



Investigation of regional sea ice budgets in the Arctic using the sea ice/ocean model NAOSIM

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Remote sensing data show a continuous decrease of sea ice in the past 30 years. Climate models predict a further decreasing for the future. Therefore, a closer analysis of the production processes, the trend development and the regional variability is necessary. The Laptev Sea plays an important role for the Arctic sea ice budget due to a high polynya activity at the Siberian coast. The coupled ocean-sea ice model NAOSIM (North Atlantic/Arctic Ocean-Sea Ice Model) is used for the study of thermodynamic and dynamic ice production processes for the whole Arctic for the period 1990-2008. The simulation is driven by daily NCEP/NCAR data, and the horizontal resolution of the model is about 9km. Sea ice concentration from satellite data is used for the verification of model results. The model is able to reproduce the mean annual cycle and the negative trend realistically. A detailed analysis of the thermodynamic sea ice production/melt and the dynamic redistribution for different regions of the Arctic shows that the mean sea ice production of the Laptev Sea area exceeds the sea ice melt rate by 740 km³/a. That sea ice volume is transported into the central Arctic. The net ice production in the Laptev Sea is as large as the net ice production in the central Arctic north of 80°N. The Laptev Sea is found to be the largest ice producer compared to other Arctic shelf areas. In addition, the interannual variability of sea ice production in the Laptev Sea is small compared to other regions. A negative trend of sea ice in the Laptev-Sea is not found. For the entire Arctic sea ice volume decrease amounts to the average of -450 km³/a from 1990 to 2008. Studies for years with extreme sea ice anomalies show no direct connections between the sea ice production of the Laptev Sea and the sea ice volume of the entire Arctic.