

## **Analysing the climatic sensitivity of glacierized alpine watersheds using historic hydro-meteorological observations**

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The high altitude environments are particularly sensitive to climate change and to the rapid and intense effects of current warming which are affecting the Alpine cryosphere. More specifically, the rapid shrinking of glaciers and expected changes in the hydrological regime of alpine rivers is of concern in view of future water availability.

The purpose of this work is to assess how climate changes are affecting the alpine cryosphere, and glaciers in particular, and the hydrological regime of catchments at different spatial scales. We quantify this impact with statistics describing total runoff, seasonal regime and low runoff. The analysis considers catchments with increasing size and decreasing percentage of glacier cover, ranging from headwater catchments of about 10 km<sup>2</sup> to mid-size alpine catchments of 1000 km<sup>2</sup>.

A conceptual, enhanced degree-day glacio-hydrological model is used for such assessments, exploiting the historical data available for the Val di Sole catchment (Eastern Italian Alps). This remarkable dataset includes observations of streamflow, meteorological data and glacier extent beginning in the 1920s, which are useful for model implementation, calibration and validation at different spatial and temporal scales.

The modelling tool is used for evaluating how different glacier cover conditions, ranging from those at the beginning of the 20<sup>th</sup> century to the complete absence of glaciers, impact the runoff in the study area. This model-based approach has the advantage of being strongly constrained by actual observations.