

Andreas Preußer¹, Günther Heinemann, Sascha Willmes and Stephan Paul

¹Dept. of Environmental Meteorology - University of Trier
preusser@uni-trier.de

Linking MODIS satellite and airborne thermal infrared imagery to assess polynya characteristics in Storfjorden, Svalbard

Spatial and temporal characteristics of the Storfjorden polynya, which forms regularly in the proximity of the islands Spitsbergen, Barentsøya and Edgeøya in the Svalbard archipelago under the influence of strong north-easterly winds, have been investigated using thermal infrared satellite and airborne imagery.

Thin ice thicknesses were calculated from MODIS ice surface temperatures, combined with ECMWF ERA-Interim reanalysis atmospheric data in an energy balance model for the winters of 2002/2003 to 2013/2014 (Nov.-Mar.). Based on calculated thin ice thicknesses, associated quantities like polynya area and total ice production were derived. Calculated values underline the importance of this relatively small coastal polynya system considering its contribution to the cold halocline layer through salt release during ice formation processes.

Airborne thermal infrared scanner data were collected during the field campaign LEAST (Lead and ABL study in the Transpolar System) in March 2014 using the POLAR 5 aircraft (Basler BT-67). Spatial distributions of the ice surface temperature were acquired with a swath-width of approximately 2 km and a spatial resolution of 2.7 m at nadir for an area of roughly 16x18 km². In addition, in-situ meteorological measurements were performed (including turbulent flux measurements at low levels). This aircraft-based dataset is used for an improvement of remote sensing methods, the verification of the MODIS-derived quantities and investigations of sub-grid effects on the scale of a satellite pixel. A case study is presented for 16th March 2014 in the Storfjorden polynya area.