



High-Resolution Permafrost Simulations in Western Greenland and an Assessment of Permafrost Degradation Risk

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Observations and model studies indicate warming of frozen ground in northern regions. We address these processes by using high-resolution versions (25 km and 5 km) of a regional climate model to create boundary conditions for an advanced permafrost model, which allows for simulation at very high resolutions. Since ensembles of different model combinations do not exist at such high resolutions, we estimate the bias of our approach with a quantile-quantile ranking of an ensemble of existing coarser simulations. We compare time-slice integrations for present-day climate and two future periods for most of Greenland. Permafrost is projected to degrade in most ice-free regions south of 76°N toward the end of the century, faster in the 5 km simulation than at the 25 km scale. We discuss a permafrost thaw potential based on modeled active layer thickness increase to assess the risk of permafrost degradation depending on surface properties and ice content.