Supplement of Biogeosciences, 12, 3769–3788, 2015
http://www.biogeosciences.net/12/3769/2015/
doi:10.5194/bg-12-3769-2015-supplement

Biogeosciences Open Access

Supplement of

Characterization of particulate organic matter in the Lena River delta and adjacent nearshore zone, NE Siberia – Part I: Radiocarbon inventories

M. Winterfeld et al.

Correspondence to: M. Winterfeld (maria.winterfeld@awi.de)

References given in the supplement

Arctic Great Rivers Observatory (A-GRO) dataset 2, www.arcticgreatrivers.org, published 10 January 2015.

Bird, M., Santruckova, H., Arneth, A., Grigoriev, S., Gleixner, G., Kalaschnikov, Y. N., Lloyd, J. and Schulze, E. D.: Soil carbon inventories and carbon-13 on a latitude transect in Siberia, Tellus B, 54, 631-641, doi:10.1034/j.1600-0889.2002.01334.x, 2002.

Karlsson, E., Charkin, A., Dudarev, O., Semiletov, I., Vonk, J., Sanchéz-García, L., Andersson, A. and Gustafsson, Ö.: Carbon isotopes and lipid biomarker investigation of sources, transport and degradation of terrestrial organic matter in the Buor-Khaya Bay, SE Laptev Sea, Biogeosciences, 8, 1865–1879, doi:10.5194/bg-8-1865-2011, 2011.

Pitkänen, A., Turunen, J., Tahvanainen, T. and Tolonen, K.: Holocene vegetation history from the Salym-Yugan Mire Area, West Siberia, The Holocene, 12, 353–362, doi:10.1191/0959683602hl533rp, 2002.

Vonk, J. E., Sanchéz-García, L., van Dongen, B. E., Alling, V., Kosmach, D., Charkin, A., Semiletov, I. P., Dudarev, O. V., Shakhova, N., Roos, P., Eglinton, T. I., Andersson, A. and Gustafsson, Ö.: Activation of old carbon by erosion of coastal and subsea permafrost in Arctic Siberia, Nature, 489, 137-140, doi:10.1038/nature11392, 2012.

Winterfeld, M., Goñi, M., Just, J., Hefter, J. and Mollenhauer, G.: Characterization of particulate organic matter in the Lena River Delta and adjacent nearshore zone, NE Siberia. Part II: Lignin-derived phenol composition, Biogeosciences, 12, accepted, 2015.

Xu, C., Guo, L., Ping, C. and White, D.: Chemical and isotopic characterization of size-fractionated organic matter from cryoturbated tundra soils, northern Alaska, J. Geophys. Res., 114, G03002, doi:10.1029/2008JG000846, 2009.

Zubrzycki, S., Kutzbach, L. and Pfeiffer, E.: Variability of soil organic carbon stocks of different permafrost-affected soils: Initial results from a North-South transect in Siberia, Proceedings of the Tenth International Conference on Permafrost, 485-490, 2012.

Zubrzycki, S., Kutzbach, L., Grosse, G., Desyatkin, A. and Pfeiffer, E.: Organic carbon and total nitrogen stocks in soils of the Lena River Delta, Biogeosciences, 10, 3507-3524, doi:10.5194/bg-10-3507-013, 2013a.

Zubrzycki, S.: Organic carbon pools in permafrost-affected soils of Siberian arctic regions, PhD thesis, University of Hamburg, 2013b.

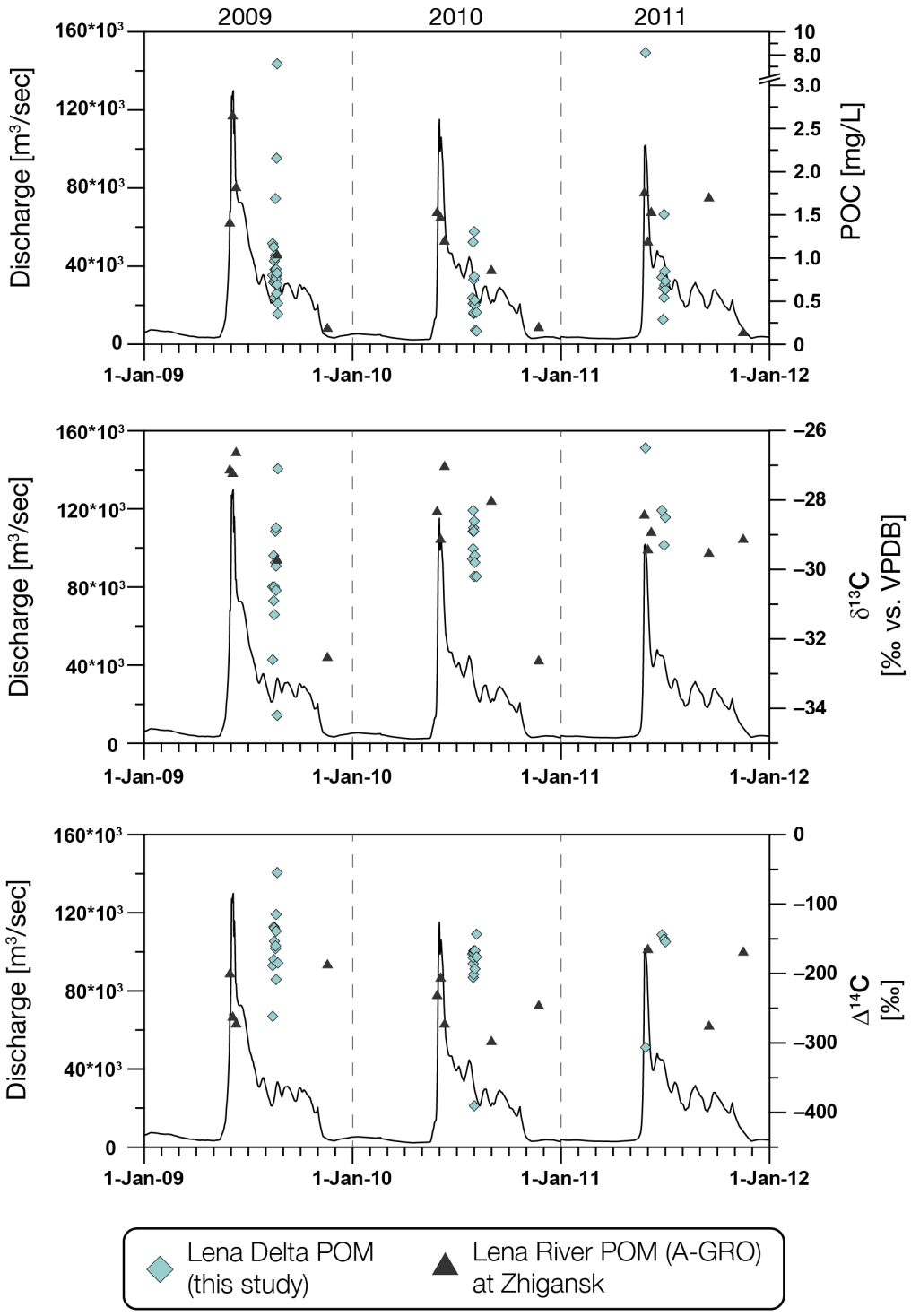

Figure S1. Particulate organic carbon (POC), $\delta^{13}C$, and $\Delta^{14}C$ of surface water particulate organic matter from 2009-2011. Lena River discharge values for the Kyusyur gauging station (ca. 100km south of the delta head) are taken from the Arctic Great Rivers Observatory (A-GRO, www.arcticgreatrivers.org) data set 2 published 10 January 2015.

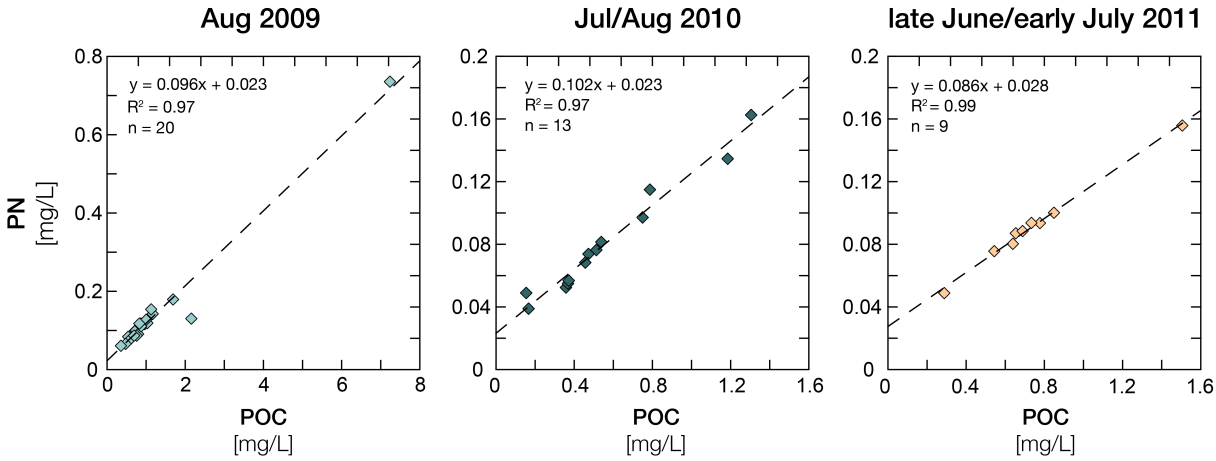

Figure S2. Particulate organic carbon (POC) versus total particulate nitrogen (PN) contents of suspended matter samples from 2009-2011. The intercept at POC = 0 was used to calculate new POC:PN ratios corrected for inorganic nitrogen. More details are given in the manuscript in section 4.3.1. The newly calculated POC:PN ratios ($POC:PN_{NEW}$) are given in Table S4.

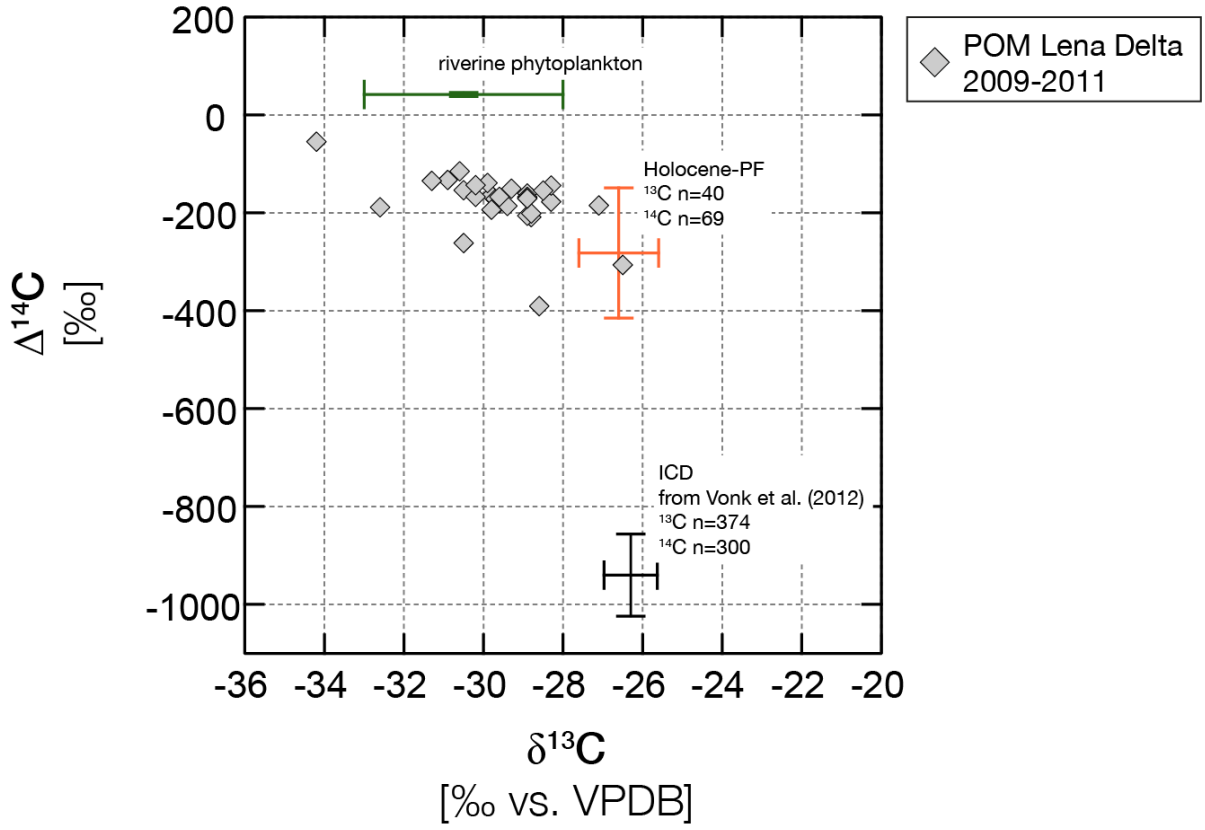

Figure S3. Isotopic ranges for Ice Complex deposit (ICD), Holocene permafrost soil (Holocene-PF), and riverine phytoplankton end-members used in the dual-carbon isotope three end-member mixing model (section 4.3.4 manuscript) as well as the bulk values of the surface water suspended matter samples (2009-2011) presented in this study. The riverine phytoplankton end-member values are $\delta^{13}C$ = –30.5 ± 2.5‰ and $\Delta^{14}C$ = 41.9 ± 4.2‰; the values for the Holocene-PF end-member are $\delta^{13}C$ = –26.6 ± 1‰ and $\Delta^{14}C$ = –282 ± 133‰; and the values for the Ice Complex deposits (ICD) are taken from Vonk et al. (2012) with $\delta^{13}C$ = –26.3 ± 0.67‰ and $\Delta^{14}C$ = –940 ± 84‰.

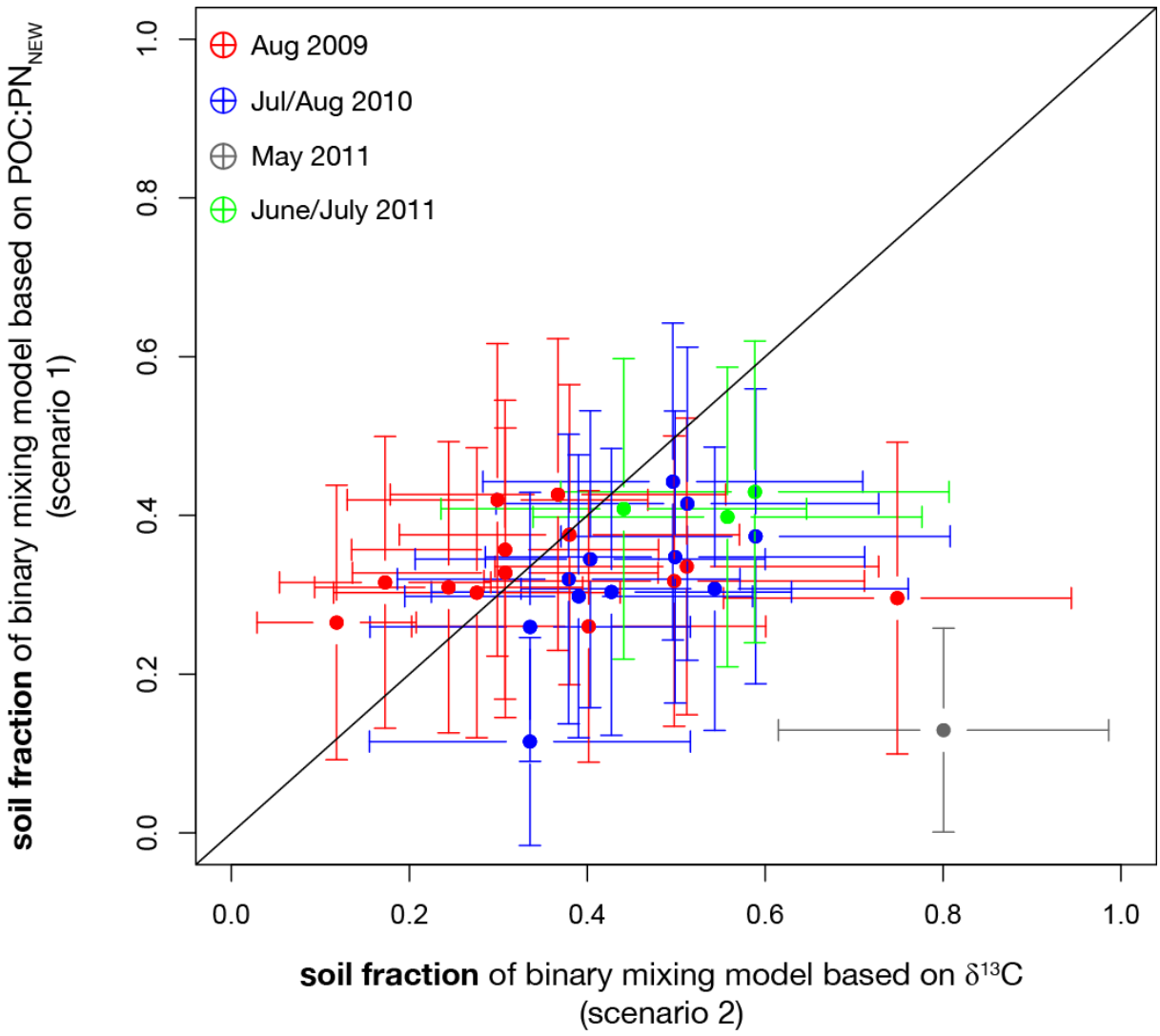

Figure S4. Comparison of the calculated values (plus 1σ standard deviation) of the soil fractions of Lena Delta POM samples (2009-2011) for the two binary mixing models based on $POC:PN_{NEW}$ ratios and $\delta^{13}C$, respectively.

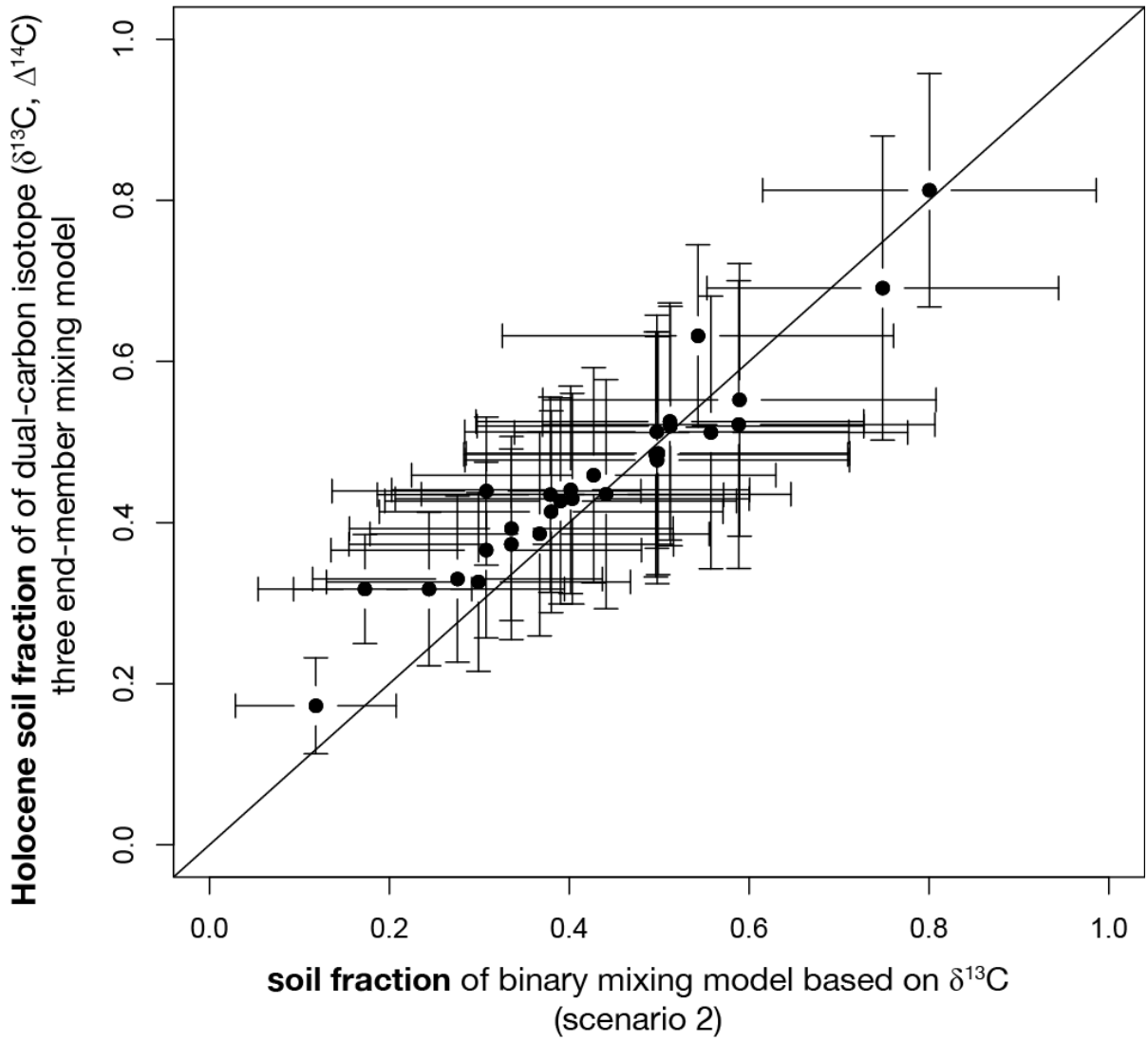

Figure S5. Comparison of the calculate soil fractions of the binary mixing model based on $\delta^{13}C$ and the Holocene soil fraction of the dual-carbon isotope three end-member mixing model (Monte Carlo Simulation). Because both mixing models used the same $\delta^{13}C$ end-member values for phytoplankton the Holocene soil fractions are not significantly different.

Table S1. Compilation of OC:TN soil end-member source data from the literature. The sample depth is given in meters below surface (m b.s.). Latitude and longitude are given in decimal degrees (dec).

Sample name, ID	Location	Lat. N [dec]	Long. E [dec]	Depth [m b. s.]	OC:TN	Source
L09-08	Gogolevsky Island	72.6158	127.2627	0.02 1.70 3.40	35.1 37.0 33.6	Winterfeld et al. (2015), companion paper
L09-12	Samoylov Island	72.3775	126.4954	0.45 1.35 2.50 4.70 5.80	23.7 56.3 51.5 68.0 56.5	Winterfeld et al. (2015), companion paper
L09-28	Lena Delta, Bykovskaya channel	72.0586	128.6309	0.30 1.70	33.1 21.7	Winterfeld et al. (2015), companion paper
L10-04	Baron Belkey Island	72.5378	126.8608	0.05 0.28 0.93 1.25 1.43 1.15 3.58 4.70 6.00	34.6 38.1 24.6 24.5 29.4 32.8 49.1 37.7 44.8	Winterfeld et al. (2015), companion paper
Polygon rim	Samoylov Island	72.62	126.80	0.00 - 0.06 0.06 - 0.11 0.11 - 0.25 0.25 - 0.30	19.5 17.8 18.4 16.4	Höfle et al. (2013)
Tik22 Polygon center – Typic Historthel	Samoylov Island	72.37	126.5	0.00 - 0.11 0.11 - 0.26	43 35	Zubrzycki (2013), Zubrzycki et al. (2012)

Table S1 continued.

Sample name, ID	Location	Lat. N [dec]	Long. E [dec]	Depth [m b. s.]	OC:TN	Source
				0.31 - 0.64	30	
Tik22 Polygon rim - Glacic Aquiturbel	Samoylov Island	72.37	126.5	0.00 - 0.12 0.12 - 0.15 0.15 - 0.47 0.47 - 0.70	21 21 24 20	Zubrzycki (2013), Zubrzycki et al. (2012)
Floodplain - Typic Aquorthel	Samoylov Island	72.37	126.5	0.00 - 0.05 0.05 - 0.09 0.09 - 0.20 0.20 - 0.35 0.35 - 0.52 0.52 -	15 12 13 15 15 10	Zubrzycki (2013)
Floodplain - Typic Psammorthel	Samoylov Island	72.37	126.5	0.00 - 0.11 0.11 - 0.21 0.21 - 0.29 0.29 - 0.36 0.36 - 0.41 0.41 - 0.75 0.75 - 0.98	13 15 17 12 13 10 15	Zubrzycki (2013)
Tik01 Polygon rim – Typic Psammoturbel	Arga Island	73.2	124.6	0.00 - 0.05 0.05 - 0.17 0.17 - 0.25 0.25 - 0.57	18 15 16 10	Zubrzycki (2013), Zubrzycki et al. (2012)
Tik01 Polygon center - Typic Psammoturbel	Arga Island	73.2	124.6	0.00 - 0.09 0.09 - 0.21 0.21 - 0.25	22 16 13	Zubrzycki (2013), Zubrzycki et al. (2012)

Table S1 continued.

Sample name, ID	Location	Lat. N [dec]	Long. E [dec]	Depth [m b. s.]	OC:TN	Source
Polygon rim – Glacic Aquiturbel	Kurungnakh Island	72.38	126.05	0.00 - 0.04	22	Zubrzycki (2013)
				0.04 - 0.09	18	
				0.09 - 0.14	19	
				0.14 - 0.23	22	
Polygon center – Ruptic Historthel	Kurungnakh Island	72.38	126.05	0.00 - 0.05	36	Zubrzycki (2013)
				0.05 - 0.25	28	
				0.25 - 0.35	21	
Polygon rim – Ruptic Histoturbel	Kurungnakh Island, thermokarst depression	72.38	126.05	0.00 - 0.04	19	Zubrzycki (2013)
				0.04 - 0.07	14	
				0.07 - 0.11	15	
				0.11 - 0.16	14	
				0.16 - 0.26	18	
Polygon center – Ruptic Histortel	Kurungnakh Island, thermokarst depression	72.38	126.05	0.00 - 0.09	28	Zubrzycki (2013)
				0.09 - 0.14	20	
				0.14 - 0.24	27	
				0.24 - 0.30	19	
				0.30 - 0.38	18	
Mound – Ruptic-Histic Aquiturbel	Kurungnakh Island, lower slope	72.38	126.05	0.00 - 0.11	14	Zubrzycki (2013)
				0.11 - 0.32	13	
				0.32 - 0.41	16	
Vale – Ruptic-Histic Aquorthel	Kurungnakh Island, lower slope	72.38	126.05	0.00 - 0.07	26	Zubrzycki (2013)
				0.07 - 0.20	16	
				0.20 - 0.25	15	
				0.25 - 0.27	16	
Tik08 – Ruptic Historthel	Byuyung-Kyuel', polygonal	72.3	125.70	0.00 - 0.07	19	Zubrzycki (2013), Zubrzycki et al. (2012)

Table S1 continued.

Sample name, ID	Location	Lat. N [dec]	Long. E [dec]	Depth [m b. s.]	OC:TN	Source
	tundra			0.07 - 0.25	17	
Tik05 – Typic Historthel	El'gene Kyuele, polygonal tundra	71.3	125.6	0.00 - 0.02 0.02 - 0.11 0.11 - 0.24	19 19 19	Zubrzycki (2013), Zubrzycki et al. (2012)
Tik09 – Ruptic-Histic Aquiturbel (forested)	Zelyonoe, tundra-taiga transition zone	70.7	125.1	0.00 - 0.05 0.05 - 0.20 0.20 - 0.25	51 24 32	Zubrzycki (2013), Zubrzycki et al. (2012)
Tik09 – Ruptic Historthel (non-forested)	Zelyonoe, tundra-taiga transition zone	70.7	125.1	0.00 - 0.04 0.04 - 0.14 0.14 - 0.20	29 21 21	Zubrzycki (2013), Zubrzycki et al. (2012)
Tik10 – Typic Histoturbel	Peschanoe, northern taiga	70.2	125.3	0.00 - 0.09 0.09 - 0.14 0.14 - 0.19	33 19 18	Zubrzycki (2013), Zubrzycki et al. (2012)
Tik12 – Fluvaquentic Historthel	Yagodnoe, northern taiga	69.9	124.6	0.00 - 0.08 0.08 - 0.09 0.09 - 0.19 0.19 - 0.20 0.20 - 0.29	33 27 22 22 24	Zubrzycki (2013), Zubrzycki et al. (2012)
Tik13 – Typic Haplorthel	Sysy-Kyuel', northern taiga	69.4	123.8	0.00 - 0.07 0.07 - 0.23 0.23 - 0.49	30 22 18	Zubrzycki (2013), Zubrzycki et al. (2012)
Holocene river terrace (mean values of 33 cores)	Samoylov Island	72.37	126.5	0.00 - 0.02 0.08 - 0.10 0.28 - 0.30	41.4 32.9 28.5	Zubrzycki et al. (2013)

Table S1 continued.

Sample name, ID	Location	Lat. N [dec]	Long. E [dec]	Depth [m b. s.]	OC:TN	Source
				0.48 - 0.50	24.2	
				0.73 - 0.75	23.8	
				0.98 - 1.00	20.7	
Active floodplains levels (mean values of 33 cores)	Samoylov Island	72.37	126.5	0.00 - 0.02	20.9	Zubrzycki et al. (2013)
				0.08 - 0.10	17.2	
				0.28 - 0.30	15.5	
				0.48 - 0.50	14.8	
				0.73 - 0.75	13.7	
				0.98 - 1.00	13.3	
				Mean	**23.7 ± 11**	

Table S2. Compilation of $\delta^{13}C$ source data from the literature and this study for the soil end-member. Sample depth is given in meter below surface (m b.s.). Latitude and longitude are given in decimal degrees (dec), where minus degrees indicate longitude west.

Sample name/ Lab ID	Location	Lat. N [dec]	Long. E [dec]	Depth [m b.s.]	$\delta^{13}C$ [‰ vs. VPDB]	Source
L09-12	Samoylov Island	72.6158	127.2627	0.45	–26.8	This study
				1.35	–26.3	
				2.50	–25.2	
				4.70	–27.0	
				5.80	–25.1	
L09-28	Lena Delta, Bykovsky channel	72.0586	128.6309	0.30	–26.1	This study
				1.70	–26.6	
SIB-14	Yenisey watershed, tundra	67.40	86.45	0.00 – 0.30	–26.9	Bird et al. (2002)
SIB-15	Yenisey watershed, taiga	66.13	87.25	0.00 – 0.30	–27.1	Bird et al. (2002)
SIB-12	Yenisey watershed, taiga	65.95	87.70	0.00 – 0.30	–27.1	Bird et al. (2002)
SIB-17	Yenisey watershed, taiga	64.35	87.63	0.00 – 0.30	–27.2	Bird et al. (2002)
SIB-18	Yenisey watershed, taiga	63.20	87.76	0.00 – 0.30	–26.2	Bird et al. (2002)
SIB-19	Yenisey watershed, pine	63.07	87.53	0.00 – 0.30	–26.0	Bird et al. (2002)
SIB-20	Yenisey watershed, taiga	62.47	88.96	0.00 – 0.30	–26.6	Bird et al. (2002)
SIB-21	Yenisey watershed, taiga	62.29	89.02	0.00 – 0.30	–27.0	Bird et al. (2002)
ZOTINO	Yenisey watershed, pine	60.75	89.36	0.00 – 0.30	–25.9	Bird et al. (2002)
SIB-28	Yenisey watershed, pine	59.41	90.87	0.00 – 0.30	–25.9	Bird et al. (2002)
SIB-26	Yenisey watershed, pine	59.29	90.71	0.00 – 0.30	–26.2	Bird et al. (2002)
SIB-30	Yenisey watershed, pine	56.37	92.95	0.00 – 0.30	–26.0	Bird et al. (2002)
Core A	Tyumen region	60.17	72.83	0.95 – 1.00	–23.1	Pitkänen et al. (2002)
				1.95 – 2.00	–25.9	
				2.95 – 3.00	–24.9	
				4.90 – 4.95	–28.5	
				4.95 – 5.00	–28.6	
Core B	Tyumen region	60.17	72.83	0.95 – 1.00	–26.1	Pitkänen et al. (2002)

Table S2 continued.

Sample name/ Lab ID	Location	Lat. N [dec]	Long. E [dec]	Depth [m b.s.]	$\delta^{13}C$ [‰ vs. VPDB]	Source
				1.95 – 2.00	–26.7	
				2.45 – 2.50	–27.2	
				2.95 – 3.00	–26.6	
				3.45 – 3.50	–26.2	
				4.44 – 4.49	–28.4	
				4.49 – 4.54	–28.7	
Core C	Tyumen region	60.17	72.83	3.30 – 3.35	–27.8	Pitkänen et al. (2002)
				3.35 – 3.40	–27.7	
Site MAT	Tundra, Alaska	69.40	-148.74	0.00 – 0.09	–26.4	Xu et al. (2009)
				0.09 – 0.36	–27.4	
				0.08 – 0.42	–27.3	
				0.32 – 0.55	–26.8	
				0.36 – 0.50	–26.8	
				0.50 – 0.90	–26.5	
				0.90 – 1.00	–26.0	
				Mean	**–26.6 ± 1.0**	

Table S3. Compilation of $\Delta^{14}C$ source data from the literature and this study for the Holocene soil end-member. Sampling depth is given in meters below surface (m b.s.), except for values from Bolshiyanov et al. (2015) where height is given in meters above water level. Latitude and longitude are given in decimal degrees (dec).

Sample name/ Lab ID	Location	Lat. N [dec]	Long. E [dec]	Depth [m b.s.]	^{14}C age [years BP]	$\Delta^{14}C$[1] [‰]	Source
L09-12	Samoylov Island	72.6158	127.2627	0.45	1710	–197	This study
				1.35	2510	–274	
				2.50	2840	–303	
				4.70	4500	–433	
				5.80	3740	–377	
L09-28	Lena Delta, Bykovsky channel	72.0586	128.6309	0.30	1780	–204	This study
				1.70	4900	–461	
Polygon rim	Samoylov Island	72.62	126.80	0.00 - 0.06	845	–107	Höfle et al. (2013)
				0.06 - 0.11	1500	–176	
				0.11 - 0.25	2000	–226	
				0.25 - 0.30	3100	–325	
LU-4201	Bol'shaya Tumatskaya channel , Sagastyr Island	73.3714	125.8394	3.1	1400	–165	Bolshiyanov et al. (2015)
LU-4191	Malaya Tumatskaya channel, Chenchike-Sise Island	72.9525	125.9183	2.5	8570	–658	Bolshiyanov et al. (2015)
LU-4412	Malaya Tumatskaya channel, Dgipiries Island	72.9119	125.875	9.0	6460	–555	Bolshiyanov et al. (2015)
LU-4197	Malaya Tumatskaya channel, Chenchike-Sise Island	72.866	125.9189	7.8	1880	–213	Bolshiyanov et al. (2015)
LU-4198	Malaya Tumatskaya channel, Dgipiries-Sise Island, N–E coast of the Lake Yugus-Dgie-Kyuele	72.8538	125.8394	7.5	6430	–554	Bolshiyanov et al. (2015)

Table S3 continued.

Sample name/ Lab ID	Location	Lat. N [dec]	Long. E [dec]	Depth [m b.s.]	^{14}C age [years BP]	$\Delta^{14}C$[1] [‰]	Source
LU-4199	Malaya Tumatskaya channel, Dgipiries-Tubelege, Tyuba-Aryta Island	72.8292	125.8278	7.0	1320	–157	Bolshiyanov et al. (2015)
LU-4193	Malaya Tumatskaya channel, Dgipiries-Tubelege, Tyuba-Aryta Island	72.8292	125.8278	5.8	2690	–289	Bolshiyanov et al. (2015)
LU-4577	Bol'shaya Tumatskaya channel, Samoylovsky channel	72.3684	126.4930	2.5	3220	–334	Bolshiyanov et al. (2015)
KIA-8169	Bol'shaya Tumatskaya channel, Samoylovsky channel (borehole)			7.5	435	–58	Schwamborn et al. (2000) in Bolshiyanov et al. (2015)
KIA-8170				6.6	230	–34	
KIA-8170				6.2	500	–66	
KIA-8172				1.3	2600	–281	
KIA-8173				1.2	2530	–275	
KIA-8174				0.4	2640	–284	
IORAN-4167	Bol'shaya Tumatskaya channel, Samoylovsky channel			3.6	2140	–238	Kuptsov and Lisitsin (1996) in Bolshiyanov et al. (2015)
IORAN-4164				4.2	4220	–412	
IORAN-4101				6.2	3700	–373	
LU-4565	Olenekskaya channel, Arga- Aryta	72.3619	126.3265	7.0	540	–71	Bolshiyanov et al. (2015)
LU-4609				3.5	3170	–330	
MGU-862	Olenekskaya Kurungnakh Island Bulkurskaya channel mouth area				3480	–355	Korotaev (1986) in Bolshiyanov et al. (2015)
MGU-808	Olenekskaya channel, Gagariy Island				4200	–411	Korotaev (1986) in Bolshiyanov et al. (2015)
LU-4911	Malaya Trofimovskaya channel, Gogolevsky Island	72.6163	127.2618	0.5	3550	–361	Bolshiyanov et al. (2015)

Table S3 continued.

Sample name/ Lab ID	Location	Lat. N [dec]	Long. E [dec]	Depth [m b.s.]	^{14}C age [years BP]	$\Delta^{14}C^{1}$ [‰]	Source
LU-4914	Maastakh-Uesya channel, Sardakh-Aryta Island			4.0	1840	–210	Bolshiyanov et al. (2015)
KIA-6759	Maastakh-Uesya channel, Sardakh-Aryta Island			8.5	2755	–295	Schwamborn et al. (2000) in Bolshiyanov et al. (2015)
KIA-6760				8.1	1369	–162	
KIA-6761				6.6	2525	–274	
KIA-6762				3.6	3460	–354	
KIA-6763				1.7	3025	–318	
KIA-6764				0.6	3420	–351	
KIA-6765				-0.2	2830	–301	
LU-5080	Noname channel, in the line of NW from the Sardakh Island, Dzhielyakh-Ordono-Aryta Island	72.5531	127.5474	2.0	3830	–383	Bolshiyanov et al. (2015)
LU-4916	Sardakhskaya channel, Sobo-Sise Island, Boruo hole	72.4564	128.9457	0.5	5220	–481	Bolshiyanov et al. (2015)
LU-4917	Sardakhskaya channel, Sobo-Sise Island	72.4564	128.9457	13.5	2320	–255	Bolshiyanov et al. (2015)
LU-5073	Sardakhskaya channel, Kuba-Ayanyn-Aryta Is- land, NW of the Sobo- Sise Island	72.4574	128.9542	0.6	1140	–138	Bolshiyanov et al. (2015)
LU-4919				1.0	2920	–310	
LU-4912	Toyonokh-Uesya chan- nel, mouth of the Trofimovskaya channel area, Arangastakh Island	72.5534	129.2117	0.5	2230	–247	Bolshiyanov et al. (2015)
LU-4915				0.1	2970	–313	
LU-4918	River Lena, main chan- nel, Tit-Ary Island	71.9730	127.1054	10.7	830	–104	Bolshiyanov et al. (2015)
LU-4909				5.4	4050	–400	

Table S3 continued.

Sample name/ Lab ID	Location	Lat. N [dec]	Long. E [dec]	Depth [m b.s.]	^{14}C age [years BP]	$\Delta^{14}C^{1}$ [‰]	Source
LU-5075	Trofimovskaya channel, Trofim-Diete Island	72.7661	127.9375	0.5	1510	–176	Bolshiyanov et al. (2015)
MGU-773	Bykovskaya channel, Lagutin Island				1400	–165	Korotaev (1986) in Bolshiyanov et al. (2015)
MGU-861					2530	–275	
LU-5492	Sardakhskaya channel, Omsukor-Belkee Island	72.6361	127.5713	2.7	880	–109	Bolshiyanov et al. (2015)
LU-5495				2.2	3490	–356	
LU-5607	Bol'shaya Tumatskaya channel, Syrdakh Island			0.9	950	–117	Bolshiyanov et al. (2015)
LU-5608				0.5	2590	–280	
LU-5610	Bol'shaya Tumatskaya channel, Kerdiepime Island	72.9815	126.4973	0.7	3210	–333	Bolshiyanov et al. (2015)
LU-5609				0.5	9010	–676	
LU-5611	Osokhtokh channel, Bezymianny-Oburo Island	73.1107	127.0193	4.2	2280	–252	Bolshiyanov et al. (2015)
LU-5612				1.3	3170	–330	
LU-5614	Osokhtokh channel, Sutura Island	73.1690	127.2045	2.2	2440	–266	Bolshiyanov et al. (2015)
LU-5613				1.2	4260	–415	
LU-5605	Osokhtokh channel, Kegeliakh Island	73.3497	127.3753	2.0	2910	–309	Bolshiyanov et al. (2015)
LU-5606	Osokhtokh channel, Alkhan Island – marine edge of delta	73.5258	127.5977	0.25	540	–71	Bolshiyanov et al. (2015)

Table S3 continued.

Sample name/ Lab ID	Location	Lat. N [dec]	Long. E [dec]	Depth [m b.s.]	^{14}C age [years BP]	$\Delta^{14}C^{1}$ [‰]	Source
LU-6004	Bykovskaya channel, Malsyva Island	72.0628	128.6199	2.3	900	–111	Bolshiyanov et al. (2015)
LU-6003				1.7	1790	–205	
LU-6002				0.7	2110	–236	
LU-5604	Lena river, main channel, Sordokh-Ary Island	72.3694	126.5179	0.3	3830	–383	Bolshiyanov et al. (2015)
					Mean	**–238 ± 133**	

[1]most of the literature values were reported as ^{14}C age in years BP, we converted these ages in *f*MC (*f*MC = $e^{-age/8033}$) and subsequently in Δ^{14}C (‰) as follows $\Delta^{14}C = (fMC / (e^{\lambda(y-1950)}) * 1000)$, where λ is 1/8267 (mean half-life of ^{14}C) and y is the year of ^{14}C measurement (assumed 2000).

Table S4. Total suspended matter concentrations (TSM), particulate organic carbon contents (POC) in milligram per liter (mg/L) and in per cent based on dry weight sediment (wt%) as well as atomic particulate organic carbon to total particulate nitrogen ratios (POC:PN) of individual Lena Delta surface water samples from 2009-2011. Not determined denoted by *n.d.*

Sample code	TSM [mg/L][1]	POC [mg/L]	POC [wt%]	atomic POC:PN	$POC:PN_{new}$ [2]
Lena Delta TSM Aug 2009					
1	3.10	1.17	37.7	9.6	11.4
2	14.17	0.80	5.7	8.8	11.2
3	6.33	0.72	11.3	8.4	10.9
4	29.01	1.13	3.9	8.6	10.0
5	11.65	0.74	6.4	8.6	11.1
6	14.09	0.97	6.9	9.7	12.1
7	7.45	0.54	7.3	7.5	10.3
8	8.82	0.87	9.8	8.6	10.7
9	66.39	1.69	2.5	11.0	12.6
10	38.97	1.03	2.6	10.1	12.5
11	52.51	1.00	1.9	9.2	11.2
12	20.20	0.80	3.9	10.2	13.6
13	29.26	0.76	2.6	10.2	13.8
14	33.32	0.87	2.6	9.2	11.6
15	15.72	0.59	3.8	8.9	12.7
16	19.56	2.16	11.0	19.3	23.4
17	174.92	7.24	4.1	11.5	11.8
18	6.72	0.69	10.3	9.3	12.6
19	*n.d.*	0.83	*n.d.*	8.2	10.2
20	10.52	0.48	4.5	8.5	12.9
21	7.33	0.35	4.8	6.8	10.9
Lena Delta TSM Jul/Aug 2010					
22	14.89	0.54	4.0	7.7	10.4
23	16.26	*n.d.*	*n.d.*	*n.d.*	*n.d.*
24	11.83	0.47	5.3	7.5	10.4
25	32.23	1.19	4.2	10.3	12.1
26	28.94	*n.d.*	*n.d.*	*n.d.*	*n.d.*
27	25.28	0.36	1.3	7.6	13.2
28	22.56	0.37	1.6	7.8	12.6
29	26.57	0.75	2.9	9.0	11.5
30	25.81	0.79	3.3	8.0	9.8
31	31.11	1.30	5.7	9.4	10.7
32	19.88	0.46	2.4	7.8	11.2
33	19.07	0.51	2.6	7.8	10.8
34	3.52	0.17	4.7	5.0	10.7
35	9.30	0.37	4.4	7.6	12.1

Table S4 continued.

Sample code	TSM [mg/L][1]	POC [mg/L]	POC [wt%]	atomic POC:PN	$POC:PN_{new}$ [2]
36	10.54	0.15	1.5	3.7	6.4
Lena Delta TSM late May 2011					
37	494.0	8.20	1.7	7.5	9.6
Lena Delta TSM late Jun/early Jul 2011					
38	16.60	0.78	4.7	8.3	13.7
39	6.25	0.29	4.6	5.9	15.8
40	15.70	*n.d.*	*n.d.*	*n.d.*	*n.d.*
41	13.10	0.65	5.0	7.5	12.8
42	11.50	0.54	4.7	7.2	13.2
43	31.70	1.51	4.7	9.7	13.7
44	16.35	0.69	4.2	7.8	13.2
45	21.55	0.85	3.9	8.5	13.6
46	16.95	0.64	3.8	8.0	14.1
47	22.90	0.73	3.2	7.8	12.9

[1] TSM values for 2009 and 2010 from Winterfeld et al. (2015, companion paper)

[2] calculated after subtracting the intercept value at POC = 0 in the POC versus PN plot (Figure S1) for each year from the total particulate nitrogen content, intercept is 0.023 for samples from 2009 and 2010, and 0.028 for 2011 (for more details see Figure S2 and description in text section 4.3.1)

Table S5. Results of the dual-carbon isotope ($\delta^{13}C$, $\Delta^{14}C$) mixing model for the three organic matter fractions contributing to the Lena Delta suspended matter samples from 2009-2011: riverine phytoplankton (*fraction* Plankton), Holocene permafrost soils (*fraction* Holocene-PF), and Pleistocene Ice Complex deposits (*fraction* ICD). Not determined is denoted by *n.d.*

Sample code	*fraction* Plankton	1σ *fraction* Plankton	*fraction* Holocene-PF	1σ *fraction* Holocene-PF	*fraction* ICD	1σ *fraction* ICD
Lena Delta TSM Aug 2009						
1	0.56	0.09	0.20	0.14	0.24	0.07
2	0.68	0.07	0.13	0.10	0.19	0.05
3	0.67	0.10	0.22	0.14	0.11	0.05
4	0.56	0.13	0.30	0.17	0.14	0.06
5	0.68	0.10	0.20	0.13	0.12	0.05
6	0.63	0.11	0.24	0.15	0.13	0.05
7	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*
8	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*
9	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*
10	0.59	0.13	0.29	0.17	0.13	0.05
11	0.52	0.15	0.37	0.19	0.11	0.06
12	0.67	0.11	0.23	0.14	0.10	0.05
13	0.61	0.13	0.28	0.16	0.11	0.05
14	0.47	0.15	0.38	0.20	0.15	0.07
15	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*
16	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*
17	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*
18	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*
19	0.83	0.06	0.11	0.08	0.07	0.03
20	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*
21	0.31	0.19	0.59	0.22	0.10	0.07
Lena Delta TSM Jul/Aug 2010						
22	0.57	0.13	0.29	0.17	0.13	0.06
24	0.54	0.13	0.32	0.18	0.14	0.06
25	0.45	0.17	0.44	0.21	0.12	0.06
26	0.49	0.14	0.36	0.19	0.15	0.07
27	0.52	0.15	0.37	0.19	0.12	0.06
28	0.48	0.15	0.38	0.20	0.14	0.07
29	0.51	0.15	0.37	0.19	0.12	0.06
30	0.61	0.11	0.26	0.16	0.14	0.06
31	0.37	0.11	0.29	0.18	0.34	0.09
32	0.57	0.13	0.30	0.17	0.13	0.06
33	0.57	0.12	0.28	0.17	0.15	0.07
34	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*
35	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*
36	0.63	0.12	0.26	0.15	0.12	0.05
Lena Delta TSM late May 2011						
37	0.19	0.14	0.64	0.20	0.18	0.10

Table S5 continued.

Sample code	*fraction* Plankton	1σ *fraction* Plankton	*fraction* Holocene-PF	1σ *fraction* Holocene-PF	*fraction* ICD	1σ *fraction* ICD
Lena Delta TSM late June/early July 2011						
38	0.48	0.18	0.43	0.21	0.09	0.06
39	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*
41	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*
42	0.56	0.14	0.33	0.18	0.11	0.06
43	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*
44	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*
45	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*
46	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*
47	0.49	0.17	0.41	0.20	0.10	0.06