



Realism vs Simplicity: Depicting snow processes in a simple hydrological model

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The HBV hydrological model is still widely popular, partly because of its simple representation of hydrological processes. Depicting catchment hydrology in a simple way reduces data requirements and minimises model uncertainty. However, the representation of some processes might benefit from increased model complexity. This is the case, for instance, of the snow routine in the HBV-light model version. This version uses a single temperature threshold parameter for precipitation phase discrimination and a simple degree-day method for quantifying snowmelt and refreezing processes. Nevertheless, recent research has shown that hydrological models using a more realistic representation of snow processes may be more successful in estimating runoff.

We explore and test different alternatives to the design of the snow routine of HBV-light such as considering a gradual transition between snowfall and rainfall, or implementing a seasonally variable degree-day factor. Furthermore, we test the use of additional data sources, such as radiation or relative humidity data. We evaluate the usefulness of these modifications to the snow routine by balancing the realism in the representation of important hydrological processes in alpine and other snow-covered areas and preservation of the characteristic simplicity of the HBV model. Preliminary results show improved model performances associated with a limited number of additional model parameters, especially those representing the seasonal variability of snow processes.