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Hydrological validation of historical precipitation reconstruction

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In order to define future climate scenarios and study climate change impact, a detailed database of historical climate is necessary. It is particularly the case when a [U+FB01]ne spatial scale is required as for regional and environmental impact studies. As a preliminary step to define future precipitation scenarios, this work has focused on the reconstruction of spatially distributed daily precipitation on a 30-year period (1980-2010).

Two alternatives have been proposed to reconstruct daily precipitation in the Llobregat basin (5000 km2). First, historical rain gauges network data have been filled and patched using regression methods, and then interpolated using a spline method. Second, a principal component analysis (PCA) of historical radar data has been used to interpolate historical gauge measurements to produce 3km-resolution daily rainfall maps. These historical reconstructions have been compared to the SPAIN02 reference, a 20-km gridded daily precipitation dataset generated by the Spanish Meteorological Agency (AEMET).

In order to assess these data from a practical point of view, both datasets have been used as inputs to a rainfall-runoff model. Simulated discharges have been compared to the observed ones for several watersheds (between 100 and 1000 km2) located on the studied territory. Results show that both precipitation reconstructions are quite good. Simulated discharges are very similar for the largest watersheds. PCA-based data have the advantage to better reproduce intense local rainfall on the smallest watersheds.