Supporting Information for "Variability and redistribution of heat in the Atlantic Water boundary current north of Svalbard"

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S1: Comparison of interpolated mooring profiles with shipboard CTD profiles

To assess potential bias when interpolating between CTD sensors on the moorings and sea surface temperature (SST), we compare the interpolated mooring profiles with CTD casts from the deployment and recovery cruises. Comparison is limited by the distance in time between available CTD casts and start and end of the mooring time series. At A800, the complete time series ends 10 days before the recovery when the SBE16 at 49 m depth stopped recording. Figure S1 therefore shows only data from the remaining CTD sensors. At AUPSTREAM, the time series starts three days after the corresponding CTD cast was done. The AUPSTREAM deployment is therefore not included in the comparison.

As expected, interpolated mooring profiles from point CTD sensors as on A200 and A800 cannot capture the full variability seen in a ship CTD profile. There is no recognisable systematic over- or underestimation of temperature in the mooring profiles. Assessment of the deviation of SST from the OISSTv2 data product is difficult as the available CTD casts do not capture the very surface. However, the comparison in Figure S1 suggests that SST is generally lower than the uppermost CTD observations, potentially leading to an

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underestimation of heat content. The difference between derived and actual SST is likely largest in periods with sea ice cover. As discussed in *Reynolds et al.* [2007], SST is set to -1.8° C when ice concentration is 100%, and simulated using a linear relationship between ice concentration and SST for concentrations greater than 50%. Biases vary depending on the amount of sea ice present between >0.6 and < -0.5° C (See Figure A1 in *Reynolds et al.* [2007]) and thus throughout the year. For our heat content calculations, this implies a negative bias for a dense ice pack, and a positive bias for ice concentrations between 50 and 75%.

Supplementary Figures

References

Reynolds, R. W., T. M. Smith, C. Liu, D. B. Chelton, K. S. Casey, and M. G. Schlax (2007), Daily high-resolution-blended analyses for sea surface temperature, *Journal of Climate*, *20*, 5473–5496, doi:10.1175/JCLI-D-14-00293.1.

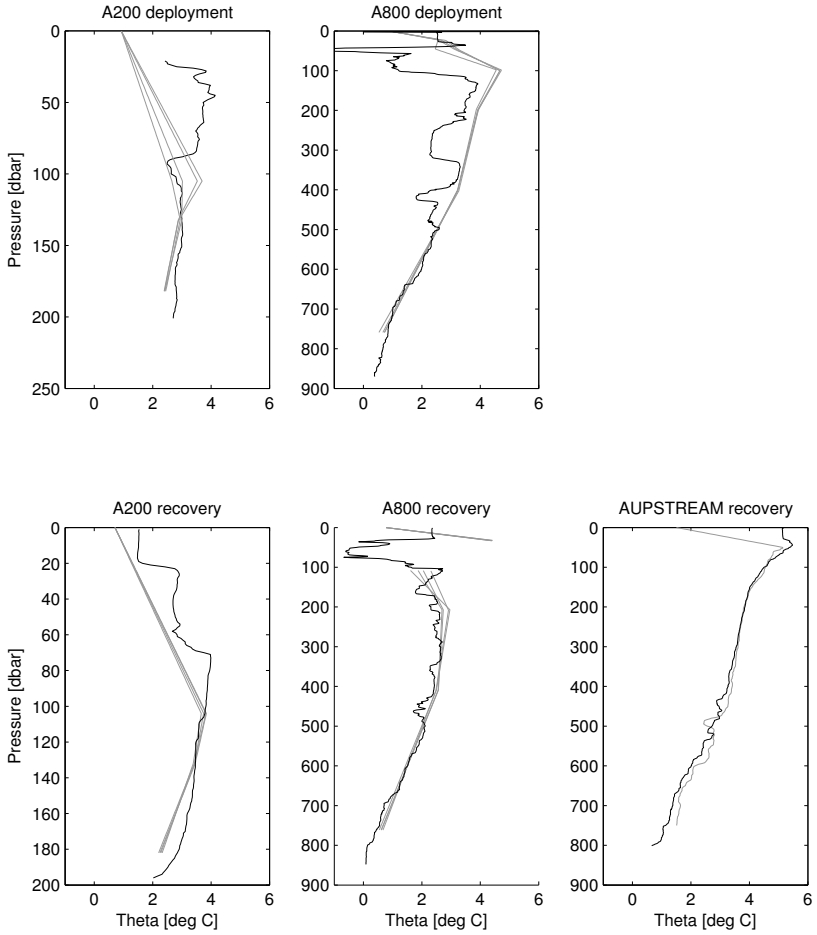

Figure S1. Comparison of potential temperature profiles from shipboard CTD (black) and moored sensor (grey) at moorings A200, A800 and AUPSTREAM (from left to right). CTD profiles were taken during the deployment (top) and recovery cruises (bottom). For A200 and A800, the four profiles closest in time to the CTD data are shown. The time difference between mooring and CTD profiles varies between just under two hours (A200 recovery) and 34 hours (A800 deployment).

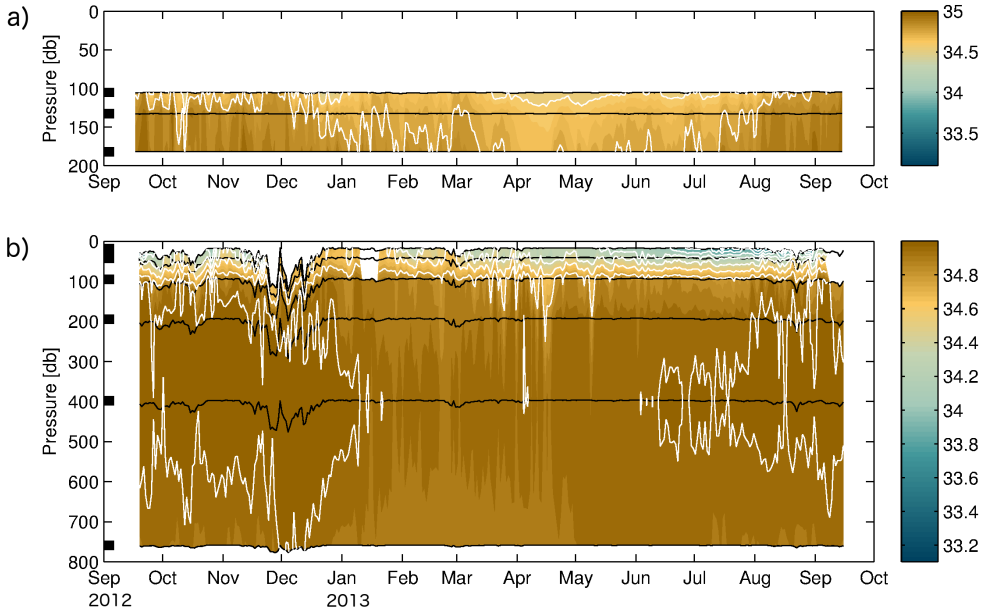

Figure S2. Daily averaged salinity from the a) 200 m and b) 800 m moorings. Black markers on the left y-axes indicate the average depth of the CTD sensors, while black lines show the pressure record from the sensors.

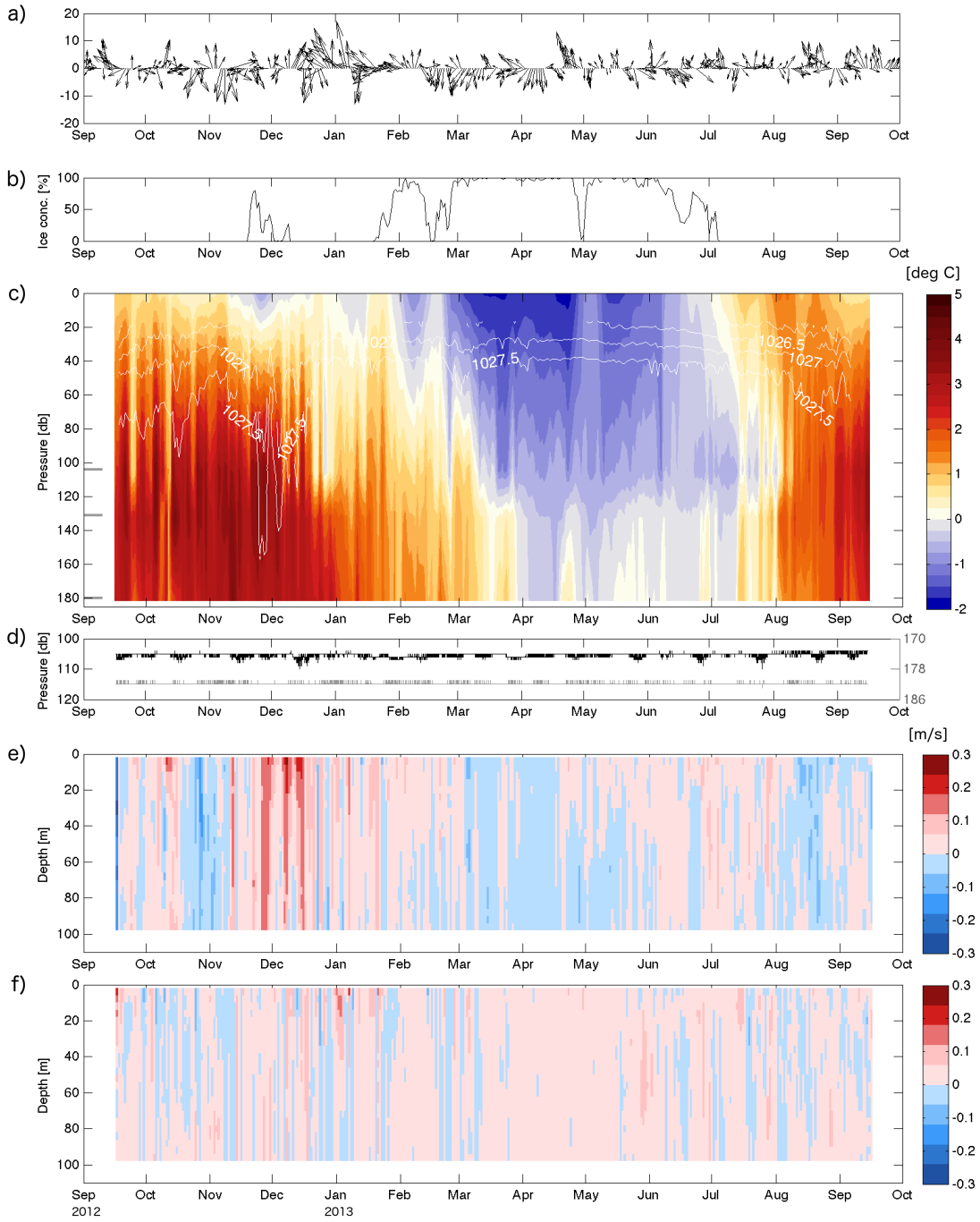

Figure S3. a) Daily wind vectors at 10 m above sea level at the 200 m mooring. b) Sea ice concentrations at the 200 m mooring location. c) Daily averaged potential temperature from SST and CTD sensors on the 200 m mooring. White contour lines represent density contours. Grey markers on the left y-axis indicate average sensor depth. d) Daily pressure from uppermost (black, left-hand y-axis) and bottom (grey, right-hand y-axis) CTD sensors. e) Daily averaged along-slope current at the 200 m mooring. f) as e) but for the across-slope current.

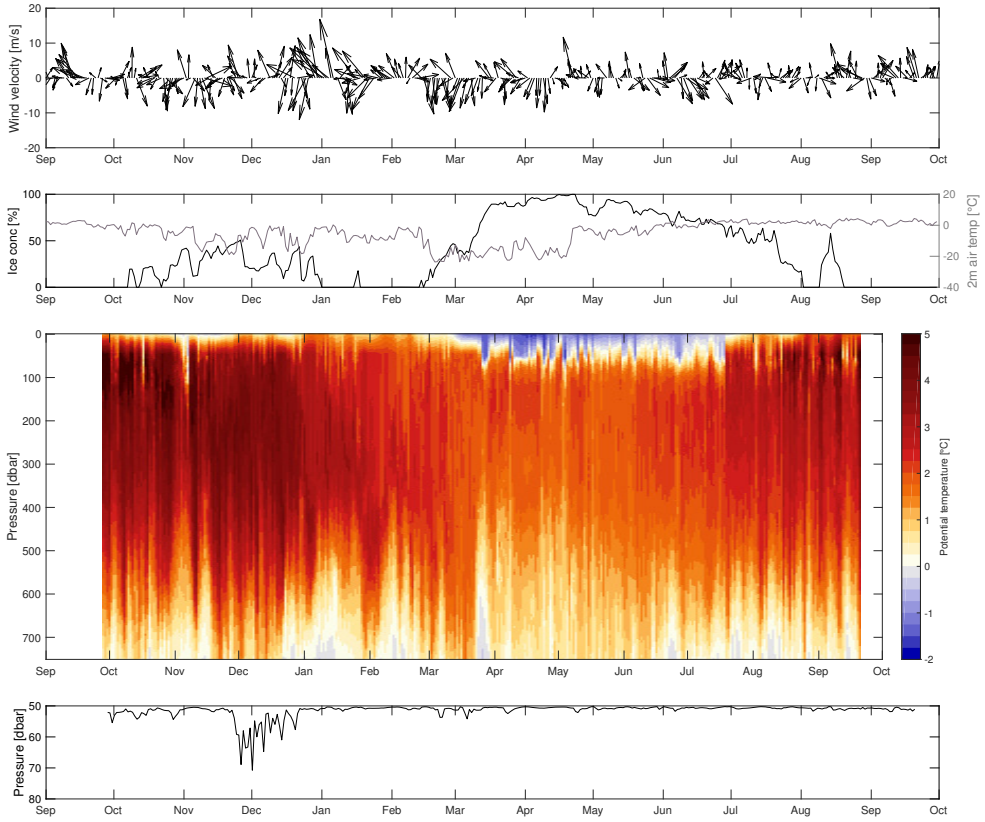

Figure S4. a) Daily wind vectors at 10 m above sea level at the upstream 800 m mooring. b) Sea ice concentrations and air temperature at the upstream 800 m mooring location. c) Daily averaged potential temperature from SST and CTD sensors (fixed and profiling) on the upstream 800 m mooring. d) Daily pressure from the uppermost CTD sensor.

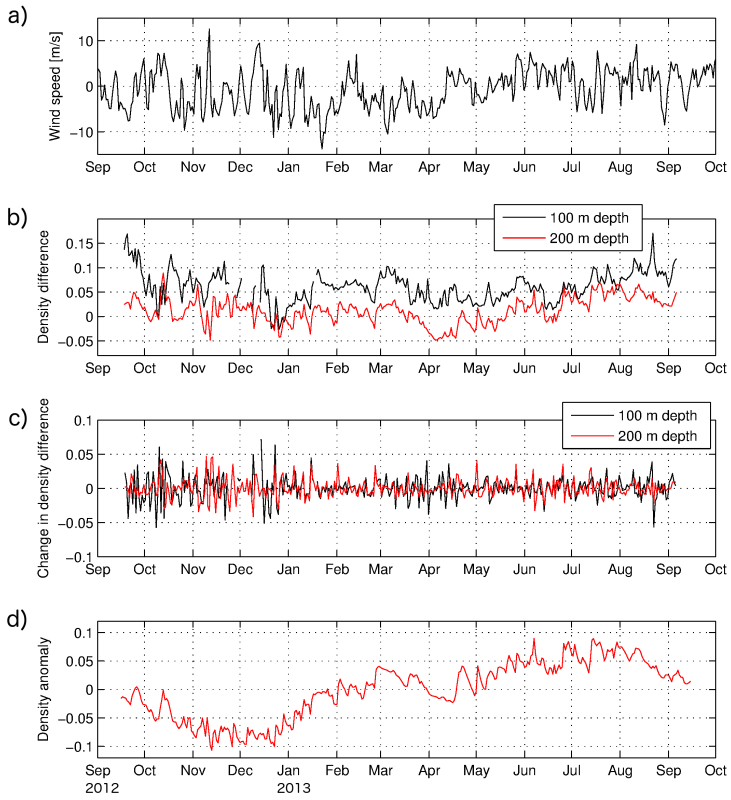

Figure S5. a) Daily along-slope wind speed at 10 m above sea level. b) Potential density difference between 200 and 800 m mooring at 100 and 200 m depth. c) Change in density differences. d) Near-bottom potential density anomalies at the 200 m mooring.