



Catchment subdivision impact on the performance of a spatially distributed hydrological model

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Flood simulation and forecasting on heterogeneous catchments require an accurate representation of the hydrological processes and spatial variability of the landscape. The aim of this paper is to investigate the impact of catchment subdivision on runoff simulation with respect to catchment characteristics, data availability and modelling time steps. The ModSpa distributed model is applied to two French catchments, the Gardons d'Anduze (522 km²) and the Orgeval (104 km²). The first is a mountainous catchment located in southern France, prone to hortonian overland flow and flash floods. The second is an artificially drained agricultural catchment located in the Parisian basin where overland flow is caused by saturation excess. The model is applied both at the hourly and daily time steps. Three discretisation levels are tested corresponding to lumped, semi-distributed and fully distributed modelling approaches. For the lumped scheme the catchment is considered as a single entity. For the semi-distributed and fully distributed approaches a threshold is set per catchment and ModSpa's dynamic segmentation procedure is used to delimit the hydrological units. The results are analysed for both time steps and all three sub-divisions. They show that for the daily time step a crude discretisation may give accurate results, whereas for the hourly time step a more detailed representation is necessary. However, if we take into account the catchment's lag time, for "slower" catchments, a crude representation may be sufficient.