Quantitative estimation of precipitation over the French mountainous areas using snow measurements and weather patterns approach

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The issue of estimating the statistical behavior of hydrological variables (such as mean annual precipitation, extreme precipitation or extreme floods) has given rise in recent decades to many developments, mostly in the domain of statistics.

Anyway, the choice of a particular statistical model may often be of secondary importance compared to the most obvious issue of the good quantitative estimation of precipitation on the studied watershed. This is particularly true for mountain hydrology where the strong variability of the meteorological phenomena and the lack of measurements induce important uncertainties.

To address this issue, Electricité de France (EDF) has made since a long time a strong effort to measure snow and rainfall in French mountainous areas. We will show here how the snow water equivalent measurements made since 40 years are essential to correctly estimate the annual mean precipitation in high altitude.

Moreover, we will present how the understanding of the orographic effect on precipitation has been improved, using the information of global atmospheric synoptic patterns.

A particular focus on Pyrenees range is given and some discussions are done on the improvement brought by the use of the snow water equivalent assimilation and weather patterns approach.