

Aspects of changes in ice, snow and freshwater in Greenland

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The cryosphere in Greenland is currently undergoing strong changes. While remote sensing improves our understanding of spatial and temporal changes across scales, particularly the knowledge of changes during the pre-satellite era is scarce and thus valuable in a climate change perspective.

At Graz University, the last work-place of Alfred Wegener, we have access to the extensive expedition results from their epic 1929-1931 expedition to Greenland. This coincides with the warmest phase of the early 20th century warm period that was particularly strong in the Arctic. We present an overview of the main findings of the Wegener expedition archive and set it into context with further monitoring activities that occurred since. We assess the potential for using reanalysis data in order to reconstruct glacier changes as well as meteorological conditions in the ablation zone and show surprising systematic deviations of snow properties compared to extensive modern databases.

While the above is based on archival data and existing databases we show exemplarily a monitoring dataset on hydrometeorological variability in catchments with minor glacier cover in Southwest Greenland and quantify strong gradients in freshwater input into a low arctic fjord both in absolute values and in the timing of discharge peaks. We identify climate gradients and catchment characteristics as the main drivers of those differences and discuss the application of such a detailed time series for larger-scale analyses.

[1] <https://www.uibk.ac.at/acinn/graduate-seminar/index.html.en>