Conference theme considered appropriate: "Environmental change detection"

Validation of remote sensing NDVI time series with ground based measurements from the automated climate station network IMIS

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Background and data: Alpine environments are particularly sensitive to climate change such as changes in snow cover. An important instrumentation to detect and monitor snow cover extent and duration as well as vegetation development is satellite-based remote sensing. The unique Advanced Very High Resolution Radiometer (AVHRR) archive of over 25 years provides the opportunity to derive long term data on snow cover and vegetation with high temporal (max. 1 day) and spatial resolution (max. 1x1km^2). Ground based measurements on snow and vegetation development in the alpine zone of Switzerland can exclusively be provided by the automated climate station network IMIS (Interkantonales Mess- und Informationssystem).
Methods: The aim of this study was to analyze snow cover and vegetation development comparing ground based with remote sensing measurements. At 17 alpine grassland sites, IMIS sensor data was analyzed with respect to Start of Season after snowmelt (SOS), vegetation development, and productivity for the period 1998 to 2005. The same locations and years were investigated using an AVHRR Normalized Difference Vegetation Index (NDVI) time series. Maximum Value Composite (MVC), running mean, and harmonic analysis algorithms were used and tested to derive SOS and maximum NDVI ($NDVI_{max}$) at the grassland sites.
Results: The ground based measuring stations showed strong correlations of snow cover characteristics such as snowmelt and plant development, i.e. vegetation phenology and productivity. SOS derived from ground based and from remote sensing data were significantly correlated, however, deviated from each other by +- 2 weeks.
Conclusions: The combination of remote sensing and ground based measurement bears the potential to accurately assess snow and vegetation development in the Alps with high spatial and temporal resolution. Further time series analyses will provide the unique opportunity to estimate vegetation change over the last 25 years.

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