



## **Pacific Water in the Arctic Ocean and Fram Strait**

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The volume, characteristics and sources of freshwater circulating in the Arctic Ocean vary in time and are expected to change under a declining sea ice cover, influencing the physical environment and Arctic ecosystem. Here we focus on relatively fresh ( $S = 32$ ) Pacific Water, which enters the Arctic Ocean via the Bering Strait and makes up a significant part of the freshwater exiting the Arctic Ocean through Fram Strait. More than 30 repeated sections of nutrient measurements were collected across Fram Strait between 1980 and 2015. The fraction of Pacific Water along these repeated sections can be estimated from the ratio of nitrate to phosphate together with salinity. The time-series of repeated Fram Strait sections indicates that the fraction of Pacific Water passing out of the Arctic Ocean has changed significantly over the last 30 years. Pacific water fractions remained high from 1980 to 1998, but in 1999 Pacific water almost disappeared from Fram Strait, reappearing only briefly from 2011 to 2012.

Several hypotheses suggest how variations in the large-scale atmospheric circulation over the Arctic Ocean may influence the transport and pathways of Pacific Water. Here we test those hypotheses by comparing established atmospheric indices with the long time series of repeated sections across Fram Strait. Repeated sections across Fram Strait are also compared with a simulated Pacific Water tracer in the NAOSIM numerical model to further investigate the upstream drivers of changes observed in Fram Strait.

The principle aim of this work is to identify the processes causing variability in freshwater fluxes out of the Arctic Ocean so that we may better distinguish inter-annual variability from longer-term changes to the Arctic freshwater budget. However, the volume of fresh, silicate-rich Pacific water exported from the Arctic Ocean may also have implications for the ecosystem in the Nordic Seas.