

Fram Strait Spring Ice Export and September Arctic Sea Ice

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The Arctic Basin exports between 600 000 – 1 million km² of its sea ice cover southwards through Fram Strait each year, comparing to about 10% of the ice covered area inside the basin. During winter ice export results in growth of new and relatively thin ice inside the basin, while during summer or spring export contributes directly to open water further north. A new updated time series from 1935 to 2014 of Fram Strait sea ice area export shows that the long-term annual mean export is about 880,000 km², with large annual and decadal variability and no long-term trend over the past 80 years.

Nevertheless, the last decade has witnessed increased annual ice export, with several years having annual ice export exceed 1 million km². Evaluating the trend onwards from 1979, when satellite based sea ice coverage became more readily available, reveals an increase in annual export of about +6% per decade. This increase is caused by higher southward ice drift speeds due to stronger southward geostrophic winds, largely explained by increasing surface pressure over Greenland. Spring and summer area export increased more (+11% per decade) than in autumn and winter. Contrary to the last decade the 1950 – 1970 period had low export during spring and summer, and mid-September sea ice extent was consistently higher than both before and after these decades. We thus find that export anomalies during spring have a clear influence on the following September sea ice extent in general, and that for the recent decade the export may be partially responsible for the accelerating decline in Arctic sea ice extent.