



A model-based climatology of wintertime gap flows in the Nares Strait region (Greenland).

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Analyses of the wintertime gap flows in the Nares Strait are presented based on 30yr of wintertime simulations (Nov-Apr, 1987/88 - 2016/17) from the atmospheric regional climate model COSMO-CLM. The Nares Strait is a small channel, bounded by the steep topography of Ellesmere Island and Greenland. COSMO-CLM simulations have a high resolution of 15km that is necessary to resolve the Nares Strait. In comparison, the Arctic System Reanalysis data (ASR, 2000-2012) of 30km resolution do not capture the maximum locations and magnitudes, but the newly available ASR data of 15km do so and show similar results as COSMO-CLM.

The topography of this unique region provides an environment for orographic channeling effects. Wind events are coupled with a strong pressure gradient resulting in intense and southward flows from Lincoln Sea to Baffin Bay. During the winter half year the flow is mostly ageostrophic and the maximum flow occurs at a height of 100 to 200m with maximum monthly mean winds of around 16m/s. Caused by the gap flow effect, these low-level jets have their maximum located immediately behind Smith Sound, the most narrow point in the Nares Strait. Wind events stronger than 20m/s occur in average almost once a week during winter, but with a high interannual variability. In the same region the North Water Polynya forms regularly, which is associated with the strong winds through the Nares Strait.