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Reproduction of snow melting spatial patterns with the hydrologic model GEOtop

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Remote sensing data can easily provide images of snow covered areas and, therefore, in the near future it will be possible to follow the time evolution of snow melting spatial patterns with increasing spatial and temporal resolution. While during the accumulation phase of the processes air temperature patterns dominate the snow distribution, during the melting period the patterns are dominated by the complex interplay of topography, available radiation forcings and atmosphere turbulent transfer processes. In this contribution the snow covered area of an alpine basin in Trentino (Italy), extended approximately 200 square kilometers, is studied during the melting time using the distributed hydrological model GEOtop and data from some satellite platforms currently available. GEOtop describes the soil-snow-atmosphere energy and mass exchanges taking into account the topography effects (slope and aspect), the solar radiation dependence on the weather conditions, and the snow physics, and has already been tested with point data. Snow cover extent can be provided by remote-sensed data at different resolution (Quick Bird 1 meter, SPOT 10 meters and MODIS 500 meters), and by data from in situ measurements. The model reproduces quite well the physical features of snow melting and shows a fair agreement with the data, although it does not describe the snow redistribution due to wind drift, and it seems to be an effective tool to upscale and downscale remote sensing data at different resolution.