



A Round Robin Exercise for an intercomparison of Snow Cover Area maps retrieved from Earth Observation

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In Europe, the majority of the precipitation during winter falls as snow over 1.000 m altitude, and remains stored in the snowpack until the melting season, when it returns in the hydrological cycle and is partly used for irrigation and power generation. Snow cover estimation is then one of the main indicators necessary to evaluate water budget and plan water management, predict possible drought conditions, and drive operational flood prediction.

The use of Earth Observation (EO) for Snow Cover Area (SCA) estimation has been improved during the last decade thanks to high resolution satellites such as the ESA Sentinels, having a pixel resolution of 10 m. Furthermore, diverse processing techniques, nowadays mature, are used by the different data providers to retrieve SCA and Fractional Snow Cover (FSC) maps from EO data.

The scope of our work is an intercomparison of different medium- to high-resolution EO-retrieved SCA/FSC maps over Europe; we use as a benchmark a vast dataset of in situ data coming from different sources and harmonized by Matiu et al. (2021).

Regarding the dataset, SCA or FSC maps retrieved from multispectral Sentinel-2 and Landsat-8 images are considered, together with gap-filled maps evaluated integrating Sentinel-1 (Synthetic Aperture Radar) and/or Sentinel-3 (multispectral). A unique dataset of Sentinel-1-retrieved snow depth maps is also used in the exercise. Finally, for a continuity with a previous project on EO snow products, medium-resolution MODIS-retrieved SCA images have been added to our dataset.

The results can be used to correctly interpret the accuracy of the EO datasets as well as the processing methodologies. From the comparison it can be evaluated the possibility of merging the different dataset in order to enhance the temporal resolution to a sub-weekly effective revisit time.