Supplementary material

Figure S1. Sampling location at three rivers for tracing the temporal variation of CDOM and DOC. The average widths at sampling stations are about 1020 m, 206m and 152 m for the Songhua River, Hunjiang River and Yalu River, respectively.

Table S1 the sampling information for fresh and saline water lakes, the location information shows the central positions of the lakes. Res. is the abbreviation for reservoir; N, numbers of samples collected; Lat., latitude; Long., longitude; A, area; L, maximum length in kilometer; W, maximum width in kilometer.

Water types	Sampling date	N	Lat.	Long.	A(km^2)	L (km)	W (km)
Fresh water lake							
Shitoukou Res.	2009.08.28	10	43.9319	125.7472	59	17	6
Songhua Lake	2015.04.29	8	43.6146	126.9492	185	55	6
Erlong Lake	2011.06.24	6	43.1785	124.8264	98	29	8
Xinlicheng Res.	2011.06.13	7	43.6300	125.3400	43	22	6
Yueliang Lake	2011.09.01	6	45.7250	123.8667	116	15	15
Nierji Res.	2015.09.16	8	48.6073	124.5693	436	83	26
Shankou Res.	2015.09.17	4	48.5280	126.8695	48	11	11
Hongqi Res.	2015.09.12	6	43.8922	125.1945	0.1	0.6	0.4
Jingpo Lake	2014.07.15	6	43.8416	128.9022	94	33	18
Xingkai Lake	2013.07.13	16	44.9417	132.4083	4103	89	68
Qingnian Res.	2015.08.18	3	45.6722	131.8127	33	11	10
Nanyin Res.	2015.09.07	5	45.9653	124.5356	116	17	13
Daqing Res.	2015.09.12	11	46.7871	125.1011	52	10	10
Lake Tai	2015.07.15	6	31.2500	120.2500	2338	69	67
Xiashan Res.	2014.10.03	6	36.4472	119.4723	101	20	12
Dongping Lake	2014.10.02	5	35.9712	116.1998	120	20	15
Weishan Lake	2014.10.03	3	34.6041	117.2339	167	18	17
Gaoyou Lake	2015.11.06	3	32.8800	119.2660	631	40	32
Lake Chao	2015.11.03	4	31.5700	117.5500	783	30	30
Hongze Lake	2015.11.05	6	33.3098	118.7060	1567	66	63
Dongting Lake	2015.10.13	4	29.3455	112.9290	1368	137	67
Poyang Lake	2015.11.01	4	29.3050	116.0779	922	85	65
Wuchang Lake	2015.11.02	6	30.2830	116.7300	78	16	10
Donghu Lake	2015.10.10	9	30.5500	114.3833	37	12	11
Yanxihu Lake	2015.10.10	9	30.5734	114.4831	16	8	8
Three Gorge Res.	2009.10	9	30.8842	110.9144	312	124	8
Zhelin Res.	2015.10.31	6	29.2755	115.3091	199	16	16
Longgan Lake	2015.11.01	7	29.9810	115.8160	29	10	7
Danjiangkou Res.	2015.10.07	5	32.6872	111.5862	379	112	58
Zhanghe Res.	2015.10.08	7	31.0102	112.0201	51	13	10
Yahekou Res.	2015.10.06	3	33.3064	112.6067	39	10	10
Xiaolangdi Res.	2015.10.05	9	34.9430	112.3011	89	86	22
Fuhai Res.	2015.07.16	6	46.7380	87.9889	25	11	6
Mengjin Res.	2015.07.19	5	44.1173	87.5472	12	4	4
Longyangxia Res.	2014.09.18	7	36.0628	100.7444	285	46	11
Liujiaxia Res.	2009.7.13	8	35.8472	103.2335	113	20	6

Keluke Lake	2014.09.13	6	37.2881	96.8905	54	10	8
Gyoring Lake	2014.09.16	7	34.9265	97.2963	526	23	23
Pumuyong Co	2015.06.25	3	28.5667	90.3833	285	17	12
Dianchi Lake	2015.10.20	5	24.9801	102.6411	305	40	20
Fuxian Lake	2015.10.21	5	24.4917	102.8833	216	31	14
Xingyun Lake	2015.10.21	3	24.3333	102.7751	36	11	6
Qilu Lake	2015.10.21	5	24.1751	102.7667	38	7	7
Chenghai Lake	2015.10.23	6	26.5417	100.6583	75	19	6
Erhai Lake	2015.10.24	5	25.7833	100.2011	239	40	14
Hongfeng Lake	2015.10.18	4	26.4806	106.4107	32	14	11
Beipanjiang Res.	2015.10.18	6	25.7877	105.4248	37	28	2
Saline water lakes							
Chagan Lake	2009.07.17	20	45.2583	124.2583	301	41	19
	2010.08.21	21	45.2583	124.2583	301	41	19
Xindian Lake	2013.07.11	21	45.3500	124.2333	57	15	13
Talahong	2011.09.23	20	46.7599	124.2150	63	14	10
Lamasi Lake	2015.09.08	5	46.2994	124.0970	59	18	11
Dongdahai Lake	2015.09.07	11	46.1083	124.6500	15	8	6
Xidahai Lake	2015.09.07	7	46.0233	124.5927	12	6	6
Longhu Lake	2015.09.09	11	46.7250	124.3750	131	18	12
Keqin Lake	2011.09.22	5	47.3000	124.2917	9	5	3
Hulun Lake	2014.09.22	27	48.8851	117.3328	2126	90	36
Beier Lake	2014.09.23	3	47.7833	117.7333	609	38	27
Huhenuoer	2014.09.23	11	48.2092	119.0573	20	8	7
Fuhai Lake	2015.07.17	18	47.2848	87.3150	856	41	28
Bositeng Lake	2015.07.11	15	41.9667	86.9667	1013	46	31
Erbinur Lake	2015.07.14	17	44.8749	82.9357	511	32	25
Jili Lake	2015.07.14	6	46.9667	87.4333	170	18	16
Ailike Lake	2015.07.18	8	44.5693	84.3270	19	6	4
Qinghai Lake	2013.08.10	18	36.8917	100.1917	4250	80	42
Tuosu Lake	2014.09.13	26	37.1417	96.9417	135	16	12
Dongjinacuo	2014.09.15	8	35.2771	98.5867	232	21	12
Nam Co	2015.06.22	10	30.7167	90.6583	1956	67	44
Siling Co	2015.06.30	6	31.7583	88.9502	1783	63	46
Bamu Co	2015.06.27	10	31.2510	90.5833	199	24	14
Yandrok Co	2015.06.24	5	28.8671	90.6528	590	102	12
Mapayum Co	2015.07.04	3	30.6751	81.4083	416	26	23
Langa Co	2015.07.04	16	30.7418	81.2285	261	28	22
Bangong Lake	2015.07.05	11	33.7198	78.8227	285	46	25
CuoE	2015.06.30	6	31.5916	88.7574	285	39	28

Table S2 Lakes in Northeast China sampled during ice covered season, some lakes were sampled two or three times during the past five years. Res. is the abbreviation for reservoir; N, numbers of samples collected; Lat., latitude; Long., longitude; A, area; L, average length in kilometer; W, average width in kilometer.

Water types	Sampling date	N	Lat.	Long.	A(km^2)	L (km)	W (km)
Ice covered lakes							
Shitoukou Res.	2011.12.20	9	43.8471	125.8264	59	17	6
Chagan Lake	2012.01.17	8	45.2524	124.2924	301	41	19
	2013.12.28	8	45.2524	124.2924	301	41	19
Erlong Lake	2011.01.24	8	43.0167	124.8167	98	29	8
	2011.12.17	7	43.0167	124.8167	98	29	8
Xinlicheng Res.	2012.01.13	6	43.6586	125.3623	43	22	6
	2013.01.17	7	43.6586	125.3623	43	22	6
	2014.01.20	9	43.6586	125.3623	43	22	6
Xindian Lake	2013.07.11	7	45.3619	124.2867	57	15	13
Shuangyang Res.	2014.01.04	5	43.5323	125.7417	10	6	4
Kuli Lake	2012.12.06	6	45.8292	124.8598	80	18	12
	2013.01.17	4	45.8292	124.8598	80	18	12
Talahong	2011.12.23	4	46.7912	124.1524	63	14	10
	2012.01.17	4	46.7912	124.1524	63	14	10
Yuepao Lake	2011.01.11	5	45.6167	124.3833	22	10	4
	2012.12.01	8	45.6167	124.3833	22	10	4
Zhongnei Lake	2012.01.11	3	46.3167	125.0583	12	5	4
	2014.12.06	5	46.3167	125.0583	12	5	4
Lamasi Lake	2014.01.08	4	46.2833	124.0917	59	18	11
	2015.01.16	3	46.2833	124.0917	59	13	12
Dongdahai Lake	2011.12.07	3	46.1083	124.6500	15	8	6
Xidahai	2011.12.07	3	46.1083	124.0583	12	6	4
	2014.12.12	4	46.1083	124.0583	12	6	4
Nanyin Res.	2014.12.13	4	45.9521	124.5788	116	17	13
	2015.12.12	3	45.9521	124.5788	116	17	13
Lianhuan Lake	2011.12.18	6	45.1234	129.6550	51	32	3
	2014.01.03	6	45.1234	129.6550	51	32	3
Longhu Lake	2014.01.05	6	46.7250	124.3750	131	18	12
	2015.12.27	3	46.7250	124.3750	131	18	12
Daqing Res.	2015.12.29	6	46.8196	125.1461	52	10	10

Table S3 the cities sampled for urban water, the field trips were carried out four times only Changchun city, and water numbers represents the numbers of water bodies sampled, several samples were collected in some large urban waters (including lakes, ponds and rivers), thus the sample numbers may be greater than water numbers.

City names	Sampling dates	Water numbers	Samples	Longitude	Latitude
Changchun	2013.05.12	10	20	125.352	43.979
	2013.06.29	8	16	125.352	43.979
	2014.08.20	8	16	125.352	43.979
	2015.07.17	8	16	125.352	43.979
Siping	2014.07.28	4	12	124.594	43.807
Dalian	2014.10.09	6	12	121.725	39.911
Harbin	2014.08.26	10	18	126.705	45.862
Shenyang	2014.08.15	8	18	123.421	41.872
Chifeng	2013.09.24	3	6	117.527	43.24
Tianjin	2014.07.28	8	10	117.213	39.131
Beijing	2014.07.26	11	21	116.372	39.847
Panjin	2015.09.04	6	8	122.071	41.012
Weifang	2014.10.04	4	6	118.922	37.241
Jingzhou	2014.10.07	6	6	112.236	30.331
Wuhan	2015.10.09	6	10	114.374	30.558
Guiyang	2015.09.17	6	6	106.629	26.651
Nanning	2015.10.16	5	10	108.232	22.839
Kunming	2015.10.15	5	10	102.706	25.047