A framework to reveal mechanic thresholds for Giant Retrogressive Thaw Slump initiation

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Giant Retrogressive Thaw Slumps (GRTS) are one of the most important carbon release processes in the Arctic (Rachold et al. 2000). The number of these GRTS in some regions, e.g. Herschel Island (Yukon Territory, Canada) has doubled in the last century (Lantuit & Polland 2008). However mechanical conditions evolving those GRTS is poorly understood.

Here we dedicate the framework of a starting PhD to device mechanical conditions of GRTS. The PhD is based on extensive previous fieldwork and will be located on Herschel Island (Canadian Arctic). Geophysical methods (e.g. Electrical Resistivity Tomography) and optical methods (e.g. LiDAR and photogrammetry) will be used to analyse the spatial and temporal dynamics of this erosive hot spots. Combined with mechanical testing under laboratory conditions this data will be used as a basis for a soil mechanical model of future activity. The aim of this PhD is (i) to gain a routine in estimating the thermal conditions of instable arctic coastlines with geophysical methods and (ii) to develop a solid straightforward mechanical model for the prediction of thawing processes and the associated destabilisation.

This abstract describes a framework for a starting PhD with investigations of large landslides in the arctic, their dynamics and climate sensitivity.