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# Preparation of European Snow, Glacier and Lake/River Ice services within the Copernicus project CRYOLAND

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The project "CryoLand – Copernicus Service Snow and Land Ice" deals with the development and delivery of customized snow, glacier and lake and river ice products for a downstream service within the Copernicus program (formerly Global Monitoring for Environment and Security; GMES) of the European Commission. CryoLand exploits Earth Observation data from current optical and microwave sensors and prepares for the upcoming Copernicus Sentinel satellite family. The project addresses the cryospheric component of GMES Land Monitoring services. The CryoLand project team consists of 10 partner organisations in Austria, Finland, Norway, Sweden, Switzerland and Romania. It is funded by the 7th Framework Program of the European Commission.

The CryoLand baseline products for snow cover are provided in near real time and include fractional snow extent from optical satellite data, the extent of melting snow from SAR data, and coarse resolution snow water equivalent maps from passive microwave data. Experimental products include maps of snow surface wetness and snow surface temperature. The snow products range from continental coverage at medium spatial resolution to regional products at high resolution serving a wide user community. The core snow extent product is the homogenized fractional snow cover map covering the pan-European domain, designed as a prototype for a future operational Copernicus Snow Service. Regional snow extent products are produced for downstream applications serving local and regional users operating in different domains. Medium resolution optical data (e.g. MODIS, and the future Sentinel-3), SAR (ENVISAT ASAR, Radarsat-2, and Sentinel-1scheduled for launch in May 2014) are the main sources of EO data for generating products covering extended areas. Quality assessment of the snow products has a high priority in the project, e.g. by comparison with snow cover information from high resolution optical sensors, which were made available through the Copernicus Data Warehouse mechanism. Glacier products are based on high resolution optical (SPOT-5, future Sentinel-2) and SAR (TerraSAR-X, future Sentinel-1) data and include glacier outlines, maps of glacier facies, ice velocities and glacier lakes. The glacier products are generated on user demand for study areas in the Alps, Greenland and Himalayan mountains. Algorithms for lake and river ice products, which include ice extent and its temporal changes and snow extent on ice, are in development, based on optical satellite data and SAR. One major task of CryoLand is the performance assessment of the products, which is carried out in different snow cover regions, and various land cover types. In this presentation processing chains and demonstration products for snow, glacier and lake/river ice parameters are shown and results for the product accuracy assessment are presented. An important point of the CryoLand project is the use of advanced information technology, which is applied for processing and distributing snow and land ice products in near real time. The concept of the prototype CryoLand Service structure is explained and examples of the near real time pan-European snow and lake ice services as well as glacier services are shown.