



Supplement of

Krill defecation at depth reduces carbon flux attenuation in the Weddell Sea euphotic zone

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Sect. S1 Microplankton community abundance

Sample Collection and Preservation

At stations S1, S2, S3, and S5, fresh seawater samples were collected from 200 m to the surface using a Sea-Bird SBE 9plus CTD system equipped with a 24bottle rosette of 20 L Niskin bottles during predawn casts. Subsamples (250 mL) from 55, 14, 1% surface irradiance levels were preserved with 5 mL acid Lugol's solution in glass amber bottles and stored at 4 °C until return to Plymouth Marine Laboratory, Plymouth, UK. S4, the nearest microplankton samples (both temporally and spatially) were collected from an ice floe (named Floe 8) with water collected using niskins lowered to four depths (1 m, 5 m, 20 m and 30 m) through a pre-drilled hole in the ice. Subsamples were then preserved as above.

Preparation, Imaging and classification

In the laboratory, samples were allowed to settle under gravity, after which the top 200 mL was gently removed, leaving the lower 50 mL containing concentrated microplankton for processing. Prior to imaging, samples were mixed thoroughly and screened through a 100 µm mesh to remove large particles and prevent flow cell obstruction. Concentrated, screened samples were analysed using a FlowCam IV (Yokogawa Fluid Imaging Technologies) with a 10× objective lens and a 100 µm deep flow cell. The imaging configuration targeted particles with an equivalent spherical diameter (ESD) of 10–100 µm, and imaging was performed in Auto-Image mode.-Image mode.

Images were processed using VisualSpreadsheet (v4.19.3). Particles were classified to genus where possible, or assigned to broader taxonomic categories including *Phaeocystis* colonies, large nanoflagellates, dinoflagellates, pennate or centric diatoms, and ciliates. Ice associated phytoplankton taxa (commonly *Fragilariopsis*, *Entomoneis*, *Nitzschia*, *Cylindrotheca* and large single centric diatoms) were subsequently compared with total protist abundance to evaluate their contribution to community structure. These taxa are considered ice associated because they are well documented components of Antarctic sea ice and under ice communities, adapted to the low light, variable salinity conditions of brine channels and the ice–water interface (e.g. Otte et al., 2023).-associated phytoplankton taxa (commonly -associated because they are well-documented components of Antarctic sea-ice and under-ice communities, adapted to the low-light, variable-salinity conditions of brine channels and the ice–water interface (e.g. Otte et al., 2023).

Otte, A., Winder, J. C., Deng, L., Schmutz, J., Jenkins, J., Grigoriev, I. V., Hopes, A., & Mock, T. (2023). The diatom *Fragilariopsis cylindrus*: A model alga to understand cold-adapted life. *Journal of Phycology*, 59, 301–306. <https://doi.org/10.1111/jpy.1332>