GlobSnow-2 SE and SWE Processing System

Andreas Wiesmann, Mwaba Kangwa Hiltunen, Matias Takala, Tazio Strozzi, Kari Luojus
GAMMA Remote Sensing, Switzerland

The improvement, optimization and extension of the GlobSnow processing system (PS) to process Snow Extent (SE) and Snow Water Equivalent (SWE) products based on earth observation data is one of the goals of the ESA GlobSnow 2 project. The processing system is used to produce snow maps from satellite archive data, but operates also in near realtime producing daily snow maps within a few hours after data acquisition. The data are available to the public through the project web site http://www.globsnow.info.

The PS architecture consists of the two independent processing chains for SE and SWE that follow different implementation strategies due to different prototype implementations and the different demands on computer resources. While for the SWE chain it was possible to have an "operational prototype" by compiling the Matlab code of the prototype implementation. The SE chain, that needs much more memory and processing resources, is implemented in ANSI-C and is using OpenMP to benefit from multiple cores to reduce processing time. The implementation is modular to allow easy integration of the different input data formats and sensors. The final products, daily, weekly and monthly aggregates, are in NetCDF/CF format following user requests and the CCV data requirements by ESA. For the users convenience quicklook images are provided with the data.

The processing of the near realtime products is done on a multi-core workstation at FMI while the large scale processing of the historical data is done on the FMI supercomputers.

The GlobSnow 2 SWE processing system assimilates passive microwave observations from AMSR and SSMI and weather station observations collected by ECMWF to produce maps of SWE estimates in EASE-Grid format at 0.1 degree spatial resolution over the northern hemisphere, covering land surfaces with the exception of mountainous regions and Greenland. A semi-empirical snow emission model is used for interpreting the passive microwave (radiometer) observations through model inversion to the corresponding SWE estimates.

The GlobSnow 2 SE processing system takes historical ATSR-2 and AATSR and near realtime VIIRS data as input and generates maps of fractional snow cover in geographic projection at 0.01 degree spatial resolution covering the northern hemisphere north of 25 degrees. Different cloud detection and snow mapping algorithms are implemented for comparison and product development.