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Turbulence and heat flux observations in the Arctic north of Svalbard

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Heat fluxes and mixing between the ocean and the sea ice in the Arctic is fundamental to understanding the new first year sea ice regime and consequences for regional and global ocean circulation. Here we present observations collected between January and June 2015 during the Norwegian Young sea Ice (N-ICE2015) campaign in the Arctic Ocean north of Svalbard.

In January 2015, the Norwegian research vessel Lance was frozen into the ice at $83^o.3N\ 21.5^oE$. Oceanographic, atmospheric, sea ice, snow and biological data were collected above, on, and below the ice using R/V Lance as the base for the ice camp that was drifting south towards the Fram Strait. Over the following six months, four different drifts took place in the same area, from the Nansen Basin, through the Marginal Ice Zone, to the open ocean.

Throughout the drifts, the oceanography team collected turbulence measurements to estimate mixing, heat, salt, and momentum fluxes in the ice-ocean boundary layer and between the sub-surface warm Atlantic Water layer and the ice-ocean boundary layer close to freezing point. Water tracer data was collected to map water mass properties, and the distribution of the Atlantic Water inflow.

Here we present 600 under-ice microstructure profiles spanning five months, from the deep Nansen Basin to the Yermak Plateau. During this period, several large atmospheric storms took place, forcing a fast drift of the ice camp. Tides were weak in the Nansen Basin and strong on the Yermak Plateau. We investigate vertical heat fluxes between the Atlantic Water layer and the surface mixed layer. Variations in mixing and heat fluxes are interpreted in terms of atmospheric forcing and regional topography.