



Investigation of the dynamics of the North Water polynya for 1996-2010 using satellite data

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The North Water polynya (NOW) forms recurrently between Ellesmere Island and northwest Greenland and is one of the largest and therefore most important polynyas in the northern hemisphere. It is considered to have a huge impact on atmospheric, biological and ocean processes. An investigation of polynya dynamics between 1996 and 2009/2010 has been performed using sea ice concentration (SIC) products from the passive microwave sensors SSM/I and AMSR-E. From SIC data we derived the total polynya area (POLA, SIC threshold of $< 70\%$), and the open water area (OWA). In June the mean POLA of the NOW reaches its maximum with ca. 101000 km^2 (SSM/I) and 79000 km^2 (AMSR-E), while the mean OWA has values of 81000 km^2 (SSM/I) and 73000 km^2 (AMSR-E), respectively. The number of days without the occurrence of the NOW decreases slightly during the period 1996-2010. The pattern of ice formation and decay shows a tendency to earlier melt of sea ice in the northern Baffin Bay in summer compared to previous studies. The dynamics of the ice bridge located at Smith Sound has a large influence on the formation of the NOW. Time series for regions north and south of the bridge are used to identify the ice bridge characteristics associated with its influence on ice export through the Nares Strait. In addition to the long-term study, a case study for a polynya event on 19 March 2009 has been carried out using MODIS data and a surface energy model. MODIS ice surface temperatures and NCEP reanalysis data are used to derive the thermal ice thickness distribution and ice production. A mean ice production of 0.35 cm/h is calculated for this case study.