Geophysical Research Abstracts
Vol. 12, EGU2010-5355, 2010
EGU General Assembly 2010
© Author(s) 2010

Air-sea-ocean interaction processes and impacts on polynya formation and sea ice production in the Laptev Sea of the Siberian Arctic

Günther Heinemann (1), David Schröder (1), Sascha Willmes (1), Lars Ebner (1), Susanne Adams (1), Thomas Ernsdorf (1), Alfred Helbig (1), and Ralph Timmermann (2)

(1) Universität Trier, Environmental Meteorology, Trier, Germany (heinemann@uni-trier.de, +49 0651 2013817), (2) Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany (Ralph.Timmermann@awi.de)

Processes of the exchange of energy and momentum at the sea ice-ocean-atmosphere interface are key processes for the polar climate system. Heat and moisture fluxes are strongly modulated by open water fractions associated with polynyas, having important consequences for the atmosphere, ocean processes, ice formation, brine release, gas exchange and biology. Our paper aims at the study of atmospheric processes forcing and maintaining polynyas in the Laptev Sea of the Siberian Arctic. This region is known as being a highly productive area for the formation of new ice throughout the winter season. We study polynya processes using passive satellite remote sensing data, high-resolution (5km) sea-ice/ocean and atmospheric models, as well as in-situ data obtained during experimental studies in that area. Passive microwave sensor data (SSM/I, AMSR) are used together with atmospheric reanalysis to characterize the long-term spatiotemporal characteristics of polynya events. A special focus lies on the detection of thin ice in polynya areas, which is studied using thermal infrared data (MODIS, AVHRR). Thin ice statistics combined with microwave data allows for estimations of ice production rates for the last decades. The NWP model COSMO is used together with the sea-ice/ocean model FESOM to study polynya dynamics. Model simulations are validated using satellite data and in-situ measurements from two campaigns in the Laptev Sea area.