



Operational permafrost monitoring in Norway through cryo.met.no

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The Norwegian Meteorological Institute (MET Norway) has recently launched a new webportal for cryospheric information, <https://cryo.met.no>. This portal gives access to the latest operational products and current state of the sea ice, snow and permafrost in Norway, Arctic and Antarctic. This abstract focuses on the operational permafrost monitoring at MET Norway and the available and planned new permafrost products on cryo.met.no

Permafrost is defined as one of the Essential Climate Variables (ECVs) by WMO. The thermal state and the active layer thickness are the variables currently monitored globally through several international programmes (IPY-TSP, PERMOS, CALM, GTN-P and CCI). Measurements show that permafrost is warming at a global scale and is affected by degradation. Enhanced warming and degradation are likely in the future and will e.g. affect ecosystems, hydrology, slope stability and infrastructure. Extensive monitoring activities are undertaken today with the general aim of documenting the distribution, state and changes of permafrost on a long-term basis. The cornerstones of all permafrost-monitoring activities are ground temperatures measured in boreholes.

Systematic long-term monitoring of permafrost in Norway and Svalbard essentially began 20 years ago under the European Union-funded Permafrost and Climate in Europe (PACE) project, with the installation of ground temperature observations in deep boreholes in southern Norway and on Svalbard. These boreholes boosted mountain permafrost research in these areas, and as an extension of the PACE project a shallow borehole monitoring network was established along an altitudinal transect across the mountain permafrost transition zone in southern Norway in 2001. During the International Polar Year (2007-2009), monitoring networks were also built up in northern Norway, and on Svalbard.

Juvvasshøe, Snøheim and Iskoras are the names of the first operational permafrost stations in mainland Norway, with ground temperature data transmitted in real time for operational permafrost monitoring. There are also established operational weather stations with extended measurement programmes at these sites. The collocated monitoring of permafrost and climate provides researchers and other users with real-time data to study and monitor e.g. effects of extreme weather and climate events. The data may contribute to early warning systems for natural hazards associated with permafrost. The sites are run in cooperation with the University of Oslo and Norwegian University of Science and Technology.

Data and metadata are currently manually reported to the international Global Terrestrial Network for Permafrost (GTN-P). Work is in progress to integrate these operational permafrost measurements into the WMO Global Cryosphere Watch (GCW, <https://globalcryospherewatch.org/>) datastream. This implies that data can be transmitted through WMO GTS if requested by GTS users. WMO GCW performs assessments on the state of the cryosphere and works actively to improve data availability in support of this service.