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DATE OF DISPUTATION: 11th of September 2012
DISSERTATION TITLE: Mountain Permafrost in Southern Norway – Distribution, Spatial Variability and Impacts of Climate Change

„Permafrost in the Norwegian mountains faces warming“

Permafrost is frozen ground year round and an important indicator for climate change. In mountain areas, permafrost stabilises steep slopes, and thawing permafrost may lead to land slides and rock falls. This thesis analyses observations from the CROYLINK project, and uses numerical models to predict past and future permafrost conditions in Southern Norway.

This study reveals that mountain permafrost in southern Norway will be strongly affected by climate change during this century. Climate models indicate a warming of up to 3 °C until the end of the 21st century for the mountains of southern Norway. The study predicts that the lower limit of mountain permafrost will reach the highest parts of the Norwegian mountains. With a likelihood of up to 75% permafrost will thaw at 1900 m a.s.l. by the year 2100.

At today's conditions the lower limit of mountain permafrost is around 1450 m a.s.l. in Jotunheimen and 1200 m a.s.l. in the eastern part of Norway. Within steep rock walls in Jotunheimen and Hurrungane the lower limit of permafrost can be expected as low as 1150 m a.s.l. Today, permafrost is stable and wide spread at higher elevations. More than 60% of the rock walls in Jotunheimen and the north faces of the Trollveggen (Romsdalen) are underlain by permafrost. These rock walls are shown in the newly created maps of Hurrungane and Jotunheimen.

These results were gathered during the CRYOLINK project of the University of Oslo. In the project mountain permafrost in southern Norway has been explored in Hurrungane (Turtagrø), Jotunheimen (Juvvasshøe area), Jetta (Vågå) and Tronfjell (Alvdal) at 13 boreholes with a maximum depth of 130 m.

The warming of permafrost can be related to a destabilisation of slopes in the Norwegian mountains, which will have a negative effect on infrastructure and human activities. Highly frequented rock climbing routes in Jotunheimen (e.g. on Galdhøpiggen and Store Skagastølstind) and Romsdalen (Trollveggen) are within permafrost, where an increase of rock falls and rock slides can be expected. Rock climbers and mountaineers will possibly have to face a higher risk of rock falls during their climbs in these areas. The increase of the thawing in summer will be a challenge for road maintenance at buildings.