

Oceanography of the Laptev Sea

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The Laptev Sea shelf is an important ice formation and export region, characterized by extensive landfast ice regions and strong polynya activity in winter. The hydrography on this shelf is dominated by freshwater runoff from the Lena, maintaining stratification year-round. Dense water formation is inhibited by freshwater stratification in south-eastern polynyas, but does occur along the north-west coast and around Severnaya Zemlya away from large freshwater sources. These regions likely dominate the communication pathways between the Laptev Sea shelf and the Arctic halocline.

Shelf-basin interactions occur along the shelf break and episodically cause on-shelf transport of basin waters. These waters may carry heat, salt, and nutrients and potentially impact sea ice, biota, and subsea permafrost. Therefore, predicting the consequences of changing ice conditions on the Laptev Sea shelf environment requires a better understanding of the shelf's under-ice circulation.

Climate warming in the Arctic will also have considerable impacts on carbon cycling. For instance, an increase in the riverine organic matter loading to the Laptev Sea will have a cascading series of effects on the physical and biological environment. A fraction of the dissolved organic matter is colored (CDOM) and absorbs both ultraviolet and visible light. The Lena river CDOM concentration is high, which can reduce the photic depth in the Laptev Sea shelf region and lead to continued light limitation even after the retreat of sea ice. Additionally, the high CDOM concentrations can potentially affect the heat budget and therefore water column structure and spring sea ice melt.

We present data from summer and winter expeditions and year-round oceanographic records carried out within the framework of the Russian-German "Laptev Sea System" program.

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