



## **Exploiting MODIS data for the assessment of snow cover simulations driven by a RCM**

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Snow cover maps from Earth Observation satellites can integrate or replace datasets based on in-situ measurements for assessing the performance of Regional Climate Models (RCM) in the snow cover simulated representation. In fact, several remote sensing data products allow to monitor wide regions with spatial and temporal resolutions suitable to regional climate studies. On the other hand, ground data require a dense network of stations covering the entire altitudinal range and techniques for interpolating the values. Taking advantage of MODIS data, we conceived a methodology for assessing the snow cover field of RCMs starting from cloud-free MODIS SCA (Snow Covered Area) maps. The area of study is the Po river basin, northern Italy. The dataset is composed of 10 years of MODIS data (2003–2011) fully cleaned from cloud cover by means of a cloud removal procedure. The maps have 500 m spatial resolution and daily temporal resolution. The RCM considered is COSMO–CLM, in the configuration running at  $0.0715^\circ$  (about 8 km) resolution and coupled with the soil module TERRA\_ML. The ERA–Interim re-analysis are used as initial and boundary conditions. The results show a good agreement between observed and simulated snow cover duration and extension. COSMO–CLM is able to reproduce the inter–annual variability of snow cover features as well as the seasonal trend of snow cover duration and extension. A lower accuracy is found when the RCM simulates the progressive depletion of the snow cover in spring. Then, we investigate the advantages obtained by increasing the spatial resolution of the climate model comparing the results of the 8 km simulations to those at  $0.125^\circ$  (about 14 km) resolution. The comparison highlights the benefits provided by the higher spatial scale of calculation in the accumulation season, reflecting the improvements obtained in temperature and precipitation fields.