Geophysical Research Abstracts
Vol. 19, EGU2017-1649, 2017
EGU General Assembly 2017

Accounting for the uncertainties in radar-raingauge rainfall estimation and the parametric uncertainties of the hydrological model in the prediction of flash floods in the Cévennes-Vivarais region, France

Rafael Navas and Guy Delrieu
Institut Géosciences Environnement, Comue Université Grenoble Alpes, Grenoble, France

The Cévennes-Vivarais is a Mediterranean medium-elevation mountainous region of about 32000 km^2 located in the south-east of France, prone to heavy precipitation events and subsequent flash floods and floods occurring mainly during the autumn season. Due to this vulnerability, it is a well instrumented region in terms of rainfall (4 weather radars of the French ARAMIS radar network, 250 hourly raingauges) and river discharge (45 stations) observations. A high-resolution (1 km^2, 1 hour) radar-raingauge rainfall re-analysis has been established for the period 2007-2014 by using the kriging with external drift (KED) technique (Delrieu et al. 2014; Boudevillain et al. 2016). In the present communication, we present first a geostatistical method aimed at generating radar-raingauge rainfall ensembles based on the KED error standard deviations and the space-time structure of the residuals to the drift. The method is implemented over the four main watersheds of the Cévennes-Vivarais region by considering a spatial segmentation in hydrological meshes of variable sizes from 10 to 300 km^2. A distributed hydrological model based on the SCS curve number and unit hydrograph concepts is then implemented in continuous mode for these watersheds. A sensitivity analysis allows us to identify the most sensitive parameters and to generate ensembles of "acceptable" hydrological simulations by using 16 discharge time series. Several results of this simulation framework will be highlighted: (1) the overall quality of the hydrological simulations as a function of the gauged watershed characteristics, (2) the transferability of the acceptable parameter sets from one year to another, (3) the effect of the space and time resolution of rainfall estimations on the hydrological simulations for gauged watersheds, (4) the respective impact of rainfall and model parametric uncertainties over a range of spatial and temporal scales for ungauged watersheds.

References:

Delrieu, G., A. Wijbrans, B. Boudevillain, D. Faure, L. Bonnifait, and P. E. Kirstetter, 2014: Geostatistical radar-raingauge merging: a novel method for the quantification of rainfall estimation error. Advances in Water Resources, 71, 110-124.
Boudevillain, B., G. Delrieu, A. Wijbrans, and A. Confoland, 2016: A high-resolution rainfall re-analysis based on radar-raingauge merging in the Cévennes-Vivarais region, France. Journal of Hydrology, 541, 14-23.