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Using multi-year data to evaluate performance of one-layer and multi-layer models in snow hydrology: an example from Col De Porte

Francesco Avanzi (1), Carlo De Michele (1), Samuel Morin (2), Carlo Maria Carmagnola (2,3), Antonio Ghezzi (1), and Yves Lejeune (2)

(1) Politecnico di Milano, Department of Civil and Environmental Engineering, Milano, Italy (francesco.avanzi@mail.polimi.it), (2) Météo-France - CNRS, CNRM-GAME, Centre d'Etudes de la Neige, St Martin d'Héres, France, (3) Dianeige, Meylan, France

Snow mass dynamics prediction represents an important task for snow hydrologists, since snow on the ground influences local/global water availability and streamflow timing and amount. Different modeling tools have been formulated for decades to predict snowmelt runoff dynamics and therefore to integrate snow mass dynamics in watershed hydrology modeling. Typical variables of interest include snow depth, snow bulk density, snow water equivalent (SWE) and snowmelt runoff. All these variables have been monitored at several locations worldwide for several decades in order to evaluate model performance. As a result, several multi-year datasets are now available to perform extensive evaluation tests. In this presentation, we report an example of these evaluations by discussing the performance of two models of different complexity in reproducing observed data of snow dynamics at a site in French Alps (Col De Porte, 1325 m AMSL), where 18 continuous-time years of observations are available. We consider Crocus as an example of multi-layer physically-based complex models and HyS (De Michele et al. 2013) as an example of a one-layer temperature-index models. Using multi-year data allows us to compare models performance over long periods of time, thus considering different climatic and snow conditions. Moreover, the use of continuous-time data allows to evaluate models performance at different temporal resolutions.

De Michele, C., Avanzi, F., Ghezzi, A., and Jommi, C.: Investigating the dynamics of bulk snow density in dry and wet conditions using a one-dimensional model, The Cryosphere, 7, 433-444, doi:10.5194/tc-7-433-2013, 2013.