



Analysis of wind driven sea ice export through Fram Strait using a high resolution climate model

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The forcing of wind driven sea ice export from the Arctic Ocean through Fram Strait is analyzed for the period 1979-2007, using output of a high-resolution regional atmospheric climate model. By explicitly calculating the components of the atmospheric momentum budget, we show that not synoptic, but mainly thermal wind forcing (THW) causes the persistent northerly flow over Fram Strait. THW results from horizontal temperature gradients in the atmospheric boundary layer (ABL). In this case, it is caused by the cold ABL over the sea-ice covered ocean along the east-Greenland coast and the relatively warmer ABL over the ice-free Atlantic Ocean further east. Over the years we find a negative trend in the THW, associated with a decrease in the large scale sea ice extent over the Greenland Sea. Although the large scale synoptic forcing (LSC) is on average smaller than THW, year to year variations in LSC are larger and strongly correlated with the sea ice area flux through Fram Strait ($R = 0.82$). A small positive trend exists for LSC in the 28 year period.