ACINN Graduate Seminar, Innsbruck University
Location: Seminar Room on the 8th Floor of Bruno-Sander-Haus (60819SR)
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The impact of climate oscillations on the surface energy budget over the Greenland Ice Sheet in a changing climate

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In response to global warming, Greenland, the largest ice body in the Northern Hemisphere, has been identified as a key contributor to sea level rise. Changes in the transport of heat and moisture from mid-latitudes towards Greenland are considered among the main drivers of the pronounced mass loss in recent decades.

We present an analysis that combined the North Atlantic Oscillation, the Greenland Blocking Index and the integrated water vapour over the Greenland Ice Sheet (GrIS) to regionally investigate the impact of large-scale atmospheric circulation patterns from the North Atlantic on the surface energy budget components (SEB) of the GrIS. With the support of 62 years of state-of-art polar-adapted regional climate model output, spatio-temporal changes on SEB components during different atmospheric circulation patterns were investigated on a seasonal scale. Warming and moistening in relation to large- and regional-scale contributions to GrIS mass loss were described. Strong changes in multiple atmospheric variables were found particularly across the northern parts of Greenland, suggesting that atmospheric drivers beyond heat and moisture originated from the North Atlantic. This is of particular relevance due to the hypsometry of the GrIS in this region with gently inclined low-lying ice volumes that indicate a strong climate sensitivity.

Literature:

Silva, T., Abermann, J., Noël, B., Shahi, S., van de Berg, W. J., and Schöner, W.: The impact of climate oscillations on the surface energy budget over the Greenland Ice Sheet in a changing climate, The Cryosphere, 16, 3375–3391, https://doi.org/10.5194/tc-16-3375-2022, 2022