Coastal Cliff Erosion in Greenland

Environmental changes like thawing permafrost and sea level rise are more severe in high latitudes, as climate change is twice as fast in the Arctic than in other parts of the world. Longer ice-free periods and higher water levels are increasing the wave energy coasts are exposed to. At the same time, thawing permafrost is decreasing soil stability making coasts more vulnerable to erosion. Therefore, the Intergovernmental Panel on Climate Change (IPCC) is predicting an increase in erosion rates on coastal cliffs consisting of soft sediments due to sea level rise and higher temperatures. Almost all inhabitants of Greenland are living directly at the coast and the faster coastal change in the Arctic has been identified as an important threat to the environment and to the indigenous population. However, little is known about coastal cliff erosion in Greenland.

The aim of this study is to observe and understand coastal change along soft coastal cliffs in Greenland. Therefore, Gregor Luetzenburg, a PhD fellow from the University of Copenhagen is going to Disko Island on the west coast of Greenland to study a coastal cliff in Greenland for the first time. In order to resolve the underlying processes driving the retreat of the cliff, data from land, ocean and atmosphere are going to be collected. During the time in Greenland, Gregor is mapping the cliffs as well as the ocean floor along a 3 km long section at the south coast of Disko Island. Aerial images taken with a drone are used to monitor the change of the cliff over time. Furthermore, an unmanned boat is deployed to map the ocean floor and explore the hidden structures in front of the beach. The nearby research station from the University of Copenhagen is acting as a base for Gregor’s fieldwork. The COWIfoundation is supporting the field campaign in the remote Arctic by covering travel, accommodation and equipment costs.

The results of this project will enhance the understanding of future changes of the coast of Greenland, providing valuable data to further investigate coastal erosion impact on land and ocean. The acquired data will be essential for the indigenous population of Greenland to manage and conserve their coastlines, protecting villages close to the coast. Ultimately, the goal is to apply the gained knowledge about coastal cliff erosion processes to predict future developments under a changing climate shedding some light on the challenges to come.