



Multi-criteria calibration of a hydrological model using MODIS snow cover data

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In alpine basins snow accumulation and snow depletion shape the annual water cycle. Over several months snow melt generates a considerable part of runoff and frequently it is the major driver for spring floods. The accurate simulation of snow processes is therefore of essential importance for modeling runoff processes in mountain areas. Measurements of the state of the snow cover - e.g. snow depth, snow water equivalent and extent of snow covered area - are scarce. Remote sensing data provide information on the extent of snow cover over an entire basin during clear-sky conditions.

In this contribution the benefits from integrating MODIS snow cover data for the calibration of a hydrological model for subcatchments of the Salzach basin in the Austrian Alps are presented. MODIS Aqua and Terra images were retrieved for the period of 2006 to 2008 for days with low cloud cover and combined to enhance image coverage. Due to remaining cloud cover and discrepancies in land or snow classification between Aqua and Terra images, a range of maximum and minimum snow cover was defined for each observation. The snow cover observations were used together with runoff observations in a multi-criteria calibration of the main parameters of the snow melt model component. The first criterion referred to the fitting of the snow cover simulation to respective satellite data while the Nash-Sutcliffe index of runoff represented the second criterion. Depending on the relative weight of the runoff criterion, runoff modeling efficiencies were improved or decreased insignificantly. Despite using only sporadic snow cover data with a range of snow cover extent, snow modeling results could be improved substantially.