fouchier (1), Pierre Javelle (1), Stéphanie Diss (1), Patrick Arnaud (1), Jaques Lavabre (1), and Didier Organde (2)

(1) Cemagref, OHAX, Aix-en-Provence, France (Pierre.Javelle@cemagref.fr), (2) Hydris Hydrologie, Saint Mathieu de Tréviers, France

Does allowing spatial variability into a hydrological model improve flood forecasting? This study tries to contribute modestly to this important question, still matter of debate in the hydrological community. To do so, different modelling tests are carried out. For all of them, the model structure is kept unchanged, while the model spatial discretisation is modified. The first test consists to represent each catchment by a simple lumped model, receiving an average basin rainfall. The other tests attempts to take advantage of the spatial variability within the catchment, in particular of rainfall. To do so, the catchment is divided into $1km^2$ cells, each containing a replica of the lumped model tested at the first stage. Then, different approaches are compared, for model parameters estimation, from "uniform" parameters (ie a unique set for all catchment cells), to "distributed" parameters (ie with inter-cells variability). The rainfall-runoff model common to all these tests is very simplified and depends on only 3 parameters, which enables automatic calibration to be done. These tests are applied on two catchments located in South of France. For each of them, parameters are calibrated using outlet discharge, and results are validated on inner available gauged points. Results suggest that introducing spatial variability into the model can improve simulations, but not in any case. These differences are discussed, and weaknesses in our approach mentioned.