Supplementary Information

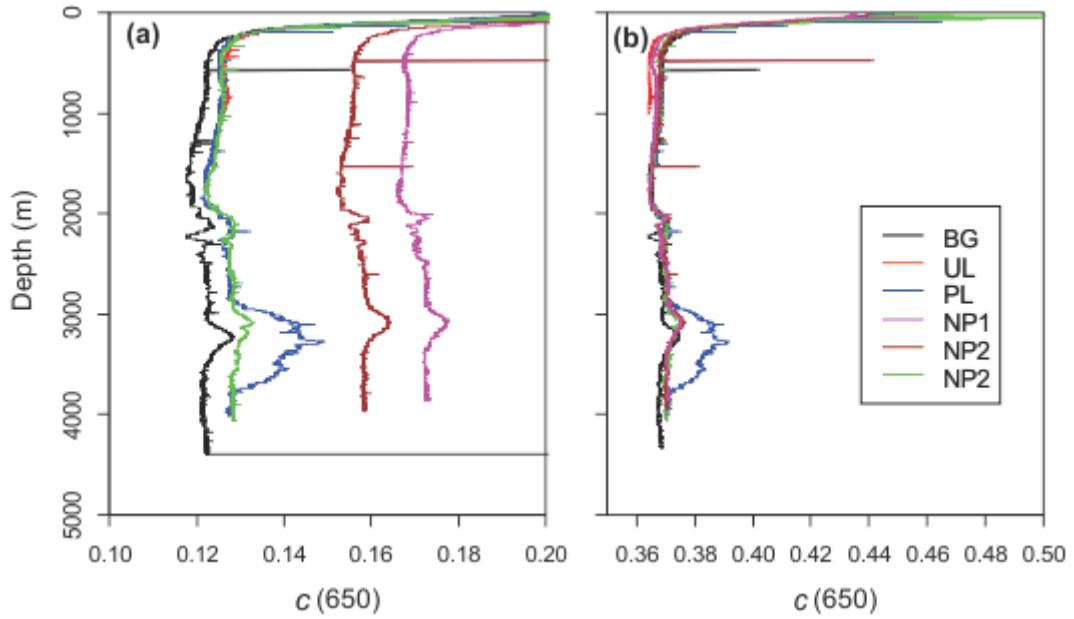
Supplementary information 1: Post calibration of beam attenuation coefficient values

5   The equation used for calculating beam attenuation coefficient was

$$\text{Beam attenuation coefficient } (c, \, [1/\text{m}]) = -(1/z) * \ln (\text{light transmission [decimal]})$$

where z = path length 0.25 m.

10   Afterwards, c values were post calibrated with an offset value that was calculated based on the theoretical clear water minimum beam attenuation coefficient of 0.364 (Intergovernmental Oceanographic Commission, 1994).

$$\text{offset} = c_{min} - 0.364$$

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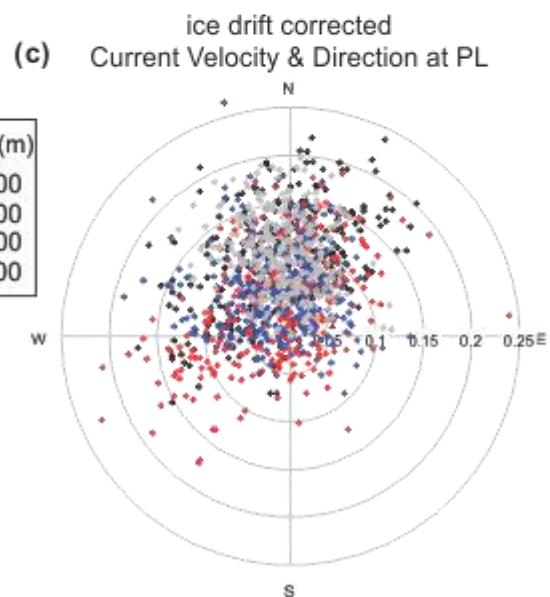
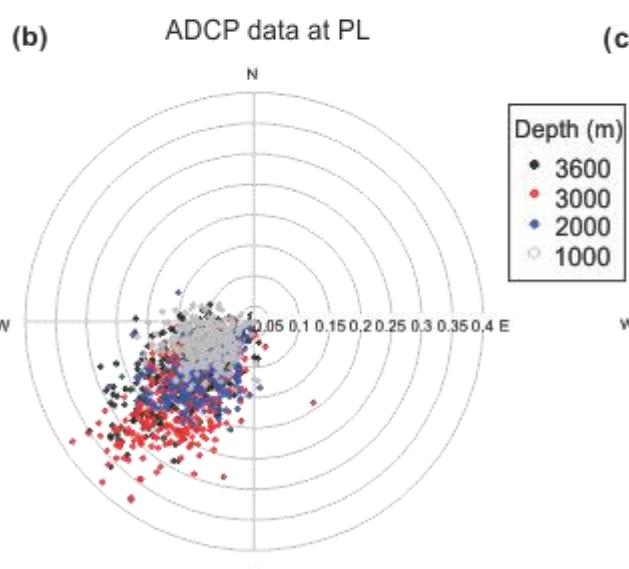
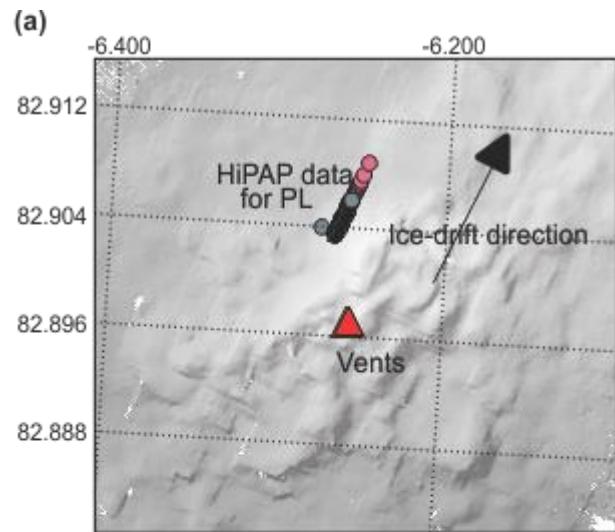
Supplementary Figure 1: Beam attenuation coefficient values before (a) and after (b) post calibration in background (BG), upper layer (UL), plume (PL) and non-plume (NP1-NP3) stations.

Supplementary information 2: Use of HiPAP data

Supplementary Figure 2: (a) High precision acoustic profiler (HiPAP) data obtained at plume (PL) station and ice drift direction of the vessel on map. (b) ADCP data obtained at several depths of PL and (c) ADCP data after ice drift correction that shows actual current direction at given depths.

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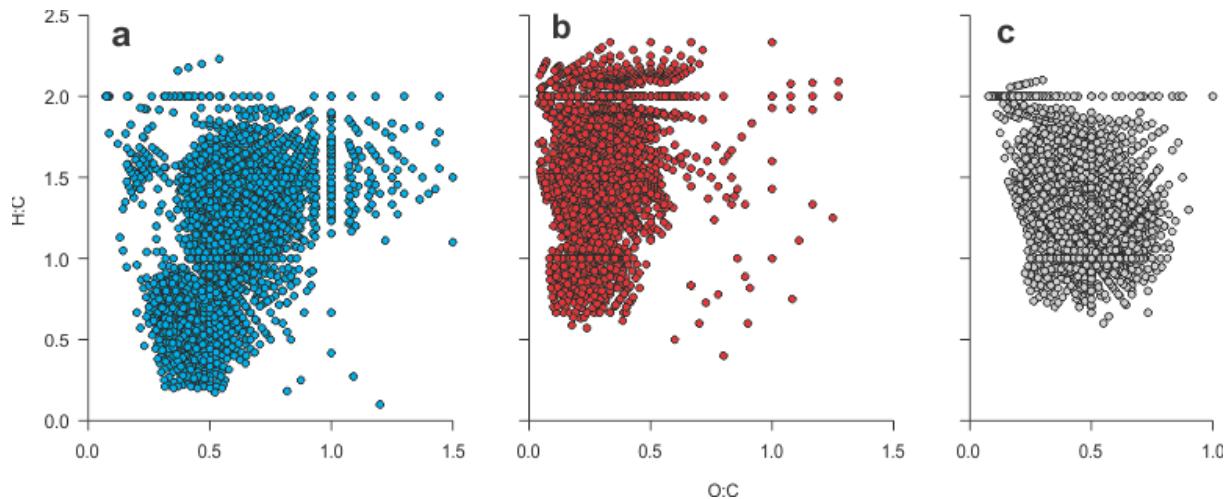
25   **Supplementary Figure 3**

Supplementary Figure 4: Dissolved organic matter (DOM) formulas on van Krevelen diagram obtained from (a) negative ESI (electrospray ionization), (b) positive ESI and (c) formulas common in negative and positive ESI.

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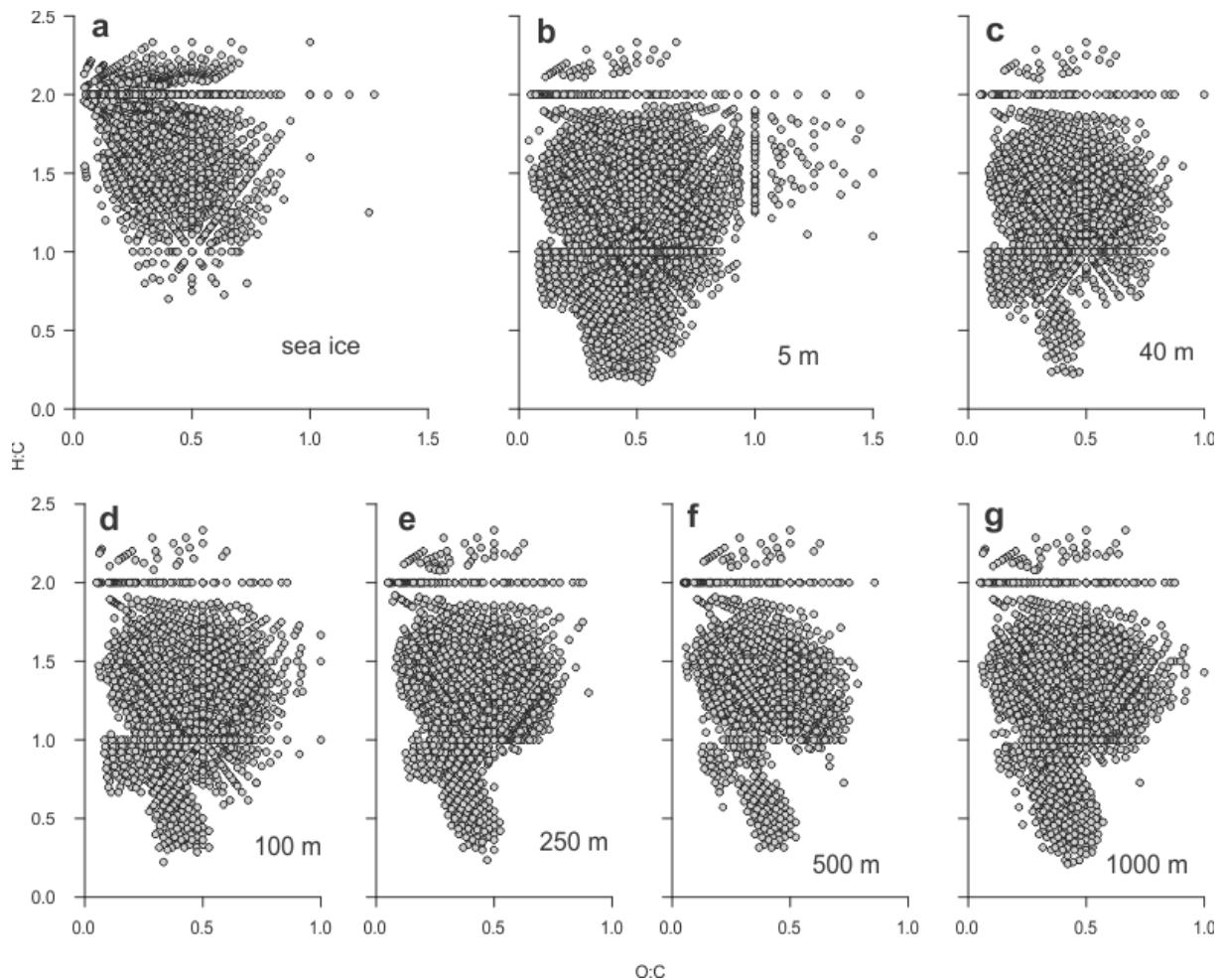
Supplementary Figure 5: Dissolved organic matter (DOM) formulas on van Krevelen diagram obtained in sea ice and upper layer (UL) station.

References

Intergovernmental Oceanographic Commission: Protocols for the Joint Global Ocean Flux Study (JGOFS) Core Measurements, Unesco, https://doi.org/10.25607/OBP-1409, 1994.