



Changes of sea-ice conditions in the area north of Svalbard in the period 1979-2012

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The marginal ice zones in the Arctic are highly dynamic; they are key areas for physical and biogeochemical processes in the climate system. This study focuses on a core area of the Arctic Ocean north of Svalbard, based on remote sensing data. An analysis was made of the processes controlling the sea-ice conditions in this region for the period 1979-2012. We discuss seasonal and inter-annual variability of parameters of the sea ice such as sea-ice concentration, sea-ice extent and vectors of the sea-ice drift. The influence of atmospheric circulation and ocean temperature on the interannual variability of sea-ice extent (SIE) were investigated using sea-ice concentrations obtained from passive microwave satellite imagery, NOAA sea surface temperatures (SST) data base, water temperature recorded in the core of the West Spitsbergen current and NCEP-NCAR sea level pressure (SLP) data. The strongest negative correlations ($R=-0.70$ to -0.78) were found between SIE and SST in the regions most influenced by Atlantic waters (south and south-west of Svalbard). The patterns of distribution of correlation coefficients between interannual variability of SIE in the area north of Svalbard and SLP over the Arctic show two well-defined zones; one zone with a high positive correlation ($R=0.60$ to 0.65) over the Greenland Sea, and one zone with high negative correlation ($R=-0.50$ to -0.55) in the area of western Siberia. We conclude that winds induced by changes in SLP gradient between these zones affect both the redistribution of sea ice, and the advection of heat from the North Atlantic and Barents Sea. We show also positive trends of sea-ice drift velocities and changes in the direction of the sea-ice drift in this region.