

New table 1. Annual discharge of freshwater, dissolved inorganic nutrients (nitrate, silicate and SRP), and dissolved and particulate organic carbon (DOC and POC, respectively) and nitrogen (DON and PON, respectively) for 9 rivers entering the Arctic Ocean. Estimates calculated from the discharge and nutrients measured at the same station are in bold. n.d. indicates no data available.

		Discharge km ³ yr ⁻¹	NO ₃ 10 ⁹ gN	SiO ₂ 10 ⁹ gSi	SRP 10 ⁹ gP	DOC 10 ⁹ gC	DON 10 ⁹ gN	POC 10 ⁹ gC	PON 10 ⁹ gN
Yenisey	Climatology^{1a}	580	20.4	843	14.3	n.d.	n.d.	n.d.	n.d.
	Climatology ^{1b}	580	29	1480	5.4	4419	132	232	32
	Gordeev et al. (1996)	620	8.7	1857	5.8	n.d.	n.d.	n.d.	n.d.
	Gordeev and Kravchishina (2009)	620	n.d.	n.d.	n.d.	4860	n.d.	170	n.d.
	Holmes et al. (2000)	577	18.4	n.d.	6.2	n.d.	n.d.	n.d.	n.d.
	Dittmar and Kattner (2003)	562-577	n.d.	200-1223	n.d.	4100-4900	82	170	17
	Holmes et al. (2011)	636	49	1740	n.d.	4645	111	n.d.	n.d.
Lena	Climatology ^{2a}	529	15.6	1160	4.2	5785	158	825	94
	Climatology^{2b}	529	17.7	340	4.8	n.d.	n.d.	n.d.	n.d.
	Climatology^{2c}	486	23	338	7.9	n.d.	n.d.	n.d.	n.d.
	Gordeev et al. (1996)	525	22	1029	4.9	n.d.	243	n.d.	n.d.
	Gordeev and Kravchishina (2009)	523	n.d.	n.d.	n.d.	3600	n.d.	1200	n.d.
	Holmes et al. (2000)	532	19.5	n.d.	3.5	n.d.	n.d.	n.d.	n.d.
	Dittmar and Kattner (2003)	524-533	n.d.	890-1640	n.d.	3400-4700	80-245	470	54
Holmes et al. (2011)	581	24	1347	n.d.	5681	135	n.d.	n.d.	
Ob	Climatology³	596	22	573	19.6	3631	114	585	85
	Gordeev et al. (1996)	429	9.4	1929	18.2	n.d.	n.d.	n.d.	n.d.
	Gordeev and Kravchishina (2009)	404	n.d.	n.d.	n.d.	3680	n.d.	360	n.d.
	Holmes et al. (2000)	404	34.8	n.d.	23.5	n.d.	n.d.	n.d.	n.d.
	Dittmar and Kattner (2003)	404-419	n.d.	311	n.d.	3100-3200	66	310-600	28-54
	Holmes et al. (2011)	427	57	1453	n.d.	4119	110	n.d.	n.d.
Mackenzie	Climatology⁴	285	16.8	464	1.5	1575	50.8	317	41

	Gordeev et al. (1996)	249	12.5	467	1.5	n.d.	n.d.	n.d.	n.d.
	Dittmar and Kattner (2003)	249-333	n.d.	470	n.d.	1300	27	1800-2100	160-190
	Holmes et al. (2011)	298	24	554	n.d.	1377	31	n.d.	n.d.
Yukon	Climatology⁵	204	19	644	1.9	1369	35.9	439	50
	Holmes et al. (2011)	208	24	694	n.d.	1472	47	n.d.	n.d.
Pechora	Climatology⁶	137	4.7	n.d.	4.0	n.d.	n.d.	n.d.	n.d.
	Gordeev et al. (1996)	131	9.1	400	1.62	n.d.	n.d.	n.d.	n.d.
	Gordeev and Kravchishina (2009)	131	n.d.	n.d.	n.d.	1666	n.d.	40	n.d.
	Dittmar and Kattner (2003)	135	n.d.	n.d.	n.d.	2100	44	n.d.	n.d.
	Holmes et al. (2000)	135	7.1	n.d.	4.2	n.d.	n.d.	n.d.	n.d.
Northern Dvina	Climatology^{7a}	105	5.1	105	3.8	n.d.	n.d.	n.d.	n.d.
	Climatology ^{7b}	105	5.1	n.d.	1.8	n.d.	n.d.	n.d.	n.d.
	Gordeev et al. (1996)	110	9.2	388	2	n.d.	n.d.	n.d.	n.d.
	Gordeev and Kravchishina (2009)	110	n.d.	n.d.	n.d.	1280	n.d.	28	n.d.
	Dittmar and Kattner (2003)	106	n.d.	n.d.	n.d.	1700	35	n.d.	n.d.
	Holmes et al. (2000)	105	6.7	n.d.	2	n.d.	n.d.	n.d.	n.d.
Kolyma	Climatology^{8a}	103	3.7	n.d.	2.0	n.d.	n.d.	n.d.	n.d.
	Climatology ^{8b}	103	4.0	212	0.6	651	17.3	81	13
	Gordeev et al. (1996)	132	3.7	248	1.22	n.d.	52.8	n.d.	n.d.
	Gordeev and Kravchishina (2009)	122	n.d.	n.d.	n.d.	740	n.d.	380	n.d.
	Holmes et al. (2000)	70	2.5	n.d.	0.76	n.d.	n.d.	n.d.	n.d.
	Dittmar and Kattner (2003)	71-98	n.d.	n.d.	n.d.	460-700	16	310	34
	Holmes et al. (2011)	111	5	276	n.d.	818	17	n.d.	n.d.
Indigirka	Climatology⁹	50	2.0	n.d.	0.35	n.d.	n.d.	n.d.	n.d.
	Dittmar and Kattner (2003)	50	n.d.	0.7	n.d.	240-400	8.4	170	24
	Holmes et al. (2000)	50	2.3	n.d.	0.35	n.d.	n.d.	n.d.	n.d.
	Gordeev et al. (1996)	61	1.7	80	0.4	n.d.	24.4	n.d.	n.d.

^{1a}discharge at Igarka, DIN/DOC/DON at Igarka

- ^{1b} discharge at Igarka, DIN/DOC/DON at Dudinka (ca. 250 km downstream Igarka)
- ^{2a} discharge at Kyusur, DIN/DOC/DON at Zhigansk
- ^{2b} discharge at Kyusur, DIN/DOC/DON at Kyusur (ca. 400 km downstream Zhigansk)
- ^{2c} discharge at Stolb, DIN/DOC/DON near Stolb (delta ca. 520 km downstream Zhigansk)
- ³ discharge at Salekhard, DIN/DOC/DON at Salekhard
- ⁴ discharge at Red Arctic, DIN/DOC/DON at Tsiigehtchic
- ⁵ discharge at Pilot Station, DIN/DOC/DON at Pilot Station
- ⁶ discharge at Oksino, DIN/DOC/DON at Oksino
- ^{7a} discharge at Ust'Pinega, DIN/DOC/DON at Ust'Pinega
- ^{7b} discharge at Ust'Pinega, DIN/DOC/DON at Arkhangelsk (ca. 60 km downstream Ust'Pinega)
- ^{8a} discharge at Kolymenskoye, DIN/DOC/DON at Kolymenskoye
- ^{8b} discharge at Kolymenskoye, DIN/DOC/DON at Cherskii (ca. 120 km downstream Kolymenskoye)
- ⁹ discharge at Vorontsovo, DIN/DOC/DON at Chokurdakh (ca. 100 km downstream Vorontsovo)

New table 2. Annual primary production (total and new), riverine nitrate flux and contribution of riverine nitrate to new primary production for the High Arctic Ocean and its river-influenced shelf seas. In the last three columns, the average (between brackets) is given along with the average \pm standard deviation.

	PP (TgC) ¹	f-ratio ¹	PPnew (TgC) ¹	Riverine nitrate flux (10 ⁹ gN)	Riverine nitrate flux in carbon equivalent (TgC)	Riverine nitrate contribution to PPnew (%)
High Arctic Ocean	>329	0.2	>65.8	213.7-50.8 (97.7)	0.29-1.2 (0.55)	<0.44-1.8 (0.83)
Barents Sea	136	0.5	68	9.6-2.5 (4.7)	0.01-0.05 (0.03)	0.01-0.07 (0.04)
White Sea	2	0.24	0.48	6.4-2.8 (5.1)	0.02-0.04 (0.03)	4.2-8.3 (6.7)
Kara Sea	37	0.24	8.9	112.8-19.9 (42.4)	0.11-0.64 (0.24)	1.2-7.2 (2.7)
Laptev Sea	16	0.25	4	47.3-11.7 (23)	0.07-0.27 (0.13)	1.7-6.7 (3.2)
East-Siberian Sea	30	0.25	7.5	11.2-2.65 (5.7)	0.01-0.06 (0.03)	0.13-0.8 (0.4)
Bering Shelf	>300	0.32	96	37.1-12.3 (19)	0.07-0.21 (0.11)	0.07-0.22 (0.11)
Beaufort Sea	8	0.24	1.9	26.4-11.3 (16.8)	0.06-0.15 (0.09)	3.1-7.9 (4.7)

¹From Sakshaug (2004)

New table. Nitrate, silicate, SRP, DOC, DON, POC, PON datasets used for each river sampling location.

		Nitrate	Silicate	SRP	DOC	DON	POC	PON
Yenisey	Igarka	GEMS/WATER (143)	GEMS/WATER (151)	GEMS/WATER (92)				
	Dudinka	OGSNK/GSN (56) A-GRO (56) PARTNERS (17)	A-GRO (56) PARTNERS (17)	OGSNK/GSN (56) A-GRO (56)	A-GRO (56) PARTNERS (16)	A-GRO (56) PARTNERS (17)	PARTNERS (16) A-GRO (10)	PARTNERS (16) A-GRO (10)
Lena	Zhigansk	A-GRO (56) PARTNERS (17)	A-GRO (57) PARTNERS (17)	A-GRO (57)	A-GRO (57) PARTNERS (17)	A-GRO (56) PARTNERS (17)	PARTNERS (17) A-GRO (10)	PARTNERS (17) A-GRO (10)
	Kyusur	GEMS/WATER (71) OGSNK/GSN (59) Publication (1)	GEMS/WATER (70) Publication (1)	GEMS/WATER (60) OGSNK/GSN (57)				
	Stolb	GEMS/WATER (94) Publication (1)	GEMS/WATER (114) Publication (3)	GEMS/WATER (27) Publication (1)				
Ob	Salekhard	GEMS/WATER (533) PARTNERS (17) A-GRO (52)	GEMS/WATER (366) A-GRO (52) PARTNERS (17)	OGSNK/GSN (57) A-GRO (52)	A-GRO (52) PARTNERS (17)	A-GRO (52) PARTNERS (16)	PARTNERS (15) A-GRO (10)	PARTNERS (15) A-GRO (10)
Mackenzie	Tsiigehtchic	A-GRO (57) PARTNERS (17) Publication (2)	A-GRO (57) GEMS/WATER (48) PARTNERS (17) Publication (2)	GEMS/WATER (84) A-GRO (57)	A-GRO (57) PARTNERS (17) Publication (1)	A-GRO (57) PARTNERS (17)	PARTNERS (14) A-GRO (13)	PARTNERS (14) A-GRO (13)
Yukon	Pilot Station	USGS (67) A-GRO (47) PARTNERS (3)	USGS (158) A-GRO (47) PARTNERS (3)	USGS (54) A-GRO (47)	USGS (67) A-GRO (47) PARTNERS (11)	A-GRO (47) PARTNERS (15)	PARTNERS (16) A-GRO (13)	PARTNERS (16) A-GRO (13)
Pechora	Oksino	OGSNK/GSN (155)		OGSNK/GSN (156)				
Northern Dvina	Ust'Pinega	GEMS/WATER (481)	GEMS/WATER (400)	GEMS/WATER (337)				
	Arkhangelsk	OGSNK/GSN (170)		OGSNK/GSN (171)				
Kolyma	Kolymskoye	GEMS/WATER (134)		GEMS/WATER (84)				
	Cherskii	OGSNK/GSN (40) PARTNERS (17) A-GRO (13)	PARTNERS (17) A-GRO (13)	OGSNK/GSN (40) A-GRO (13)	Publication (64) PARTNERS (17) A-GRO (13)	PARTNERS (17) A-GRO (13)	PARTNERS (16) A-GRO (10)	PARTNERS (16) A-GRO (10)
Indigirka	Chokurdakh	OGSNK/GSN (60)		OGSNK/GSN (60)				
All rivers		2436	1683	1618	509	380	160	160

Appendix

New table 1. Monthly-binned riverine concentrations of nitrate (mmol N m^{-3}). Linearly interpolated values are shown in red.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Northern Dvina ^a	7.8	17.1	16.4	21.5	1.6	1.2	1.0	0.9	1.0	1.0	2.2	4.7
Northern Dvina ^b	7.4	14.1	14.6	16.6	2.0	0.8	1.3	1.6	1.3	1.7	3.6	8.8
Pechora	8.0	14.8	12.3	12.8	2.9	1.6	0.7	1.1	1.0	1.7	2.9	3.0
Yenisey ^c	0.8	0.7	18.2	12.1	6.5	1.1	1.0	1.0	1.1	1.1	1	0.9
Yenisey ^d	12.1	14	15.9	5.6	4.2	2.0	1.4	1.0	1.2	1.8	8.3	10.2
Ob	7.8	9.4	10.7	7.9	10.7	3.8	1.0	1.1	1.3	3.6	3.5	7.4
Lena ^e	9.8	12.4	15.1	16.0	4.3	1.4	1.2	1.0	1.7	2.4	4.5	7.2
Lena ^f	4.2	5.1	6.1	7.0	8.0	3.1	1.1	1.7	1.2	1.3	2.3	3.2
Lena ^g	3.6	4.1	4.7	5.3	9.5		1.3	1.6	2.9	1.8	2.4	3.0
Indigirka	5.6	6.8	8.1	9.3	4.8	4.5	1.4	2.7	2.7	1.9	3.1	4.4
Kolyma ^h	7.4	9.0	10.7	6.5	4.7	2.8	1.5	2.1	2.0	2.4	4.1	5.7
Kolyma ⁱ	4.0	4.6	5.3	6.0	5.0	2.4	4.1	1.7	2.2	2.4	2.6	3.3
Yukon	13.4	14.8	16.1	13.7	7.7	5.0	5.3	4.4	8.3	5.0	7.8	10.6
Mackenzie	6.2	6.7	7.3	5.7	4.1	3.7	3.4	3.3	3.9	4.5	5.0	5.6

^a at Ust'Pinega

^b at Arkhangelsk

^c at Igarka

^d at Dudinka

^e at Zhigansk

^f at Kyusur

^g at Stolb

^h at Kolymskoye

ⁱ at Cherskii

Appendix

New table 2. Monthly-binned riverine concentrations of SRP (mmol P m⁻³). Linearly interpolated values are shown in red.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Northern Dvina ^a	1.21	1.24	1.52	1.36	1.36	1.01	0.90	0.89	0.98	0.84	0.92	1.33
Northern Dvina ^b	0.58	0.74	0.90	0.86	0.44	0.42	0.42	0.65	0.53	0.50	0.89	0.70
Pechora	1.54	1.19	1.29	0.98	1.20	0.69	0.88	0.95	0.91	1.12	1.02	1.09
Yenisey ^c	0.60	0.58	1.10	1.69	0.88	0.86	0.60	0.80	0.62	0.67	0.65	0.63
Yenisey ^d	0.19	0.21	0.22	0.23	0.38	0.33	0.28	0.26	0.30	0.33	0.17	0.18
Ob	1.23	1.86	2.49	2.83	1.09	0.78	1.92	1.98	2.77	1.77	1.19	0.60
Lena ^e	0.24	0.24	0.24	0.23	0.23	0.25	0.26	0.27	0.26	0.26	0.25	0.25
Lena ^f	0.23	0.24	0.24	0.24	0.24	0.43	0.21	0.18	0.25	0.23	0.23	0.23
Lena ^g	0.44	0.42	0.40	0.38	0.39	0.38	0.37	0.56	1.30	0.49	0.47	0.45
Indigirka	0.32	0.31	0.29	0.28	0.26	0.20	0.14	0.24	0.37	0.37	0.35	0.34
Kolyma ^h	0.21	0.18	0.16	0.14	0.35	0.95	0.33	0.58	0.49	0.27	0.25	0.23
Kolyma ⁱ	0.07	0.06	0.06	0.06	0.24	0.18	0.17	0.23	0.22	0.10	0.07	0.07
Yukon	0.17	0.32	0.46	0.22	0.18	0.30	0.20	0.14	0.29	0.52	0.74	0.97
Mackenzie	0.11	0.11	0.11	0.14	0.37	0.27	0.25	0.18	0.14	0.14	0.13	0.12

^a at Ust'Pinega

^b at Arkhangelsk

^c at Igarka

^d at Dudinka

^e at Zhigansk

^f at Kyusur

^g at Stolb

^h at Kolymskoye

ⁱ at Cherskii

Appendix

New table 3. Monthly-binned riverine concentrations of silicate (mmol Si m^{-3}). Linearly interpolated values are shown in red.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Northern Dvina ^a	48.3	57.9	71.4	57.8	33.0	34.5	28.3	21.6	22.5	32.0	37.8	51.5
Yenisey ^b	128.2	155.0	40.7	46.4	45.5	39.3	43.8	49.2	55.8	47.8	74.6	101.4
Yenisey ^c	109.1	110.2	111.4	98.6	85.9	73.1	87.0	97.2	118.2	132.6	106.7	107.9
Ob	34.1	98.2	121.4	121.5	54.1	40.9	29.5	28.4	43.4	45.4	57.0	45.6
Lena ^d	129.7	125.8	121.9	132.5	58.0	60.4	71.3	82.1	94.9	107.6	137.5	133.6
Lena ^e	31.5	30.6	29.6	28.7	27.7	14.4	27.4	20.3	31.3	34.4	33.4	32.5
Lena ^f	34.1	37.7	41.3	44.9	27.3	23.7	20.1	23.4	31.7	23.2	26.8	30.4
Kolyma ^g	121.9	125.8	129.8	133.7	12.7	47.0	92.4	89.1	97.3	105.7	114.0	117.9
Yukon	192.4	200	205.3	202.6	80.6	68.6	105.7	112.2	120.7	133.0	160.9	188.7
Mackenzie	69.3	76.7	72.3	63.9	44.9	51.3	61.1	60.9	59.1	58.1	60.8	68.3

^a at Ust'Pinega

^b at Igarka

^c at Dudinka

^d at Zhigansk

^e at Kyusur

^f at Stolb

^g at Cherskii

Appendix

New table 4. Monthly-binned riverine concentrations of DON (mmol N m⁻³). Linearly interpolated values are shown in red.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Yenisey ^a	6.6	5.5	4.5	10.0	15.5	21.0	20.1	13.8	12.3	14.8	8.6	7.6
Ob	18.0	14.4	10.7	7.1	20.0	19.1	25.6	25.0	21.7	15.5	14.1	21.6
Lena ^b	14.9	14.1	13.3	8.7	22.0	31.2	21.8	12.4	11.5	10.6	16.5	15.7
Kolyma ^c	6.0	5.0	4.1	3.1	23.3	17.6	4.5	8.7	10.2	9.1	7.9	6.9
Yukon	7.9	8.4	8.9	7.1	20.6	17.6	11.1	9.1	10.6	9.9	9.3	8.6
Mackenzie	8.2	8.2	8.3	16.6	24.9	17.9	10.1	8.7	7.9	8.0	8.0	8.1

^a at Dudinka

^b at Zhigansk

^c at Cherskii

Appendix

New table 5. Monthly-binned riverine concentrations of DOC (mmol C m^{-3}). Linearly interpolated values are shown in red.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Yenisey ^a	300	282	265	452	640	827	753	465	441	583	334	317
Ob	609	612	616	458	589	696	942	857	849	708	889	605
Lena ^b	692	696	700	558	946	1252	915	577	583	589	684	688
Kolyma ^c	212	218	223	311	456	797	463	316	312	310	307	196
Yukon	245	241	234	219	842	759	464	382	459	710	555	400
Mackenzie	368	373	379	560	740	559	403	381	345	351	356	362

^a at Dudinka

^b at Zhigansk

^c at Cherskii

New appendix Table

New table. Monthly-binned riverine concentrations of PON (mmol N m^{-3}). Linearly interpolated values are shown in red.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Yenisey ^a	1.86	1.74	1.62	2.62	3.61	4.61	4.73	4.12	3.94	3.45	2.21	1.98
Ob	2.93	3.98	5.03	8.61	21.50	18.78	17.06	18.87	13.25	12.88	7.38	1.87
Lena ^b	1.46	1.15	0.70	1.34	11.39	16.55	14.23	10.64	11.47	7.25	1.85	1.56
Kolyma ^c	3.30	4.29	5.29	6.29	8.42	10.56	9.10	9.83	8.21	4.75	1.30	2.30
Yukon	3.42	2.94	2.45	3.74	22.04	18.86	24.08	21.24	15.63	12.58	9.52	6.47
Mackenzie	3.26	2.93	2.60	8.25	13.91	19.56	13.40	7.68	4.57	4.24	3.91	3.58

^a at Dudinka

^b at Zhigansk

^c at Cherskii

New appendix Table

New table. Monthly-binned riverine concentrations of POC (mmol C m⁻³). Linearly interpolated values are shown in red.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Yenisey ^a	16.7	15.6	14.4	23.2	32.0	40.8	49.1	24.3	26.3	24.1	19.1	17.9
Ob	56.7	59.3	61.9	93.5	207.5	160.3	130.8	114.1	97.4	71.9	63.0	54.1
Lena ^b	13.5	10.7	6.5	13.3	135.0	187.0	155.0	90.3	72.5	58.9	16.8	14.2
Kolyma ^c	27.7	34.3	40.9	47.5	126.7	77.6	53.9	56.5	59.7	37.1	14.5	21.1
Yukon	47.6	37.8	27.9	50.9	283.7	200.0	257.2	255.8	94.6	82.9	71.1	59.4
Mackenzie	30.1	29.7	29.3	77.0	124.6	172.3	145.1	58.8	31.7	31.3	30.9	30.5

^a at Dudinka

^b at Zhigansk

^c at Cherskii