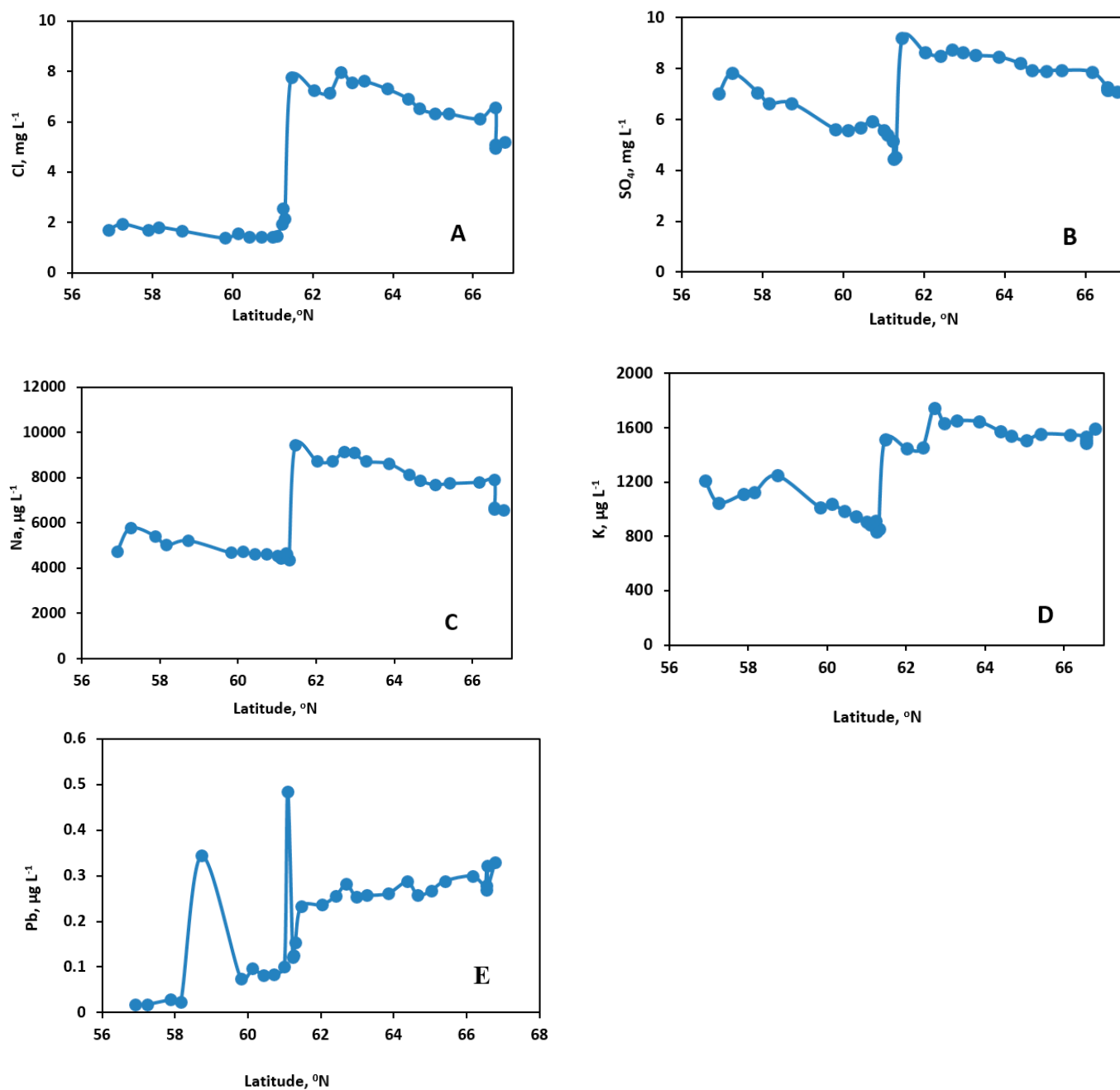
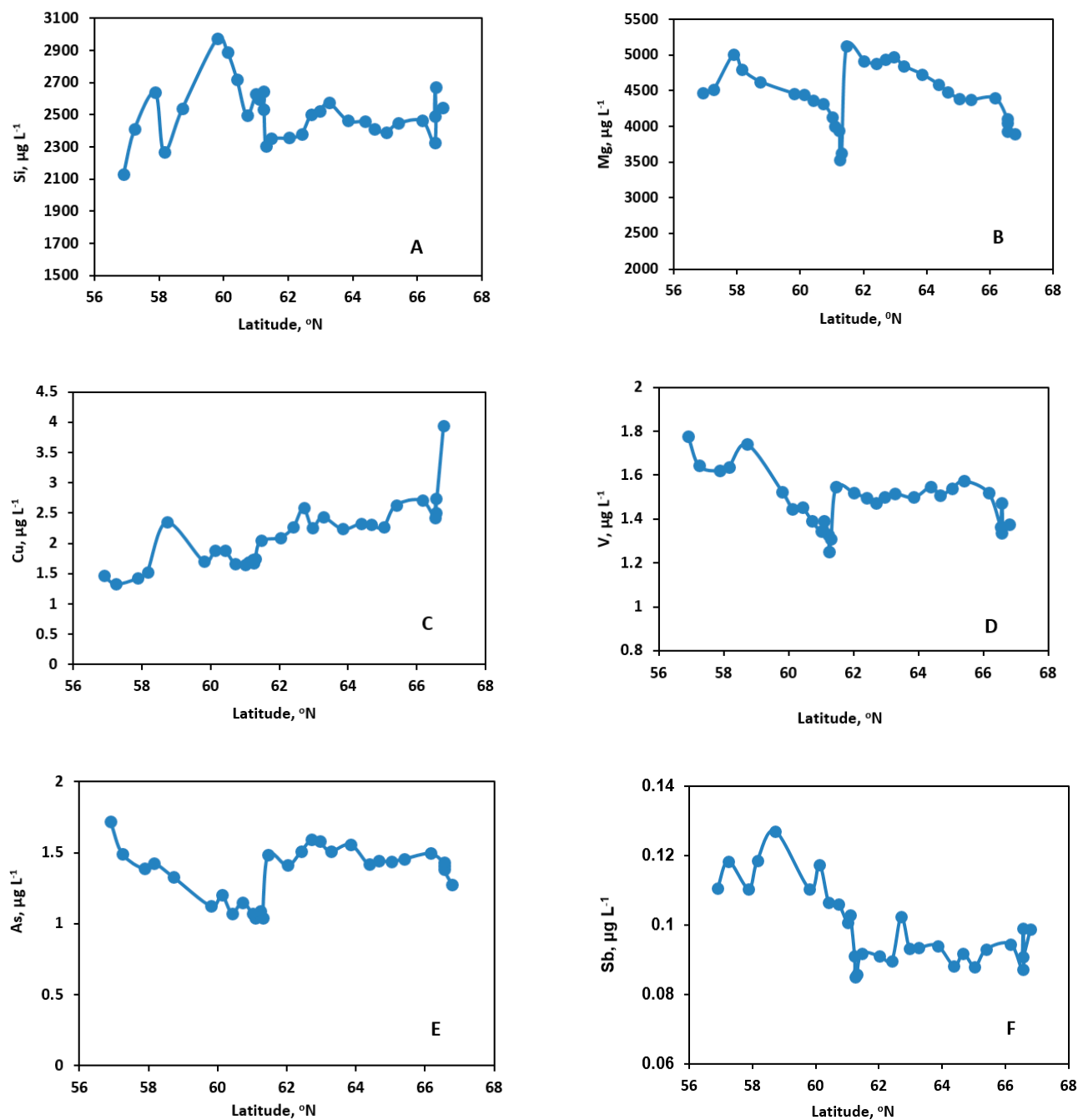


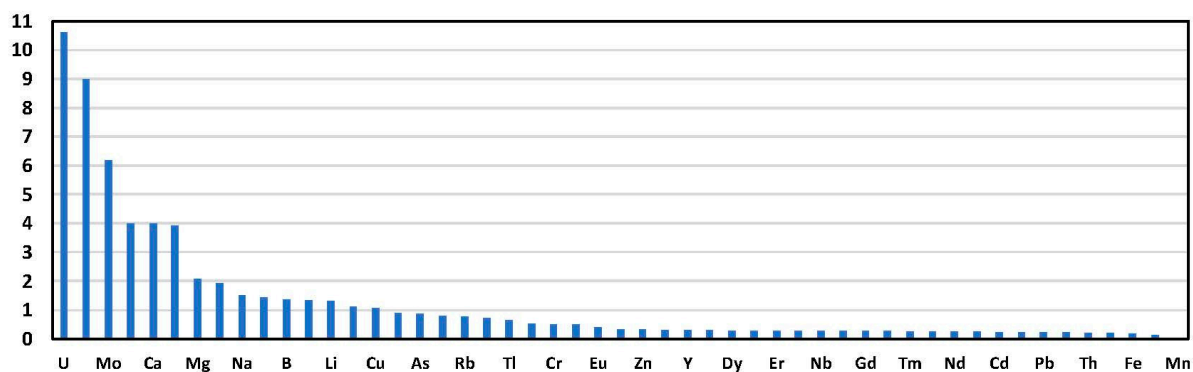
## SUPPLEMENTARY MATERIAL



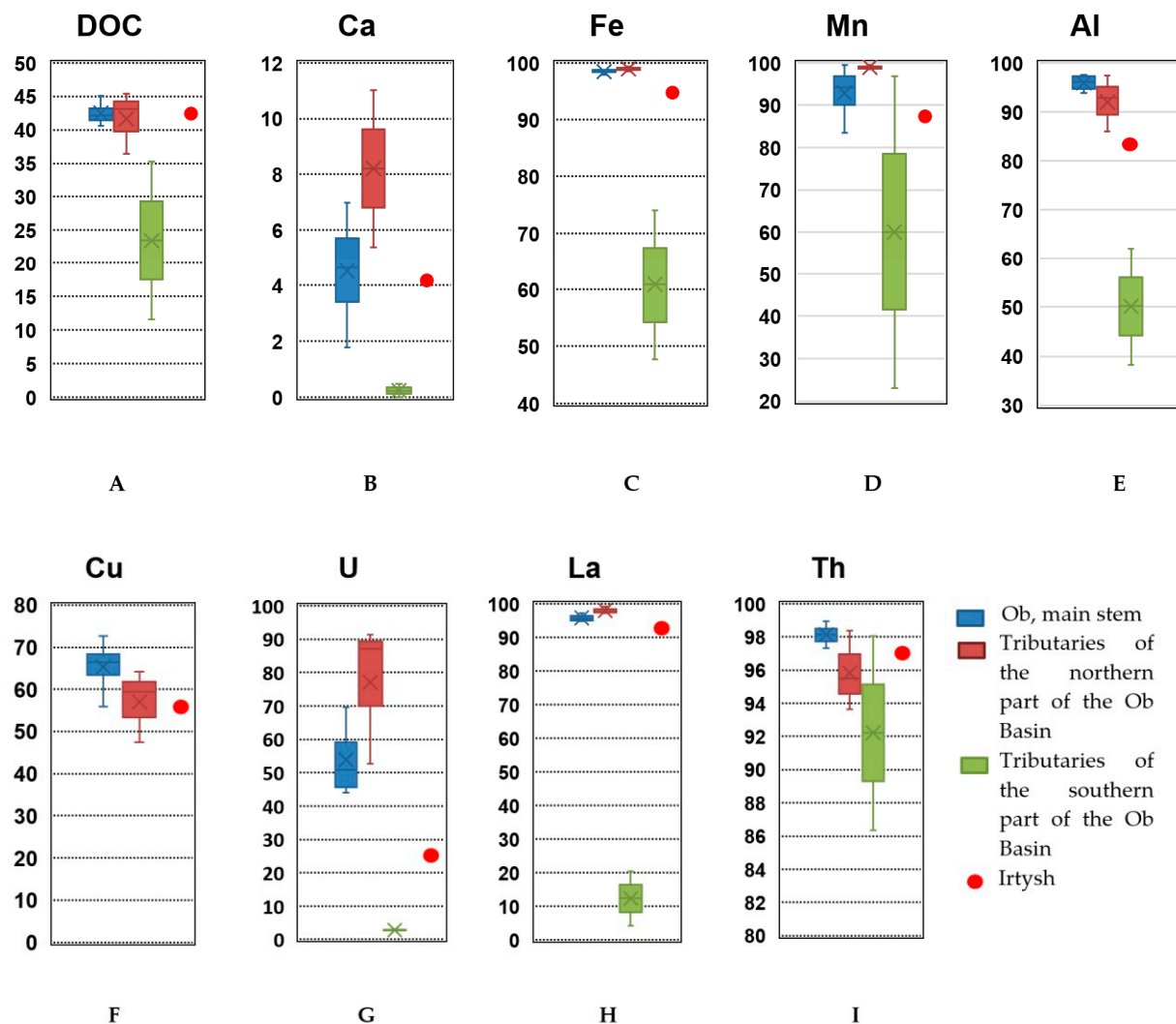
**Figure S1.** Latitudinal dependence of Cl (A), SO<sub>4</sub> (B), Na (C), K (D) and Pb (E) concentration in the main stem of the Ob River. A sharp increase visible at approx. 61°N corresponds to the confluence with the Irtysh River.



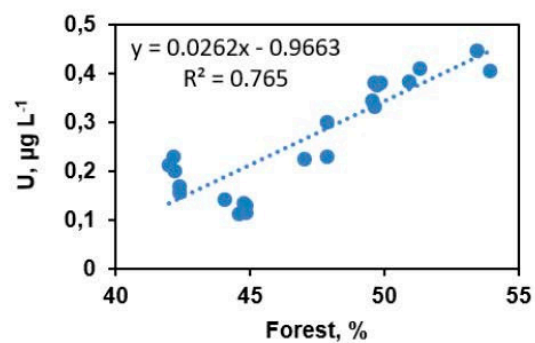
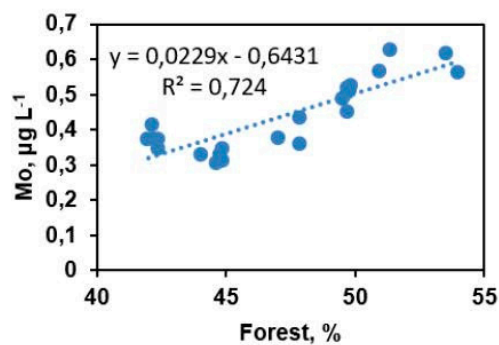
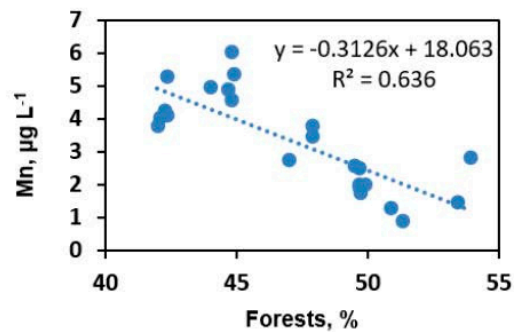
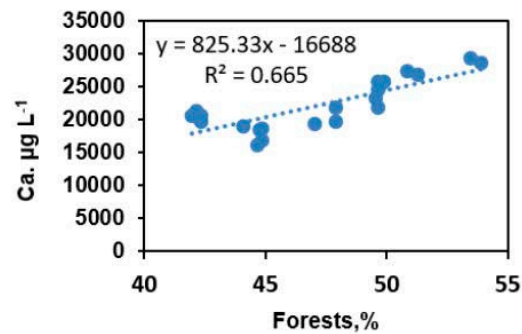
**Figure S2.** Main stem concentration of elements which do not show any particular pattern with latitude: Si (A), Mg (B), Cu (C), V (D), As (E) and Sb (F).



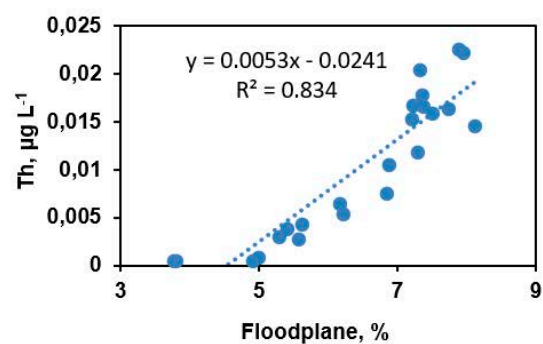
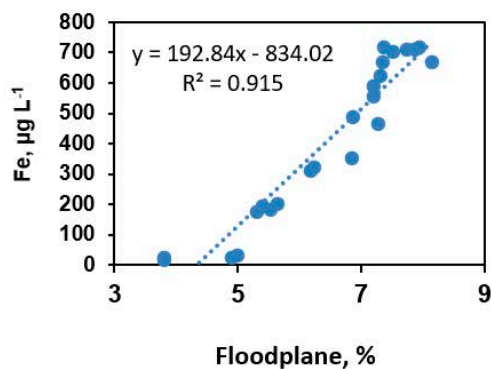
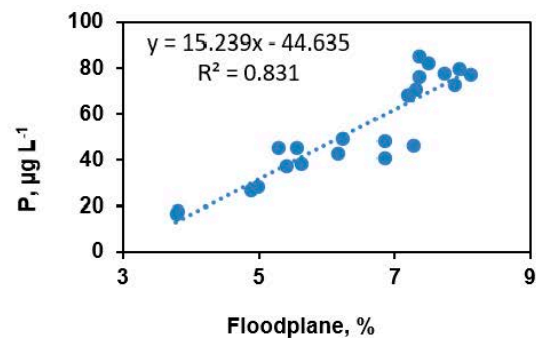
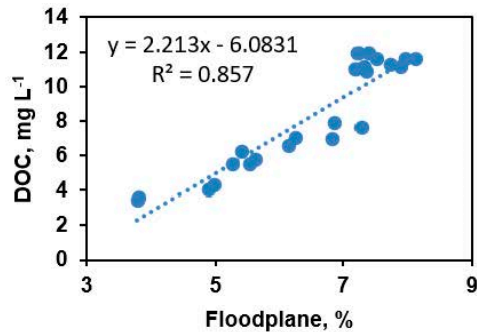
**Figure S3.** A histogram of elemental ratio in 2 northern tributaries (downstream of Irtysh) to 8 southern tributaries (upstream of Irtysh) of the Ob River.



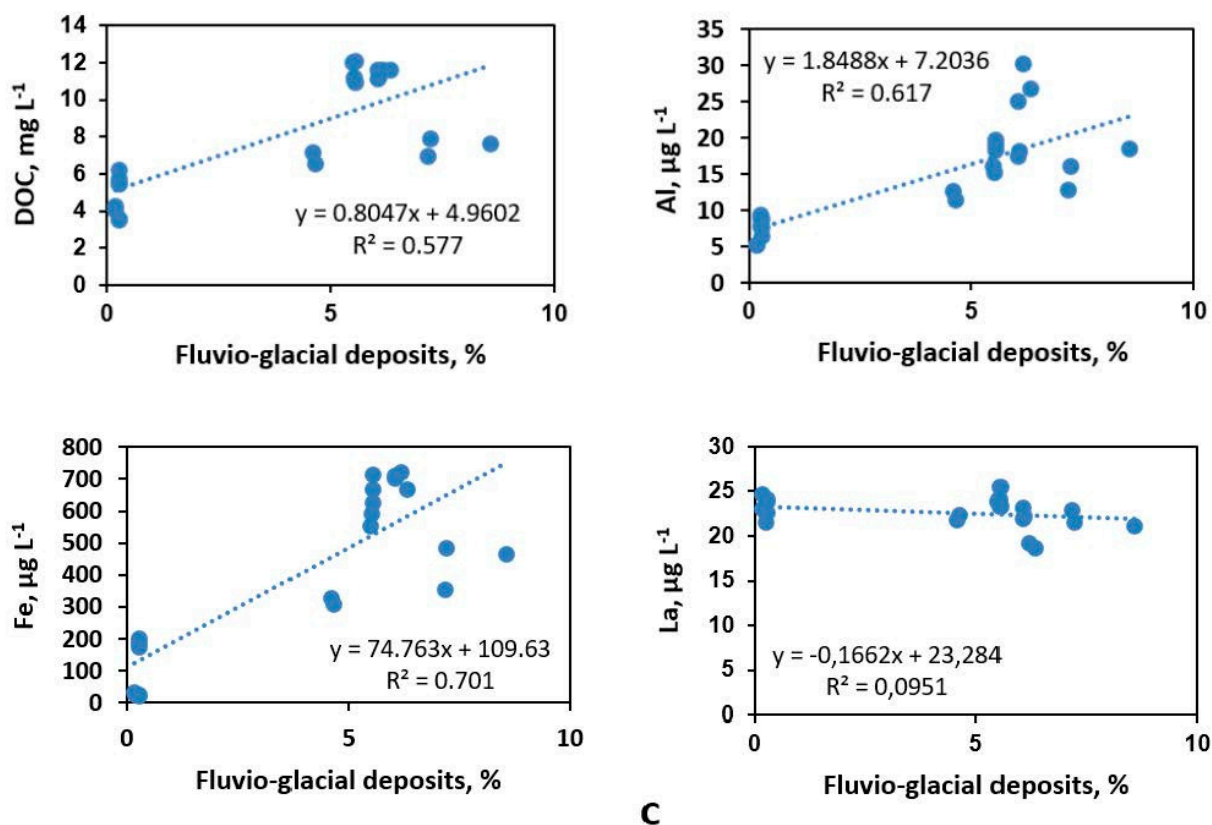
**Figure S4.** Proportion of colloidal (1 kDa - 0.45  $\mu\text{m}$ ) fraction of DOC (A), Ca (B), Fe (C), Mn (D), Al (E), Cu (F), U (G), La (H) and Th (I) in the main stem (blue box plot column) and tributaries of the southern (blue circles) and northern (red circles) part of the Ob Basin.



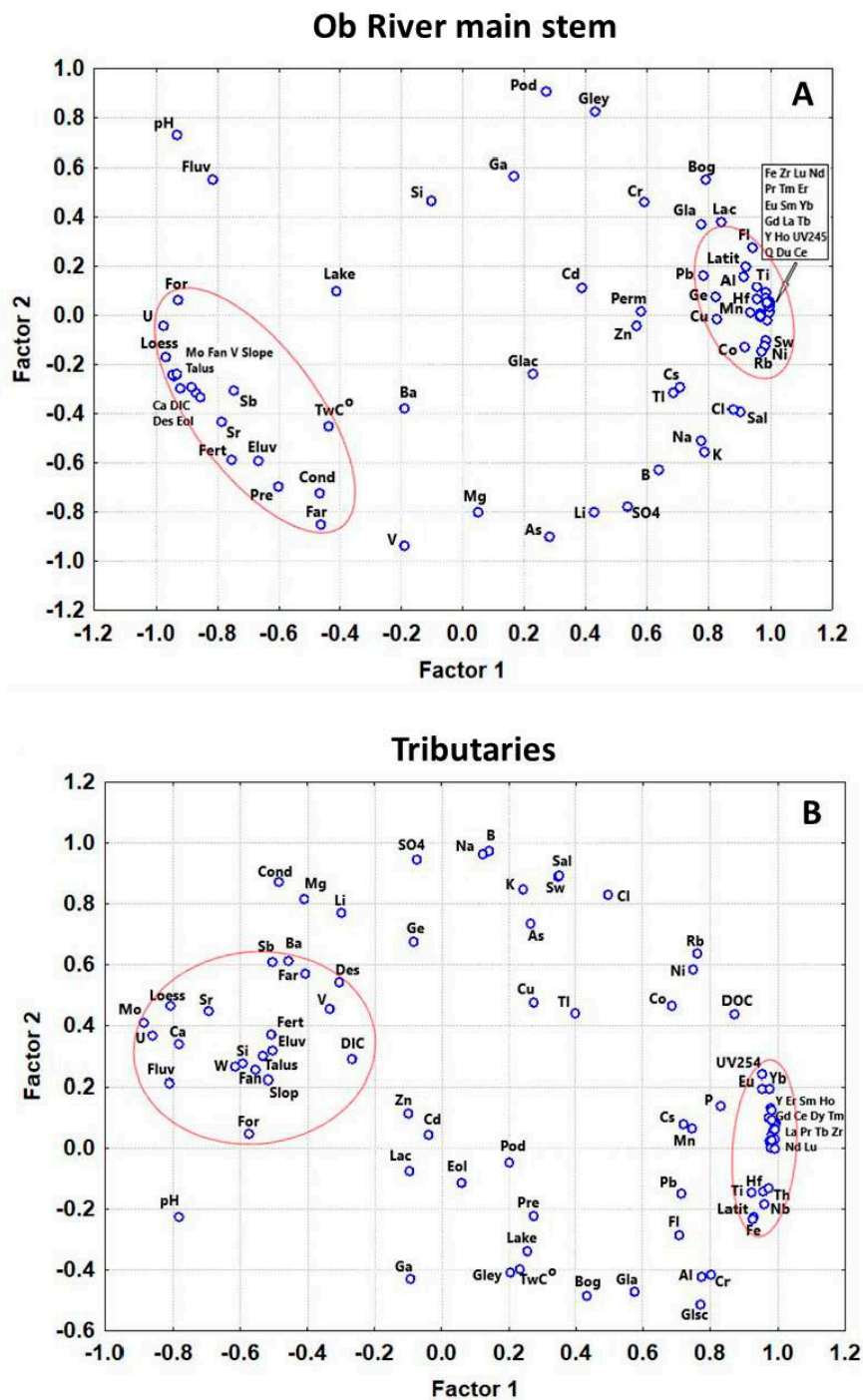
A



B



**Figure S5.** Examples of major and trace element concentration with landscape parameters of the Ob River main stem: **A:** Impact of the forest coverage on Ca, Mn, Mo and U; **B:** Impact of the floodplain coverage on DOC, P, Fe and Th concentrations; **C:** Impact of the fluvio-glacial deposits on DOC, Al, Fe and La concentrations. Examples of major and trace element concentration with landscape parameters of the Ob River main stem: **C:** Impact of the fluvio-glacial deposits on DOC, Al, Fe and La concentrations.



**Figure S6.** Results of PCA treatment of the solute data and watershed characteristics for the Ob River main stem (a) and tributaries. (b). See Figure 7 for abbreviation of landscape parameters.

**Table S1.** List of sampled sites at the main stem of the Ob River and its tributaries.

Name	Number on the map	Descriptions, km	N	E	date
Ob's g1	1	0	66.788694	69.143972	08.07.16, 21:37
Ob's g2	2	74.241	66.554056	67.839944	09.07.16, 11:50
Ob's 1	3	120.2	66.561925	67.032767	10.07.2016
Ob's g3	4	153.8	66.544861	66.511833	13.07.16, 11:30
Ob's 2	5	209.7	66.158222	65.763806	13.07.16, 19:00
Ob's 3	6	299.7	65.4005	65.641667	14.07.16, 0:28
Ob's g4	7	344.9	65.034722	65.240833	14.07.16, 07:48
Ob's g5	8	408.6	64.664889	65.613806	14.07.16, 19:06
Ob's 4	9	452.4	64.378278	65.904444	15.07.16, 00:10
Ob's p4	10	527.3	63.852222	65.368917	15.07.16, 07:30
Ob's 5	11	610.2	63.269361	64.991528	15.07.16, 15:10
Ob's 6	12	648.4	62.968083	65.069278	15.07.16, 20:26
Ob's p5	13	687.5	62.7064	65.508883	16.07.16, 0:45
Ob's 7	14	744.4	62.411503	66.333239	16.07.16, 19:15
Ob's g6	15	821.2	62.022069	67.369903	17.07.16, 1:22
Ob's 8	16	909.0	61.461306	68.224083	17.07.16, 8:00
Ob's 9	17	1149.2	61.302833	71.286006	18.07.16, 8:03
Ob's 10	18	1253.9	61.243361	72.849944	18.07.16, 19:27
Ob's 11	19	1291.9	61.232167	73.538694	19.07.16, 0:25
Ob's 12	20	1419.9	61.09325	75.326528	19.07.16, 8:00
Ob's 13	21	1469.9	61.004361	76.085556	19.07.16, 13:15
Ob's 14	22	1550.6	60.720639	77.114083	19.07.16, 23:13
Ob's 15	23	1624.8	60.420694	77.978444	20.07.16, 5:25
Ob's 16	24	1702.0	60.124361	78.915167	20.07.16, 12:06
Ob's 17	25	1752.4	59.811222	79.116	20.07.16, 17:51
Ob's 18	26	2185.3	58.159194	82.941139	22.07.16, 15:15
Ob's 19	27	2230.4	57.883861	83.345361	22.07.16, 19:15
Ob's 20	28	2361.7	57.245944	84.348944	23.07.16, 07:23
Ob's 21	29	2410.2	56.906833	84.448892	23.07.16, 12:51
Ob's p1	p_1 (Pasaydevakha)	0	67.709	72.904389	06.07.2016
Ob's p2	p_2 (Poluy)	291.0	66.522917	66.599611	10.07.16, 20:53
Ob's p3	p_3 (Pitljär)	397.0	65.771694	65.510778	13.07.16, 22:20
Ob's p6	p_4 (Irtys)	975.7	61.067947	68.929806	17.07.16, 17:22
Ob's p7	p_5 (Nazym)	1172.0	61.193594	68.922253	17.07.16, 19:21
Ob's p8	p_6 (Ljamin)	1172.0	61.280639	71.792972	18.07.16, 11:39
Ob's p11	p_7 (Tym)	1623.0	59.431417	80.02025	21.07.16, 03:09
Ob's p10	p_8 (Vasjugan)	1257.0	59.121222	80.744258	21.07.16, 11:31
Ob's p12	p_9 (Kopilovskaja Ket')	1369.0	58.911256	81.559931	21.07.16, 20:00
Ob's g7	p_10 (Parabel')	2189.0	58.727083	81.573639	21.07.16, 23:33
Ob's p13	p_11 (Chulyim)	2542.0	57.729083	83.822494	23.07.16, 01:00
Ob's p14	p_12 (Tom')	2677.0	56.795861	84.530528	23.07.16, 12:00

**Table S2. A:** Main landscape parameters (% of the watershed coverage) of the tributaries and several key points at the Ob River main stem.

Sam- pling point	latitude	catchment area. km <sup>2</sup>	Q. m <sup>3</sup> /s	For- ests	Bogs	Lake s	Flood- plain	Farm- land	Perma- frost	Pod- zol	Gley soils	Sa- line soils	Fertile soil
g1	66.788 7	2479211	31683	45	20	0.02	8.13	19	7.59	10.97	5.77	1.73	18.92
1	66.561 9	2450170	30835	45	20	0.00	7.96	19	6.94	11.05	5.83	1.76	19.14
2	66.158 2	2416527	30050	45	19	0.01	7.89	19	5.66	11.04	5.50	1.78	19.41
3	65.400 5	2399324	29616	45	19	0.00	7.74	19	5.17	11.00	5.34	1.79	19.55
4	64.378 3	2360079	28625	44	19	0.00	7.50	20	4.43	10.66	4.96	1.82	19.87
5	63.269 4	2222409	25151	42	19	0.00	7.38	21	2.62	11.32	5.14	1.93	21.10
6	62.980 6	2220366	25099	42	19	0.00	7.35	21	2.58	11.32	5.11	1.94	21.12
7	62.411 5	2210933	24861	42	19	0.00	7.31	21	2.41	11.37	5.13	1.94	21.21
g6	62.022 1	2203777	24680	42	19	0.00	7.20	21	2.30	11.40	4.93	1.95	21.28
8	61.461 3	2196865	24506	42	19	0.02	7.22	21	2.27	11.43	4.86	1.96	21.35
9	61.302 8	1100150	18220	47	21	0.27	7.28	15	2.42	16.59	5.69	0.07	19.20
10	61.243 4	1059511	16353	48	20	0.01	6.86	15	2.37	17.22	5.91	0.07	19.94
11	61.232 2	1058205	16295	48	20	0.37	6.84	15	2.35	17.22	5.88	0.07	19.97
12	61.093 3	963155	12046	50	17	0.00	6.24	17	2.10	15.36	6.03	0.08	21.94
13	61.004 4	951873	11542	50	17	0.50	6.16	17	2.08	14.88	6.03	0.08	22.20
14	60.720 6	873109	8021	50	15	0.01	5.63	19	1.77	12.40	5.95	0.09	24.20
15	60.420 7	865715	7730	50	14	0.03	5.55	19	1.72	12.09	5.91	0.09	24.40
16	60.124 4	853949	7607	50	14	0.05	5.42	19	1.74	11.48	5.98	0.09	24.74
17	59.811 2	846169	7538	50	14	0.22	5.29	19	1.76	11.25	6.04	0.09	24.97
18	58.159 2	547112	5763	54	3	0.01	5.00	30	2.72	5.13	3.77	0.14	38.62
19	57.883 9	518674	5464	53	2	0.05	4.90	31	2.87	5.30	1.71	0.15	40.73
20	57.245 9	360677	3799	51	1	0.00	3.79	37	4.12	5.78	1.99	0.20	44.33
21	56.906 8	344424	3628	51	0	0.77	3.81	39	4.32	6.05	1.53	0.21	45.62
Tom'	56.795 8	74581	7 0 2	61	0	0.04	2	38	4.32	0.74	0.00	0.11	84.36
Thculym	57.729 1	133600	6 2 8	66	2	0.17	8	23	0.00	2.83	0.00	0.04	37.28
Parabel'	58.727 1	24600	9 0	58	38	0.37	4	0	0.00	2.69	37.56	0.00	0.00
Vasju- gan	59.121 2	66404	2 1 4	60	40	0.20	1	0	0.00	10.70	30.62	0.00	0.00
Tym	59.431 4	37366		53	40	0.39	8	0	0.00	59.45	0.00	0.00	0.00
L'yamin	61.280 6	27400		15	67	10.9 5	11	0	0.00	22.70	0.82	0.00	0.00



Nazym	61.193 6	11395		57	30	1.70	13	0	0.00	26.48	17.39	0.00	0.00
Irtysk	61.067 9	2183722	5980	41	18	0.53	6.85	21	2.03	10.95	4.51	1.97	21.48
Poluj	66.522 9	20000	1 3 8	45	41	0.50	11	0	29.6 3	12.46	33.19	0.00	0.00

**Table S2. B:** Main genetic types of Quaternary deposits. % of the watershed. Slopewash, Desertium, and Fanalluvial. deposits represent less than 2% and not listed here.

	Pre-Quaternary	Loess	Glacial	Eluvial	Lacustrine	Fluvial	Talus	Fluvio-glacial	Eolian
<i>The Ob River main stem</i>									
<b>g1</b>	2.03	17.98	5.12	2.84	16.18	22.40	1.04	6.33	0.54
<b>1</b>	2.04	18.20	4.97	2.87	16.16	22.41	1.05	6.18	0.55
<b>2</b>	2.07	18.45	4.69	2.89	15.99	22.41	1.06	6.05	0.56
<b>3</b>	2.08	18.58	4.52	2.90	15.94	22.36	1.07	6.09	0.56
<b>4</b>	2.11	18.89	4.02	2.94	15.74	22.33	1.09	6.06	0.57
<b>5</b>	2.16	20.06	2.13	2.98	15.73	22.30	1.16	5.56	0.60
<b>6</b>	2.16	20.08	2.09	2.98	15.73	22.29	1.16	5.56	0.60
<b>7</b>	2.16	20.16	1.96	3.00	15.69	22.27	1.16	5.54	0.61
<b>g6</b>	2.13	20.23	1.88	3.01	15.69	22.24	1.17	5.52	0.61
<b>8</b>	2.11	20.29	1.88	3.01	15.64	22.19	1.17	5.49	0.61
<b>9</b>	1.83	21.20	3.06	2.59	12.88	28.71	2.15	8.57	0.71
<b>10</b>	1.86	21.71	2.83	2.69	12.97	28.82	2.24	7.22	0.67
<b>11</b>	1.86	21.73	2.83	2.69	12.98	28.80	2.24	7.17	0.67
<b>12</b>	2.04	22.27	2.23	2.96	12.66	29.31	2.46	4.59	0.64
<b>13</b>	2.07	22.00	2.23	2.99	12.48	29.30	2.49	4.65	0.64
<b>14</b>	2.18	23.43	1.85	3.26	12.91	29.68	2.72	0.27	0.66
<b>15</b>	2.20	23.19	1.85	3.29	12.90	29.66	2.74	0.27	0.66
<b>16</b>	2.23	22.89	1.88	3.34	13.03	29.34	2.78	0.28	0.67
<b>17</b>	2.25	22.75	1.89	3.37	13.15	29.05	2.80	0.28	0.68
<b>18</b>	3.06	25.77	2.93	5.21	5.39	27.23	4.33	0.18	0.89
<b>19</b>	3.22	25.39	3.09	5.49	3.45	27.27	4.57	0.19	0.94
<b>20</b>	4.15	25.97	4.40	4.02	2.83	26.20	4.94	0.27	0.83
<b>21</b>	4.35	24.58	4.60	4.21	1.95	26.35	5.18	0.29	0.86
<i>Tributaries</i>									
Tom'	1.57	27.62	0.67	6.07	0.52	39.46	3.03	0.00	0.02
Tchulym	1.37	33.46	0.13	10.46	4.13	31.92	4.40	0.00	1.41
Parabel'	0.61	20.33	0.00	0.00	44.15	34.89	0.00	0.00	0.00
Vasjugan	1.13	24.56	0.00	0.00	47.69	27.03	0.00	0.00	0.00
Tym	0.98	18.47	0.00	0.00	33.39	39.05	0.00	3.69	0.83
L'yamin	1.46	0.00	13.26	0.00	3.42	18.52	0.00	59.74	2.75
Nazym	21.36	0.00	25.87	0.00	0.96	16.29	0.00	33.12	0.31
Irtys	2.02	20.15	1.70	3.03	15.05	21.65	1.18	5.12	0.61
Poluj	0.00	0.00	27.28	0.00	28.05	21.07	0.00	23.67	0.00

**Table S3 A and B.** A correlation matrix of element concentration in the Ob main stem tributaries and landscape coverage (%) of the watersheds. Significant ( $p < 0.05$ ,  $n = 23$  for Ob and  $n = 9$  for tributaries)) correlations are given in red.

**A: Landscape and soil characteristics**

	Latitude	Forest	Bogs	Lakes	Flood-plain	Farm-land	Perma- frost	Perma- frost*	Podzol	Gley soil	Saline soil	Fertile soil
S.C.	-0.69	0.34	-0.53	0.01	-0.69	0.57	-0.20	-0.23	-0.62	-0.44	0.29	0.54
pH	-0.85	0.74	-0.04	0.56	-0.56	-0.56	-0.73	0.33	0.37	-0.74	0.14	
UV254	0.93	-0.80	0.51	-0.28	0.75	-0.19	0.36	0.84	0.31	0.18	0.39	-0.56
Cl	0.66	-0.75	0.23	-0.40	0.42	0.29	0.51	0.34	-0.05	-0.25	0.69	-0.24
SO <sub>4</sub>	0.10	-0.30	-0.35	-0.52	-0.09	0.73	0.34	0.08	-0.61	-0.52	0.83	0.27
DOC	0.88	-0.80	0.48	-0.28	0.73	-0.12	0.28	0.62	0.29	0.11	0.43	-0.51
DIC	-0.76	0.48	-0.41	0.17	-0.80	0.21	-0.32	-0.70	-0.28	-0.13	-0.06	0.46
Li	-0.01	-0.18	-0.30	-0.43	-0.06	0.62	0.28	0.22	-0.48	-0.57	0.69	0.22
B	0.18	-0.28	-0.07	-0.32	0.22	0.49	0.21	0.28	-0.44	-0.49	0.61	-0.01
Na	0.24	-0.33	-0.10	-0.42	0.17	0.57	0.38	0.30	-0.48	-0.47	0.71	0.04
Mg	-0.39	0.11	-0.42	-0.16	-0.29	0.63	-0.15	-0.02	-0.55	-0.60	0.44	0.40
Al	0.90	-0.64	0.54	-0.27	0.76	-0.29	0.46	0.71	0.43	0.21	0.21	-0.59
Si	-0.29	0.31	-0.18	0.07	-0.18	-0.07	-0.31	0.22	-0.12	0.03	-0.19	0.14
P	0.86	-0.69	0.42	-0.35	0.78	-0.13	0.32	0.79	0.24	0.11	0.39	-0.50
K	0.39	-0.42	-0.01	-0.44	0.25	0.40	0.30	0.57	-0.41	-0.26	0.71	-0.12
Ca	-0.92	0.68	-0.48	0.31	-0.69	0.25	-0.51	-0.77	-0.36	-0.29	-0.25	0.53
Ti	0.93	-0.70	0.54	-0.31	0.82	-0.19	0.35	0.74	0.33	0.13	0.33	-0.59
V	-0.31	0.11	-0.21	-0.12	-0.42	0.38	0.02	0.18	-0.50	-0.29	0.39	0.16
Cr	0.68	-0.49	0.70	0.05	0.62	-0.53	0.05	0.87	0.63	0.35	-0.08	-0.66
Mn	0.80	-0.63	0.53	-0.26	0.53	-0.17	0.37	0.84	0.14	0.20	0.35	-0.56
Fe	0.97	-0.74	0.56	-0.39	0.80	-0.26	0.40	0.84	0.37	0.22	0.32	-0.61
Co	0.66	-0.50	0.38	-0.27	0.63	0.02	0.40	0.85	-0.09	-0.10	0.35	-0.46
Ni	0.85	-0.70	0.49	-0.24	0.82	-0.13	0.29	0.63	0.19	0.04	0.37	-0.57
Cu	0.71	-0.59	0.52	-0.26	0.58	-0.24	0.13	0.76	0.15	0.10	0.36	-0.62
Zn	0.29	0.02	0.14	-0.08	0.32	0.03	0.29	-0.16	-0.44	0.11	0.14	-0.32
Ga	0.07	0.09	0.38	0.23	0.19	-0.45	-0.12	0.60	0.47	0.15	-0.43	-0.30
Ge	0.45	-0.44	0.36	-0.10	0.34	-0.07	0.18	0.43	-0.04	-0.09	0.29	-0.41
As	0.11	-0.26	-0.10	-0.27	0.02	0.48	0.32	0.60	-0.36	-0.38	0.64	0.03
Rb	0.86	-0.81	0.46	-0.30	0.70	-0.11	0.27	-0.59	0.29	0.04	0.50	-0.51
Sr	-0.85	0.53	-0.51	0.25	-0.63	0.39	-0.48	0.75	-0.45	-0.40	-0.04	0.55
Y	0.96	-0.79	0.50	-0.42	0.75	-0.17	0.38	0.82	0.29	0.13	0.45	-0.57
Zr	0.96	-0.78	0.54	-0.35	0.76	-0.21	0.40	0.65	0.33	0.19	0.38	-0.59
Nb	0.93	-0.76	0.56	-0.38	0.71	-0.20	0.36	-0.78	0.35	0.16	0.40	-0.60
Mo	-0.94	0.67	-0.48	0.35	-0.70	0.26	-0.48	0.43	-0.36	-0.34	-0.26	0.53
Cd	0.40	-0.20	0.08	-0.23	0.33	-0.02	0.23	0.09	-0.26	0.22	0.21	-0.24
Sb	-0.62	0.44	-0.43	0.10	-0.66	0.25	-0.14	0.69	-0.44	-0.16	0.06	0.39
Cs	0.61	-0.52	0.30	-0.22	0.50	0.11	0.55	-0.28	-0.02	-0.11	0.46	-0.37
Ba	-0.37	0.08	-0.28	-0.01	-0.27	0.35	-0.41	0.30	-0.30	-0.35	0.26	0.29
La	0.97	-0.77	0.50	-0.43	0.76	-0.18	0.37	0.71	0.30	0.16	0.44	-0.58
Ce	0.98	-0.78	0.52	-0.39	0.77	-0.21	0.41	0.84	0.30	0.19	0.40	-0.60
Pr	0.97	-0.77	0.50	-0.43	0.75	-0.18	0.37	0.73	0.31	0.16	0.44	-0.57
Nd	0.97	-0.78	0.52	-0.42	0.77	-0.19	0.38	0.75	0.32	0.16	0.43	-0.59
Sm	0.95	-0.79	0.49	-0.43	0.74	-0.16	0.36	0.71	0.30	0.14	0.46	-0.56
Eu	0.94	-0.80	0.48	-0.41	0.72	-0.15	0.35	0.62	0.31	0.12	0.47	-0.55
Gd	0.97	-0.78	0.52	-0.42	0.76	-0.19	0.39	0.79	0.30	0.16	0.42	-0.58
Tb	0.96	-0.79	0.51	-0.42	0.76	-0.18	0.38	0.73	0.30	0.14	0.43	-0.58
Dy	0.96	-0.79	0.50	-0.45	0.74	-0.17	0.37	0.70	0.30	0.14	0.44	-0.57
Ho	0.96	-0.79	0.50	-0.43	0.72	-0.17	0.40	0.73	0.31	0.15	0.46	-0.57
Er	0.95	-0.79	0.49	-0.39	0.74	-0.17	0.36	0.73	0.30	0.14	0.45	-0.56
Tm	0.97	-0.79	0.50	-0.37	0.75	-0.19	0.40	0.80	0.28	0.19	0.42	-0.57
Yb	0.95	-0.80	0.49	-0.38	0.72	-0.17	0.41	0.79	0.29	0.14	0.45	-0.57
Lu	0.96	-0.77	0.54	-0.36	0.76	-0.21	0.37	0.74	0.34	0.19	0.39	-0.59
Hf	0.93	-0.73	0.46	-0.31	0.75	-0.13	0.47	0.66	0.33	0.12	0.37	-0.50
W	-0.81	0.58	-0.34	0.32	-0.78	0.07	-0.35	-0.79	-0.16	-0.11	-0.27	0.40
Tl	0.43	-0.51	0.32	-0.14	0.41	0.15	0.34	0.36	0.01	-0.36	0.35	-0.30
Pb	0.81	-0.60	0.54	-0.26	0.58	-0.35	0.27	0.70	0.19	0.41	0.20	-0.61
Th	0.95	-0.78	0.53	-0.35	0.73	-0.20	0.37	0.67	0.37	0.21	0.39	-0.56
U	-0.96	0.73	-0.45	0.38	-0.68	0.18	-0.54	-0.87	-0.31	-0.28	-0.36	0.51

\* - Only northern sampling points ( $n = 18$ )

**B: Main genetic types of Quaternary deposits**

	Loess	Glacial	Eluvial	Lacustrine	Fluvial	Fluvio-Glacial	Eolian
S.C.	0.60	-0.64	0.60	-0.10	0.25	-0.82	0.19
pH	0.62	-0.32	-0.05	-0.56	0.57	-0.39	0.28
UV254	-0.83	0.38	-0.47	0.54	-0.67	0.76	-0.48
Cl	-0.57	0.31	-0.15	0.29	-0.75	0.54	-0.42
SO <sub>4</sub>	0.02	-0.23	0.42	0.19	-0.26	-0.25	-0.27
DOC	-0.77	0.29	-0.41	0.50	-0.68	0.70	-0.46
DIC	0.61	-0.53	0.39	-0.20	0.44	-0.75	0.26
Na	-0.21	-0.16	0.21	0.37	-0.36	-0.07	-0.39
Mg	0.34	-0.63	0.52	0.06	0.10	-0.62	0.10
Al	-0.82	0.56	-0.55	0.35	-0.58	0.85	-0.52
Si	0.26	-0.56	0.16	0.15	0.59	-0.42	0.04
P	-0.78	0.26	-0.38	0.59	-0.56	0.62	-0.44
K	-0.35	-0.03	0.07	0.57	-0.41	0.01	-0.27
Ca	0.76	-0.66	0.49	-0.31	0.62	-0.87	0.49
Ti	-0.82	0.37	-0.48	0.53	-0.62	0.75	-0.49
Cr	-0.69	0.28	-0.66	0.38	-0.43	0.71	-0.37
Mn	-0.67	0.28	-0.47	0.62	-0.65	0.58	-0.57
Fe	-0.85	0.45	-0.53	0.55	-0.64	0.80	-0.50
Co	-0.65	0.15	-0.33	0.50	-0.49	0.45	-0.64
Ni	-0.81	0.27	-0.43	0.57	-0.58	0.65	-0.46
Cu	-0.78	0.08	-0.49	0.74	-0.37	0.45	-0.43
Zn	-0.37	0.21	-0.16	0.51	-0.18	0.08	-0.37
Ge	-0.52	-0.20	-0.30	0.60	-0.17	0.22	-0.51
Rb	-0.81	0.22	-0.41	0.54	-0.62	0.68	-0.45
Sr	0.69	-0.75	0.56	-0.24	0.50	-0.85	0.40
Y	-0.83	0.37	-0.47	0.55	-0.61	0.74	-0.51
Zr	-0.84	0.41	-0.49	0.56	-0.65	0.76	-0.51
Nb	-0.82	0.35	-0.51	0.56	-0.65	0.73	-0.54
Mo	0.77	-0.65	0.49	-0.38	0.64	-0.84	0.46
Cd	-0.39	0.11	-0.16	0.40	-0.19	0.08	-0.61
Sb	0.46	-0.48	0.37	-0.01	0.49	-0.74	0.10
Cs	-0.66	0.42	-0.29	0.39	-0.60	0.51	-0.52
Ba	0.29	-0.73	0.38	0.13	0.18	-0.54	0.22
La	-0.83	0.40	-0.48	0.54	-0.62	0.75	-0.49
Ce	-0.85	0.44	-0.50	0.57	-0.63	0.77	-0.50
Pr	-0.83	0.39	-0.47	0.54	-0.61	0.75	-0.50
Nd	-0.84	0.41	-0.49	0.56	-0.63	0.76	-0.48
Sm	-0.82	0.35	-0.46	0.55	-0.62	0.74	-0.49
Eu	-0.82	0.34	-0.45	0.54	-0.62	0.72	-0.49
Gd	-0.84	0.39	-0.48	0.56	-0.61	0.76	-0.52
Tb	-0.84	0.39	-0.48	0.55	-0.62	0.75	-0.50
Dy	-0.82	0.38	-0.47	0.54	-0.63	0.75	-0.50
Ho	-0.83	0.39	-0.47	0.55	-0.62	0.75	-0.52
Er	-0.83	0.35	-0.46	0.55	-0.62	0.74	-0.50
Tm	-0.84	0.41	-0.47	0.55	-0.63	0.76	-0.52
Yb	-0.83	0.39	-0.48	0.55	-0.62	0.75	-0.51
Lu	-0.84	0.38	-0.49	0.56	-0.63	0.76	-0.52
Hf	-0.80	0.50	-0.42	0.42	-0.67	0.78	-0.48
W	0.61	-0.44	0.28	-0.33	0.56	-0.66	0.33
Pb	-0.75	0.29	-0.56	0.60	-0.44	0.57	-0.63
Th	-0.82	0.38	-0.47	0.53	-0.67	0.75	-0.52
U	0.78	-0.63	0.45	-0.40	0.68	-0.83	0.51

**Table S4.** Proportion of colloidal fraction of elements in the Ob River downstream of Irtysh (4 points) and 7 tributaries. Elements not listed in this table (Li, B, Si, Cl, DIC...) exhibited less than 5-10 % of colloids in all studied samples.

	<i>p-1 (Pasay-deyakha)</i>	<i>2 (Ob')</i>	<i>p-2 (Poluy)</i>	<i>p-3 (Pitljär)</i>	<i>8 (Ob')</i>	<i>10 (Ob')</i>	<i>11 (Ob')</i>	<i>p-4 (Irtysh)</i>	<i>p-9 (Ket')</i>	<i>p-12 (Tom')</i>
DOC	43	43	45	36	41	45	42	42	12	35
Al	86	95	93	97	98	97	94	79	62	38
P	98	98	87	94	84	85	93	74	41	78
Ca	nd	7	11	5	5	2	4	4	0	0
Ti	71	73	79	78	74	79	78	60	34	9
V	76	74	68	58	65	61	64	36	11	11
Cr	60	54	61	59	46	55	64	15	27	nd
Mn	99	92	99	100	100	83	96	99	23	97
Fe	99	99	99	99	99	98	98	96	74	48
Co	92	68	84	69	65	67	64	85	15	47
Ni	41	51	76	54	49	51	47	46	31	14
Cu	47	66	59	64	56	73	67	55	nd	nd
Zn	92	nd	96	67	83	77	47	92	nd	nd
Ga	86	nd	nd	87	8	68	84	85	47	12
Ge	14	0	11	13	0	12	1	16	nd	0
As	56	43	37	39	47	44	36	22	9	0
Y	97	96	96	95	95	95	94	89	76	73
Zr	99	96	99	98	98	98	98	95	93	89
Nb	nd	51	84	96	96	94	89	60	23	nd
Mo	8	1	0	4	10	1	6	4	0	0
Cd	78	nd	85	38	43	nd	25	29	nd	nd
Sb	0	0	21	26	19	16	12	17	0	2
Cs	nd	<10	36	43	54	46	33	13	nd	nd
Ba	0	17	35	12	14	13	12	13	0	1
La	99	95	97	97	97	96	95	91	4	20
Ce	99	97	98	99	99	99	98	97	71	63
Pr	99	98	98	98	98	98	97	95	86	88
Nd	99	98	98	98	97	98	97	94	78	84
Sm	98	97	96	97	98	96	95	96	80	92
Eu	97	91	97	85	85	88	88	82	52	23
Gd	99	97	97	97	97	97	96	94	68	80
Tb	99	97	97	97	95	97	97	94	76	77
Dy	98	97	97	97	96	96	96	95	78	86
Ho	98	98	97	97	97	95	96	90	85	89
Er	97	97	95	96	95	96	96	91	69	61
Tm	96	94	92	95	97	99	92	86	78	51
Yb	96	96	95	96	94	95	91	89	54	74
Lu	93	98	94	92	93	92	90	84	69	45
Hf	98	97	99	92	88	94	96	88	68	75
W	nd	0	43	36	48	37	17	19	4	3
Tl	44	0	67	30	26	11	0	nd	5	13
Pb	99	98	99	100	100	99	96	95	25	nd
Th	94	99	96	98	97	98	98	97	86	98
U	87	70	91	53	56	46	44	25	3	3