Supplemental Tables and Figures

Table S1. In situ rate measurements - Rate measurements for ammonia oxidation, nitrite oxidation, nitrate reduction and nitrite uptake from 4 cruises to the ETNP. Incubated in ambient conditions. Shows water characteristics at sample collection site, and standard deviation and limit of detection for experimental bottle replicates.

Rate Measurement Data

Cruise	Depth	Region	Station	Longitude	Latitude	SigmaT	Salinity	TempC	Oxygen	NO2 (uM)	NO3 (uM)	NH4 (nM)	Chl_SP	pPAR	PNM_depth	PNM_max	NH4Oxs	Stdev_4	LOD_4	NO2Oxs	Stdev_2	LOD_2	NO3Red	Stdev_3	LOD_3	NO2up	NetNit	NetPhy	NetNO2
Ward	60	Offshore	FS1	-113	10.00	23.86	34.39	21.63	88.53	0.79	1.21	19.7	2.42	1%	55	1.49	5.43	0.37	0.16	9.38	4.53	0.6	0.29	0.58	-0.23	5.44	-3.88	-5.2	-9.2
Ward	30	Coastal	FS3	-102.35	17.68	24.75	34.59	18.83	31.64	0.47	19.0	29	5.28	1%	21	0.85	85.28	1.95	0.09	51.81	2.11	0.85	1.65	0.82	nd.	4	33.5	-2.4	29.5
Ward	30	Coastal	FS3	-102.35	17.68	24.74	34.5	20.17	65.03	0.52	19.4	25	1.93	3%	30	0.52	72.88	2.69	1.39	45.95	1.71	0.88	1.43	0.44	nd.	3.82	26.9	-2.4	23.1
Ward	55	Offshore	FS1	-113	10.00	23.57	34.29	22.42	86.46	1.08	1.22	68.5	3.17	2%	60	1.52	15.54	3.39	0.47	11.35	3.68	1.45	5.62	1.17	nd.	9.49	4.2	-3.9	-5.3
Ward	60	Offshore	FS1	-113	10.00	23.86	34.37	21.57	68.2	0.75	1.48	9	2.72	1%	60	1.52	11.68	4.28	0.49	2.95	0.7	1.7	3.78	0.18	nd.	6.04	8.7	-2.3	2.7
Ward	65	Offshore	FS1	-113	10.00	24.25	34.47	20.42	45.27	0.44	17.6	0	2.49	1%	60	1.52	20.52	2.24	0.49	3.09	nd.	2.77	3.48	0.71	nd.	3.74	17.4	-0.3	13.7
Ward	70	Offshore	FS1	-113	10.00	25.1	34.64	17.6	8.04	0.05	17.2	9	2.53	0%	60	1.52	21.18	1.23	1.09	13.27	1.08	1.73	1.89	0.22	nd.	2.01	7.9	-0.1	5.9
Ward	10	Coastal	FS3	-102.35	17.68	23.89	34.49	21.79	120.03	0.47	3.6	5	4.03	2%	25	1.3	-0.43	0.35	0.21	2.27	3.71	19.34	0.42	0.78	nd.	2.28	-2.7	-1.9	-5.0
Ward	25	Coastal	FS3	-102.35	17.68	24.39	34.56	20.29	41.66	1.3	1.21	5	3.96	1%	25	1.3	4.85	5.2	1.12	54.44	1.6	24.95	2.28	0.22	nd.	3.24	-49.6	1.0	-50.9
Ward	75	Offshore	FS2	-105	15.77	24.73	34.42	18.39	63.17	0.75	15.0	5	1.47	2%	63	0.62	24.54	0.44	0.18	50.48	5.43	37.18	11.83	1.29	nd.	8.8	-26.0	3.0	-34.9
Ward	70	Offshore	FS2	-105	15.77	23.51	34.48	23.13	196.34	0.18	0.6	25	3.13	3%	80	0.48	-0.33	0.11	0.12	-2.4	0.52	3.26	nd.	nd.	nd.	10.43	2.1	nd.	-8.4
Ward	80	Offshore	FS2	-105	15.77	24.84	34.3	17.57	86.22	0.48	1.27	25	1.77	1%	80	0.48	37.86	1.48	0.74	80.97	11.58	53.86	nd.	nd.	nd.	2.32	-43.1	nd.	-45.4
Keller	70	Offshore	F2	-103	14.00	24.28	34.48	20.34	79	0.31	13.6	25	0.4	3%	60	0.76	72.61	34.07	nd.	24.87	0.82	nd.	nd.	nd.	nd.	3.06	47.9	nd.	44.9
Keller	65	Offshore	F9	-110	14.00	22.7	34.07	24.8	150	0.39	7.6	20	0.85	1%	65	0.39	18.31	1.76	nd.	10.44	4.98	nd.	nd.	nd.	nd.	nd.	7.9	nd.	nd.
HOT	25	Coastal	P1	-106.05	20.18	23.78	34.54	22.28	169.16	0.05	0.8	90	5.94	6%	30	0.47	2.69	1.24	0.26	0.1	nd.	nd.	0.0	0.0	nd.	123.26	2.4	-123.3	-120.9
HOT	30	Coastal	P1	-106.05	20.18	24.12	34.49	20.95	112.15	0.47	6.2	80	3.81	4%	30	0.47	22.12	3.08	0.7	13.62	4.8	nd.	53.15	2.15	nd.	46.41	8.5	3.7	-40.9
HOT	40	Coastal	P1	-106.05	20.18	24.72	34.53	18.78	57.48	0.22	14.4	70	0.71	2%	30	0.47	29.18	4.41	1.22	45.73	4.18	nd.	1.92	0.51	nd.	10.83	-19.8	-8.9	-70.4
HOT	60	Coastal	P1	-106.05	20.18	25.22	34.57	16.83	22.19	0.05	19.5	0	0.33	0%	30	0.47	16.87	0.09	0.68	18.35	1.92	nd.	0.0	0.0	nd.	0.66	-1.5	-0.7	-2.1
HOT	25	Coastal	P1	-106.21	20.30	23.4	34.58	23.75	182.18	0	0.4	38.64	2.8	6%	35	0.35	1.56	0.06	0.04	0.0	0.0	nd.	0.0	0.0	nd.	11.274	1.6	-112.7	-111.2
HOT	30	Coastal	P1	-106.21	20.30	24.07	34.55	21.28	142.92	0.18	3.1	87.56	9.78	4%	35	0.35	4.2	0.05	0.18	2.12	5.99	nd.	49.13	1.02	nd.	145	2.1	-115.9	-149.9
HOT	35	Coastal	P1	-106.21	20.30	24.19	34.56	20.14	87.82	0.35	10.8	17.27	1.67	3%	35	0.35	50.45	2.92	0.65	-4.09	1.1	nd.	33.23	5.84	nd.	18.79	54.6	14.4	35.8
HOT	45	Coastal	P1	-106.21	20.30	24.8	34.53	18.46	53.27	0.05	16.2	54.4	0.89	1%	35	0.35	49.85	3.89	1.51	34.96	0.47	nd.	3.54	1.6	nd.	4.4	14.9	-0.9	10.5
HOT	50	Offshore	P2	-107.15	16.37	21.56	33.73	27.44	183.12	0.13	2.0	362.18	1.33	17%	55	0.99	-1.3	1.05	1	n.d.	nd.	nd.	-1.18	0.77	nd.	3.99	n.d.	-5.2	nd.
HOT	55	Offshore	P2	-107.15	16.37	22.61	34.3	24.68	145.88	0.99	4.2	26.13	1.57	6%	55	0.99	3.24	1.08	0.4	11.72	1.81	nd.	2.06	0.23	nd.	7.34	-8.5	-5.3	-15.8
HOT	65	Offshore	P2	-107.15	16.37	23.7	34.43	22.31	83	0.05	20.5	0	0.78	3%	55	0.99	71.2	1.32	2.06	46.63	2.71	nd.	13.12	6.29	nd.	6.97	24.6	6.2	17.6
ETNP2016	55	Coastal	3	-110.2	22.61	24.04	34.43	20.83	209.9	0.15	0.4	158.26	0.24	4%	73	0.06	0.59	0.06	0.06	-0.06	0.14	-0.17	nd.	nd.	nd.	46.95	0.7	nd.	-46.3
ETNP2016	75	Coastal	3	-110.2	22.61	24.72	34.33	18.13	358.22	0.47	5.2	24.3	0.26	1%	73	0.06	31.71	9.34	0.83	26.58	2.12	0.99	-2.3	nd.	nd.	8.85	5.1	-31.2	-37
ETNP2016	100	Coastal	3	-110.2	22.61	25.48	34.38	15.02	61.14	0.05	18.0	25.76	0.08	0%	73	0.06	29.8	1.49	0.82	39.6	1.57	0.84	3.5	nd.	0.19	1.07	-10.0	0.4	-11.1
ETNP2016	120	Coastal	3	-110.2	22.61	25.82	34.49	13.83	40.51	0	24.4	15.51	0.06	0%	73	0.06	11.7	1.5	1.01	10.35	0.88	1.55	0	nd.	0	1.07	1.3	-1.1	0.3
ETNP2016	25	Coastal	6	-104.42	18.69	23.39	34.41	25.12	204.1	0.08	1.2	64.92	0.33	8%	43	0.85	1.65	0.97	0.01	-2.44	27.06	nd.	7.39	1.85	0.1	4.68	4.1	-39.4	-42.7
ETNP2016	40	Coastal	6	-104.42	18.69	24.13	34.52	20.56	57.17	0.18	18.9	33.94	0.27	1%	43	0.85	40.93	2.92	1.1	31.88	3.02	nd.	5.56	1.08	-0.1	3.5	8.8	2.1	5.3
ETNP2016	55	Coastal	6	-104.42	18.69	24.65	34.61	17.78	14.74	0.12	22.3	25	0.13	1%	43	0.85	4.261	5.33	1.47	25.46	1.38	nd.	3.07	1.56	-0.08	0.86	17.4	2.4	14.7
ETNP2016	75	Coastal	6	-104.42	18.69	25.46	34.75	15.28	0.89	0.1	23.9	24.93	0.14	0%	43	0.85	8.2	1.89	0.81	13.86	0.56	nd.	2.18	0.36	0.4	0	-5.7	2.2	-5.7
ETNP2016	35	Coastal	9	-99	15.00	22.76	34.33	23.65	129.52	0.52	0.5	21.2	0.39	7%	71	1.36	8.38	6.28	0.44	0.03	2.37	nd.	0.12	0	0.01	6.64	8.4	-6.5	1.7
ETNP2016	40	Coastal	9	-99	15.00	23.62	34.43	21.82	57.17	0.82	17.9	46	0.42	3%	71	1.36	39.67	1.12	1.16	9.33	0.43	nd.	12.33	1.9	1.33	7.18	30.3	5.2	23.2
ETNP2016	50	Coastal	9	-99	15.00	24.31	34.57	19.4	20.99	0.22	20.9	37	0.25	1%	71	1.36	53.67	16.31	1.62	25.31	0.2	nd.	0.41	0.49	0	3.35	33.2	-2.9	29.8
ETNP2016	60	Coastal	9	-99	15.00	24.84	34.64	17.9	8.04	0.15	22.3	44	0.16	0%	71	1.36	12.49	4.46	1.93	5.74	1.53	nd.	0.04	0	0.01	0.54	6.8	-0.5	6.2
ETNP2016	75	Offshore	12	-106.09	16.32	22.39	34.13	25.96	103.21	0	0.6	0	0.1	1%	103	0.66	4.02	0.4	0.06	25.64	6.93	nd.	0.9	0.22	-0.01	19.04	-21.6	-18.1	-40.7
ETNP2016	85	Offshore	12	-106.09	16.32	22.63	34.19	25.34	109.91	0.09	0.1	11.4	0.14	0%	103	0.66	0.31	0.04	-0.03	0.37	37.79	nd.	0.04	0.01	0	17.4	-0.1	-17.4	-17.5
ETNP2016	95	Offshore	12	-106.09	16.32	23.31	34.35	23.37	168.82	0.22	4.9	34.8	0.21	0%	103	0.66	23.79	0.09	0.28	n.d.	nd.	nd.	0.09	0.04	0.04	21.26	n.d.	-21.2	nd.
ETNP2016	100	Offshore	12	-106.09	16.32	23.97	34.44	21.38	103.61	0.44	7.6	17	0.17	0%	103	0.66	32.89	0.76	0.48	5.8	0.08	nd.	0.78	0.3	0.63	11.18	27.1	-10.4	15.9
ETNP2016	30	Offshore	12	-106.09	16.32	21.25	33.48	28.02	192.49	0	0.5	0	0.06	20%	103	0.66	-0.42	0.1	0.01	n.d.	nd.	nd.	n.d.	nd.	nd.	nd.	n.d.	nd.	nd.
ETNP2016	62	Offshore	16	-111.89	19.91	23.68	34.42	21.29	204.42	0	0.6	247.5	0.22	4%	88	0.3	0.55	0.16	0	n.d.	nd.	nd.	n.d.	nd.	nd.	nd.	n.d.	nd.	nd.
ETNP2016	72	Offshore	16	-111.89	19.91	24.14	34.33	20.41	184.55	0.46	2.9	381.52	0.24	2%	88	0.3	31.52	3	0	n.d.	nd.	nd.	n.d.	nd.	nd.	nd.	n.d.	nd.	nd.
ETNP2016	80	Offshore	16	-111.89	19.91	24.32	34.25	19.49	166.06	0.21	4.9	266.45	0.23	1%	88	0.3	53.57	3.4	0	n.d.	nd.	nd.	n.d.	nd.	nd.	nd.	n.d.	nd.	nd.

Table S2. Table of Station Summary Features – Station specific water column features are listed for each station from the 2016 PPS dataset (a). Means are presented in the second table for all stations in the PPS2016 dataset (b), as well as means for the 'offshore' and 'coastal' station groupings (13,14,15,16 and 6,7,8,9, respectively).

(a)

Summary of PPS Stations

Station	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0
PNM_max	0.3	0.4	0.1	0.3	0.7	0.8	1.0	1.2	1.4	0.5	0.5	0.7	0.5	0.5	0.8	0.3
PNM_depth	70.6	102.0	72.9	53.4	66.7	42.1	56.9	38.1	45.2	81.2	76.8	103.0	92.5	96.0	99.2	86.1
PNM_top	60.5	80.8	64.1	47.2	58.7	26.8	27.0	28.7	38.8	NA	66.5	92.4	78.8	80.5	94.2	81.2
PNM_sig	24.5	24.7	24.5	23.7	24.5	22.7	24.1	23.2	23.8	23.7	23.9	24.1	24.5	22.3	24.1	23.1
Temp_max	19.6	21.0	21.9	24.3	25.2	25.9	26.6	27.3	28.7	29.5	29.2	28.0	27.7	26.0	27.0	24.0
TempPNM	18.9	18.0	18.8	22.4	19.6	19.2	20.9	23.7	21.8	22.2	21.4	21.0	19.2	19.5	20.9	19.2
NH4PNM	0.3	0.0	0.1	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MLD	71.1	75.8	54.0	14.7	28.1	20.2	22.8	21.0	16.3	24.6	25.6	45.0	19.6	20.3	36.9	14.8
Chl_max	4.5	4.7	8.9	7.1	7.0	14.2	9.9	48.5	11.1	12.2	7.8	6.2	6.1	5.4	5.0	9.5
PARChl	0.7	0.8	0.6	1.2	1.3	1.5	1.7	4.1	1.5	1.9	0.4	0.3	6.8	2.9	0.7	1.6
Chl_depth	69.2	75.0	78.7	66.6	48.5	34.3	52.4	36.9	46.2	64.4	74.1	90.2	63.0	69.6	89.5	76.7
Chl_sig	24.5	24.3	24.7	24.0	23.7	23.9	23.8	23.2	23.9	22.3	23.6	23.2	23.0	23.2	23.4	24.1
Nitracline	96.6	105.0	79.7	54.2	54.3	55.9	61.2	38.7	41.8	81.9	75.0	93.6	93.2	110.0	118.0	110.0
Nitracline_top	69.7	102.0	60.2	50.2	53.7	31.1	34.0	29.8	40.0	74.2	72.6	93.2	81.5	90.2	95.0	83.8
NitPNM	1.3	1.7	8.5	5.3	9.4	14.3	20.1	19.5	12.9	7.7	15.6	8.7	7.3	4.4	7.4	2.1
NitChl	1.1	NaN	12.1	16.7	-0.1	4.5	8.6	15.2	13.1	0.9	5.2	0.0	0.4	0.2	0.9	0.0
ChlPNM	4.2	1.6	3.6	1.4	2.4	1.6	5.0	28.1	5.2	4.7	3.0	2.2	2.0	2.7	2.7	3.0
Oxycline_top	65.0	65.0	63.7	52.8	40.0	22.0	42.0	32.8	33.0	58.0	65.0	85.0	60.0	60.0	85.0	70.0
OxyPNM	227.0	151.0	173.0	219.0	101.0	31.5	63.7	149.0	56.7	85.6	65.8	74.8	63.2	120.0	86.6	164.0
pPAR1	64.8	74.8	73.2	NA	50.9	38.3	57.1	45.6	49.0	70.2	64.4	86.4	NA	84.1	84.9	83.3
PARPNM	0.7	0.2	1.0	3.8	0.2	0.7	1.0	3.1	1.8	0.3	0.7	0.1	0.5	0.3	0.3	0.8
PNM_dist_Nittop	1.0	0.4	12.7	3.2	13.0	-29.1	22.9	8.2	4.7	6.9	4.3	9.8	11.0	-87.7	16.9	-81.3
PNM_dist_Oxytop	41.4	NA	9.2	0.6	38.8	NA	28.7	5.2	22.2	53.3	48.7	56.2	54.1	-44.7	61.0	-18.0
PNM_dist_Chl	1.4	27.0	-5.8	-13.2	18.2	-32.2	4.5	1.2	-1.1	16.8	2.7	12.7	29.6	-67.1	9.7	-74.1
PNM_dist_pPAR1	5.8	27.2	-0.3	NA	15.8	-36.3	-0.2	-7.5	-3.8	11.0	12.4	16.5	NA	-81.6	14.3	-80.7
Int_Chl	159.0	146.0	182.0	161.0	192.0	217.0	214.0	295.0	195.0	247.0	155.0	178.0	204.0	184.0	156.0	186.0
Int_NO3	513.0	84.7	987.0	1350.0	1120.0	2170.0	1670.0	2510.0	2120.0	978.0	1150.0	369.0	506.0	330.0	396.0	357.0
Int_NO2	13.2	11.1	2.4	19.0	21.3	28.1	48.4	45.7	31.7	13.2	18.3	16.4	21.5	22.4	18.1	14.1
Int_NH4	36.0	2.6	7.2	3.5	3.2	2.3	0.2	3.1	1.1	1.3	0.9	0.3	0.2	0.2	0.2	0.2
ChlxNO3_ln	1.0	0.9	7.6	2.4	5.3	4.4	14.9	83.6	13.4	9.6	8.2	4.7	4.0	4.0	5.5	2.2
OxyxNO3_ln	57.0	82.6	370.0	367.0	225.0	83.8	191.0	443.0	145.0	174.0	181.0	162.0	126.0	178.0	173.0	122.0
Sig_slope	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.0
NH4_depth_manual	86.0	86.0	68.0	50.0	56.0	35.0	50.0	35.0	42.0	75.0	75.0	98.0	85.0	40.0	96.0	80.0
NH4_max_manual	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sigma_slope	-70.0	-35.0	-25.0	-42.0	-24.0	-14.0	-12.0	-12.0	-9.6	-9.7	-11.0	-12.0	-29.0	-19.0	-15.0	-42.0

(b)

PPS Station Characteristics

column	n	mean	sd	min	max	se
Station	16	8.50	4.76	1.00	16.00	1.19
PNM_max	16	0.63	0.35	0.06	1.37	0.09
PNM_depth	16	73.92	21.93	38.10	103.00	5.48
PNM_top	15	61.75	23.41	26.80	94.20	6.05
PNM_sig	16	23.84	0.70	22.30	24.70	0.18
Temp_max	16	25.75	2.92	19.70	29.50	0.73
TempPNM	16	20.42	1.60	18.00	23.70	0.40
NH4PNM	16	0.05	0.07	0.00	0.27	0.02
MLD	16	31.84	19.32	14.70	75.40	4.83
Chl_max	16	8.30	10.03	4.10	45.30	2.51
Chl_depth	16	63.61	17.82	28.30	86.90	4.46
Chl_sig	16	23.56	0.61	22.30	24.60	0.15
Nitracline	16	84.89	28.09	38.70	120.00	7.02
Nitracline_top	16	66.33	24.23	29.80	102.00	6.06
NitPNM	16	9.14	5.90	1.29	20.10	1.48
NitChl	15	3.85	5.58	-0.13	16.70	1.44
ChlPNM	16	4.61	6.51	1.46	28.60	1.63
Oxycline_top	16	56.18	18.08	22.00	85.00	4.52
OxyPNM	16	114.49	59.55	31.50	227.00	14.89
pPAR1	16	67.46	15.58	38.30	86.40	3.90
PARPNM	16	0.97	1.08	0.12	3.85	0.27
PNM_dist_Nittop	16	7.61	5.74	0.39	22.90	1.43
PNM_dist_Oxytop	16	17.74	10.90	1.05	37.00	2.72
PNM_dist_Chl	16	10.31	11.06	-13.20	26.90	2.76
PNM_dist_pPAR1	16	6.46	10.67	-16.50	27.20	2.67
Int_Chl	16	191.44	38.69	143.00	297.00	9.67
Int_NO3	16	1039.91	750.87	82.50	2510.00	187.72
Int_NO2	16	21.55	12.07	2.36	48.40	3.02
Int_NH4	16	4.00	8.76	0.17	36.00	2.19
NH4_depth_manual	16	66.06	21.96	35.00	98.00	5.49
NH4_max_manual	16	0.06	0.08	0.00	0.31	0.02

Offshore Station Characteristics

column	n	mean	sd	min	max	se
Station	4	14.50	1.29	13.00	16.00	0.65
PNM_max	4	0.53	0.19	0.30	0.75	0.09
PNM_depth	4	93.45	5.61	86.10	99.20	2.81
PNM_top	4	83.67	7.09	78.80	94.20	3.54
PNM_sig	4	23.50	0.99	22.30	24.50	0.50
Temp_max	4	26.18	1.61	24.00	27.70	0.80
TempPNM	4	19.70	0.81	19.20	20.90	0.41
NH4PNM	4	0.00	0.00	0.00	0.00	0.00
MLD	4	22.90	9.65	14.80	36.90	4.82
Chl_max	4	4.69	0.37	4.16	5.03	0.19
Chl_depth	4	75.85	7.76	69.60	86.50	3.88
Chl_sig	4	23.42	0.45	23.20	24.10	0.23
Nitracline	4	107.80	10.44	93.20	118.00	5.22
Nitracline_top	4	87.62	6.14	81.50	95.00	3.07
NitPNM	4	5.30	2.55	2.11	7.39	1.27
NitChl	4	0.58	0.85	-0.03	1.84	0.43
ChlPNM	4	2.59	0.41	2.03	2.99	0.20
Oxycline_top	4	68.75	11.81	60.00	85.00	5.91
OxyPNM	4	108.45	43.76	63.20	164.00	21.88
pPAR1	4	84.10	0.70	83.30	85.00	0.35
PARPNM	4	0.48	0.23	0.31	0.81	0.12
PNM_dist_Nittop	4	5.81	3.76	2.23	11.00	1.88
PNM_dist_Oxytop	4	24.70	11.15	14.20	36.00	5.57
PNM_dist_Chl	4	17.62	7.92	9.39	26.40	3.96
PNM_dist_pPAR1	4	9.36	4.98	2.79	14.20	2.49
Int_Chl	4	182.25	18.66	157.00	202.00	9.33
Int_NO3	4	397.25	77.40	330.00	506.00	38.70
Int_NO2	4	19.02	3.77	14.10	22.40	1.88
Int_NH4	4	0.20	0.03	0.17	0.25	0.02
NH4_depth_manual	4	75.25	24.43	40.00	96.00	12.22
NH4_max_manual	4	0.01	0.00	0.00	0.01	0.00

Coastal Station Characteristics (5,6,7,8)

column	n	mean	sd	min	max	se
Station	4	6.50	1.29	5.00	8.00	0.65
PNM_max	4	0.95	0.25	0.66	1.23	0.12
PNM_depth	4	50.95	13.25	38.10	66.70	6.63
PNM_top	4	35.30	15.62	26.80	58.70	7.81
PNM_sig	4	23.62	0.82	22.70	24.50	0.41
Temp_max	4	26.25	0.90	25.20	27.30	0.45
TempPNM	4	20.85	2.03	19.20	23.70	1.02
NH4PNM	4	0.08	0.07	0.01	0.18	0.04
MLD	4	23.02	3.55	20.20	28.10	1.78
Chl_max	4	17.27	18.78	5.74	45.30	9.39
Chl_depth	4	40.05	9.33	28.30	48.50	4.66
Chl_sig	4	23.42	0.22	23.20	23.70	0.11
Nitracline	4	52.52	9.68	38.70	61.20	4.84
Nitracline_top	4	37.15	11.17	29.80	53.70	5.59
NitPNM	4	15.82	5.02	9.38	20.10	2.51
NitChl	4	5.18	7.19	-0.13	15.20	3.59
ChlPNM	4	9.33	12.90	1.65	28.60	6.45
Oxycline_top	4	34.20	9.04	22.00	42.00	4.52
OxyPNM	4	86.30	50.53	31.50	149.00	25.27
pPAR1	4	48.00	7.99	38.30	57.10	4.00
PARPNM	4	1.26	1.29	0.22	3.14	0.65
PNM_dist_Nittop	4	13.78	6.39	8.23	22.90	3.19
PNM_dist_Oxytop	4	16.74	9.06	5.24	26.70	4.53
PNM_dist_Chl	4	10.89	7.23	1.16	18.20	3.61
PNM_dist_pPAR1	4	2.96	9.71	-7.51	15.70	4.85
Int_Chl	4	229.00	46.45	192.00	297.00	23.23
Int_NO3	4	1867.50	606.10	1120.00	2510.00	303.05
Int_NO2	4	35.88	13.24	21.30	48.40	6.62
Int_NH4	4	2.19	1.39	0.18	3.17	0.70
NH4_depth_manual	4	44.00	10.68	35.00	56.00	5.34
NH4_max_manual	4	0.14	0.12	0.03	0.31	0.06

Table S3. Coefficients from 'Full' MLR model – Optimized multiple linear regression coefficients from each 'full' model and relative importance values (all-stations, coastal, offshore).

Full MLR Coefficients - All Stations

Variable	Coefficient	Percent Importance
(Intercept)	-10.798	
Temperature:SigmaT	0.0175	19.8
Ammonium:Temperature	0.0245	6.7
Oxygen:Temperature	-0.0052	5.8
SigmaT:Chlorophyll	0.9121	5.7
Chlorophyll	-28.526	5.5
Nitrate:Temperature	0.0063	5.1
Temperature:Chlorophyll	0.3126	4.9
Ammonium	-0.6865	4.5
Oxygen	0.3892	4.4
Oxygen:SigmaT	-0.0118	4.1

Full MLR Coefficients - Coastal

Variable	Coefficient	Percent Importance
(Intercept)	-38.861	
Nitrate:Oxygen	0.0078	17.7
Oxygen:pPAR	-0.0043	10.4
pPAR	0.9702	10
Nitrate:Chlorophyll	0.0450	9.3
Nitrate:Ammonium	0.2290	6.8
Ammonium:pPAR	0.0147	6.8
Oxygen:Chlorophyll	-0.0018	4.8
Ammonium	-0.5882	4.3
SigmaT	1.5081	4.1
pPAR:Chlorophyll	0.0371	2.7

Full MLR Coefficients - Offshore

Variable	Coefficient	Percent Importance
(Intercept)	-2.5289	
Oxygen:Chlorophyll	-0.0027	9.4
SigmaT:Chlorophyll	0.5121	9.4
Nitrate:Temperature	0.1299	9.1
Chlorophyll	-13.565	8.6
Nitrate	-12.572	7.3
Nitrate:SigmaT	0.4168	6.9
Ammonium:Oxygen	-0.0002	5.4
Nitrate:Ammonium	0.0141	5.4
Temperature:Chlorophyll	0.0898	5.3
Ammonium:Chlorophyll	-0.0029	5.3
Ammonium:pPAR	-0.0003	3.2
Ammonium:SigmaT	-0.0009	0.9

Table S4. Error values for 'Full' MLR – Observed nitrite maxima and corresponding depth are listed for each station during the 2016 cruise (PPS data). The depth error and nitrite maxima size errors are listed for each of the three models. Negative error values are underestimates of the observed feature, and positive errors are overestimates of the observed nitrite maximum. The stations used for training the coastal and offshore models are boxed (coastal – 6,7,8,9 and offshore – 13,14,15,16). Summary of the observed nitrite maxima across the region (means and standard errors), and summaries for the errors in each model are listed at the bottom of the table. In the offshore model, nitrite maxima size error at Station 8 is an extreme outlier, thus a summary excluding this station is also provided for the offshore model. Summaries (mean and standard error) of the errors for only the subset of training stations for each model are also included.

Full Variable MLR

Station	Nitrite Maxima (uM)	Depth of Nitrite Maxima (m)	All-Station Errors Depth (m)	All-Station Errors Size (uM)	Coastal Errors Depth (m)	Coastal Errors Size (uM)	Offshore Errors Depth (m)	Offshore Errors Size (uM)
1	0.27	70.61	29.01	-0.1	NA	NA	2.2	-0.08
2	0.42	102	4.96	-0.27	30.96	2.58	4.96	-0.3
3	0.06	72.88	-9.29	0.05	7.12	3.14	5.8	1.54
4	0.35	53.4	11.66	-0.04	6.6	2.06	13.15	1.96
5	0.66	66.67	-10.27	-0.41	1.33	0.64	0.44	0.26
6	0.85	42.1	-8.19	-0.25	-6.06	-0.01	-7.85	4.05
7	1.05	56.89	-8.81	-0.45	-6.89	-0.05	-4.52	2.95
8	1.23	38.08	-1.16	15.28	0.18	0.64	-1.16	13670
9	1.37	45.15	1.09	-0.84	1.09	-0.1	2.85	4.93
10	0.51	81.18	4.97	-0.09	3.82	-0.17	5.82	2.85
11	0.54	76.84	-1.87	-0.07	-0.62	-0.15	6.16	0.56
12	0.66	103	2.25	-0.21	0.05	0.34	4.05	-0.01
13	0.53	92.53	-0.53	-0.22	-4.53	3.21	-1.53	0.09
14	0.52	96.01	6.99	-0.21	-2.01	1.58	0.66	-0.12
15	0.75	99.2	4.09	-0.38	-4.22	0.4	0.8	-0.24
16	0.3	86.06	34.94	0.05	8.94	2.8	-1.06	0.07
Mean	**0.63**	**73.91**	**3.74**	**0.74**	**2.38**	**1.13**	**1.92**	**855.53**
Std Error	*0.1*	*5.5*	*3.2*	*1.0*	*2.3*	*0.3*	*1.2*	*854.3*
								1.23
								0.44
					Coastal Stations Only		Offshore Stations Only	
					-2.92	**0.12**	**-0.28**	**-0.05**
					2.07	0.17	0.59	0.08

Table S5. Error values for 'Core' MLR – Observed nitrite maxima and corresponding depth are listed for each station during the 2016 cruise (PPS data). The depth error and nitrite maxima size errors are listed for each of the two core models. Negative error values are underestimates of the observed feature, and positive errors are overestimates of the observed nitrite maximum. The stations used for training the coastal and offshore models are boxed (coastal – 6,7,8,9 and offshore – 13,14,15,16). Summary of the observed nitrite maxima across the region (means and standard errors), and summaries for the errors in each model are listed at the bottom of the table. Summaries (mean and standard error) of the errors for only the subset of training stations for each model are also included.

Core Variable MLR

Station	Nitrite Maxima (uM)	Depth of Nitrite Maxima (m)	Coastal Errors Depth (m)	Coastal Errors Size (uM)	Offshore Errors Depth (m)	Offshore Errors Size (uM)
1	0.27	70.61	23.41	0.29	17.42	-0.09
2	0.42	102	4.96	0.1	4.96	-0.11
3	0.06	72.88	5.8	0.57	12.12	0.25
4	0.35	53.4	6.77	0.36	18.6	-0.03
5	0.66	66.67	0.44	-0.14	-1.67	-0.28
6	0.85	42.1	-5.11	-0.34	-4.1	-0.05
7	1.05	56.89	-4.52	-0.47	6.11	-0.6
8	1.23	38.08	1.65	0.81	13.92	-0.92
9	1.37	45.15	1.09	-0.83	7.85	-0.97
10	0.51	81.18	2.27	0.01	6.82	-0.06
11	0.54	76.84	-1.87	-0.03	-2.73	-0.14
12	0.66	103	-0.61	-0.15	-2.95	-0.17
13	0.53	92.53	-4.98	0.05	-5.53	0.18
14	0.52	96.01	0.59	-0.02	-0.01	-0.19
15	0.75	99.2	0.04	-0.25	2.8	-0.35
16	0.3	86.06	7.34	0.23	13.94	0.04
Mean	**0.63**	**73.91**	**2.33**	**0.01**	**5.47**	**-0.22**
Std Error	*0.1*	*5.5*	*1.7*	*0.1*	*2.0*	*0.1*
			Coastal Stations Only		Offshore Stations Only	
			-1.72	**-0.21**	**2.80**	**-0.08**
			1.79	0.35	4.10	0.12

Figure S1. Nitrite concentrations vs environmental quantities (not stations water column features) – Cannot expect linear correlations between a unimodal quantity across depth (nitrite) with quantities that are offset in depth space or have more linear distributions. This, data was summarized into station features to look for correlations across stations.

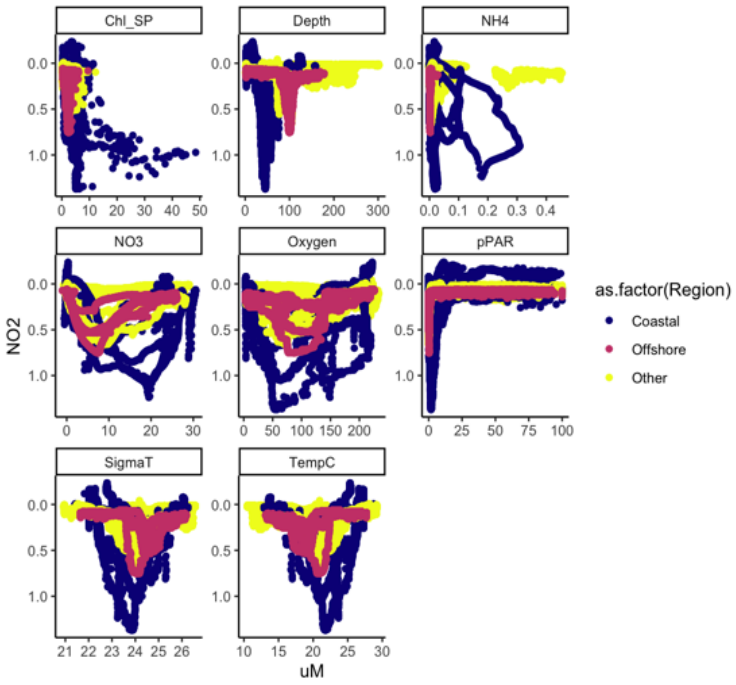


Figure S2. Regressions with CTD data included – (a) Concentration of the nitrite maxima regressed against water column features and (b) depth of the nitrite maxima regressed against depth-related water column features.

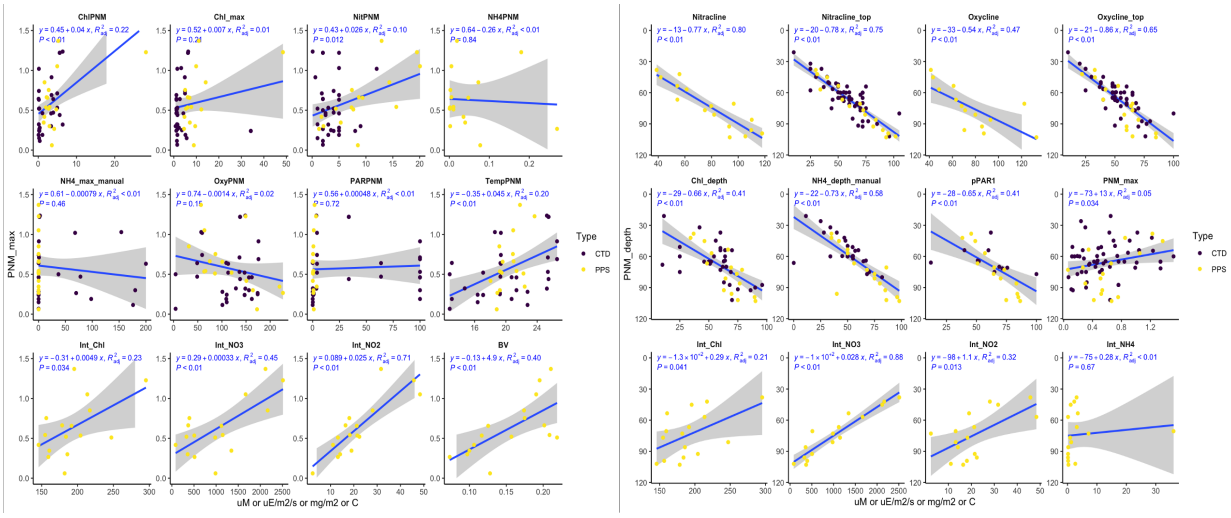


Figure S3. Regression of depth of nitrite maxima – This plot shows regressions of depth vs features of the water column that are not limited to depth-related features (eg. depth of nitrite maxima vs concentration of chlorophyll at the nitrite maxima).

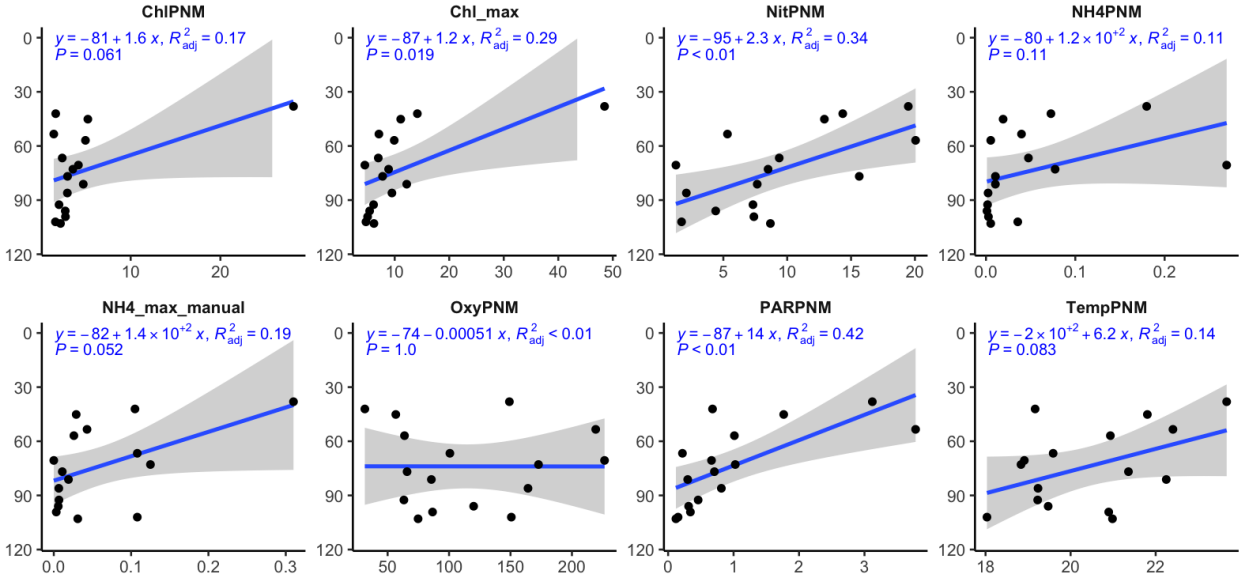


Figure S4. Rates vs nitrite concentration – None of the four rate measurements (ammonia oxidation, nitrite oxidation, nitrate reduction or nitrite uptake) or net nitrite calculations (NetNit, NetPhy, $NetNO_2$) correlate with observed nitrite concentrations at the depth of measurement.

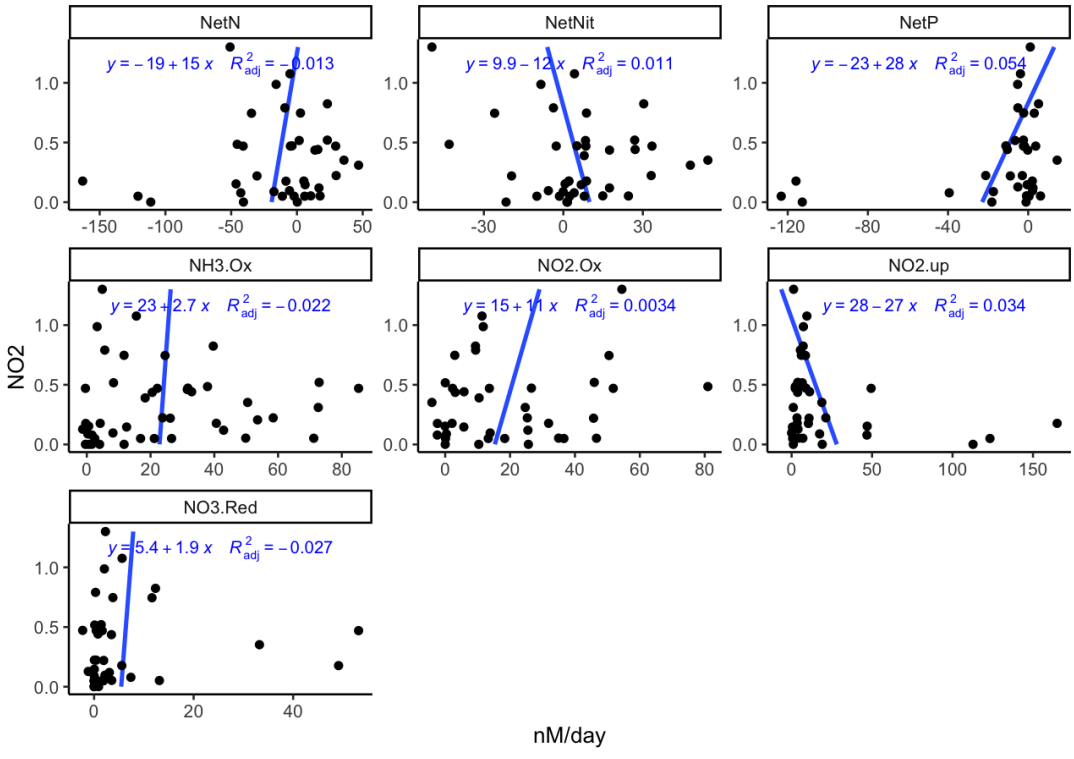


Figure S5. Maximum Rates vs PNM size – The maximum measured rate at each station was regressed against the size of the PNM for that station, and no correlations were seen. Because only 3-4 depths were sampled for rate measurements per station, there is a possibility that we missed the depth of the real maximum rate and/or the real nitrite maxima.

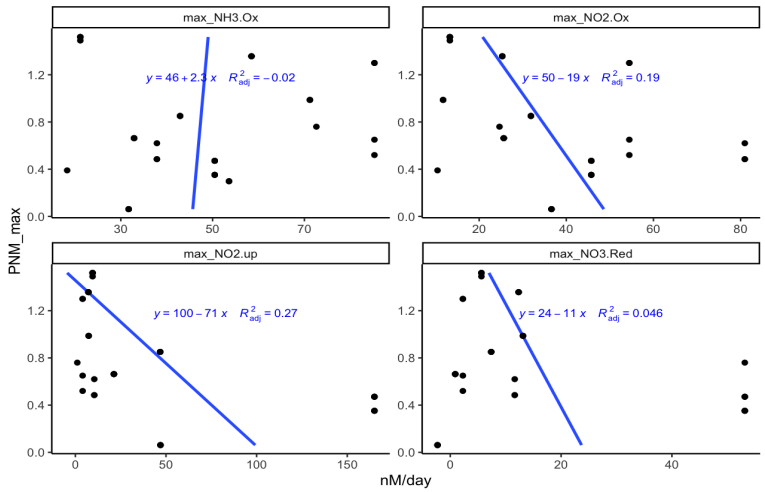
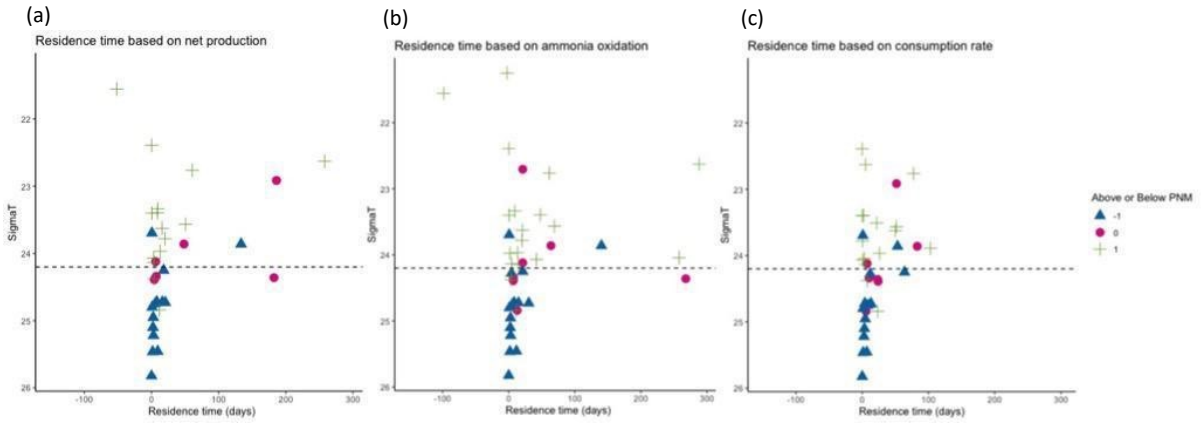


Figure S6. Residence Time – residence time can be calculated from net influx or outflux to the system assuming steady-state. We calculated residence time using net production of nitrite (a), production from ammonia oxidation (b) and using net consumption (c). Mean residence times are 30.8, 43.4, 20.3 days, respectively. Potential formation time is calculated using the NetNO2 production rates and observed nitrite concentrations (d). Mean formation time is 4.4 days.



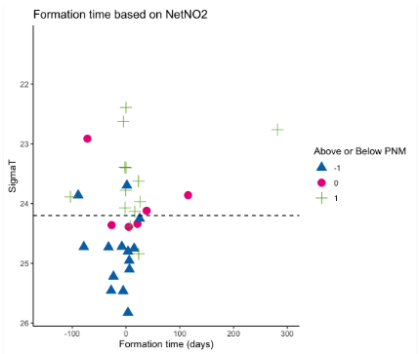


Figure S7. Predicted vs observed plots for natural log transformed nitrite at model training stations in 'full' MLRs (a. All-Station, b. Coastal, c. Offshore)

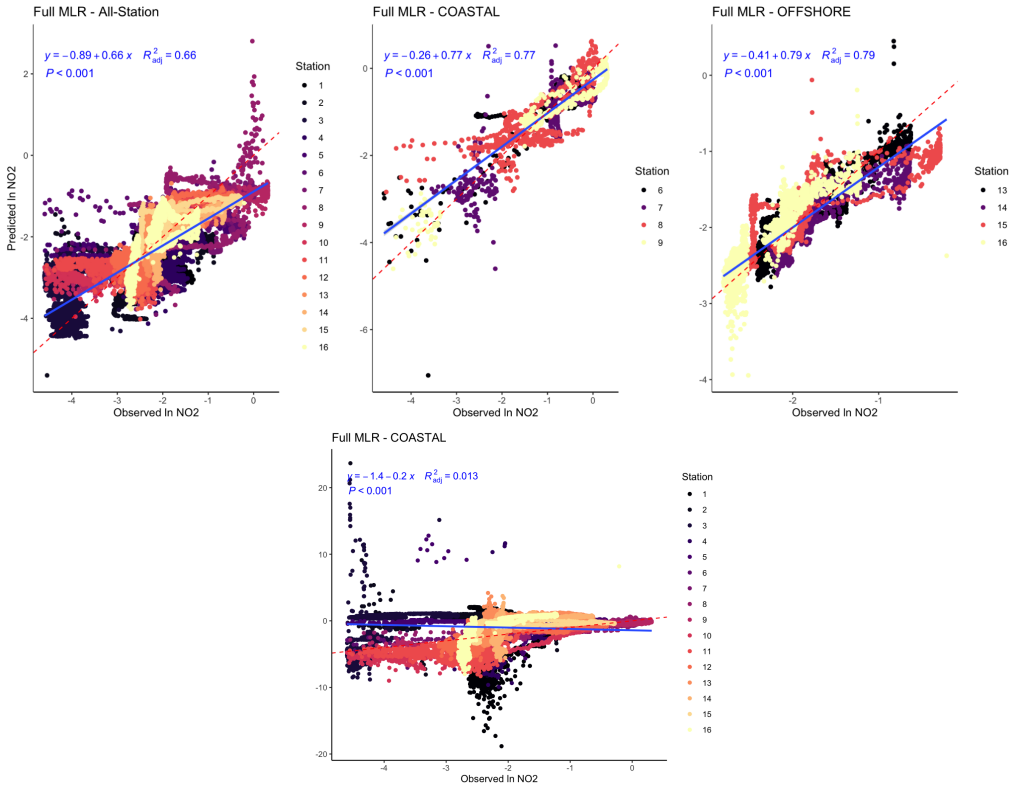


Figure S8. Predicted vs observed plots for natural log transformed nitrite at model training stations in 'core' MLRs (a. Coastal and b. Offshore)

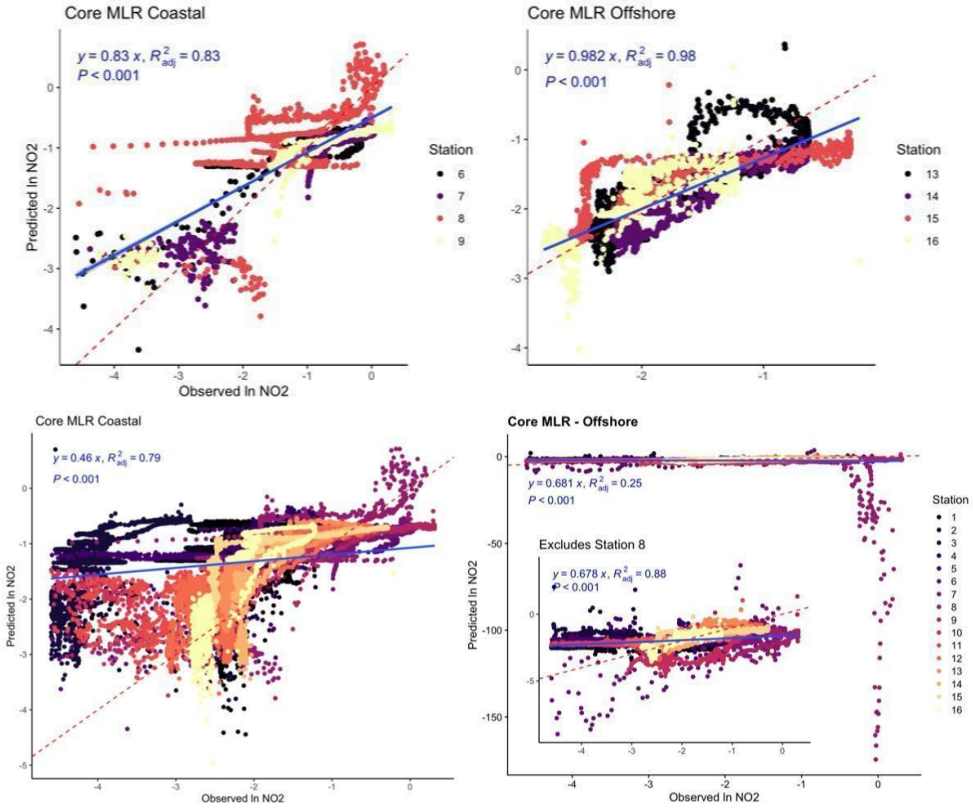


Figure S9. Rescale of Figure 6. Nitrite profile predictions from three 'full' model multiple linear regression analyses plotted with larger scale (0-4uM). Offshore model: Station 8 and 9 are beyond the x-axis. All-station model: Station 8 is beyond the x-axis.