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# Flash flood warning at ungauged locations: can proxy data be useful to calibrate the hydrological model used?

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The Mediterranean region is subject to flash flood events that lead to many damages and sometimes to fatalities. Because not every little river's tributaries can be monitored, flash floods occur most often on small ungauged catchments with limited available data. In this context, the calibration of the hydrological model used within a flood warning system is a tricky task.

The aim of this study is to evaluate the potential benefit of 'proxy data' in areas where no classical continuous flow measurements are available. Administrative services for example collect and archive large amounts of regional and local information over long periods based on observed damages, some of which can be used as proxy indicators for flood occurrences (e.g. infrastructure maintenance, insurance claims,...).

To determine if such data could be helpful, a benchmark test is carried out, comparing three cases. In the first case the entire streamflow data series is used. In the second case, data from case 1 is degraded: only the date and value of the flood peak are retained. In the last case, only the date of the flood peak is used. This last case aims to imitate the case, where only proxy data collected by administrative services are available. The first case corresponds to the classical gauged basin case, which is used as reference.

These 3 cases are carried out using a simple conceptual hydrological model (from the GR model family) and data coming from around 150 catchments located in the South East of France and covering a 10-year period (1997-2007). The performance of simulated runoff is evaluated using contingency statistics (CSI). A split-sample test is used in order to asses the robustness of the different calibrations.

Results indicate that performances decrease from case 1 to case 3, case 2 beeing intermediate. Since the methodology developped for case 3 can be applied at ungauged locations, it seems that obtained alerts can be very helpful when no classical hydrological data is available to calibrate the hydrological model used in the flood warning system. This work has been made in the framework of the ongoing RHYTMME project. This project aims at developping a warning system in the south of French Alps, using radar rainfall data (http://rhytmme.cemagref.fr/synopsis).