Supplementary material for: Vetrov A. & Romankevich E. 2019. Distribution and fluxes of dissolved organic carbon in the Arctic Ocean. *Polar Research 38.* Contact: Alexander Vetrov, Shirshov Institute of Oceanology Russian Academy of Sciences, 36, Nahimovskiy prospect, Moscow, Russia, 117997, E-mail aa.vetrov@mail.ru

At the Shirshov Institute of Oceanology dissolved organic matter (DOC) was measured using the high-temperature combustion method with a Shimadzu TOC Vcph total organic carbon analyser. The range of the measured concentrations was 0.05-25000 mg C / L, the volume of the injected sample was 100 µl. Deviation of the device is 1%. The reproducibility of the test results is ± 5.

All metadata are included in the CARBON data bank.

Supplementary Table S1. Data set of dissolved organic matter (DOC), used for multiple linear regression (MLR).

Sample	Reference	Region	Date
AMK54	Belyaev N.A., Peresypkin V.I. & Ponyaev M.S. 2010 Concentrations of dissolved and particulate organic carbon in waters of the Kara Sea along the section to the east-northeast of the Yamal Peninsula. https://doi.org/10.1594/PANGAEA.763806.	Kara Sea	09.2007
BP97	Kodina L.A. 2005. D13C, dissolved organic carbon, alkalinity and salinity measurements of different surface sites. https://doi.org/10.1594/PANGAEA.57446.	Kara Sea	09.1997
AMK59	Belyaev N.A., Ponyaev M.S. & Kiriutin A.M. 2015. Organic carbon in water, particulate matter, and upper layer of bottom sediments of the central part of the Kara Sea. *Oceanology 55*, 508–520, https://doi.org/10.1134/S0001437015040013.	Kara Sea	09.2011
BP00	Stein R., Fahl K., Futterer D.K., Galimov E.M. & Stepanets O.V. (eds.) 2003. *Siberian river run-off in the Kara Sea: characterisation, quantification, variability, and environmental significance. Vol 6.* Pp. 281-308. Amsterdam: Elsevier.	Kara Sea	09.2000
BP97	Köhler H., Meon B; Gordeev V.V., Spitzy A. & Amon R.M.W. 2004. Dissolved organic carbon in surface water during cruise BP97. https://doi.org/10.1594/PANGAEA.138356.	Kara Sea	09.1997
BP99	Köhler H., Meon B; Gordeev V.V., Spitzy A. & Amon R.M.W. 2004. Dissolved organic carbon in surface water during cruise BP99. https://doi.org/10.1594/PANGAEA.138357.	Kara Sea	09.1999

BRW; CS	Wang D., Henrichs S.M. & Guo L. 2006. Distributions of nutrients, dissolved organic carbon and carbohydrates in the western Arctic Ocean. *Continental Shelf Research 26*, 1654–1667, https://doi.org/10.1016/j.csr.2006.05.001.	Chukchi Sea–Canada Basin	09.2002
CARDEEP7_95	ESOP Members & Johannessen O.M. 1998. Hydrochemistry measured on water bottle samples during Hakon Mosby cruise CARDEEP7/95. https://doi.org/10.1594/PANGAEA.759041.	Greenland Sea	02–03.1995
East Greenland Current; Fram Straight; Greenland Gyre	Opsahl S., Benner R. & Amon R.M.W. 1999. Major flux of terrigenous dissolved organic matter through the Arctic Ocean. *Limnology and Oceanography 44*, 2017–2023, https://doi.org/10.4319/lo.1999.44.8.2017.	Greenland Sea	1996–1997
Healy_02, BS	Mathis J.T., Hansell D.A., Kadko D., Bates N.R. & Cooper L.W. 2007. Determining net dissolved organic carbon production in the hydrographically complex western Arctic Ocean. *Limnology and Oceanography* 52, 1789–1799, https://doi.org/10.4319/lo.2007.52.5.1789.	Chukchi Sea, Beaufort Sea	08.2002
JH1996210_hydro_chem	ESOP Members & Rey F. 1998. Hydrochemistry measured on water bottle samples during Johan Hjort cruise JH1996210. https://doi.org/10.1594/PANGAEA.759046.	Greenland Sea	07–08.1996
Lena delta	Dubinenkov I., Flerus R., Schmitt-Kopplin P., Kattner G. & Koch B.P. 2014. Dissolved organic matter in the Lena Delta in 2009. https://doi.org/10.1594/PANGAEA.831765.	Laptev Sea	08.2009
LI-ChS	Lein A.Y., Savvichev A.S., Rusanov I.I., Pavlova G.A., Belyaev N.A., Crane K., Pimenov N.V. & Ivanov M.V. 2007. Biogeochemical processes in the Chukchi Sea. *Lithology and Mineral Resources 42*, 221-239, https://doi.org/10.1134/S0024490207030029.	Chukchi Sea	08.2004
PS70	Amon R.M.W. 2012. Fluorescence for CDOM, dissolved organic carbon, absorption coefficient at 350 nm and specific UV absorption measurements during POLARSTERN cruise ARK-XXII/2. Alfred Wegener Institute, Helmholtz Center for Polar and Marine Research, Bremerhaven. https://doi.org/10.1594/PANGAEA.789137.	Arctic Basin	07–09.2007
SPASIBA 1	Vetrov A.A. & Romankevich E.A. 2004. *Carbon cycle in the Russian Arctic seas*. Berlin: Springer.	Laptev Sea	09.1989
SPASIBA 2	Vetrov A.A. & Romankevich E.A. 2004. *Carbon cycle in the Russian Arctic seas*. Berlin: Springer.	Laptev Sea	09.1991

T-3	Kinney D.J., Loder T.C. & Groves J. 1971. Particulate and dissolved matter in the Amerasian Basin of the Arctic Ocean. *Limnology and Oceanography 16*, 132-137.	Arctic Basin	04.1968; 05.1969
Yukon River	Guo L., Cai Y., Belzile C. & Macdonald R.W. 2012. Sources and export fluxes of inorganic and organic carbon and nutrient species from the seasonally ice-covered Yukon River. *Biogeochemistry 107*, 187–206, https://doi.org/10.1007/s10533-010-9545-z.	Yukon River	07.2004–09.2005
Lena delta	Dubinenkov I., Flerus R., Kattner G. & Koch B.P. 2015. Dissolved organic matter in the Lena Delta and coastal Laptev Sea in 2010. Alfred Wegener Institute, Helmholtz Center for Polar and Marine Research, Bremerhaven. https://doi.org/10.1594/PANGAEA.842220.	Laptev Sea	07.2009 07.2010
Lena delta	Dubinenkov I., Kraberg A.C., Bussmann I. et al. 2015. Physical oceanography and dissolved organic matter in the coastal Laptev Sea in 2013. Size: 519 data points. Score: 23.76. https://doi.org/10.1594/PANGAEA.842221.	Laptev Sea	07.2011
WHS, EHS	Mathis J.T., Hansell D.A. & Bates N.R. 2005. Strong hydrographic controls on spatial and seasonal variability of dissolved organic carbon in the Chukchi Sea. *Deep-Sea Research Part II 52*, 3245–3258, https://doi.org/10.1016/j.dsr2.2005.10.002.	Arctic Basin	05-0.8.2002 07-08.2003
BS; BC2A; CB; CB/MR; ESS; MB; EB; LS; CS	Letscher R.T., Hansell D.A. & Kadko D. 2011. Rapid removal of terrigenous dissolved organic carbon over the Eurasian shelves of the Arctic Ocean. *Marine Chemistry 123*, 78-87, https://doi.org/10.1016/j.marchem.2010.10.002.	Beaufort Sea, Chukchi Sea, Arctic Basin	08-10. 2008
CS-CB	Wang D., Henrichs S.M. & Guo L. 2006. Distributions of nutrients, dissolved organic carbon and carbohydrates in the western Arctic Ocean. *Continental Shelf Research 26*, 1654–1667, https://doi.org/10.1016/j.csr.2006.05.001.	Chukchi Sea–Canadian Basin	09.2002
AK23	Vetrov A.A. & Romankevich E.A. 2004. *Carbon cycle in the Russian Arctic seas*. Berlin: Springer.	Barents Sea	08–09.1976
AF13	Data bank CARBON, Shirshov Institute of Oceanology, Russian Academy of Sciences	Arctic Basin	08–09.2013
AMK63	Data bank CARBON, Shirshov Institute of Oceanology, Russian Academy of Science	Kara Sea, Laptev Sea	08.2015–10.2015
Oden_14	Data bank CARBON, Shirshov Institute of Oceanology, Russian Academy of Science	Laptev Sea, East Siberian Sea	08.2014

PSh63	Data bank CARBON, Shirshov Institute of Oceanology, Russian Academy of Science	Barents Sea	07–08.2004
PSh128	Data bank CARBON, Shirshov Institute of Oceanology, Russian Academy of Science	Kara Sea	08–09.2014
PSh129	Data bank CARBON, Shirshov Institute of Oceanology, Russian Academy of Science	Barents Sea, Kara Sea	09.2014
KD-04; KDranitsyn	Data bank CARBON, Shirshov Institute of Oceanology, Russian Academy of Science	Barents Sea, Kara Sea, Laptev Sea	09.2004

Supplementary Table S2. Regression coefficients for the predictive equations for DOC of the Arctic Ocean in the form: DOC = Intercept + a · Offshore distance + b · Longitude + c ·Latitude + d ·Depth + e · Horizon + f · Temperature + g · Salinity (Stow et al. 2009). ME values of 0 indicate that the model has no advantage over the average of the observations.

Region (depth, m)	Intercept	a	b	c	d	e	f	g	Correlation coefficient	Root mean square error	Modelling efficiency	Average error	No. of observations
(1) Spitsbergen	16.8 ±37	–	–	–	-0.00016 ±0.00026	0.00006 ±0.00023	0.18 ±0.31	-0.44 ±1.05	0.52	0.17	0.26	0.02	10
(2) Severnaya Zemlya western area, <50 m	29.5 ±7.2	0.0034 ±0.0017	–	-0.31 ±0.08	0.00005 ±0.00012	0.00007 ±0.0096	-0.005 ±0.07	-0.11 ±0.087	0.57	0.93	0.20	-0.24	87
eastern area, <50 m	-3.56 ±2.15	0.0005 ±0.00082	–	0.074 ±0.031	0.0004 ±0.00004	0.0029 ±0.0049	0.44 ±0.096	-0.023 ±0.028	0.54	0.49	0.30	-0.01	76
50-100 m	7.19 ±29	0.0025 ±0.0027	0.0049 ±0.0083	-0.25 ±0.11	0.000026 ±0.00018	-0.0021 ±0.0085	-0.53 ±0.22	0.038 ±0.76	0.49	0.73	0.24	-0.0002	36

100-900 m	-5.9 ±25	-0.0021 ±0.0007	–	-0.14 ±0.036	0.00003 ±0.00003	0 ±0.0003	0.74 ±0.13	0.54 ±0.74	0.59	0.90	0.36	-0.00073	137
>900 m	-279 ±194	–	–	-0.047 ±0.025	0 ±0	0 ±0	1 ±0.49	8.15 ±5.6	0.48	0.43	0.80	0.0069	53
(3) New Siberian	-29.5 ±8.4	0.0049 ±0.0012	–	0.044 ±0.12	-0.0008 ±0.00018	0.0011 ±0.00063	0.136 ±0.15	-0.197 ±0.062	0.96	0.18	0.87	0.019	10
(4) Wrangel Island (<20 m)	8.54 ±6.65	0.00072 ±0.00068	0.00025 ±0.00027	-0.098 ±0.093	0.00003 ±0.00005	-0.014 ±0.034	0.038 ±0.09	-0.019 ±0.016	0.42	0.04	0.19	-0.0074	35
20-80 m	-113 ±98	-0.013 ±0.012	-0.007 ±0.011	1.59 ±1.35	0 ±0.00002	0.002 ±0.0033	0.0022 ±0.021	-0.007 ±0.048	0.94	0.044	-0.05	0.080	13
>80 m	0.92 ±1.24	0.0019 ±0.00044	–	–	-0.00007 ±0.00002	0.00008 ±0.00007	-0.084 ±0.042	-0.016 ±0.037	0.95	0.040	0.91	0.0005	13
(5) Canadian (<60 m)	-12.4 ±1.9	0.0005 ±0.0004	–	0.13 ±0.026	0.0002 ±0.00006	-0.011 ±0.0041	0.51 ±0.15	0.092 ±0.04	0.79	0.39	0.62	0.020	66
<60 m, <80N	0.317 ±6.68	0.00017 ±0.00041	–	-0.014 ±0.086	0.000017 ±0.000034	–	0.013 ±0.015	0.05 ±0.019	0.84	0.065	0.72	-0.0006	14
<60 m, >80N	-15.2 ±2.7	0.0013 ±0.00067	–	0.13 ±0.041	0.0002 ±0.000077	-0.01 ±0.0048	-1.67 ±2.13	0.055 ±0.096	0.75	0.43	0.51	0.14	54
60-300 m	8 ±2.65	0.00023 ±0.00038		-0.029 ±0.024	0.00005 ±0.00003	-0.0042 ±0.0019	0.083 ±0.091	-0.13 ±0.074	0.77	0.20	0.60	-0.0014	54
300-1000 m	126 ±75	0.001 ±0.0004	–	0.021 ±0.032	-0.0001 ±0.00002	0.0006 ±0.0005	0.031 ±0.27	-3.7 ±2.16	0.69	0.14	-0.14	-0.13	23
>1000 m	681 ±227	-0.0002 ±0.0006	–	-0.026 ±0.023	-0.0001 ±0.0001	0.0001 ±0.0001	-0.28 ±1.35	-19.4 ±6.51	0.93	0.12	0.54	-0.11	12

(6) Canadian–Greenland	1.39 ±0.33	-0.002 ±0.00086	–	–	0.00031 ±0.00004	–	0.018 ±0.0073	-0.016 ±0.011	0.97	0.025	0.93	$2\cdot10^{-6}$	8
(7) East Greenland <1100 m	39.3 ±8.7	-0.11 ±0.029	0.00033 ±0.00008	0.00019 ±0.00006	0.05 ±0.051	–0.9 ±0.2	–	–	0.79	0.064	0.60	-0.016	27
>1100 m	215 ±441	–	–	–	0.0001 ±0.0001	0 ±0.0001	0.23 ±0.94	-6.1 ±12.6	0.4	0.14	-2.51	0.20	12
(8) Greenland, <30 m	-4.8 ±11.4	–	–	–	–	-0.021 ±0.0068	0.023 ±0.072	0.18 ±0.33	0.9	0.12	0.97	0.079	6
30-200 m	3683 ±1700	–	-0.003 ±0.049	-48.3 ±23	-0.002 ±0.006	0 ±0.001	0.26 ±0.29	-1.43 ±1.69	0.92	0.12	0.61	0.13	13
200-900 m	-17.5 ±245	-0.0004 ±0.001	–	-1.57 ±1.9	–	0 ±0	0.029 ±0.06	3.9 ±3.7	0.57	0.09	0.16	0.039	18
>900 m	186 ±79	–	–	–	–	0.0001 ±0.00003	-0.64 ±0.31	-5.33 ±2.28	0.55	0.075	0.006	-0.042	26
(9) Scandinavian <100 m	-3.94 ±3.27	0.0011 ±0.00018	–	0.036 ±0.017	0.00008 ±0.00003	-0.0016 ±0.00095	0.056 ±0.015	0.035 ±0.089	0.65	0.19	0.42	0.0079	118
100-1000 m	-2.3 ±26	0.0005 ±0.0003	0.015 ±0.014	-0.0019 ±0.017	-0.0001 ±0.00001	0 ±0.0001	0.013 ±0.034	0.096 ±0.074	0.52	0.12	0.26	-0.015	55
>1000 m	138 ±130	–	-0.028 ±0.00099	-0.044 ±0.017	–	0 ±0	-0.43 ±0.29	-3.86 ±3.74	0.69	0.076	-0.59	-0.090	23
Barents Sea Atlantic Water	11.6 ±8.3	-0.0014 ±0.00039	–	–	-0.0027 ±0.025	-0.28 ±0.24	–	–	0.33	0.59	0.02	0.011	135
Arctic Water	29.5 ±7.2	0.0034 ±0.0017	–	-0.31 ±0.08	0.00005 ±0.00012	0.00007 ±0.0096	-0.005 ±0.07	-0.11 ±0.087	0.53	0.93	0.20	-0.26	25

Coastal Water	86 ±71	0.0057 ±0.0073	-0.17 ±0.13	-0.85 ±1.11	0.01 ±0.023	-0.02 ±0.0076	-0.66 ±0.23	-0.42 ±0.43	0.72	0.92	0.52	0.0017	21
modified Barents Water, <100 m	46 ±39	0.001 ±0.0036	–	–	–	–	-0.13 ±0.14	-1.27 ±1.11	0.43	0.46	0.49	-0.0011	18
>100 m	15.6 ±9.1	-0.0012 ±0.0016	0.5 ±0.15	-0.5 ±0.18	-0.0031 ±0.0036	0.0016 ±0.0025	–	–	0.97	0.07	0.94	0.0005	7
Kara Sea	8.33 ±4.52	0.0012 ±0.0016	-0.0028 ±0.015	-0.0045 ±0.074	-0.0053 ±0.0017	0.0084 ±0.0024	0.19 ±0.052	-0.11 ±0.018	0.6	1.45	0.08	0.33	555
zone of river discharge	8.06 ±0.32	0.0024 ±0.0024	–	–	-0.0088 ±0.0074	0.086 ±0.018	0.049 ±0.042	-0.23 ±0.015	0.9	0.98	0.79	0.068	110
Laptev Sea	38 ±6.9	0.001 ±0.0014	–	-0.43 ±0.093	0.00043 ±0.00023	0.0021 ±0.0025	0.18 ±0.06	-0.13 ±0.024	0.78	0.89	0.61	-0.0007	107
zone of river discharge	-13.1 ±20.8	-0.011 ±0.0061	-0.09 ±0.019	0.45 ±0.28	-0.028 ±0.027	0.013 ±0.046	-0.016 ±0.14	-0.106 ±0.02	0.77	0.93	-0.01	0.89	57
East Siberian Sea	-0.34 ±8.5	0.000057 ±0.00058	-0.091 ±0.023	0.053 ±0.094	-0.00069 ±0.0042	-0.0063 ±0.0022	-0.06 ±0.12	0.44 ±0.076	0.94	2.2	-1.07	-1.17	75
Chukchi Sea	7.31 ±2.94	0.0012 ±0.00076	-0.014 ±0.015	-0.038 ±0.016	0.003 ±0.0045	0.0048 ±0.0012	0.026 ±0.0075	-0.21 ±0.023	0.97	0.048	0.93	0.000035	35

References

Stow C.A., Jolliff J., McGillicuddy D.J. Jr., Doney S.C., Allen J.I., Friedrichs M.A.M., Rose K.A. & Wallhead P. 2009. Skill assessment for coupled biological/physical models of marine systems. *Journal of Marine Systems 76,* 4–15, http://dx.doi.org/10.1016/j.jmarsys.2008.03.011.