WHERE AND WHY DO COASTAL RETROGRESSIVE THAW SLUMPS DEVELOP?

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Introduction

Retrogressive thaw-slumps (RTSs) are among the most dynamic thermokarst landforms in the Arctic. These slope failures created by permafrost thaw are initiated when active layer detachments or wave erosion expose the ice-rich permafrost layers to solar radiation. RTS occurrence is mostly driven by climatic factors, such as air temperatures, precipitation events leading to changes in the ground thermal conditions.

In some areas of the Arctic, RTSs undergo a period of enhanced activity. However, RTSs are heterogeneous and do not develop in a homogeneous way everywhere along the Arctic coast. In order to better predict Arctic coastal dynamics, it is crucial to get a better overview of RTS distribution along the Arctic coasts and to determine the prevailing factor accounting for their occurrence.

Our objectives are to:
• Describe the extent of RTSs
• Explain differences in the density and coverage of RTSs

Study Area & Methods

The study area comprises a 235 km long and 2 km wide coastal segment of the Yukon Coastal Plain including Herschel Island, Canada. The total study area is 115.4 km². We used an extensive dataset with 26 environmental variables and applied univariate regression trees to define the most influential factors explaining high density of RTSs and large coverage.

Results

RTSs were affecting a larger surface area of coastal segments, which contained a percentage of massive ice equal or greater than 13.7%.

- RTSs occupied 4% of the whole study area.
- 1.3 RTSs per km of coast.
- Highest densities on rolling moraines (2.9 RTs per km of coast).

Explanation: RTSs were affecting a larger surface area of coastal segments, which contained a percentage of massive ice equal or greater than 13.7%.

1 Data obtained from: