Geophysical Research Abstracts
Vol. 15, EGU2013-6275, 2013
EGU General Assembly 2013

Preparation for Snow Cover Monitoring Using Sentinel-1 and Sentinel-3 Data

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Seasonal snow is a key element of the water cycle in high and mid latitudes, characterized by high spatial and temporal variability. Melt water is an important water resource in many mountain areas and also in lowlands downstream. Accurate observations of snow extent and physical properties of snow are not only of interest for climate change research, but are of great socio-economic importance. The Sentinel satellite series, including SAR and multispectral optical satellite data enable to monitor the snow extent from regional to global scale with high temporal sampling. Automatic processing lines of multispectral optical satellite data including rectification, calibration, cloud masking and snow detection have been implemented for generation of snow information and tested with various satellite sensors. Ongoing work is related with adapting and optimizing the snow retrieval algorithm for Sentinel 3 SLSTR and OCLI, making use of the full spectral capabilities of these sensors for generating high quality snow maps. The algorithm for mapping snow makes use of the typical spectral signature of snow in the visible (VIS) and short wave infrared (SWIR) region of the spectrum, which enables a clear discrimination against other surfaces. The baseline products include binary snow extent maps derived from combinations of VIS and SWIR bands and maps of fractional snow extent. The preliminary version of the retrieval algorithm uses dual-sensor Sentinel-3 SLSTR and OCLI data for mapping the snow extent and applies the multi-spectral un-mixing method and cloud screening making use of the various spectral channels of the two sensors. Snow conditions (wet/dry) can be retrieved from SAR observations as provided by Sentinel-1. The algorithm builds on the multi-temporal change detection technique for mapping melting snow areas and improved to make use of the dual-polarisation acquisition capabilities of Sentinel-1. In the presentation we will show first examples of the improved Sentinel-1 SAR wet snow mapping using dual-polarized C-Band data and results of the Sentinel-3 SLSR and OLCI dual-sensor concept tested with ENVISAT AATSR /MERIS data acquired over the Alps and low land. The performance of the snow products is tested by comparison with snow maps from high resolution sensors. The work is supported by the ESA GlobSnow-2 project, EC FP7 CryoLand project, and the FFG ASAP PRESENT project.