BMBF project MISLAM

Modelling the **i**mpact of **s**ea-ice **l**eads on the **a**tmospheric boundary layer during **M**OSAiC (MISLAM)

MISLAM is a joint project of the department of Environmental Meteorology University of Trier (PI Günther Heinemann) and the Institute for Meteorology and Climatology of the Leibniz University of Hannover (PI Micha Gryschka). The overarching hypothesis of the project is that subgrid-scale effects of sea-ice leads have an impact on the atmospheric boundary layer (ABL) that is not adequately considered in the current representation of sea ice in regional climate models (RCMs). The overall goal of the project is to study the impact of sea-ice leads on the ABL during the MOSAiC experiment 2019/20 by high-resolution atmospheric simulations from convection to large-eddy resolving scales. The project will yield an important data set for the verification of sea-ice parameterizations in weather forecast and climate models, and it will improve our understanding of the impact of sea-ice leads on the ABL.

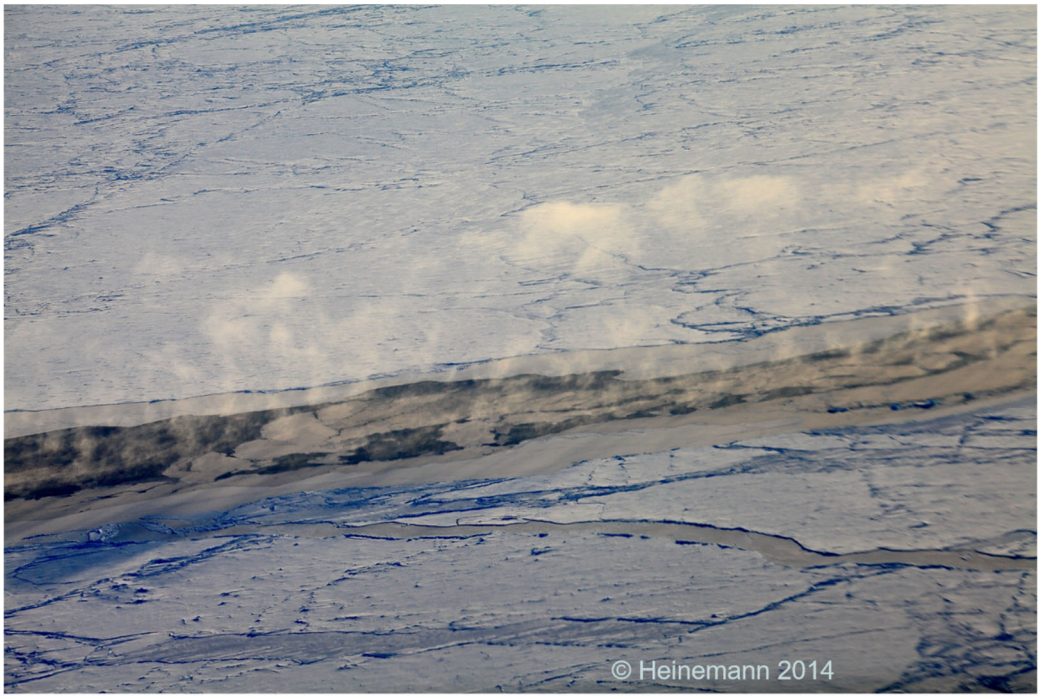

Fig.1: Sea smoke over a sea ice lead in the Arctic indicating intense energy exchange between surface and atmosphere.

Subproject University Trier – Multi-Scale simulations using a regional climate model

Regional climate simulations are carried out for the Arctic using the regional climate model CCLM with resolutions from 15 km down to 1 km. In addition to microwave sea-ice concentration (SIC) data, daily lead maps and SIC with 1 km resolution are used for November 2019-April 2020 by a lead retrieval that was developed at the University Trier. These data are used for CCLM with resolutions of 15, 5 and 1 km. The impact on the interactions at the atmosphere/sea ice/ocean interface and the ABL will be studied. The verification of the simulations is performed using meteorological data acquired at the MOSAiC site.

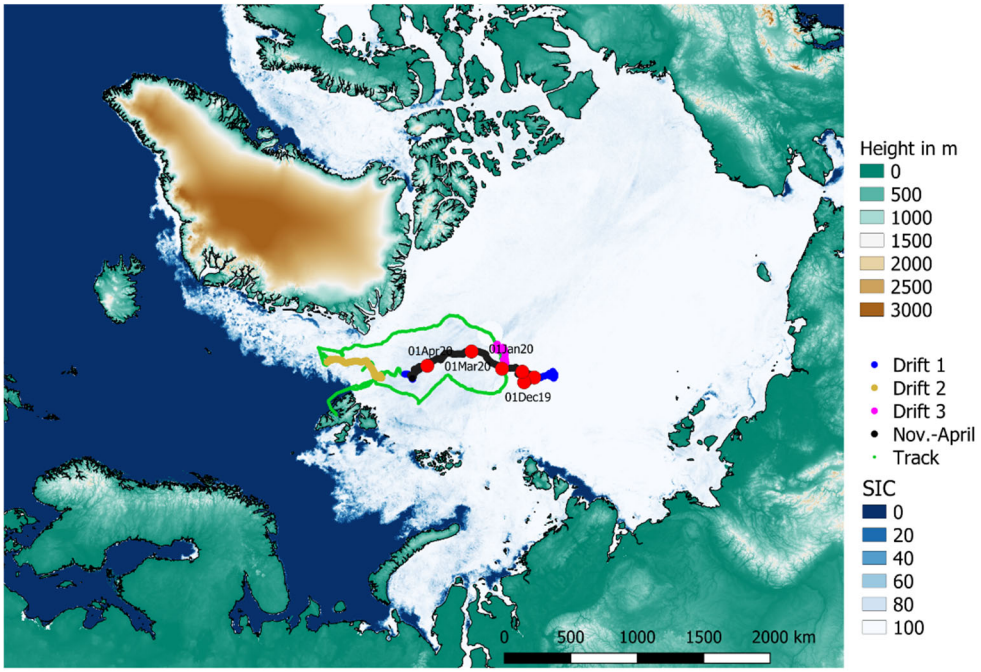

Fig.2: Model domain with 15 km resolution with topography and AMSR2 sea ice concentration for 23 April 2020. The green line shows the entire track of Polarstern, the three drift phases are marked in blue, orange and violet. The black line marks the winter period Nov. to April with dates of selected ship positions. From Heinemann et al. (2022).

References: Heinemann, G., Schefczyk, L., Willmes, S., Shupe, M., 2022a: Evaluation of simulations of near-surface variables using the regional climate model CCLM for the MOSAiC winter period. Elem. Sci. Anth., 10 (1). DOI: 10.1525/elementa.2022.00033

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