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# Towards a TTOP-model for Northern Norway

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The permafrost distribution in the North Atlantic area is to a large degree climatically controlled, mainly by the North Atlantic Drift, causing much less permafrost than in any other high latitude terrestrial region on the Northern Hemisphere. The current knowledge on the extent and the thermal conditions of permafrost in Northern Norway is scarce. Thawing of permafrost in this area may lead to subsidence of the ground surface, having a substantial impact on e.g. the stability of mountain slopes and infrastructure. It is therefore important to delineate the distribution and assess the thermal state of permafrost. By making standardized temperature measurements in existing and new boreholes, the Norwegian IPY project 'Permafrost Observatory Project: A Contribution to the Thermal State of Permafrost in Norway and Svalbard' (TSP NORWAY) will obtain a "snapshot" of the permafrost environments as a benchmark against which to assess past and future changes. The main objective of TSP NORWAY (http://www.tspnorway.com) is to measure and model the distribution of permafrost in northern Norway and Svalbard, as well as to assess its thermal state, thickness and influence on periglacial landscape-forming processes.

Regional permafrost modelling in Southern Norway has so far been based on gridded maps of Mean Annual Air Temperature (MAAT) indicating permafrost as probable in non-glaciated mountain areas where MAAT is below -3˚C. This crude approach does not take into consideration the effects of the uneven thickness and timing of the winter snow cover as well as the vegetation cover. In Troms and Finnmark, the two northern-

most counties of mainland Norway, permafrost is presumably absent in large forested areas although MAAT $<$ -3˚C. The reason is the influence of the forest, which collects snow and has a different energy-balance regime as compared to wind-exposed locations. Aiming for a better spatial representation of ground temperature and thus permafrost conditions in Northern Norway, ongoing work elaborates on the connection between MAAT and Mean Annual Ground Surface Temperature (MAGST) through the Canadian 'temperature at the top of permafrost' (TTOP) model. The TTOP-model uses seasonal n-factors and air temperatures to model MAGST, and a ratio of thawed to frozen conductivity of the ground to model the average TTOP. In a first step we derive seasonal n-factors based on records of air and ground surface temperatures and of snow parameters. Input data for future modelling of regional MAGST will be gridded $1 \times 1$ km data on snow thickness and air temperature (http://senorge.no).