Photoproduction of ammonium in the southeastern Beaufort Sea and its biogeochemical implications

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Supplemental materials

Table SM1. Comparison of the quasi- (3 parameters) with simple (2 parameters) exponential functions for fitting $\Phi_{NH_4^+,\lambda}$ based on statistical results of least-squares linear regression between predicted and measured NH_4^+ photoproduction rates. N = 6 for all cases. *RSS* denotes residual sum of squares in (nmol NH_4^+ L^{-1} $d^{-1})^2$. Here m_1, m_2, and m_3 are fitting paramenters. λ is wavelength in nanometers and 290 denotes the reference wavelength.

	Quasi-exponential: $\Phi_{NH_4^+,\lambda} = m_1 \times exp[m_2 \times (m_3 + \lambda)^{-1}]$		Simple exponential: $\Phi_{NH_4^+,\lambda} = m_1 \times exp[m_2 \times (\lambda - 290)]$	
Station	r^2	*RSS*	r^2	*RSS*
391	0.995	4.5	0.962	67.3
394	0.976	77.5	0.961	119.2
398	0.986	184.7	0.955	587.9
430	0.990	12.4	0.949	49.0
640	0.988	15.3	0.970	41.4
691	0.997	5.5	0.968	82.2
693	0.990	78.4	0.954	348.8
694	0.984	149.2	0.970	256.4
697	0.997	29.6	0.991	134.6

Table SM2. Results of least-squares regression between $\Phi_{NH_4^+,\lambda}$ and $a_{cdom,412}$. λ in nanometers; $\Phi_{NH_4^+,\lambda}$ in mol NH_4^+ (mol quanta)$^{-1}$; $a_{cdom,412}$ in m^{-1}. $N = 9$ for all cases.

Equation $\Phi_{NH_4^+,\lambda} = y_0 + a \times exp(-b \times a_{cdom,412})$ (λ: 290−349 nm)									
λ	$a \times 10^6$	b	$y_0 \times 10^7$	r^2	λ	$a \times 10^6$	b	$y_0 \times 10^7$	r^2
290	13	7.70	51	0.625	329	2.0	2.37	11	0.910
291	12	7.51	48	0.633	330	1.9	2.30	11	0.914
292	11	7.33	46	0.641	331	1.9	2.24	11	0.918
293	10	7.15	43	0.649	332	1.9	2.17	10	0.922
294	9.4	6.97	41	0.657	333	1.8	2.11	10	0.925
295	8.8	6.80	39	0.665	334	1.8	2.05	9.8	0.929
296	8.2	6.62	37	0.673	335	1.8	2.00	9.5	0.932
297	7.6	6.45	36	0.681	336	1.7	1.94	9.2	0.935
298	7.2	6.27	34	0.690	337	1.7	1.89	8.9	0.938
299	6.7	6.10	33	0.698	338	1.7	1.84	8.6	0.941
300	6.3	5.93	31	0.707	339	1.7	1.79	8.4	0.943
301	5.9	5.76	30	0.715	340	1.6	1.75	8.1	0.946
302	5.6	5.60	29	0.724	341	1.6	1.70	7.9	0.948
303	5.3	5.43	28	0.732	342	1.6	1.66	7.6	0.950
304	5.0	5.27	26	0.741	343	1.6	1.62	7.4	0.952
305	4.7	5.12	25	0.749	344	1.6	1.58	7.1	0.954
306	4.5	4.96	24	0.757	345	1.5	1.54	6.9	0.956
307	4.3	4.81	24	0.766	346	1.5	1.51	6.7	0.957
308	4.1	4.66	23	0.774	347	1.5	1.47	6.5	0.959
309	3.9	4.51	22	0.782	348	1.5	1.44	6.2	0.960
310	3.7	4.37	21	0.790	349	1.5	1.41	6.0	0.961
311	3.5	4.23	20	0.798					
312	3.4	4.10	20	0.806					
313	3.2	3.97	19	0.814					
314	3.1	3.84	18	0.821					
315	3.0	3.72	18	0.828					
316	2.9	3.60	17	0.836					
317	2.8	3.48	17	0.843					
318	2.7	3.37	16	0.849					
319	2.6	3.26	16	0.856					
320	2.5	3.15	15	0.862					
321	2.4	3.05	15	0.868					
322	2.4	2.95	14	0.874					
323	2.3	2.86	14	0.880					
324	2.2	2.77	13	0.885					
325	2.2	2.68	13	0.891					
326	2.1	2.60	13	0.896					
327	2.1	2.52	12	0.901					
328	2.0	2.45	12	0.905					

Table SM2 (continued from last page)

	Equation $\Phi_{NH_4^+,\lambda} = a \times exp(-b \times a_{cdom,412})$ (λ: 350−420 nm)						
λ	a × 10^6	b	r^2	λ	a × 10^6	b	r^2
350	1.9	0.626	0.942	388	1.4	0.707	0.960
351	1.9	0.629	0.945	389	1.4	0.708	0.960
352	1.9	0.632	0.947	390	1.4	0.710	0.959
353	1.8	0.635	0.949	391	1.3	0.711	0.958
354	1.8	0.637	0.951	392	1.3	0.713	0.958
355	1.8	0.640	0.953	393	1.3	0.714	0.957
356	1.8	0.643	0.955	394	1.3	0.716	0.956
357	1.8	0.645	0.956	395	1.3	0.717	0.956
358	1.8	0.648	0.958	396	1.3	0.718	0.955
359	1.7	0.650	0.959	397	1.3	0.720	0.954
360	1.7	0.653	0.960	398	1.3	0.721	0.953
361	1.7	0.655	0.961	399	1.3	0.722	0.952
362	1.7	0.658	0.962	400	1.3	0.723	0.951
363	1.7	0.660	0.963	401	1.3	0.725	0.951
364	1.7	0.662	0.964	402	1.3	0.726	0.950
365	1.6	0.665	0.964	403	1.2	0.727	0.949
366	1.6	0.667	0.965	404	1.2	0.728	0.948
367	1.6	0.669	0.965	405	1.2	0.729	0.947
368	1.6	0.671	0.966	406	1.2	0.730	0.946
369	1.6	0.673	0.966	407	1.2	0.732	0.945
370	1.6	0.675	0.966	408	1.2	0.733	0.945
371	1.6	0.677	0.966	409	1.2	0.734	0.944
372	1.5	0.679	0.966	410	1.2	0.735	0.943
373	1.5	0.681	0.966	411	1.2	0.737	0.941
374	1.5	0.683	0.966	412	1.2	0.737	0.941
375	1.5	0.685	0.966	413	1.2	0.738	0.940
376	1.5	0.687	0.966	414	1.2	0.739	0.939
377	1.5	0.689	0.966	415	1.2	0.740	0.938
378	1.5	0.691	0.965	416	1.2	0.741	0.937
379	1.5	0.692	0.965	417	1.2	0.742	0.936
380	1.4	0.694	0.965	418	1.2	0.743	0.936
381	1.4	0.696	0.964	419	1.2	0.744	0.935
382	1.4	0.697	0.964	420	1.1	0.745	0.934
383	1.4	0.699	0.963				
384	1.4	0.701	0.963				
385	1.4	0.702	0.962				
386	1.4	0.704	0.962				
387	1.9	0.626	0.942				

Table SM2 (continued from last page)

Equation $\Phi_{NH_4^+,\lambda} = y_0 - a \times a_{cdom,412}$ (λ: 421−500 nm)

λ	a × 10^7	y_0 × 10^7	r^2	λ	a × 10^7	y_0 × 10^7	r^2
421	4.46	10	0.927	462	3.94	9.0	0.905
422	4.44	10	0.926	463	3.94	8.9	0.905
423	4.43	10	0.926	464	3.93	8.9	0.904
424	4.41	10	0.925	465	3.92	8.9	0.904
425	4.40	10	0.925	466	3.91	8.9	0.903
426	4.38	10	0.924	467	3.90	8.8	0.903
427	4.37	10	0.924	468	3.89	8.8	0.902
428	4.35	10	0.923	469	3.88	8.8	0.902
429	4.34	10	0.923	470	3.87	8.8	0.901
430	4.32	10	0.922	471	3.86	8.7	0.900
431	4.32	10	0.922	472	3.85	8.7	0.900
432	4.31	10	0.922	473	3.84	8.7	0.899
433	4.28	9.9	0.921	474	3.83	8.7	0.899
434	4.28	9.9	0.921	475	3.82	8.6	0.898
435	4.25	9.9	0.920	476	3.82	8.6	0.898
436	4.24	9.8	0.919	477	3.81	8.6	0.897
437	4.23	9.8	0.919	478	3.80	8.6	0.897
438	4.22	9.7	0.918	479	3.79	8.5	0.896
439	4.20	9.7	0.918	480	3.78	8.5	0.896
440	4.19	9.7	0.917	481	3.77	8.5	0.895
441	4.18	9.6	0.917	482	3.77	8.5	0.895
442	4.17	9.6	0.916	483	3.76	8.5	0.894
443	4.15	9.6	0.915	484	3.75	8.4	0.894
444	4.14	9.5	0.915	485	3.74	8.4	0.893
445	4.13	9.5	0.914	486	3.73	8.4	0.893
446	4.12	9.5	0.914	487	3.73	8.4	0.892
447	4.11	9.4	0.913	488	3.72	8.4	0.892
448	4.09	9.4	0.913	489	3.71	8.3	0.891
449	4.08	9.4	0.912	490	3.70	8.3	0.891
450	4.07	9.3	0.912	491	3.70	8.3	0.890
451	4.06	9.3	0.911	492	3.69	8.3	0.890
452	4.05	9.3	0.911	493	3.68	8.3	0.889
453	4.04	9.2	0.910	494	3.67	8.2	0.889
454	4.03	9.2	0.910	495	3.67	8.2	0.888
455	4.02	9.2	0.909	496	3.66	8.2	0.888
456	4.01	9.1	0.908	497	3.65	8.2	0.888
457	4.00	9.1	0.908	498	3.64	8.2	0.887
458	3.99	9.1	0.907	499	3.64	8.1	0.887
459	3.98	9.1	0.907	500	3.63	8.1	0.886
460	3.96	9.0	0.906				
461	3.95	9.0	0.906				