

Regional patterns in ammonia-oxidizing communities throughout Chukchi Sea waters from the Bering Strait to the Beaufort Sea

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Table S1. Physicochemical data from each sample.

Station	Region ^a	Sample depth (m)	Bottom depth (m)	Date	Time	Lat. (°N)	Lon. (°E)	Temp. (°C)	Sal.	σ_θ (kg m ⁻³ -1000)	DO (μmol L ⁻¹)	Silicate (μmol L ⁻¹)	Phosphate (μmol L ⁻¹)	Nitrate (μmol L ⁻¹)	Nitrite (μmol L ⁻¹)	Ammonium (μmol L ⁻¹)	DIN (μmol L ⁻¹)	Total C (mmol L ⁻¹)
2	C	41.8	46	28.06.11	1037	65.6164	-168.2801	2.74	31.36	25.02	387.5	5.51	0.70	0.02	0.00	0.03	0.05	2.09
4	C	49.7	53	28.06.11	1339	65.6492	-168.4366	1.69	31.82	25.44	395.2	6.12	0.80	0.08	0.00	0.34	0.42	2.06
8	C	39.0	51	28.06.11	2231	65.7274	-168.8269	2.41	31.96	25.51	348.6	12.23	0.89	2.36	0.05	1.50	3.91	2.03
9	C	26.8	35	29.06.11	1227	67.2089	-166.0795	2.58	31.78	25.35	383.7	5.81	0.73	0.14	0.00	0.63	0.77	2.07
11	C	23.6	32	29.06.11	1756	66.9704	-164.6756	3.61	31.55	25.08	369.1	6.71	0.65	0.05	0.00	0.36	0.41	2.04
13	C	18.4	23	29.06.11	2251	66.6934	-163.3811	4.96	29.40	23.70	371.5	5.21	0.46	0.07	0.00	0.06	0.13	1.93
15	C	42.0	45	30.06.11	1123	67.4501	-167.4803	1.44	31.94	25.55	342.5	11.94	1.08	1.97	0.10	2.06	4.13	2.10
24	C	30.9	44	01.07.11	1151	68.3072	-166.9287	2.76	31.05	24.88	391.9	6.62	0.61	0.08	0.00	0.43	0.51	2.03
25	C	42.0	44	01.07.11	2312	69.8988	-166.1925	-1.10	32.39	26.05	408.3	7.12	1.03	3.26	0.09	2.48	5.83	2.13
31	C	42.1	46	02.07.11	2226	70.9052	-161.7334	0.80	33.10	26.54	338.4	4.62	0.77	1.24	0.04	1.56	2.84	2.15
71	NC	41.1	48	08.07.11	1643	72.2719	-164.5426	-1.68	33.20	26.75	310.6	19.56	1.74	11.61	0.21	1.86	13.68	2.33
93	B	242.1	254	11.07.11	1131	73.1304	-160.5048	0.53	34.81	27.92	289.6	12.34	1.02	13.70	0.04	0.27	14.01	2.22
94	B	340.9	349	11.07.11	1306	73.2000	-160.3844	0.42	34.86	27.97	300.5	9.03	0.91	12.86	0.00	0.00	12.86	2.21
95	B	766.5	840	11.07.11	1510	73.2722	-160.2564	0.14	34.87	28.01	307.6	8.12	0.89	12.73	0.00	0.01	12.74	2.21
97	B	1383.3	1407	11.07.11	1917	73.3840	-160.0761	-0.32	34.92	28.06	306.3	9.74	0.97	13.40	0.00	0.00	13.40	2.21
102	B	304.3	315	14.07.11	2050	72.8395	-158.7246	0.45	34.85	27.96	297.9	10.83	0.97	12.94	0.01	0.07	13.02	2.40
103	B	219.5	231	15.07.11	237	72.7783	-158.8417	0.54	34.81	27.93	283.9	15.24	1.13	13.20	0.10	0.14	13.44	2.23
132	B	302.7	3766	20.07.11	1542	72.6794	-150.9328	0.20	34.63	27.80	289.3	12.24	1.03	13.42	0.00	0.00	13.42	2.23
133	B	300.5	3617	20.07.11	2155	72.5025	-151.0075	0.34	34.67	27.82	289.9	10.83	0.99	13.15	0.00	0.00	13.15	2.23
139	B	353.2	1561	21.07.11	1328	71.6873	-151.8276	0.65	34.81	27.92	295.0	9.33	0.97	13.42	0.00	0.00	13.42	2.22

Lat. = latitude; Lon. = longitude; Temp. = temperature; Sal. = salinity; σ_θ = potential density anomaly; DO = dissolved oxygen; DIN = dissolved inorganic nitrogen (ammonium + nitrate + nitrite); total C = total carbon. ^aC = coastal Chukchi Sea, NC = northern Chukchi Sea, and B = Beaufort slope.

Table S2. qPCR primers and cycling conditions.

	"Total" AOA <i>amoA</i>	MGI 16S rRNA	WCA <i>amoA</i>	WCB <i>amoA</i>	AOB <i>amoA</i>	Bacterial 16S rRNA
Forward primer	<i>Arch-amoAF</i> (0.3 μ M; Francis et al. 2005) 5'-STAATGGTCTGGCTTAGACG-3'	<i>GI_751F</i> (0.2 μ M; Mincer et al. 2007) 5'-GTCTACCAGAACAYGTTC-3'	<i>WCA-amoA-F</i> (0.2 μ M; Mosier and Francis 2011) 5'-ACACCAGTTTGGCTWCCDTCAGC-3'	<i>Arch-amoAFB</i> (0.2 μ M; Beman et al. 2008) 5'-CATCCRATGTGGATTCCATCDTG-3'	<i>amoA-1F</i> (0.5 μ M; Rothauwe et al. 1997) 5'-GGGGTTTCTACTGGTGGT-3'	<i>BACT1369F</i> (Suzuki et al. 2000) 5'-CGGTGAATACGTTTCYCGG-3'
Reverse primer	<i>Arch-amoAR</i> (0.3 μ M; Francis et al. 2005) 5'-GCGGCCATCCATCTGTATGT-3'	<i>GI_956R</i> (0.2 μ M; Mincer et al. 2007) 5'-HGGCGTTGACTCCAATTG-3'	<i>WCA-amoA-R</i> (0.2 μ M; Mosier and Francis 2011) 5'-TCAGCCACHGTGATCAAATTG-3'	<i>WCB-amoA-R</i> (0.2 μ M; Mosier and Francis 2011) 5'-AAYGCAGTTTCTAGYGGATC-3'	<i>amoAr-NEW</i> (0.5 μ M; Hornek et al. 2006) 5'-CCCCTCBGSAAAVCCTTCTTC-3'	<i>PROK1492R</i> (Suzuki et al. 2000) 5'-GGWTACCTTGTACGACTT-3'
Probe	NA	<i>MGI_889</i> (0.3 μ M; Lund et al. 2012) 5'-FAM-AGTACGTACGCAAGTATGAA-BHQ1-3'	<i>WCA-amoA-P</i> (0.3 μ M; Mosier and Francis 2011) 5'-FAM-ACTCCGCCGAACAGTATCA-BHQ1-3'	<i>WCB-amoA-P</i> (0.3 μ M; Mosier and Francis 2011) 5'-FAM-CCAAAGAATATYAGCGARTG-BHQ-3'	NA	<i>TM1389F</i> (Suzuki et al. 2000) 5'-FAM-CTTGTACACACCGCCCGTC-BHQ1-3'
Cycling conditions	95°C, 3 m 38 cycles of: 95°C, 30 s 56°C, 45 s 72°C, 1 m <i>Acquisition at 80°C</i>	95°C, 10 m 40 cycles of: 95°C, 15s 55°C, 1m <i>Acquisition at 55°C</i>	95°C, 10 m 40 cycles of: 95°C, 15s 56°C, 1m <i>Acquisition at 56°C</i>	95°C, 10 m 40 cycles of: 95°C, 15s 56°C, 1m <i>Acquisition at 56°C</i>	95°C, 5 m 40 cycles of: 94°C, 30 s 61.5°C, 40 s 72°C, 40 s <i>Acquisition at 80°C</i>	95°C, 10 m 35 cycles of: 95°C, 15 s 56°C, 1 m <i>Acquisition at 56°C</i>
Premix	iTaq Universal SYBR Green Supermix (Bio-Rad)	TaqMan Environmental Master Mix 2.0 (Thermo Fisher)	TaqMan Environmental Master Mix 2.0 (Thermo Fisher)	TaqMan Environmental Master Mix 2.0 (Thermo Fisher)	iTaq Universal SYBR Green Supermix (Bio-Rad)	TaqMan Environmental Master Mix 2.0 (Thermo Fisher)
Number plates run	4	4	4	4	2	2
r²	0.988 (\pm 0.001)	0.997 (\pm 0.002)	0.993 (\pm 0.002)	0.998 (\pm 0.002)	0.995 (\pm 0.005)	0.994 (\pm 0.007)
Efficiency	101.70% (\pm 0.67%)	95.16% (\pm 7.56%)	100.22% (\pm 9.40%)	92.12% (\pm 6.34%)	83.53% (\pm 9.34%)	112.71% (\pm 1.41%)

For r^2 and efficiency, the mean (\pm standard deviation) is reported if the number of plates run is >2 . If two plates were run, reported values are the midpoint (\pm range).

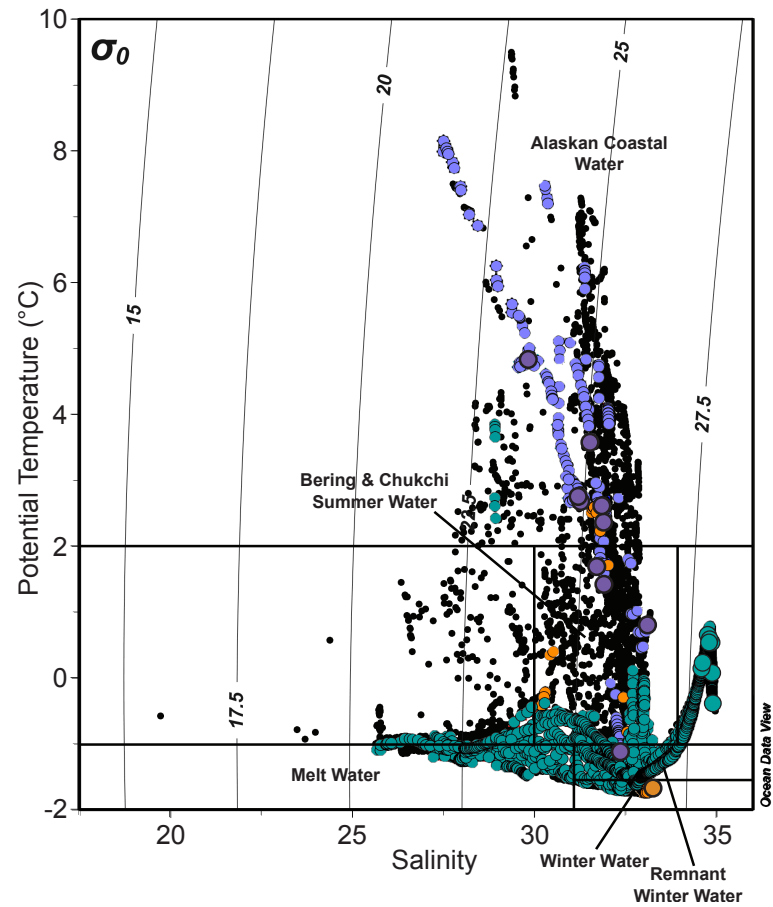


Fig. S1. Temperature-salinity diagram of sampled waters. Dashed contours show σ_0 . Shaded dots show all depths from stations sampled in this study (purple=coastal Chukchi, orange=northern Chukchi, green=Beaufort slope); large circles are the depth where microbial samples were collected. Small black circles show data from HLY1101 stations not sampled for microbial analysis. Black boxes demarcate dominant water masses.