



Towards the improvement of model internal consistency using water isotope composition measurements in a glacierized basin

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This study developed an approach to model the water stable isotope composition in streamflow in a glacierized basin. The spatial variability of water isotope composition in precipitation was simulated in a Rayleigh fractionation procedure using spatial temperature and precipitation. The fractionation and mixing processes of water isotope compositions in various water sources were modeled in a glacio-hydrological model, associated with the simulation of runoff generation processes. Observed water isotope composition in streamflow was additionally used for the calibration of model parameters. The model internal consistency was investigated by the model performance in the reproduction of water isotope compositions in various water sources, as well as the simulation of snow cover area fraction and glacier mass balance. Specific questions addressed are three-fold: 1) How does the proposed approach perform in the reproduction of water isotope compositions in various water sources? 2) Do the water isotope composition measurements help to improve the simulations of snow and glacier melt runoff? (3) What a degree the model internal consistency can be improved aided by the water isotope composition measurements? This study is one of the first attempts to simulate the water stable isotope composition in streamflow in glacierized basins. Our findings could shed lights on the application of water isotope composition measurements for model constraining in glacierized basins.