Impact of glacial meltwater on biogeochemical cycling in coastal and shelf waters off South West Greenland: Insights from shipboard and glider observations

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We used shipboard and ocean glider observations in shelf waters off SW Greenland to inform on how nutrients reach the coastal oceans, and eventually mix off the shelf and into the open ocean.
Mixing of both dissolved and particulate macronutrients and organic matter off the shelf is likely driven by advection in geostrophic currents, tidal and buoyancy forcing, and impacted by storm events and resuspension.

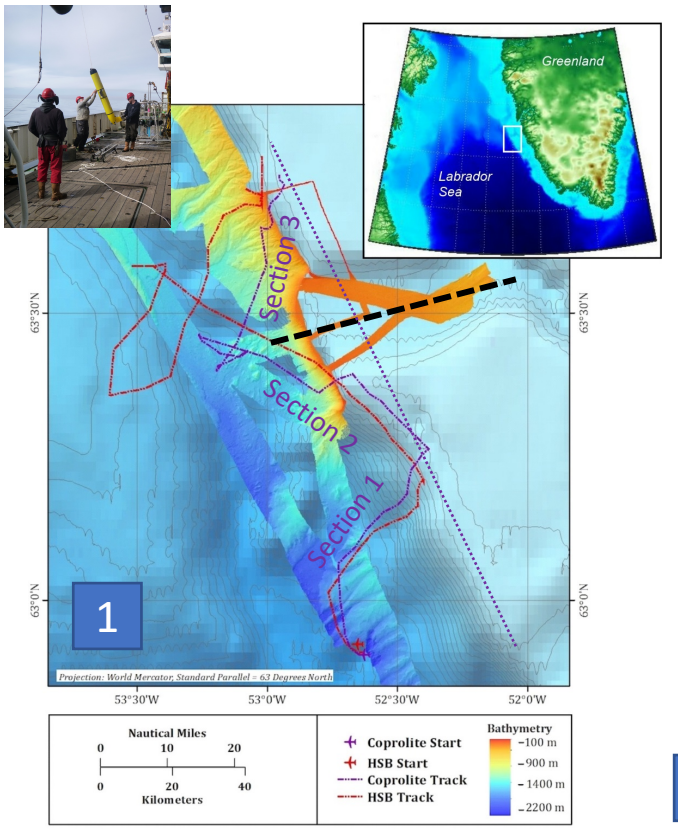


Figure 1: Map of area/glider track. Contoured etopo bathymetry data overlain with ship-board bathymetry data (*Hoy et al., 2018*). Black dashed line shows trough transect; glider sections shown relative to ~100m contour baseline (dotted purple line, for glider 330 "Coprolite" only).

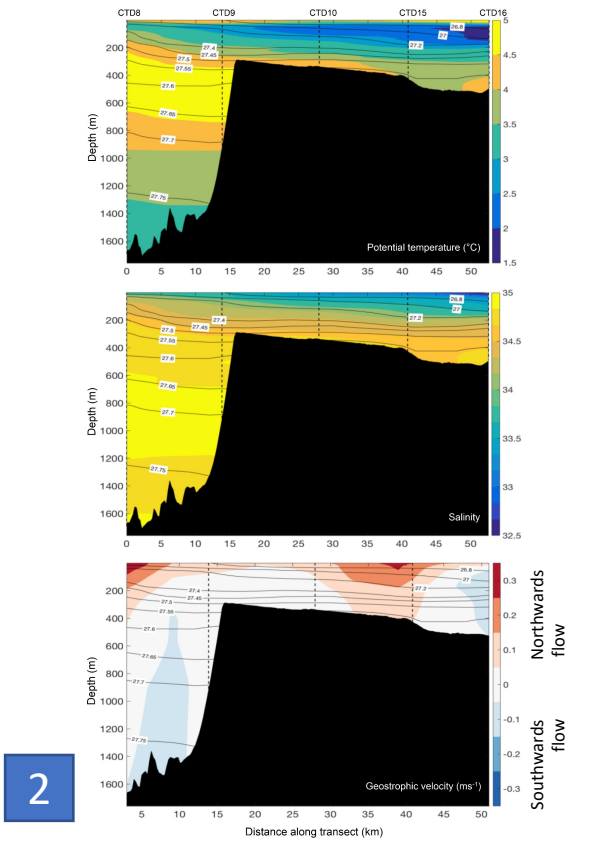


Figure 2: Gridded vertical trough section, from top, of potential temperature (°C), salinity, and geostrophic velocity (m s^{-1}) perpendicular to transect, red: northward, blue: southward along the coast. The black lines with the white boxed labels are isopycnals, which are lines of constant potential density (in kg m^{-3}). The dashed vertical lines indicate the CTD stations from which these vertical sections were derived (*Hendry et al., 2019*).

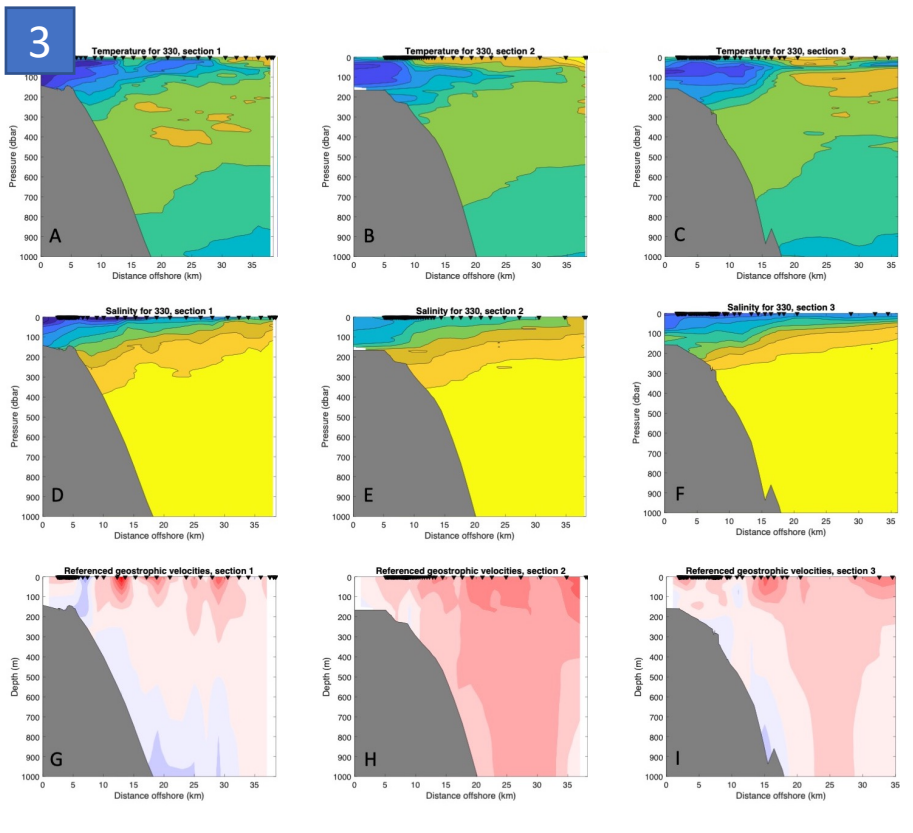
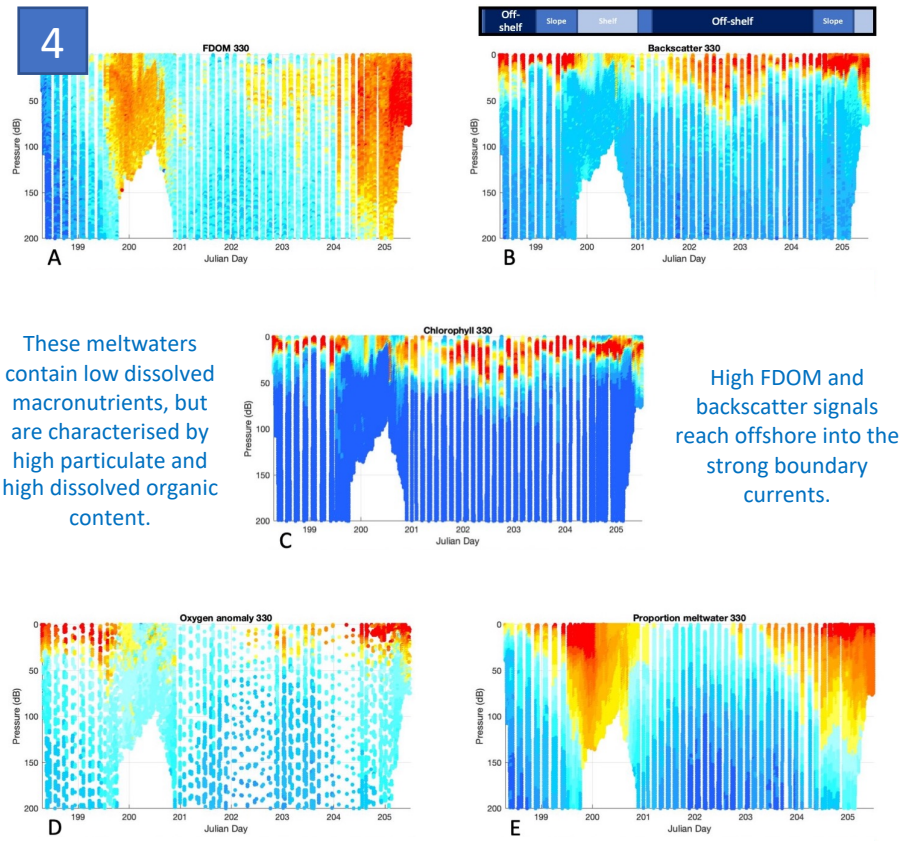


Figure 3: Gridded temperature (A-C), salinity (D-F) and perpendicular structure of geostrophic boundary currents (G-I) for each glider section, plotted against distance offshore from baseline (see fig. 1). Black triangles show start of profile dives.



These meltwaters contain low dissolved macronutrients, but are characterised by high particulate and high dissolved organic content.

High FDOM and backscatter signals reach offshore into the strong boundary currents.

Figure 4: Particulate backscattering coefficient (bbp) (A), fluorescent dissolved organic matter (FDOM) (B), calculated meltwater proportion (C), chlorophyll fluorescence (D), and oxygen anomaly (E) for glider unit 330, plotted against Julian Day along total glider track.

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