



Supplement of

Testing the influence of light on nitrite cycling in the eastern tropical North Pacific

Nicole M. Travis et al.

Correspondence to: Nicole M. Travis (nicole.m.t.martin@hawaii.edu)

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Supplemental Figures and Tables

Table S1. Tracer additions and preparation process for rate measurements

Process	¹⁵ N-labeled reactant	¹⁵ N-labeled product	Prep Method
Ammonia Oxidation	NH ₄ Cl	NO _x	Denitrifier method
Nitrite Oxidation	NaNO ₂	NO ₃ ⁻	Sulfamic treated + denitrifier method
Nitrate Reduction	KNO ₃	NO ₂ ⁻	Azide method w/ carrier
Nitrite Uptake	NaNO ₂	Particulate N	Dry and pack in tin

Figure S1. Experimental station nitrite profiles - Station profiles of nitrite data collected at PS1,PS2,PS3, FK2 and FK9.

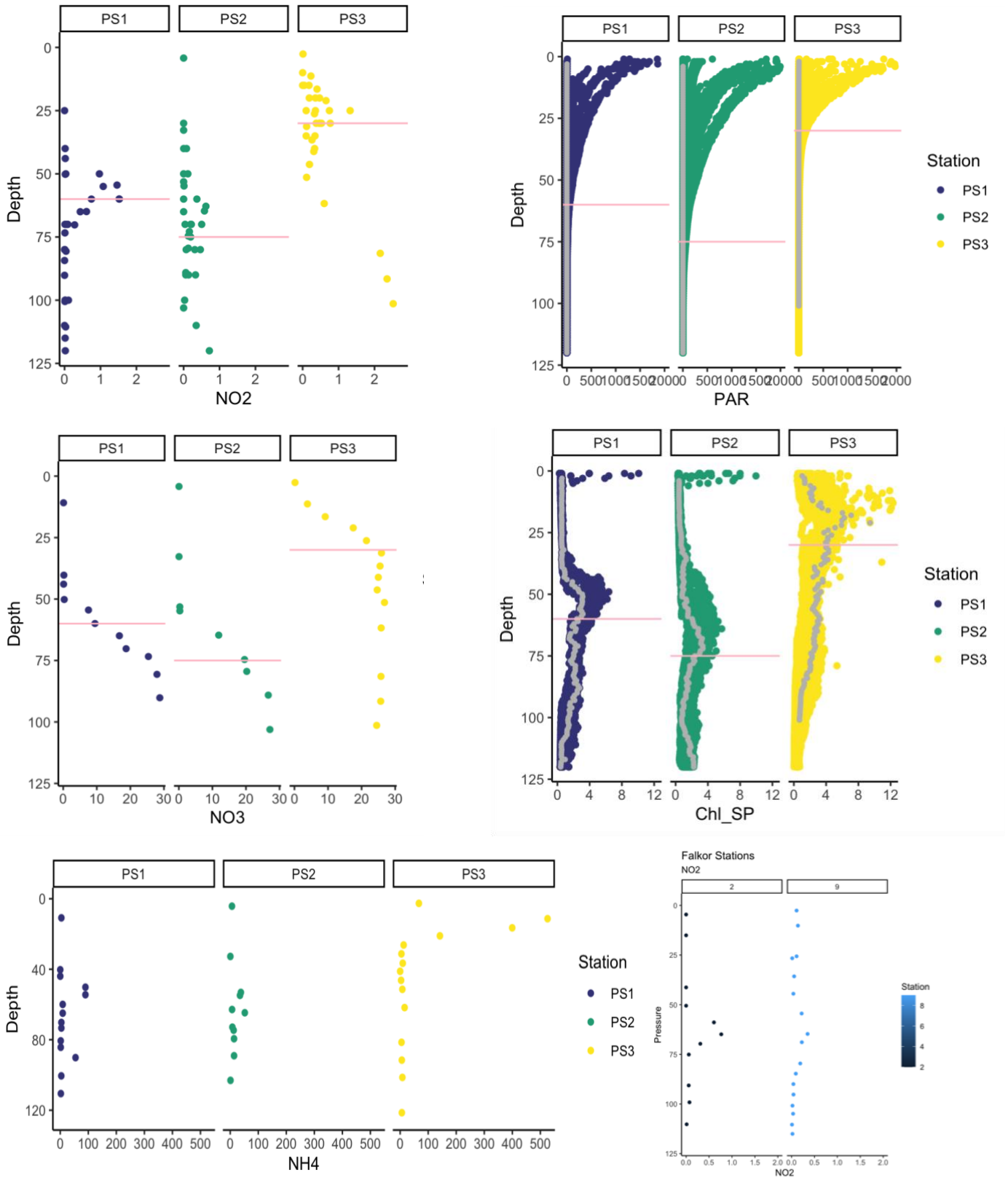


Figure S2. Extra data from coastal station PS3, experiment RM5. Ambient nitrate conditions only. Source water was collected at 25m depth.

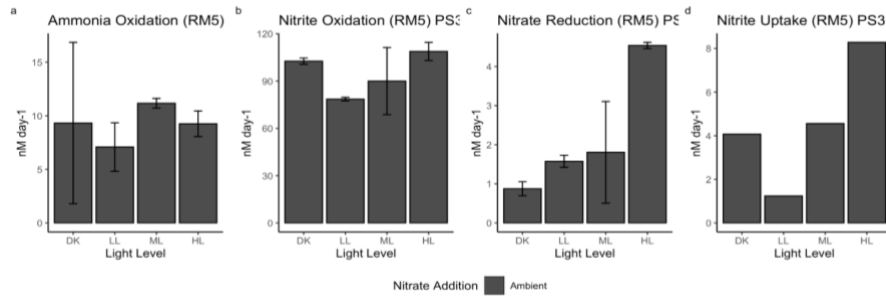


Figure S3. Extra data from offshore station PS1, experiment RM3. Ambient nitrate conditions only. (Depth = 80m, deeper than other PS1 data). Nitrate reduction data not available.

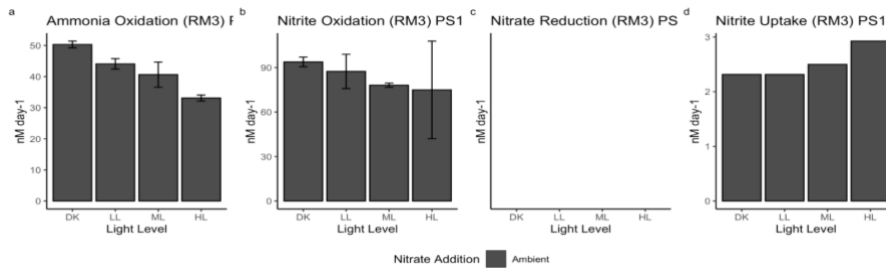


Figure S4. Falkor Station 2 (top row) and Station 9 (bottom row) for ammonia oxidation (a,c) and nitrite oxidation (b,d). Ambient nitrate (dark bars), 20 μM NO_3^- (white bars). Measurements of nitrate reduction and nitrite uptake not available. NetNit with SE.

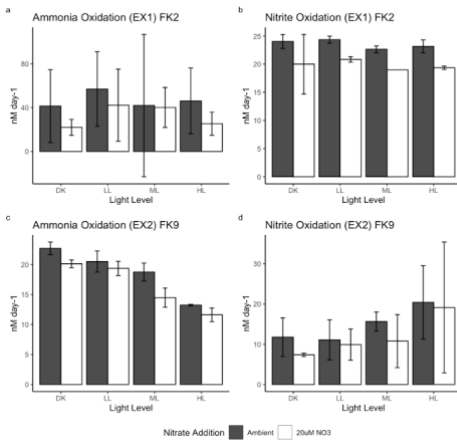
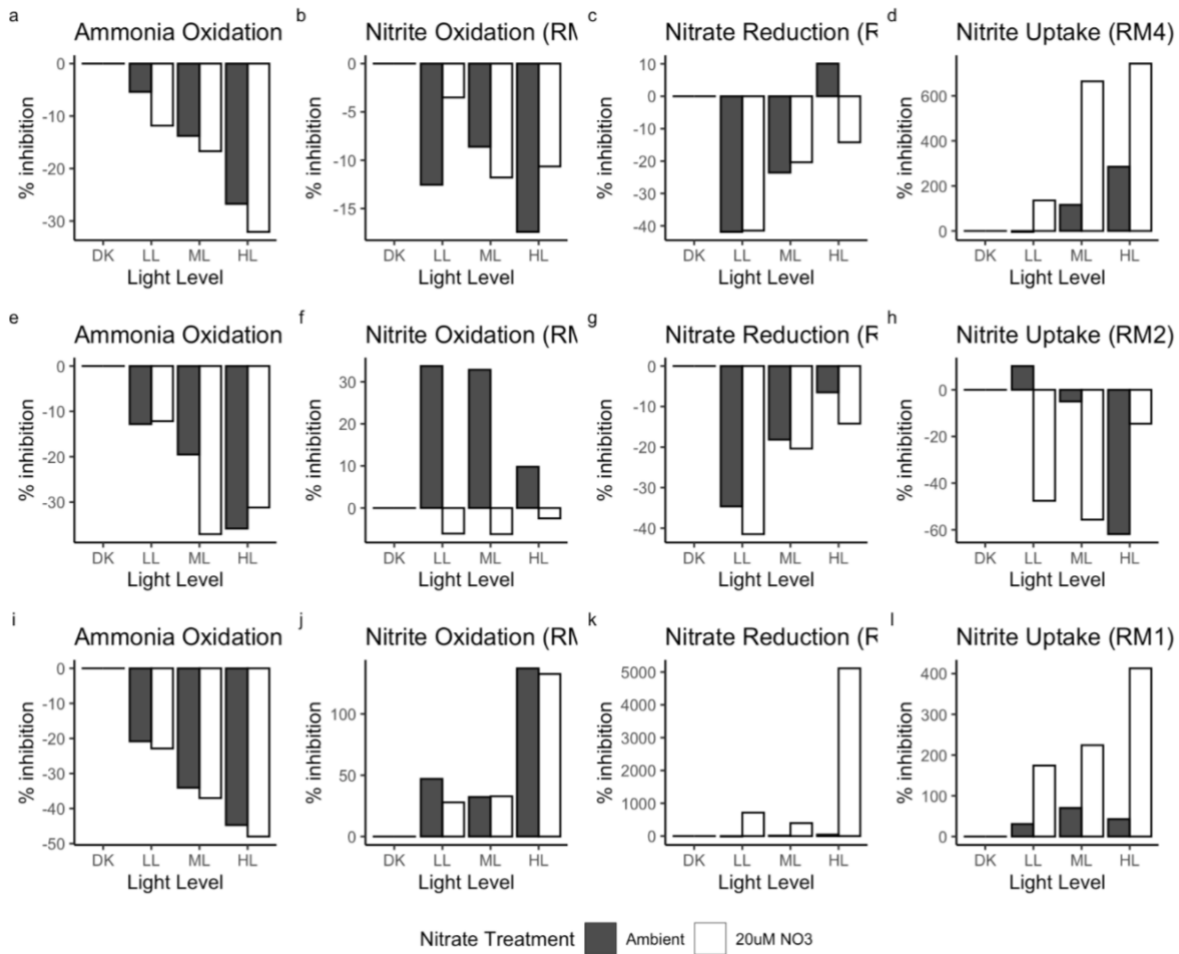


Figure S5. Percent inhibition or enhancement of each rate process (columns) for each station (rows). Percent inhibition of ammonia oxidation at PS3 (a), PS2 (e) and PS1 (i). Percent inhibition of nitrite oxidation at PS3 (b), PS2 (f) and PS1 (j). Percent inhibition of nitrate reduction at PS3 (c), PS2 (g) and PS1 (k). Percent inhibition of nitrite uptake at PS3 (d), PS2 (h) and PS1 (l).

Bars are colored by ambient NO_3^- (solid bars) and 20 μM NO_3^- addition (open bars).



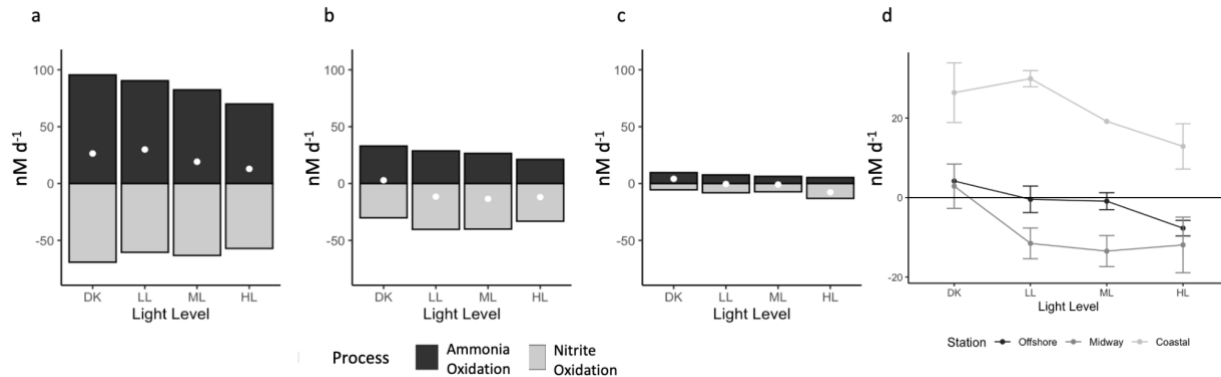
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Table S3. Percent inhibition in rates due to light (relative to DK) – Summary of percent inhibition data across all stations and depths for each rate process (as plotted in whisker plots).

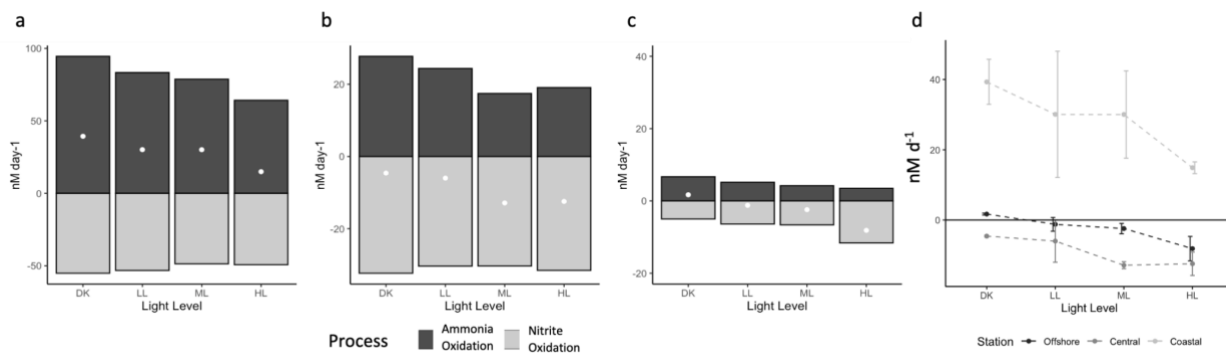
Treatment_2	Light	pi_in_AOX	se_AOX	pi_in_NOX	se_NOX	pi_in_NR	se_NR	pi_in_NO2up	se_up
Ambient	DK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ambient	HL	-0.22	0.08	0.34	0.24	2.41	1.38	0.51	0.82
Ambient	LL	-0.03	0.05	-0.34	0.51	-0.11	0.24	-0.12	0.26
Ambient	ML	-0.10	0.06	0.12	0.09	0.31	0.25	0.28	0.41
20uM NO3	DK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20uM NO3	HL	-0.28	0.11	0.55	0.37	-0.54	0.39	2.70	1.90
20uM NO3	LL	0.08	0.21	0.12	0.08	-0.31	0.11	0.46	0.64
20uM NO3	ML	-0.07	0.23	0.11	0.12	-0.17	0.04	1.89	1.73

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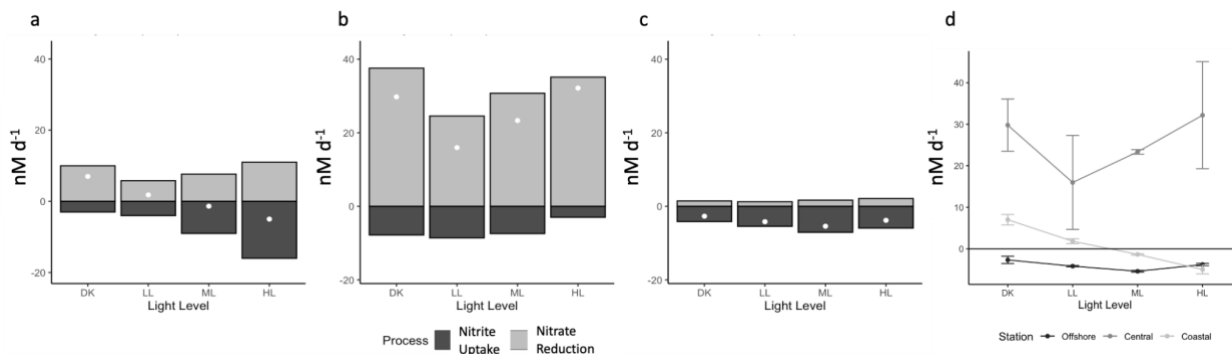
35 **Figure S6. Net nitrification rates (NetNit)** for ambient treatments. Rates of ammonia oxidation (black bars), nitrite oxidation (gray bars) and NetNit (white dots) across light treatments, for ambient nitrate treatment only (20 $\mu\text{M NO}_3^-$ treatments shown in Fig. S7). The data are plotted separately for (a) the coastal station (PS3), (b) central station (PS2) and (c) offshore station (PS1). Error bars on NetNit (d) are the pooled SE from ammonia oxidation and nitrite oxidation rates.



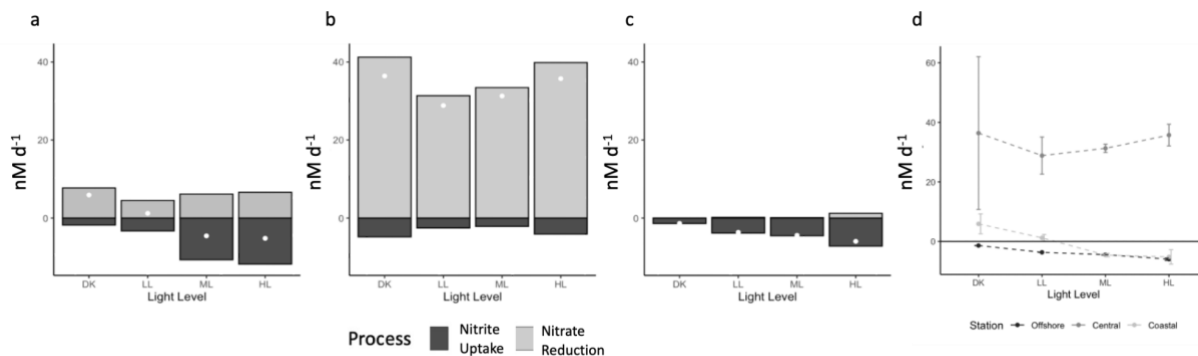
40 **Figure S7. Net nitrification rates (NetNit)** for 20 $\mu\text{M NO}_3^-$ treatments. Ammonia oxidation (black bars), nitrite oxidation (grey bars) and NetNit values (white dots) are shown in panel a) coastal PS3, b) central PS2, and c) offshore PS1. NetNit is presented in panel d for each station with pooled SE.



45 **Figure S8. Net phytoplankton nitrite production rates (NetPhy)** for ambient treatments. Rates of nitrate reduction (gray bars), nitrite uptake (black bars) and NetPhy (white dots) across light treatments from the a) coastal station PS3, b) central station PS2 and c) offshore station PS1. NetPhy for each station is shown in panel d with error bars are from nitrate reduction rates since nitrite uptake measurements did not have replicates to contribute to a pooled SE. Ambient nitrate only, does not include 20 μM nitrate treatments which are presented in Fig. S9.

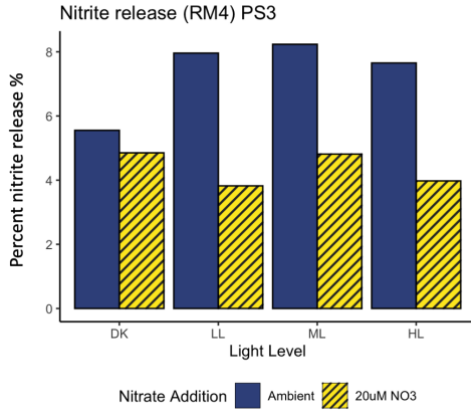


50 **Figure S9. Net phytoplankton nitrite production rates (NetPhy)** for 20 μM NO_3^- treatments. Nitrite uptake (black bars), nitrate reduction (grey bars) and NetPhy values (white dots) are shown in panel a) coastal PS3, b) central PS2, and c) offshore PS1. NetPhy is presented in panel d for each station with error bars from nitrate reduction only.



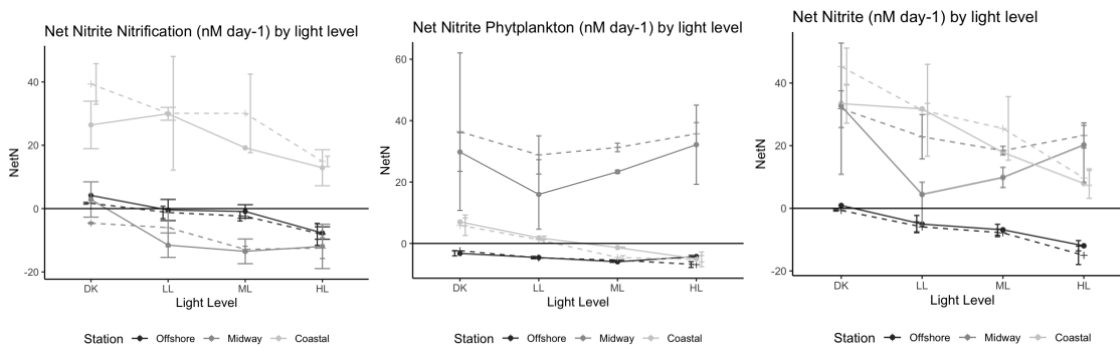
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Figure S8. Nitrite release – Nitrite release (Nitrate Reduction) as a percentage of nitrate uptake at the coastal station PS3. Previous work has suggested that ~10% of nitrate uptake by phytoplankton is released as nitrite, but a wide range of nitrite release percentages have been reported over a variety of growth conditions (Collos 1998).



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Figure S9. Net nitrite production rates calculated from the direct measurement of the 4 major nitrite cycling processes measured at each station during the SR1805 cruise. Offshore station (PS1, dark grey) central station (PS2, grey) and coastal station (PS3, light grey). Ambient NO₃⁻ treatment is solid line and 20 μM NO₃⁻ addition is dashed line.



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