



Spatiotemporal variability of polynya dynamics and ice production in the Laptev Sea between the winters of 1979/80 and 2007/08

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Polynyas in the Laptev Sea are examined with respect to recurrence and inter-annual wintertime ice production. We use a polynya classification method based on passive microwave satellite data to derive daily polynya area from long-term sea-ice concentrations. This provides insight into the spatial and temporal variability of open water and thin ice regions on the Laptev Sea shelf. Using thermal infrared satellite data to derive an empirical thin ice distribution within the thickness range from 0 to 20 cm, we calculate daily average heat loss and the resulting wintertime ice formation within the Laptev Sea polynyas between 1979 and 2008. Results indicate that previous studies significantly overestimate the contribution of polynyas to the ice production in the Laptev Sea. Average wintertime ice production in polynyas amounts to approximately $55 \text{ km}^3 \pm 30\%$ and is mostly determined by the polynya area, wind speed and associated large-scale circulation patterns. No trend in ice production could be detected in the period from 1979/80 to 2007/08.