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Supplement of

Impact of river discharge, upwelling and vertical mixing on the nutrient loading and productivity of the Canadian Beaufort Shelf

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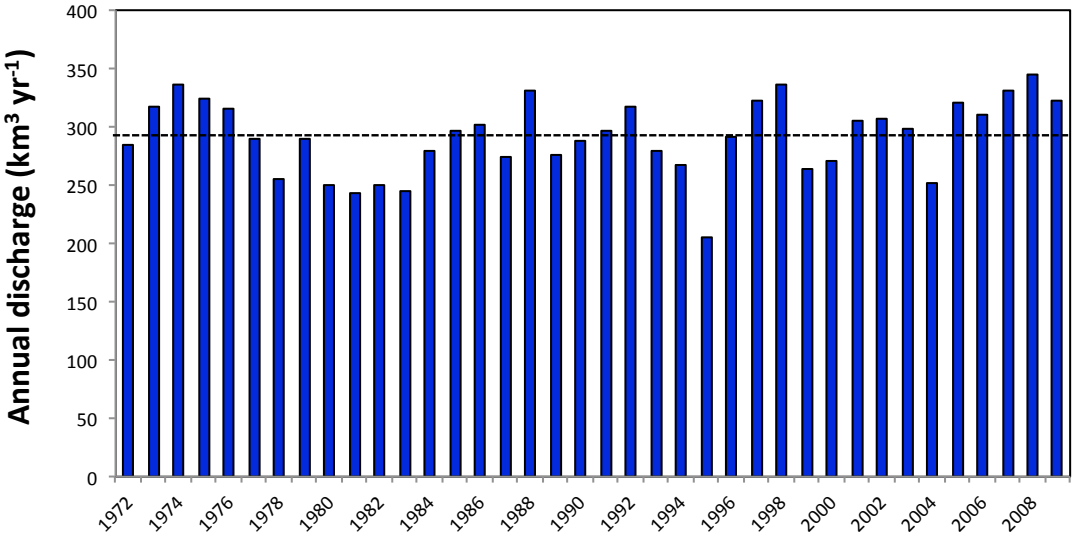
Supplement

Figure S1: Annual or daily Mackenzie River discharge at Tsiigehtchic (67°27'21" N, 133°45'11" W; www.ec.gc.ca/rhc-wsc/) for (A) the period 1972-2009 and (B) the years 2009 (black, this study) and 2004 (green, contemporary to the study of Emmerton et al. 2008b). Blue symbols indicate the period during which nutrient measurements were made at Inuvik and red symbols mark the main sampling period of the Malina program in the southeast Beaufort Sea.

A)



B)

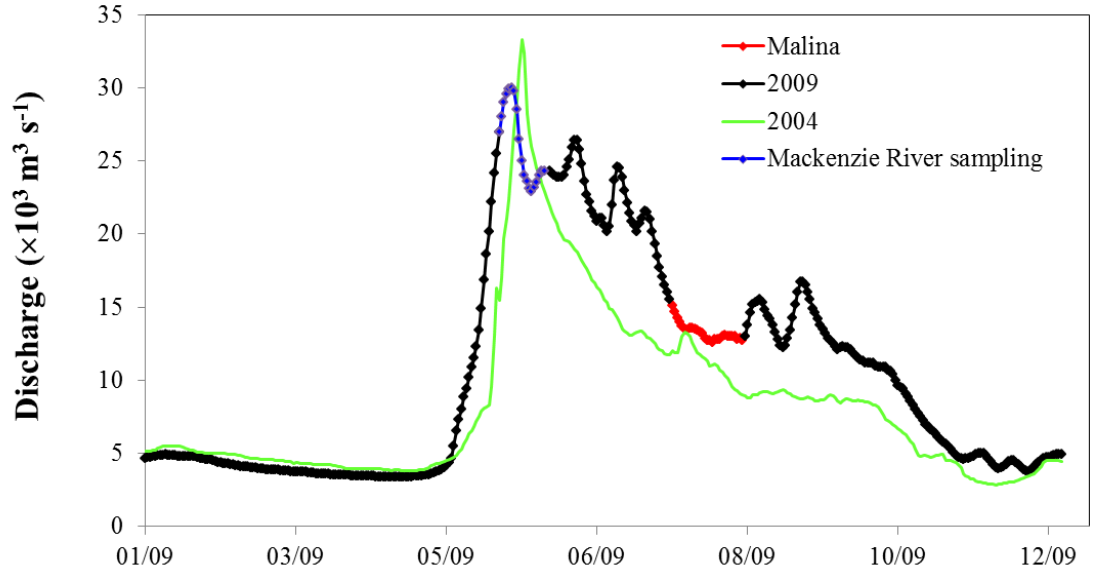


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Table S1: Daily measurements of discharge and dissolved constituents in the Mackenzie River at Inuvik and Tsiigehtchic during spring 2009, with median values, coefficients of variation (CV) and the r^2 value of significant relationships (see Fig. S2) between concentration and discharge at Inuvik and Tsiigehtchic (*ns* = non-significant). These relationships are shown in Figure S2 for DON and DOC.

Location/date	Discharge (m^3 s^{-1})	DOC (μM)	TDN (μM)	Nitrate+Nitrite (μM)	DON (μM)	TDP (μM)	Phosphate (μM)	DOP (μM)	N* (μM)	N:P mol:mol
Inuvik										
23 May	28000	1766	34.27	3.47	30.79	0.94	0.42	0.51	-3.32	8.18
24 May	29000	1657	34.27	4.32	29.94	0.99	0.20	0.79	1.07	21.23
25 May	29600	1287	26.70	3.14	23.56	0.69	0.23	0.46	-0.55	14.18
26 May	29900	2520	50.94	9.41	41.53	0.94	0.31	0.62	4.38	30.23
27 May	30000	1188	29.97	3.73	26.24	0.57	0.05	0.52	2.88	70.23
28 May	29800		36.72	5.34	31.38	0.57	0.03	0.54	4.91	201.10
29 May	28500	1397	35.70	5.76	29.94	0.57	0.04	0.54	5.20	162.80
30 May	26500	1138	27.31	3.90	23.41	0.51	0.01	0.50	3.69	293.67
31 May	25000	958	26.90	4.24	22.66	0.43	0.02	0.42	3.95	239.41
01 June	24000	1028	26.29	3.98	22.31	0.99	0.07	0.92	2.85	56.26
02 June	23600	1028	27.92	4.24	23.69	0.41	0.04	0.37	3.53	95.76
03 June	23100	988	24.45	3.81	20.63	0.43	0.05	0.38	2.96	71.82
04 June	22900	1237	27.72	3.14	24.58	0.97	0.09	0.88	1.72	35.43
05 June	23200	838	21.79	3.98	17.80	0.74	0.09	0.65	2.57	45.01
06 June	23500	808	27.31	3.05	24.26	0.42	0.06	0.36	2.06	49.25
07 June	24000	1078	26.90	3.22	23.68	0.59	0.03	0.57	2.80	121.30
08 June	24300	988	26.08	3.56	22.52	0.46	0.02	0.44	3.28	201.10
09 June	24300	888	23.42	3.39	20.03	0.40	0.02	0.38	3.11	191.53
10 June	24400	908	23.01	3.39	19.63	0.46	0.03	0.43	2.97	127.68
median		*1053*	*27.31*	*3.81*	*23.68*	*0.57*	*0.05*	*0.51*	*2.96*	*71.82*
CV (%)		*35*	*23*	*35*	*22*	*35*	*119*	*31*	*74*	*79*
r^2		*0.52*	*0.50*	*0.22*	*0.52*	*ns*	*ns*	*ns*	*ns*	*ns*
Tsiigehtchic										
25 May		1188	28.33	3.90	24.44	1.03	0.18	0.85	1.07	22.03
01 June		699	22.81	3.98	18.83	0.45	0.04	0.40	3.28	90.02
11 June		729	22.20	3.14	19.06	0.47	0.03	0.44	2.71	118.11
median		729	22.81	3.90	19.06	0.47	0.04	0.44	2.71	90.02

Supplement

Figure S2: Relationships between daily discharge and the concentrations of DOC and DON in the Mackenzie River (closed symbols) and at the river's outlet on the shelf (open symbols). The data plotted are from the present study (circles; river data from Inuvik and Tsiigehtchic), the PARTNERS project (triangles; Holmes et al. 2012) and the Ardex project (squares; from Emmerton et al. 2008).

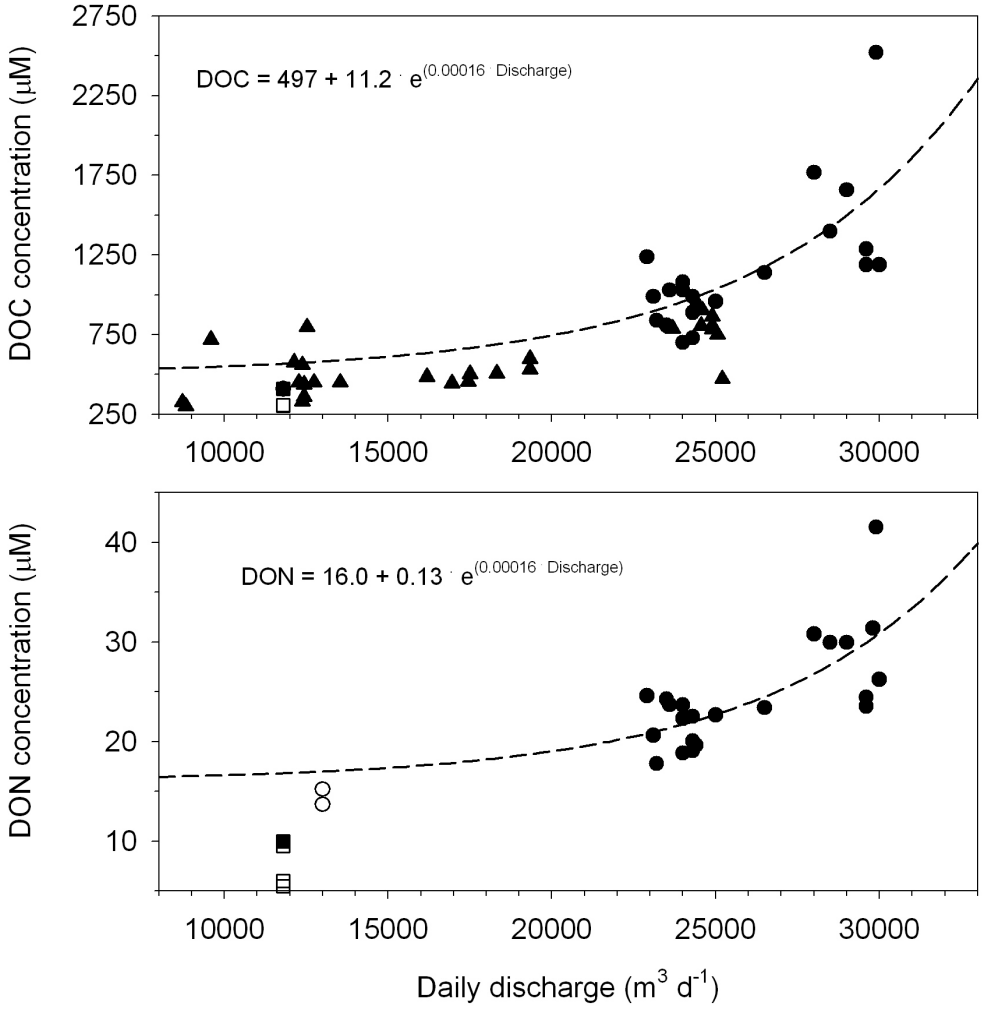

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Figure S3: Relationship between daily primary production and TPN concentration at the surface for deep (left side of the dashed line) and shallow (right side of the dashed line; squares = Kugmallit Bay) stations.