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First results of TTOP-based regional ground surface temperature mapping in Norway

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Regional permafrost modelling in 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. Especially in Northern Norway this approach is erroneous as 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 surface temperatures and thus permafrost conditions in 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 freezing and thawing degree-days of air to model MAGST. The basis for the model is several perennial time series of ground surface temperatures mainly from mountain areas. The model is hence presumably best adapted to areas above the timber line. In a first step we derived seasonal 1 × 1 km n-factor maps based on records of air and ground surface temperatures, snow parameter and vegetation. The work presented is based on the IPY-project TSP NORWAY (http://www.tspnorway.com) and the new project CRYOLINK (http://www.geo.uio.no/cryolink).