

Supplementary Information

From estuaries to the open ocean: Uncertainties in photochemical predictability

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Supporting Information

Included: Figures S1, S2, S3, and Table S1.

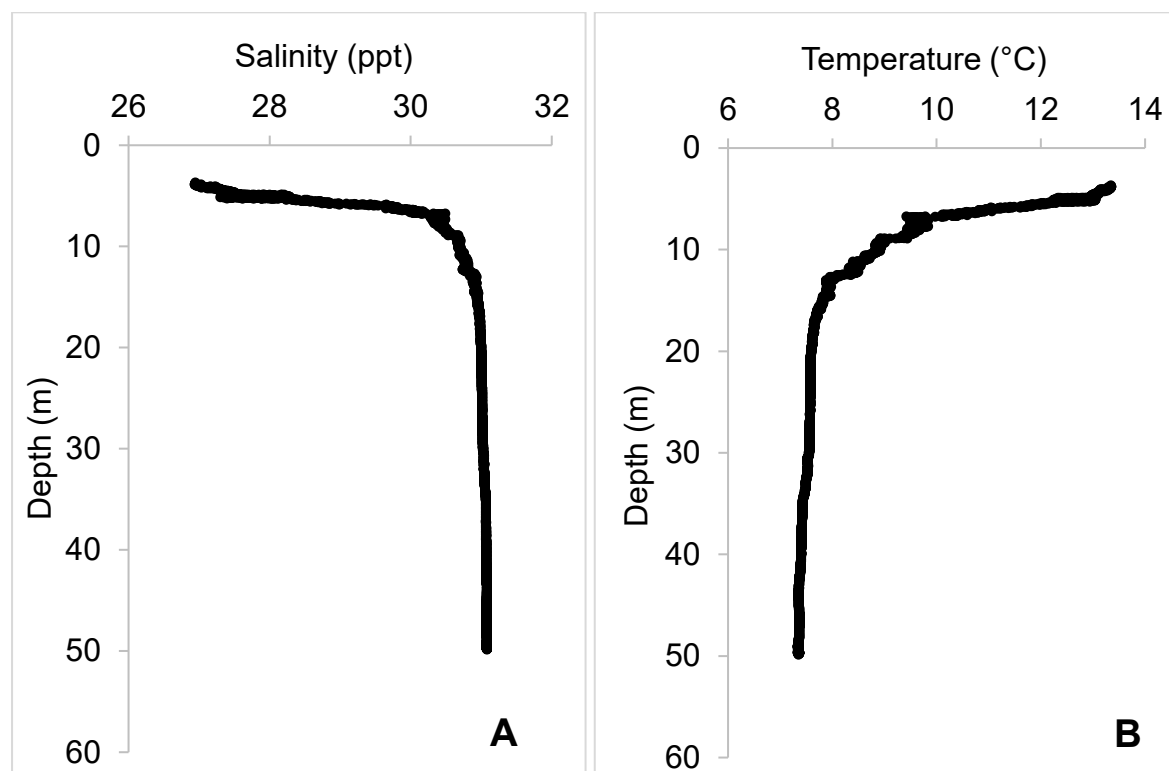


Figure S1. Vertical profiles of (A) salinity (ppt) and (B) temperature (°C) as a function of depth (m) at Station U27.

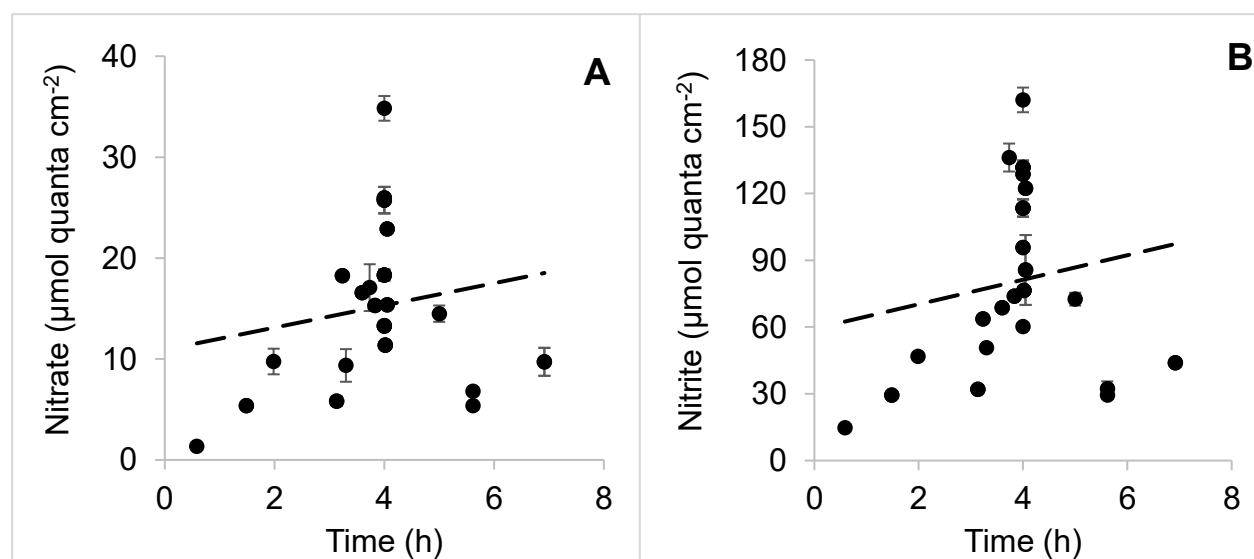


Figure S2. Photon exposure ($\mu\text{mol quanta cm}^{-2}$) versus irradiation time (h) for (A) nitrate and (B) nitrite chemical actinometers. The linear regression produced r^2 values of 0.032 and 0.031, respectively.



Figure S3: Photograph of water bath on the *R/V Endeavor*'s aft deck (June 23, 2025).

Table S1. Sampling station information and experimental conditions including station identifier, latitude (N), longitude (W), sample salinity (ppt), time irradiated (min), average incubation temperature (°C), CO photoproducted in sunlight-exposed samples (nM), and the photon exposure determined using nitrate and nitrite chemical actinometry ($\mu\text{mol quanta cm}^{-2}$). All samples were collected from approximately 5 m unless otherwise noted. All errors are $\pm$ standard deviation.

Station	Latitude (N)	Longitude (W)	Salinity (ppt)	Time irradiated (min)	Average Incubation Temp. (°C)	Average CO photoproducted (nM)	Average Photon Exposure ($\mu\text{mol quanta cm}^{-2}$)	
							Nitrite	Nitrate
A1 ^b	39.675	68.522	35.47	240	28.4 $\pm$ 0.2	12.5 $\pm$ 1	131.7 $\pm$ 3.1	18.3 $\pm$ 0.5
A2 ^c	36.337	66.161	34.66	240	28.4 $\pm$ 0.2	6.6 $\pm$ 0.4	131.7 $\pm$ 3.1	18.3 $\pm$ 0.5
A3 ^c	36.019	70.029	36.95	300	24.6 $\pm$ 0.6	2.2 $\pm$ 0.3	72.5 $\pm$ 2.9	14.5 $\pm$ 0.8
A4	36.008	75.162	30.90	243	23.3 $\pm$ 0.1	16.4 $\pm$ 0.6	85.7 [†]	15.4 [†]
A5	41.292	68.325	32.40	415	17.2 $\pm$ 1.5	4.0 $\pm$ 0.5	43.9 $\pm$ 1.2	9.7 $\pm$ 1.4
U2	38.880	67.596	33.47	240	28.4 $\pm$ 0.2	7.1 $\pm$ 0.5	131.7 $\pm$ 3.1	18.3 $\pm$ 0.5
U3 ^c	37.495	66.183	36.87	243	23.3 $\pm$ 0.1	1.7 $\pm$ 0.4	85.7 [†]	15.4 [†]
U4 ^c	36.146	68.575	36.50	240	24.2 $\pm$ 0.2	1.9 $\pm$ 0.1	162.1 $\pm$ 5.5	34.8 $\pm$ 1.2
U5 ^c	35.916	71.179	36.56	240	23.2 $\pm$ 0.6	1.7 $\pm$ 0.5	95.8 $\pm$ 1.8	13.3 $\pm$ 0.3
U6 ^c	35.830	72.472	36.45	240	23.2 $\pm$ 0.6	1.5 $\pm$ 0.5	95.8 $\pm$ 1.8	13.3 $\pm$ 0.3
U7 ^{*c}	35.707	73.885	36.29	224	24.2 $\pm$ 2.3	0.8 $\pm$ 0.1	136.2 $\pm$ 6.3	17.1 $\pm$ 2.3
U8	37.071	75.008	31.36	243	19.6 $\pm$ 0.3	20.1 $\pm$ 0.9	122.3 $\pm$ 1.2	22.9 $\pm$ 0.1
U9	39.176	73.679	31.65	243	19.6 $\pm$ 0.3	13.6 $\pm$ 0.3	122.3 $\pm$ 1.2	22.9 $\pm$ 0.1
U10	40.157	72.225	32.20	240	16.3 $\pm$ 0.5	12.0 $\pm$ 0.4	113.5 $\pm$ 3.9	25.7 $\pm$ 1.3
U11	40.935	68.988	32.66	240	16.3 $\pm$ 0.5	10.1 $\pm$ 0.6	113.5 $\pm$ 3.9	25.7 $\pm$ 1.3
U12	41.618	69.464	31.30	240	16.3 $\pm$ 0.5	20.5 $\pm$ 0.8	113.5 $\pm$ 3.9	25.7 $\pm$ 1.3
U13	41.945	69.689	31.10	240	17.2 $\pm$ 0.6	13.2 $\pm$ 0.6	60.2 $\pm$ 0.9	13.2 $\pm$ 0.1
U14	42.165	70.008	30.90	240	17.8 $\pm$ 0.5	26.2 $\pm$ 0.4	128.7 $\pm$ 1.5	26.0 $\pm$ 0.3
U15	42.652	69.777	31.20	240	17.8 $\pm$ 0.5	20.7 $\pm$ 0.6	128.7 $\pm$ 1.5	26.0 $\pm$ 0.3
U16	42.755	69.738	30.70	230	16.9 $\pm$ 0.9	17.0 $\pm$ 0.4	73.8 $\pm$ 0.9	15.3 $\pm$ 0.1
U17	43.016	69.599	30.90	230	16.9 $\pm$ 0.9	17.1 $\pm$ 1	73.8 $\pm$ 0.9	15.3 $\pm$ 0.1
U18	43.266	69.475	31.10	241	15.5 $\pm$ 1.8	19.6 $\pm$ 1.7	76.4 $\pm$ 1.9	11.4 $\pm$ 0.2
U19	43.515	69.354	31.60	241	15.5 $\pm$ 1.8	12.7 $\pm$ 0.5	76.4 $\pm$ 1.9	11.4 $\pm$ 0.2
U20	43.760	69.236	31.00	241	15.5 $\pm$ 1.8	20.4 $\pm$ 1.8	76.4 $\pm$ 1.9	11.4 $\pm$ 0.2
U21	44.121	68.997	30.30	188	13.8 $\pm$ 1.6	17.1 $\pm$ 0.3	32.0 $\pm$ 1.2	5.8 $\pm$ 0.4
U22	44.236	68.987	29.40	188	13.8 $\pm$ 1.6	26.2 $\pm$ 1.4	32.0 $\pm$ 1.2	5.8 $\pm$ 0.4
U23	44.365	68.926	26.30	35	18.1 $\pm$ 0.1	27.3 $\pm$ 0.5	14.7 $\pm$ 0.5	1.4 $\pm$ 0.2
U24	44.340	68.839	29.00	89	18.6 $\pm$ 0.1	27.1 $\pm$ 0.6	29.4 $\pm$ 0.4	5.4 $\pm$ 0.4
U25	44.217	68.903	29.60	89	18.6 $\pm$ 0.1	23.9 $\pm$ 0.9	29.4 $\pm$ 0.4	5.4 $\pm$ 0.4
U26	44.182	69.006	28.50	198	13.6 $\pm$ 1.9	48.3 $\pm$ 1.6	50.7 $\pm$ 0.1	9.4 $\pm$ 1.6
U27	44.300	68.951	28.00	194	13.3 $\pm$ 1.4	69.9 $\pm$ 0.8	63.6 $\pm$ 1.4	18.3 $\pm$ 0.3
U28	44.404	68.861	29.70	337	17.0 $\pm$ 1.6	30.1 $\pm$ 0.8	32.4 $\pm$ 3.2	6.8 $\pm$ 0.4
U29	44.273	68.877	29.77	194	13.3 $\pm$ 1.4	44.4 $\pm$ 4.2	63.6 $\pm$ 1.4	18.3 $\pm$ 0.3
U30	44.175	68.922	30.00	337	18.6 $\pm$ 0.1	26 $\pm$ 0.8	29.4 $\pm$ 0.4	5.4 $\pm$ 0.4
U31	42.413	70.270	31.10	415	17.2 $\pm$ 1.5	11.0 $\pm$ 0.5	43.9 $\pm$ 1.2	9.7 $\pm$ 1.4
U32	42.180	70.313	30.77	216	18.9 $\pm$ 0.4	19.0 $\pm$ 0.5	68.8 $\pm$ 1.1	16.6 $\pm$ 0.4
U33	41.393	71.252	31.60	216	18.9 $\pm$ 0.4	15.4 $\pm$ 1	68.8 $\pm$ 1.1	16.6 $\pm$ 0.4
U34	40.992	71.314	31.95	119	18.1 $\pm$ 0.1	8.2 $\pm$ 1.3	46.9 $\pm$ 0.9	9.8 $\pm$ 1.3

* Irradiated at home laboratory.

† Single measurement. No error determined.

^b sample collected from 15 m.

^c samples collected from approximately 10 m.