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ABSTRACT

Changes in Atlantic water temperature and polynya size in the region north of Spitsbergen

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The west Spitsbergen shelf is the principal region for the Atlantic water pass. Herein we present the results of analysis of long-term variability of thermohaline characteristics of West-Spitsbergen current and Coastal current for the period from 1950 to 2014. It was found that the temperature and salinity in the study region are exposed to quasi-periodic changes: temperature increase is observed with an average period of 11-12 years. The warm flow of West-Spitsbergen current has a huge impact on the area to the north of Spitsbergen, which is also known as Whaler's Bay polynya. Last years (since 2012), significant changes are happening in the ice-cover of this region, polynya stays open even in winter time. In this study changes of polynya size was calculated for the different time scales: interannual variability based on daily AMSR-E Aqua high-resolution ice-concentration data and long-term variability based on ice-concentration data and AARI ice-charts. Polynya size is considered as open water area and was calculated as a sum of pixels on image with value of ice-concentration equal to 0 % for high-resolution data and from 0 to 15 % for low-resolution data. Time series of polynya size and AW temperature were considered together, strong correlation between AW temperature and polynya size was found (correlation coefficient up to 0.7). In some periods, mainly in autumn, rapid changes in area of open-water are observed which are not connected to AW temperature. In recent studies I. Onarheim et al. (2014), S. Falk-Petersen et al. (2014) wind speed and direction is considered as another important driver in changes of ice-cover.