

## Ocean heat transport and Arctic sea ice decrease

The Norwegian Atlantic Current, transporting warm and saline Atlantic waters northward, splits into two branches before entering the Arctic Ocean. One branch flows into the Barents Sea, losing most of its heat to the atmosphere, while the second continues north along the west coast of Svalbard, directly providing salt and heat to the Arctic Ocean. During the last three decades observations have shown a warming of the Atlantic water inflows. At the same time the sea ice cover has retreated in the Barents Sea and the area north of Svalbard, and hence contributed to local atmospheric warming. A relation between Atlantic heat and sea ice cover was postulated more than a century ago, and in the Barents Sea, both variations and the recent trend in ice cover have been explained by a warming and strengthening of the Atlantic inflow. We show that warmer Atlantic water also has caused the sea ice loss in the area north of Svalbard.

A lagged response between inflowing Atlantic heat and sea ice cover suggests that the ice cover may be predictable. Guided by a regional ocean model and using available observations from the Barents Sea Opening, we propose and evaluate a prognostic framework to predict the Barents Sea ice cover 1-2 years in advance. Based on recent Atlantic heat input and sea ice cover, the framework appears skillful, and the qualitative prediction of an increase/decrease in ice cover is correct 80% of the available 16 years considering the observations retrospectively. It is in particular predicted that the mean winter sea ice cover for 2015 will exceed that of 2014.