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**ABSTRACT:** Accumulation and melting of the snow control the hydrological regime in the Alps where the headwaters of major European streams are located (Danube, Rhine, Rhone and Po). In these regions, the snow pack seasonal evolution is a key parameter for understanding of the stream-flow dynamics in the lowlands down to the mountain range. The most widely used method for snow dynamic simulation relies on temperature index approach, that makes snow melt and accumulation processes depend on air temperature related parameters. Snow coverage maps retrieved from remote sensors in mountainous areas can be used to calibrate threshold temperature parameters for snow dynamics simulation. This work describes the calibration and validation of snow module of a spatially distributed physically based hydrological model based on long series (2000-2009) of MODIS snow coverage images. Remotely sensed images were validated against 104 snow depth measuring stations. The results show that accuracy of MODIS product is good enough for calibrating hydrological model, and that when the investigated basin is large and includes both mountains and lowlands with heterogeneous characteristics, particular attention has to be put when comparing simulated snow covered area to satellite observations. The work was carried out in the framework of the ACQWA project whose aim is to assess the impacts of a changing climate, focusing on the quantity and quality of water originating in mountain regions, particularly where snow- and ice melt represent a large, sometimes the largest, streamflow component.

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