

# **SENSITIVITY STUDIES OF SEA ICE FORMATION IN THE KARA SEA**

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Sea ice formation is an important process in Arctic shelf seas because it determines environmental conditions in the whole Arctic, in particular at the coasts. Arctic shelf seas receive large amounts of freshwater which has a significant impact on ice formation and which could be affected by climate change.

In order to study the direct and indirect influence of river runoff on sea ice formation, a high resolution baroclinic 3-d circulation and sea ice model is applied to the Kara Sea. The model is forced with realistic atmospheric winds, surface heat fluxes, river runoff and tides. A vertical adaptive grid is used which provides high resolution in critical areas such as shallow estuaries, slopes or topographic obstacles. The surface following boundary layer is resolved uniformly in 4 m intervals in order to resolve the strong vertical stratification.

The simulated melting rates are sensitive to the penetration depth of shortwave radiation into the water column. Peak runoff rates in the Kara Sea in spring might exceed  $100.000 \text{ m}^3/\text{s}$  which causes high suspended loads in the water column and reduces the shortwave penetration depth considerably compared to ambient Arctic waters. As a result, coastal sea surface temperatures rise and ice melting is significantly enhanced. Our sensitivity studies show, that the indirect influence of river runoff on ice melting could play an important role in future studies on climate variability in the Arctic.