



Introduction of a SWE-SCA hysteresis in a degree-day snow model for rainfall-runoff modelling

Philippe Riboust (1,2), Guillaume Thirel (1), Nicolas Le Moine (2), and Pierre Ribstein (2)

(1) IRSTEA, Hydrology Research Group, Antony, France (guillaume.thirel@irstea.fr), (2) Sorbonne Universités, UPMC Univ Paris 06, CNRS, EPHE, UMR 7619 Metis

Degree-day snow models have the advantage of requiring limited data for running and for calibration, which is of the utmost importance for real-time hydrological forecasting or assessment of the impact of climate change on the hydrological regimes of snow-driven catchments.

The CemaNeige model is a daily 2-parameter degree-day model that proved to be very efficient for discharge simulation when run together with a daily rainfall-runoff model (usually the GR4J model). In this work, we tried to represent in a more realistic way the snowpack, based on the integration of a SWE-SCA hysteresis. These SWE-SCA relationships aim at describing the heterogeneity of snow patterns both in space and time in the catchments.

With this improved model, we showed that it is possible to make use of spatial satellite MODIS SCA data to improve the snow representation without deteriorating the discharge. The sensitivity of the relative weights between snow-based and discharge-based numerical criteria was assessed. Robustness of the model (i.e. its ability to be applied on independent periods and catchments) was improved.