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An upper-mesopelagic-zone carbon budget for the subarctic North Pacific

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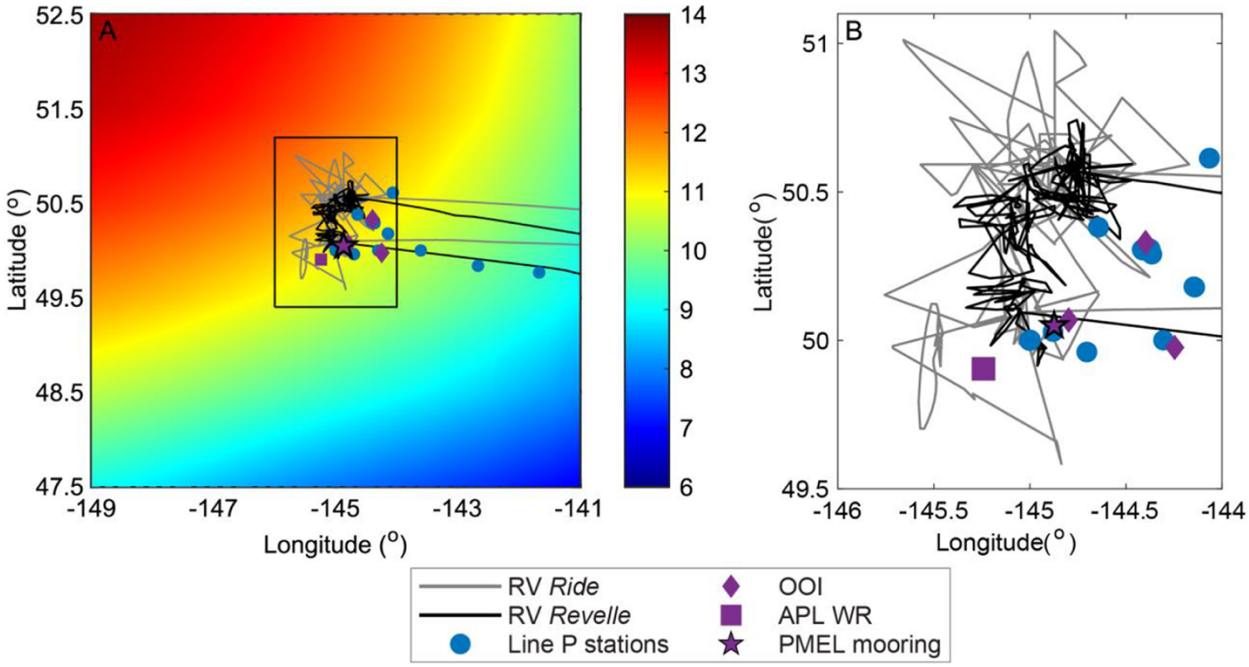

Fig. S1. Site map for the EXPORTS Northeast Pacific field deployment. (A) Annual mean surface nitrate concentrations (color bar in µmol kg^{-1}) from the 2013 World Ocean Atlas (https://www.nodc.noaa.gov/OC5/woa13/) along with ship tracks of the R/V Revelle (black line) and R/V Ride (gray line) in the boxed area, and Canadian Line P stations from their Fall 2018 cruise (Line P cruise 2018-40; blue circles). (B) Enlargement of inset in (A) showing locations of the NOAA PMEL air-sea interaction mooring (purple star), UW-APL waverider buoy (purple square), and NSF OOI subsurface moorings (purple diamonds) along with locations of proximal Line P stations from their Fall 2018 cruise (Line P cruise 2018-40; https://www.waterproperties.ca/linep/2018-040/; blue circles), as well as ship tracks of the R/V Revelle (black line) and R/V Ride (gray line). From Siegel et al. (2021). DOI: https://doi.org/10.1525/elementa.2020.00107.

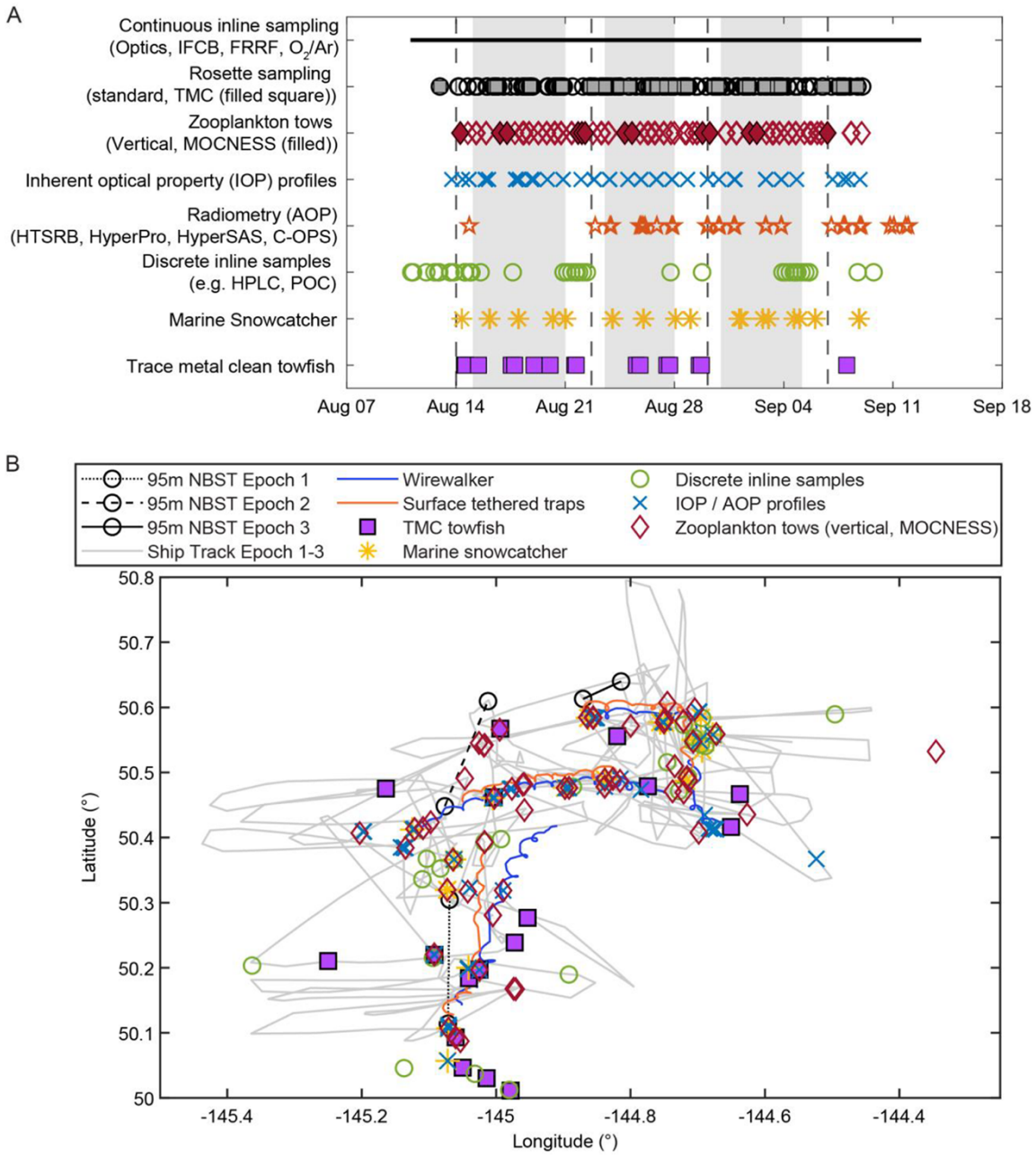

Fig. S2. Temporal and spatial operations of the R/V Revelle during the EXPORTS Northeast Pacific field deployment. (A) Broad categories of sampling events are marked by color, Epoch boundaries are denoted by vertical dashed lines, and autonomous asset deployment periods are shown in gray. The Epoch boundaries are given in UTC as Epoch 1, August 14 00:00 to August 23 09:00; Epoch 2, August 23 09:00 to August 31 09:00; and Epoch 3 August 31 09:00 to September 9 18:00. (B) Epochs and their spatial extent are delineated approximately by the autonomous assets deployed and recovered from the R/V Revelle (black dashed, purple, and blue lines) superimposed over the ship tracks (gray), with the first Epoch in the south and the last Epoch finishing in the most northeast of the EXPORTS experiment region. Locations of specific operations are color-coded to match those in (A). From Siegel et al. (2021). DOI: https://doi.org/10.1525/elementa.2020.00107.

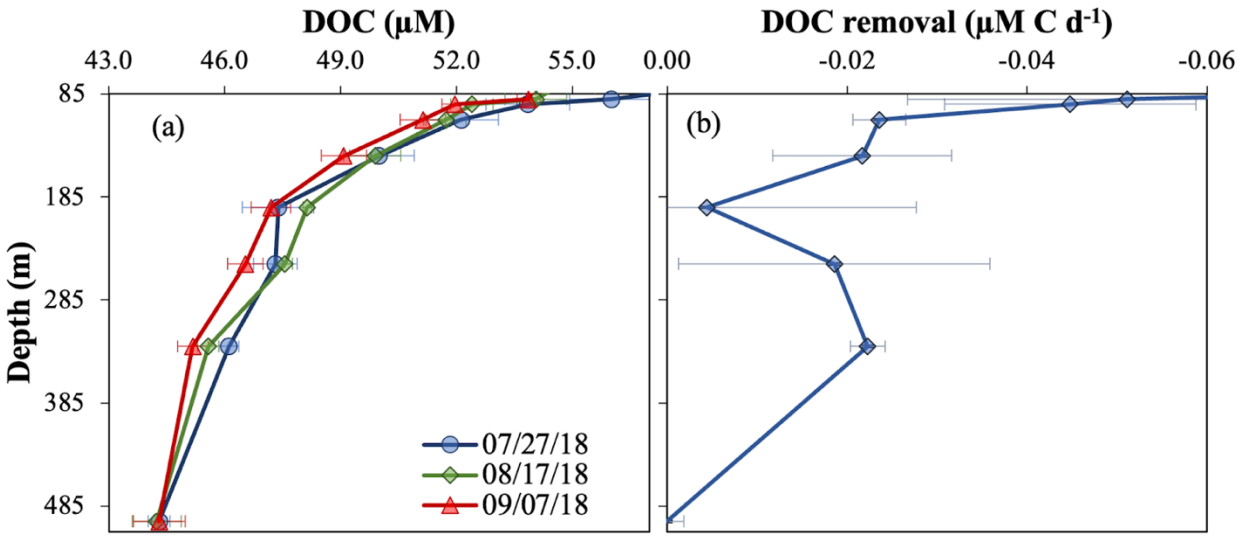

Fig. S3. Decreases in DOC concentrations were used to infer DOC removal rates, the contributions to which may not have been accurately captured by methods conducted during the cruise (i.e., long-term DOC removal may not be captured by ^{3}H-Leu-based uptake by free-living bacteria). When integrated over the 95 to 500 m depth range, DOC removal rates averaged 5.6 ± 3.2 mmol C m^{-2} d^{-1}.

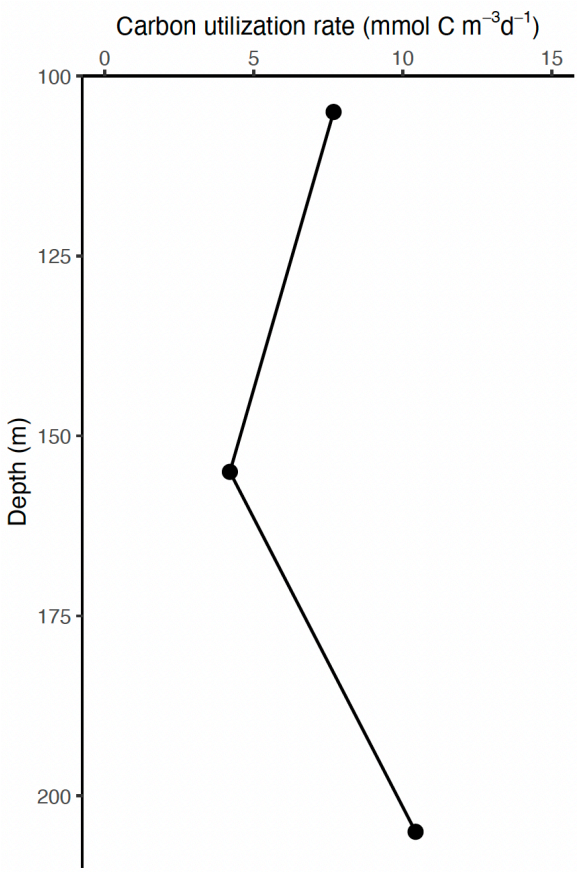

Fig. S4. Particle-attached respiration rates estimated from RESPIRE traps during Epoch 3 at 105, 155 and 205 m. Note that the carbon utilization error bars are less than the size of the data points (e.g., 0.03 mmol C m^{-3} d^{-1}).

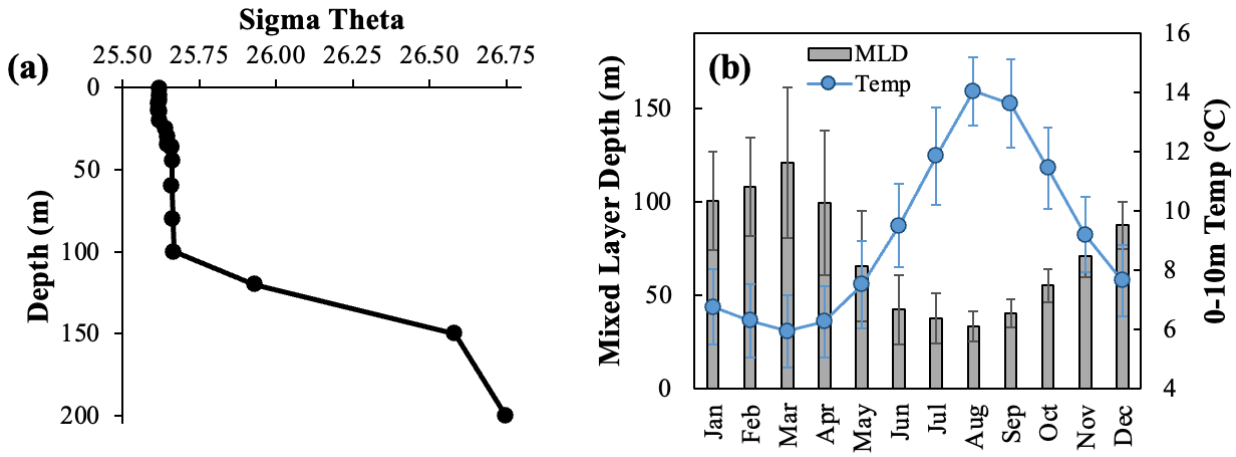

Fig. S5. Potential density profile from the OSP mooring collected on March 29, 2018, illustrating the weakest stratification (a). Mean OSP mooring monthly mixed layer depths (MLD) and surface temperature (0-10 m average) collected between 2008 and 2018 (b).