Modelling efforts to assess changes in hydrology and sustainability of water uses in Alpine context

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The Durance River is one of the major French alpine rivers located in the Southern Alpes, and providing water for a variety of uses downstream - irrigation, hydropower, drinking water, industries, recreation and ecological services. Under current rules for water allocation, these uses may be threatened in future climate.
Within the the R^2D^2-2050 research project "Risk, Water Resources and Sustainable Development within the Durance River Basin in 2050" (Sauquet et al., in press), a comprehensive chain of models was developped to simulate climate at regional scale, water resources, and water demand for agriculture and domestic purposes under present-day and future conditions, including socio-econmic scenrios. This methodology aimed at capturing the uncertainties associated with combined climate and socio-economic changes, and their consequences for the water resource in an Alpine region with key economic interest. It highlighted sources of uncertainties and weaknesses in hydrological modelling, that are now being dealt with : the representation of snow and glaciers in conceptual hydrological models, and the direct embedding of water uses in hydrological modelling for integrated impact assessment.
Efforts are simultaneously directed to the probabilistic reconstruction of hydro-climatic conditions at high spatial resolution for the last 150 years,for testing the sustainability of current water uses against historic extreme benchmark situations stemming from natural climate variability (Caillouet et al. 2016).

References:
Sauquet et al. : Water allocation and uses in the Durance River basin in the 2050s: Towards new management rules for the main reservoirs?, La Houille Blanche, in press, 2017.
Caillouet, L., Vidal, J.-P., Sauquet, E., Devers, A., and Graff, B.: Ensemble reconstruction of spatio-temporal extreme low-flow events in France since 1871, Hydrol. Earth Syst. Sci. Discuss., doi:10.5194/hess-2016-405, in review, 2016.