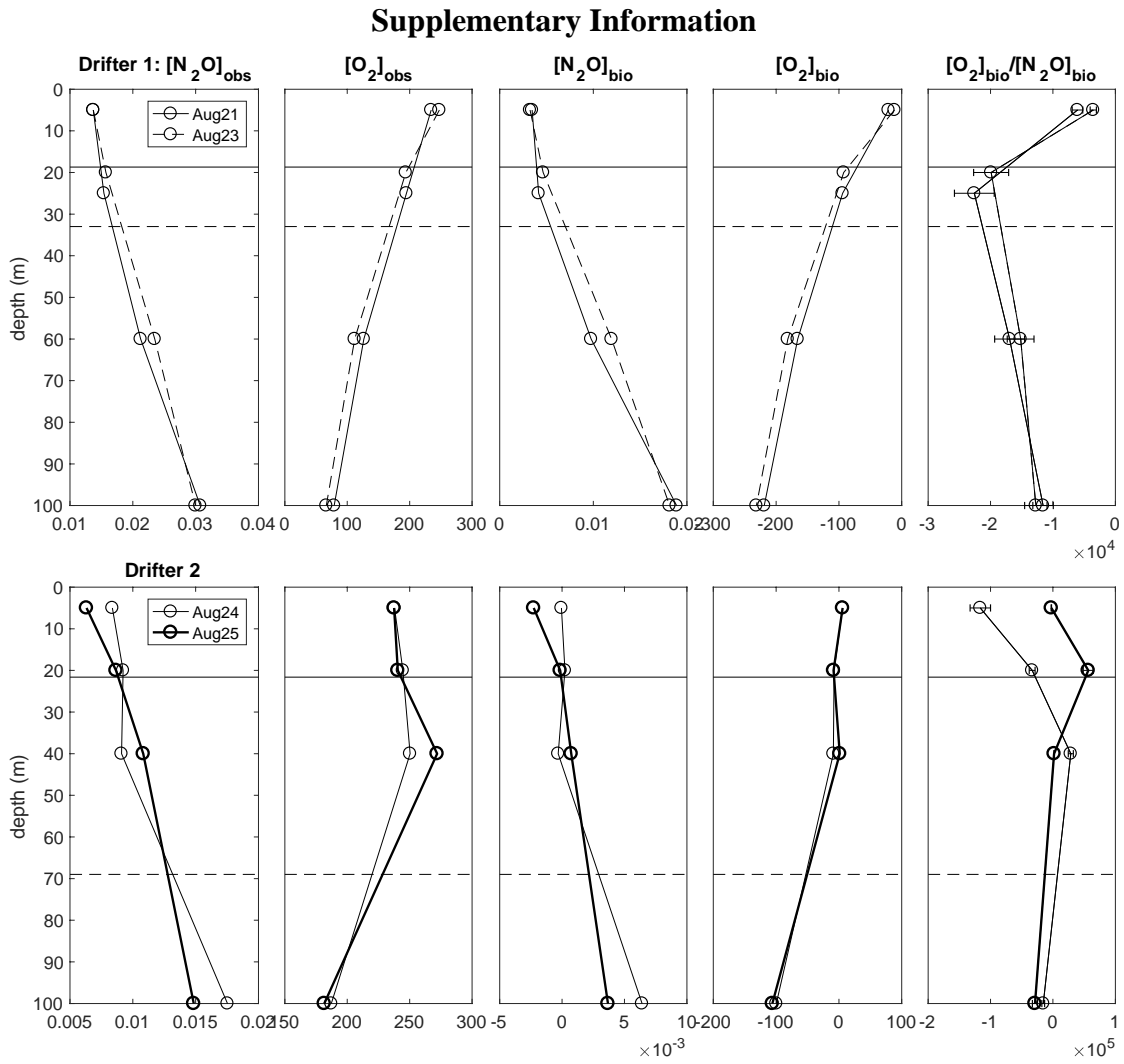
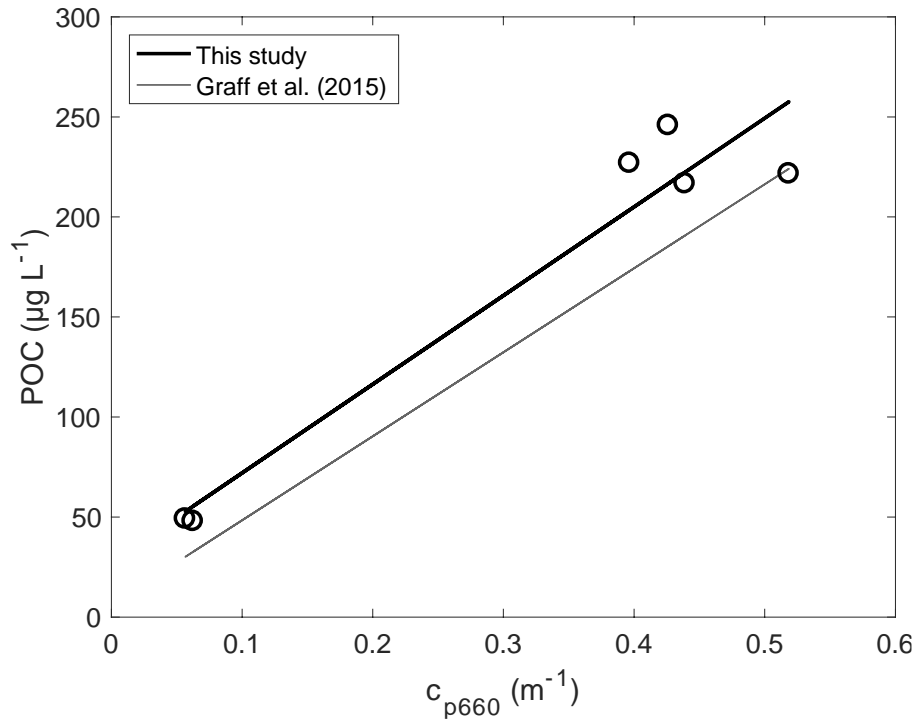


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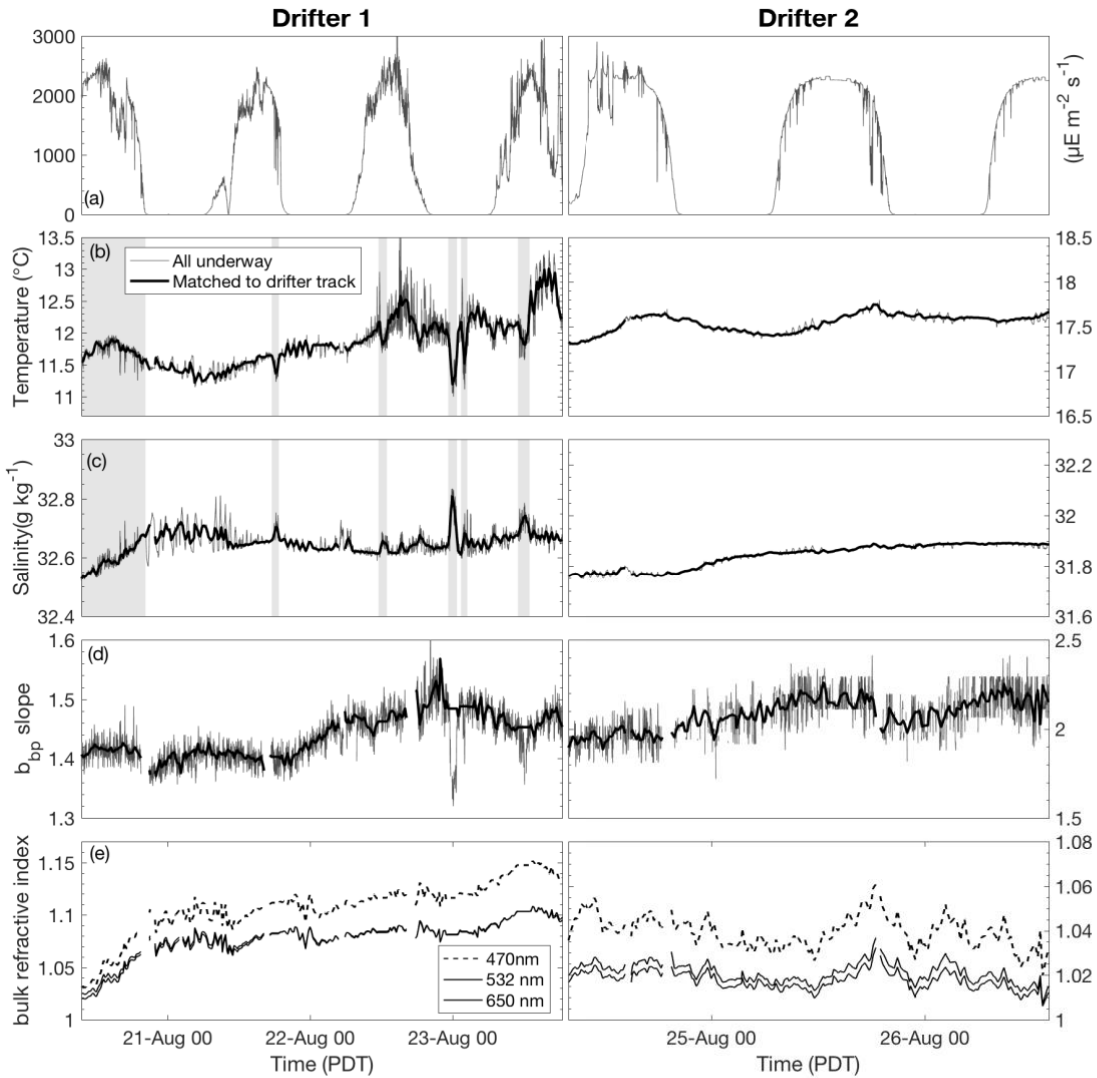
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Figure S1: Vertical profiles of (left to right) dissolved nitrous oxide (N_2O) concentration, dissolved oxygen (O_2) concentration, $[N_2O]_{bio}$ (Sect. 2.6, Eq. 7), $[O_2]_{bio}$ (Sect. 2.6, Eq. 3), and the ratio of $[O_2]_{bio}$ to $[N_2O]_{bio}$ during (top) drifter period 1 and (bottom) drifter period 2. Gas samples were taken during CTD deployments from 12:00 to 14:00 of each day. The horizontal lines on each panel represent the average depths of the mixed layer (solid line) and base of the euphotic zone (dashed line). All concentration units are $mmol\ m^{-3}$. The uncertainty in $[O_2]_{bio}/[N_2O]_{bio}$ is 14.1% (Izett et al., 2018).



15
 16 **Figure S2:** Relationship between particulate organic carbon (POC) concentration measured in 5
 17 m CTD cast samples and underway beam attenuation (c_{p660}) at 660 nm, measured within 5
 18 minutes of the cast time. The five higher values were collected during drifter period 1, while the
 19 two lowest values were collected during the first day of drifter period 2. The best-fit linear
 20 regression of [POC] against c_{p660} (thick black line) is plotted relative to the linear regression (thin
 21 line) reported in Graff et al. (2015).

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26 **Figure S3:** (a-c) Underway measurements of sea surface PAR, temperature, and salinity.

27 Anomalous values, likely from intrusion of external water masses into the sampled drifter patch,

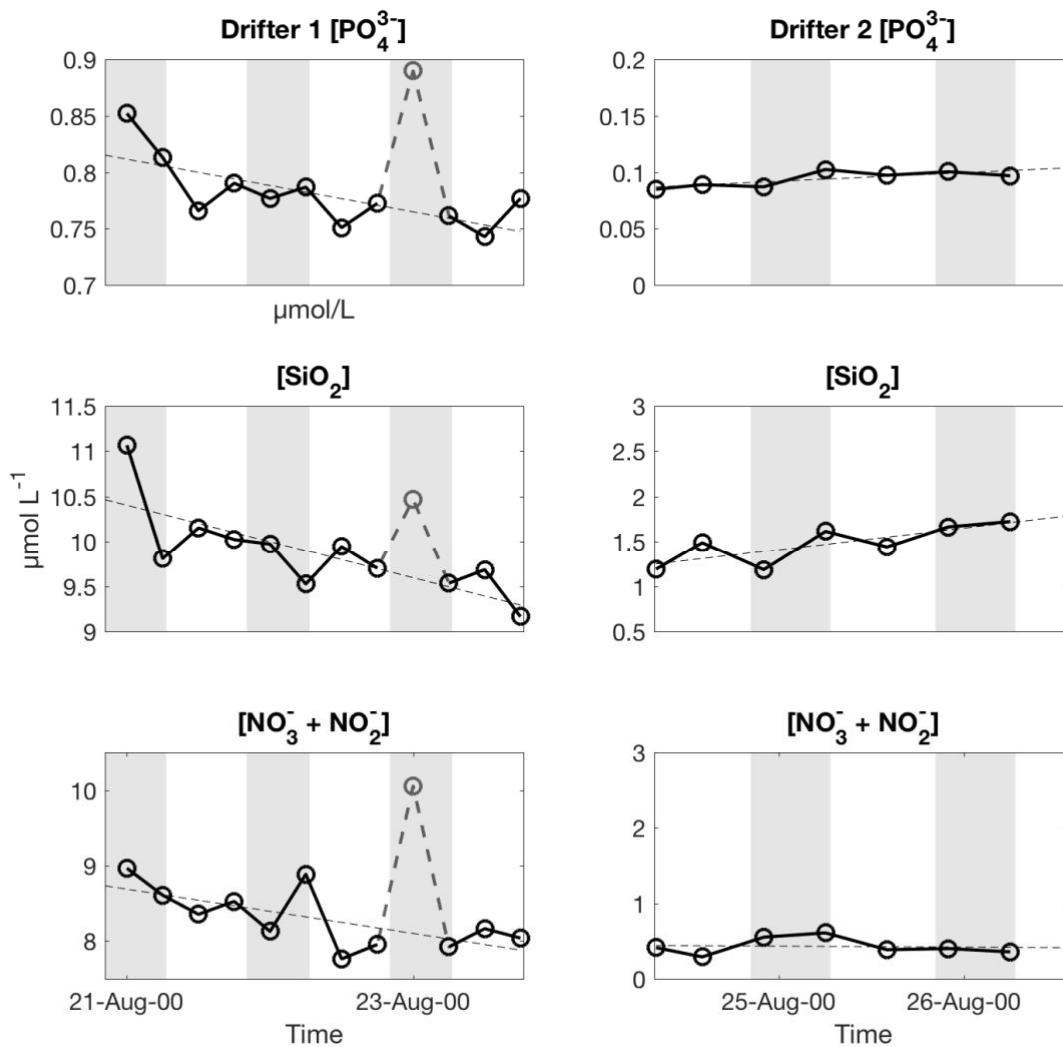
28 are shaded. Underway observations from these periods were omitted from the data set. The brief

29 decrease in PAR during the morning of 21 August was caused by a total solar eclipse. (d) The

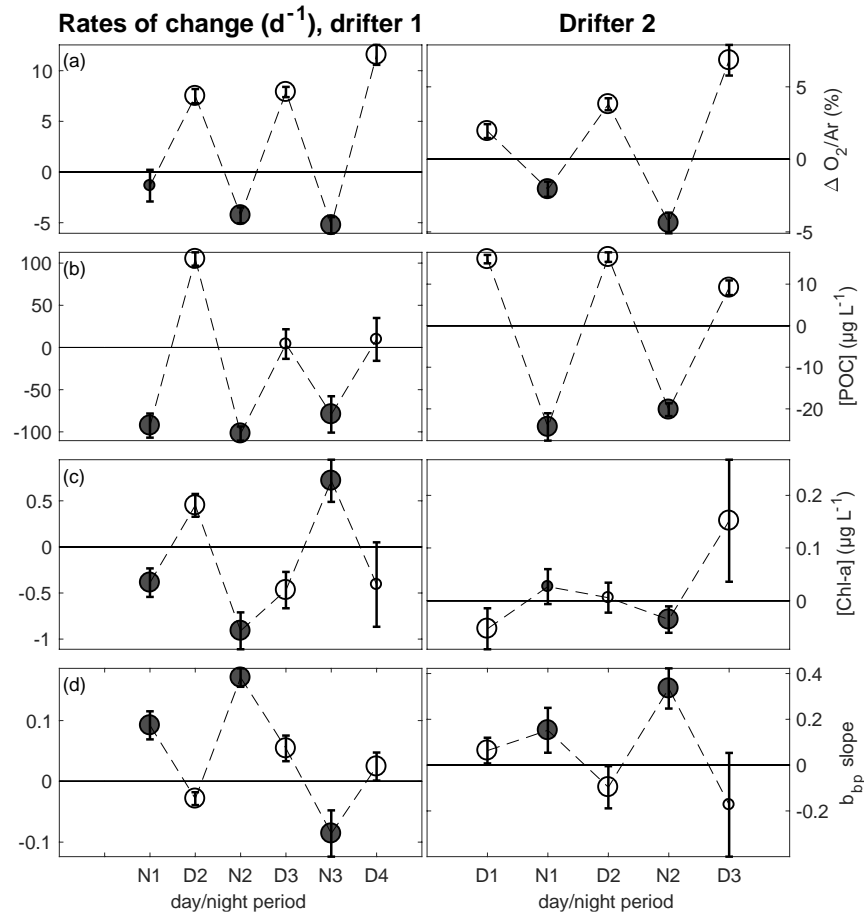
30 spectral slope of particulate backscatter (b_{bp}). (e) Bulk refractive index (η_p) at 470 nm, 532 nm

31 and 650 nm.

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33
 34 **Figure S4:** Nutrient concentration time series during both drifter periods. The gray point
 35 indicates an anomalously high value measured during an erratic CTD cast during the third night
 36 of drifter period 1. This data point was omitted from analysis. The dashed line is the best fit
 37 linear regression of each nutrient concentration against time. All regressions indicated significant
 38 changes ($p < 0.05$), except for $[NO_3^- + NO_2^-]$ concentrations during drifter survey 2.
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40

41 **Figure S5:** Rates of change in (a) biological oxygen saturation ($\Delta O_2/Ar$), (b) particulate organic
 42 carbon (POC) concentration, (c) chlorophyll-a (Chl-a) concentration, and (d) the particulate
 43 backscatter (b_{bp}) slope. The rates were derived from linear regressions over successive day (D
 44 open circle) and night (N shaded circle) intervals during the two drifter deployments. Slopes of
 45 significant linear regressions ($p < 0.05$) are plotted as larger circles, and slopes of non-significant
 46 linear regressions ($p \geq 0.05$) are plotted as smaller circles. The vertical bars span the lower and
 47 upper 95th confidence intervals of the regression slopes.

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