

Paleo-landslides and paleo-climate: insights from West Greenland

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Landslides are worldwide geohazards that are likely to increase in the future. Landslide occurrences have been prone in nearshore slopes of high latitude areas of Alaska, Canada, Norway, Greenland, Iceland and the Faroe Islands. Alone in Greenland, over 560 landslides have been mapped based on observations from remotely sensed imagery, and geological maps. The nearshore sedimentary record preserves the deposits of historical and paleo-landslides from coastal slopes in the form of mass transport deposits (MTDs). A unique archive of geophysical and geological data was obtained in the nearshore of Karrat Fjord and Vaigat Strait during 2019 and 2021 GEUS expeditions, which aimed to image and sample MTDs related to past occurrences of landslides under the broader Fjeldskreds project. Hence, morpho-structural and seismic-stratigraphic analyses have been performed on >4000 km of high resolution seismic, sub-bottom, and bathymetry data resulting in detailed mapping of the MTDs embedded in the sedimentary records of Karrat Fjord and Vaigat Strait. Besides, ~80 m of sediments recovered in 30 cores have been scanned providing information about the lithology and composition of the uppermost sediments (~6 m), i.e., the last ~10 ka based on sparse ¹⁴C dating. Preliminary results of these analyses show spatial and temporal variability in the occurrence of landslides. The distribution and recurrence of MTDs across the stratigraphic succession infers that landslides have occurred in Karrat Fjord and Vaigat Strait in the recent geological past, since at least the last glacial maximum. The estimated sediment volumes of buried paleo-landslides (1-8 km³) are in an order of magnitude larger than those of historical landslides documented along the slopes (43-50 million m³). However, further investigation is required to assess the preconditioning factors and triggers of these mega-landslides.