



## **Drivers of sea ice decline in the Atlantic water sector of the Fram Strait and north of Svalbard**

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The causes and mechanisms of decreasing concentrations and thickness of sea ice in the Arctic Ocean, observed in recent decades, are still one of the most challenging questions related to accelerated climate changes in the Arctic region, mainly occurring in the loss of sea ice. The north of Svalbard area is one of the regions where the substantial changes in sea ice concentrations are observed both in summer and in winter. One of the possible reasons can be sought in the observed warming of Atlantic water, carried through Fram Strait into the Arctic Ocean. The northward transport of warm and salty Atlantic water, carried by the West Spitsbergen Current, has a significant impact on conversion and circulation of water masses, and heat content of the Arctic Ocean. The working hypothesis of the research is that continuously shrinking sea ice cover in the north of Svalbard and shifting the ice edge in Fram Strait are driven by the interplay between increased oceanic heat in the Atlantic origin water and changes in the local atmospheric conditions that can result in the increased ocean-air-sea ice exchange. The strategy for examining this hypothesis is based on describing the influence of temperature and heat released from Atlantic water, air temperature and wind on shaping winter conditions in two selected regions with different sea ice regimes (the marginal ice zone in the northern Fram Strait and the upper continental slope north of Svalbard). The observed increase in the Atlantic water temperature is the potential driver of the decline in the Arctic sea ice concentration in the studied area, especially during the winter. The analysis of past and present changes in the sea ice cover in relation to Atlantic water variability and atmospheric forcing employs hydrographic data from the repeated CTD sections, systematically collected since 1996 during annual summer Arctic long-term monitoring program ARES, satellite products of sea ice concentration and drift, and selected reanalysis data sets.