



Investigating the role of topography on snow cover duration and distribution in the Italian Apennines by means of MODIS data

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Snow cover plays an important role in the water cycle influencing water resource availability. As the seasonal cycle of snowpack is highly sensitive to variations of precipitation and temperature, the expected future changes in the atmospheric forcings may impact on the timing of snow accumulation and melt. In this work we investigated the effects of the complex topography of a mountain range on snow dynamics by means of MODIS data of snow cover (2003 - 2014) and a 500 m-resolution Digital Elevation Model. The study area is the central Apennines, having peaks in elevation over 2800 m asl in the Majella and Gran Sasso massifs. Firstly, we carried out a validation of MOD10A1/MYD10A1 SCA products comparing ground data of snow depth measured by seven monitoring stations with the remote sensing time series of snow covered area. The comparison confirms the accuracy of MODIS products in snow cover mapping in mountain areas, in agreement with what found in other regions around the world. Then, we subjected Aqua and Terra snow cover maps to a cloud removal procedure ensuring a pixel-scale estimate of snow cover presence at daily temporal resolution. The new cloud-free dataset was used for deriving trends of snow cover duration and snow cover distribution for different classes of aspect, slope and concavity within the mountain part of the domain. The analysis has allowed us to quantify the impacts of these topographic features on the accumulation and melting processes. In particular, the north-facing slopes show a lower snowline altitude in all seasons and a longer snow duration in spring.