

EGU23-11618, updated on 26 Apr 2024

<https://doi.org/10.5194/egusphere-egu23-11618>

EGU General Assembly 2023

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Validation of high resolution remotely sensed and modeled snow cover with webcam imagery

Andreas Kollert¹, Andreas Mayr¹, Martin Rutzinger¹, and Stefan Dullinger²

¹Department of Geography, University of Innsbruck, Innsbruck, Austria (andreas.kollert@uibk.ac.at)

²Department of Botany and Biodiversity Research, University of Vienna, Vienna, Austria

Recently, snow cover has gained a lot of interest as an important driver of plant species distribution in arctic and alpine environments, especially on small spatial scales. However, variation of snow cover at this scale is hardly resolved by open satellite data. Hence, linking remotely sensed snow cover and critical patterns and processes in vegetation can be challenging due to a mismatch in spatial resolution.

We present a study based on a high alpine network of three webcams for the validation of snow cover products covering an entire year. Satellite based snow cover products (Landsat, Sentinel-2, downscaled MODIS products) are benchmarked on webcam-derived snow cover. While optical satellite remote sensing is a valuable tool for characterizing snow cover dynamics at the scale of tens of meters, cloud cover causes considerable data gaps. As a temporally and spatially more continuous estimate, we additionally produce meter-scale snow cover using the openAmundsen model, and we compare this to the webcam derived snow cover as well. For all datasets, ecologically relevant indicators like snow cover duration and the number of snow-free days are aggregated and validated both for the entire year and on a sub-seasonal scale.