

Anna Irrgang ✉ anna.irrgang@awi.de

Oral – Permafrost in a Warming World: Impacts and Consequences

Anna M. Irrgang, Mette Bendixen, Louise M. Farquharson, Alisa V. Baranskaya, Li H. Erikson, Ann E. Gibbs, Stanislav A. Ogorodov, Pier Paul Overduin, Hugues Lantuit, Mikhail N. Grigoriev, Benjamin, M. Jones

Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung

DYNAMICS OF ARCTIC PERMAFROST COASTS IN THE 21ST CENTURY

Climate warming is particularly pronounced in the Arctic with temperatures rising twice as much as in the rest of the world. It seems natural that this warming has profound effects on the speed of erosion of Arctic coasts, since the majority consists of permafrost, composed of unlithified material and hold together by ice. Permafrost stores approximately 1307 Gt of carbon, which is almost 60 % more than currently being contained in the atmosphere. Understanding the main drivers and dynamics of permafrost coastal erosion is of global relevance, especially since floods and erosion are both projected to intensify. However, the assessment of the impacts of climate warming on Arctic coasts is impaired by little data availability. We reviewed relevant scientific literature on changing dynamics of Arctic coast, potential drivers of these changes and the impacts on the human and natural environment. We provide a comprehensive overview over the state of the art and share our thoughts on how we envision potential pathways of future Arctic coastal research. We found that the overwhelming majority of all studied Arctic coasts is erosive and that in most cases erosion rates per year are increasing, threatening coastal settlements, infrastructure, cultural sites and archaeological remains. The impacts on the natural environment are also manifold and reach from changing sediment fluxes which limit light availability in the water column to a higher input of carbon and nutrients into the nearshore zone with the potential to influence food chains.