Towards a 25 year snow cover time series over the European Alps derived from AVHRR satellite data: Validation and first results

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Satellite time series can provide spatially and temporally consistent measurements of the Earth surface processes. In recent years, an increasing need for full resolution, multi-temporal satellite data sets has been identified to serve the purpose of climate change monitoring. Solely AVHRR offers the opportunity to analyze more than 25 years of medium resolution satellite imagery on a daily basis and thereby holds a great potential to detect, map and quantify long-term environmental changes.

The University of Bern receives and archives daily full resolution (1.1 km) AVHRR data over Europe since 1984. The data set is used to generate a number of geophysical data records such as snow cover extent. In this study, we validate snow cover retrieval from 1-km AVHRR HRPT data using a stable snow detection algorithm, which allows homogenizing data series from all different AVHRR sensors employed over the decades. The validation includes a comparison to the quality assessed MOD10A1 snow cover product and a conventional ground-truth station validation. The accuracy of the binary snow mask was found to be close to 90% (when compared to ground measurements) and correlations with MODIS snow masks exceed 0.9. While MODIS data provided the better mean for spatial comparisons, the station data were particularly valuable as a temporally stable reference to ensure sensor-to-sensor consistency. We will discuss snow product validation, first time series results and address the remaining challenges of a 25 year snow cover time series from space.

Given the importance of mountainous regions for climate change studies, the resulting data set has the potential to become an important tool for the assessment of environmental changes in the European Alps. Once the overall quality is established, comprehensive snow cover information over the past decades will be provided for the first time in one consistent and spatially explicit dataset.