Critical uncoupling between biogeochemical stocks and rates in Ross Sea springtime production-export dynamics

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Supplemental Material

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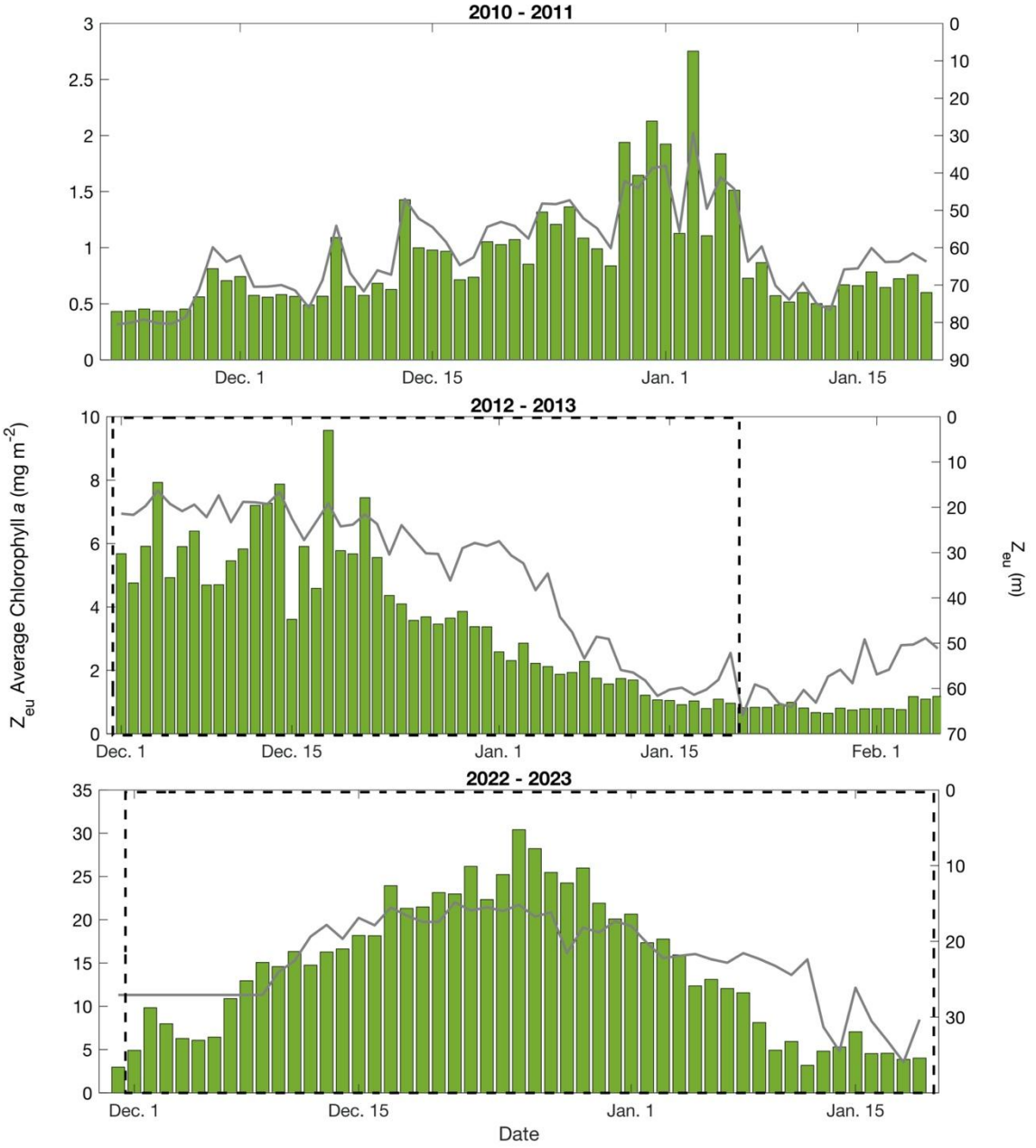

Figure S1. Average euphotic zone (Z_{eu}) chlorophyll *a* concentrations (mg m^{-2}; left y-axis) by day and the average daily euphotic zone (m; right y-axis) for 2010-2011, 2012-2013, and 2022-2023 glider deployments. The dashed box represents sample days where chlorophyll concentrations are within 90% of the peak chlorophyll concentrations. Absence of a box indicates all samples are located within 90%. In 2022-2023, Z_{eu} values were extrapolated from December 9th backwards to account for absent PAR data.

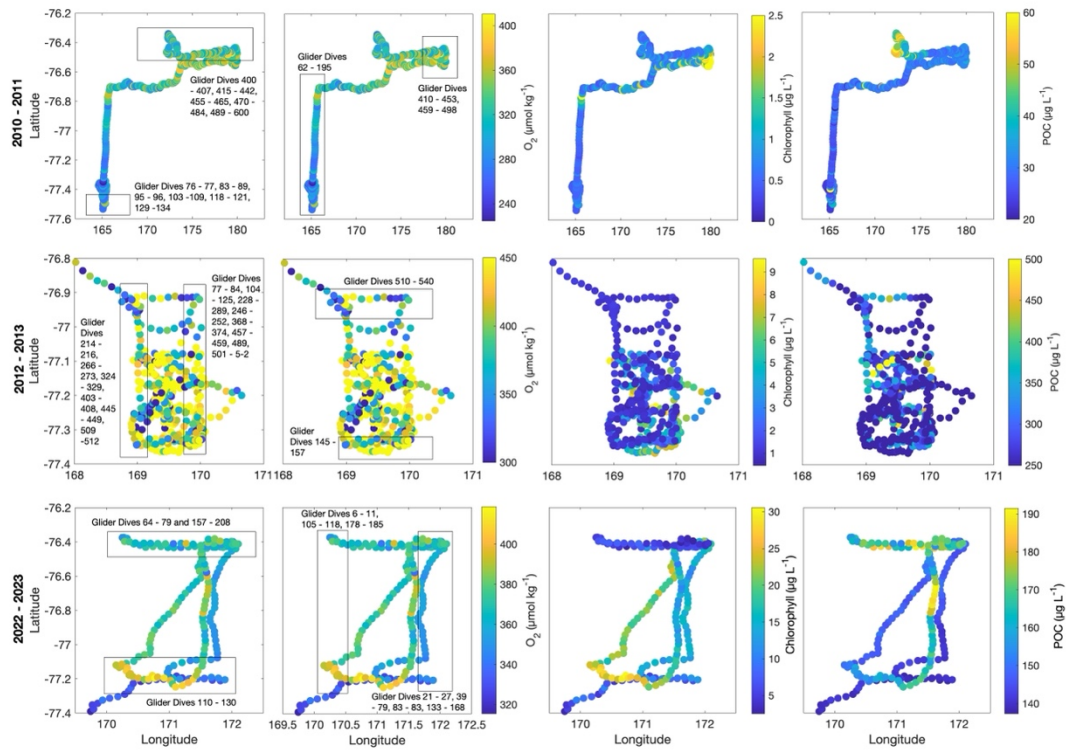

Figure S2. Average 25 m dissolved oxygen (µmol kg^{-1}), chlorophyll (µg L^{-1}), and particulate organic carbon (POC; µg L^{-1}) concentrations by latitude and longitude for the 2010-2011, 2012-2013, and 2022-2023 glider deployments. The boxes indicate minimal and maximal latitude and longitude glider dives used to calculate advective fluxes of oxygen and POC.

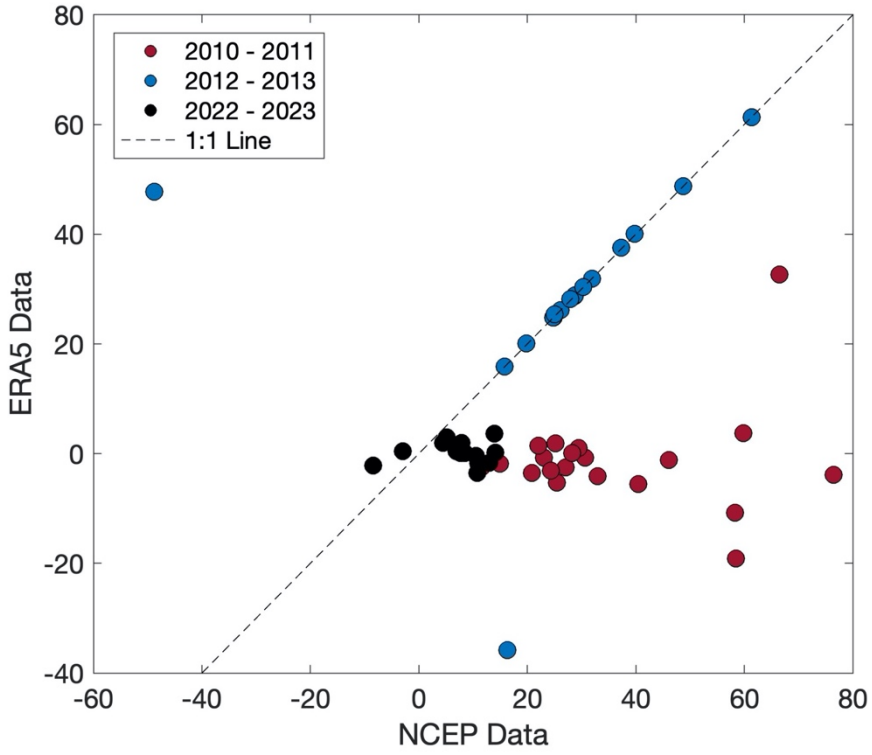

Figure S3. Air sea exchange rates that utilize National Center for Environmental Prediction (NCEP) Reanalysis 1 wind speed and sea level pressure data versus air sea exchange rates that utilize ECMWF Reanalysis v5 (ERA5) wind speed and sea level pressure data for the 2010-2011, 2012-2013, and 2022-2023 deployment dates, specifically. The dashed line represents a 1:1 line. Ultimately, NCEP reanalysis products were deemed best fitted to the study.

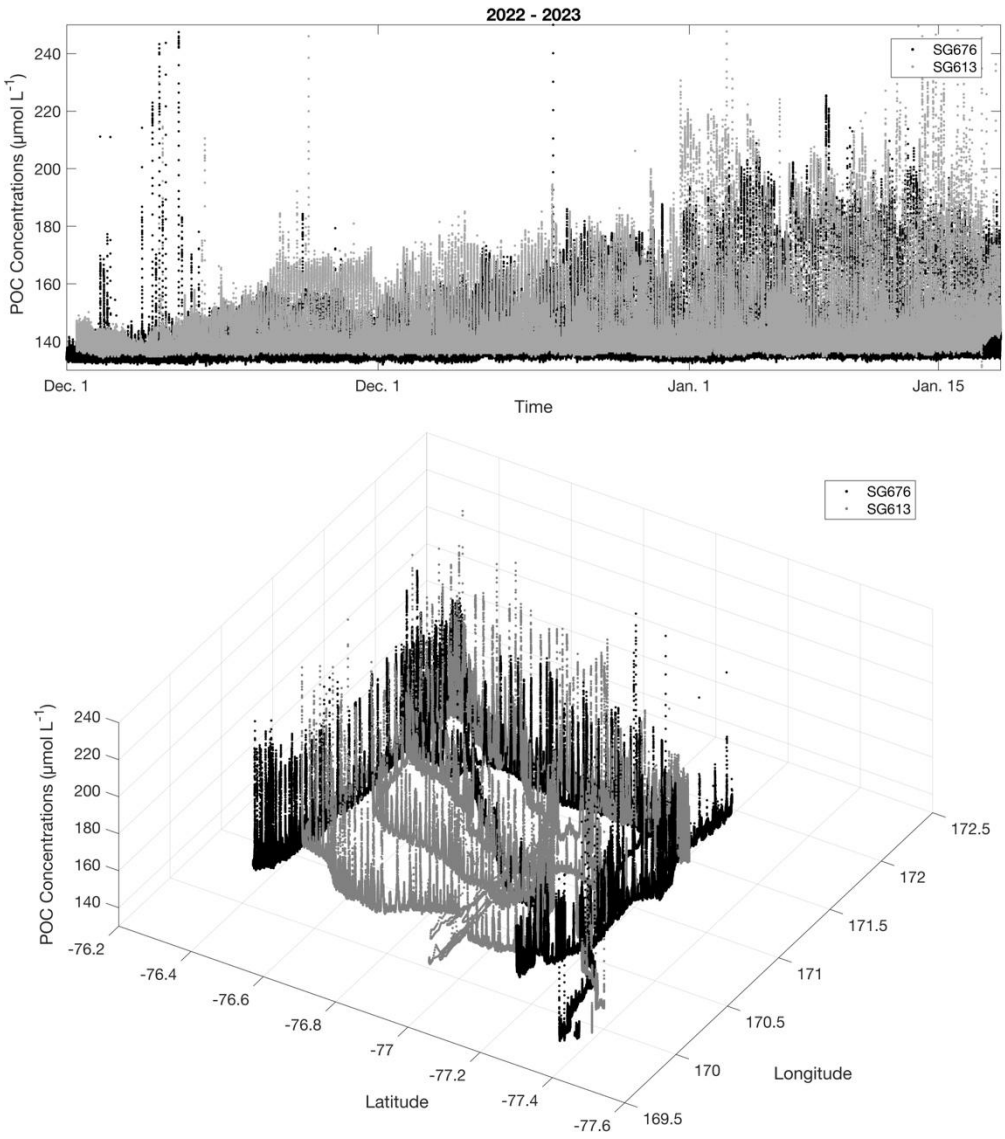

Figure S4. Temporal and spatial comparison of discrete POC concentrations (µmol C L^{-1}) from Seagliders 676 and 613 deployed in the Ross Sea in 2022-2023. Glider measurements show minimal temporal variability despite being in different locations.

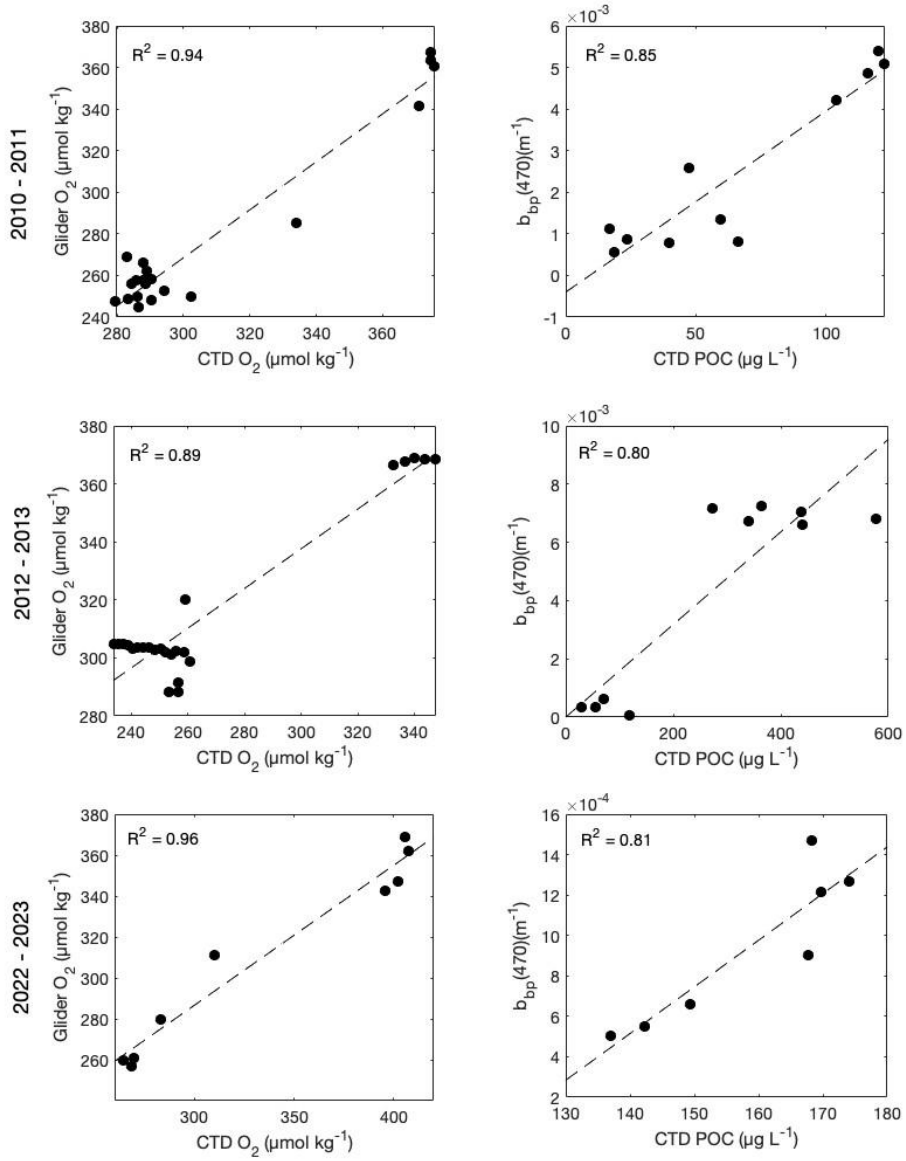

Figure S5. CTD vs. glider derived oxygen (µmol O_2 kg^{-1}) and POC concentrations (µg C L^{-1}) for 2010-2011, 2012-2013, and 2022-2023 glider deployments. CTD and glider oxygen concentrations come from an Aandera optode. Glider POC concentrations come from a Wetlabs sensor whereas CTD POC concentrations come from water samples collected from the CTD rosette, filtered, and analysed according to Gardner et al. (2000).

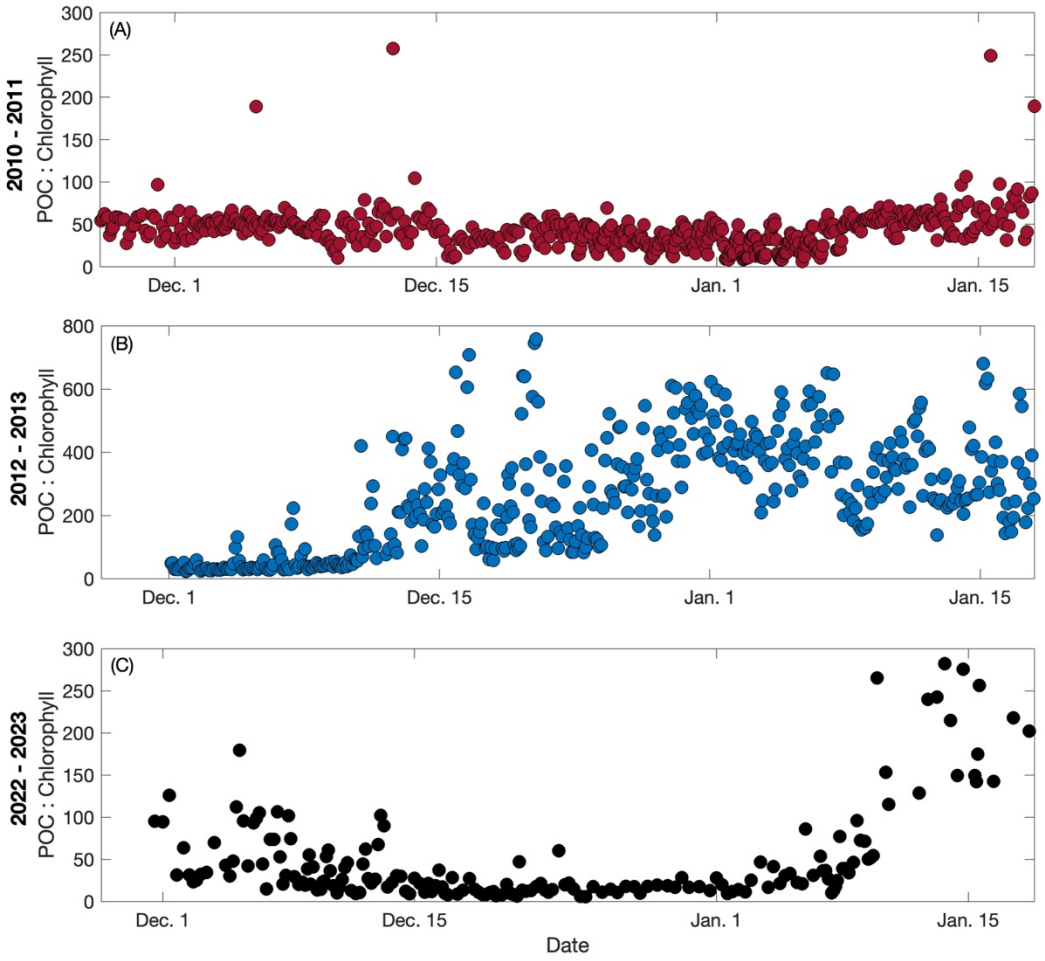

Figure S6. Average 5 m particulate organic carbon: chlorophyll (POC:Chl) ratios through time for each of the glider deployments.