Supplementary Material

Region	Locality	Number of samples	Previously reported details	Link to prior work(s)
Antarctica	Andvord Bay	16	12 new samples, 4 literature values	Forsch et al., 2021
Antarctica	Fildes Bay	24	19 new samples, 5 previously reported	Höfer et al., 2019
Antarctica	Flandres Bay	15	New samples	n/a
Antarctica	Marion Cove	16	New samples	n/a
Antarctica	Nelson Glacier	30	New samples	n/a
Antarctica	Neumayer Channel	22	New samples	n/a
Antarctica	South Bay	17	New samples	n/a
Antarctica	Thunder Bay	59	New samples	n/a
Antarctica	WAP and Polar Front	9	Literature values	De Baar et al., 1995; Lin et al., 2011; Loscher et al., 1997; Martin et al., 1990
Antarctica	Wilhelmina Bay	14	New samples	n/a
Antarctica	Yelcho	26	Previously reported for Fe	Höfer et al., 2019; Hopwood et al., 2019
Baffin Bay	Bylot Island	1	Literature value	Campbell & Yeats, 1982
Greenland	Disko Bay	30	New samples	n/a
Greenland	Eqip Glacier	62	58 new samples, 4 previously reported for Fe	Hopwood et al., 2019
Greenland	Ilulissat Icefjord	26	24 new samples, 2 previously reported for Fe	Hopwood et al., 2019
Greenland	Nioghalvfjerdsbræ	26	Previously reported for Fe	Hopwood et al., 2019
Greenland	Nuup Kangerlua (otherwise known as Godthåbsfjord)	86	49 new samples, 37 previously reported	Hopwood et al., 2016, 2019
Greenland	Saqqarleq Fjord–Saqqarliup Sermia	3	New samples	n/a
Greenland	Upernavik	9	Previously reported for Fe	Hopwood et al., 2019
Greenland	Uumanaaq	8	Previously reported for Fe	Hopwood et al., 2019
Iceland	Jökulsárlón	9	Previously reported for Fe	Hopwood et al., 2019
Patagonia	PIA fjord	15	Previously reported for Fe	Hopwood et al., 2019

Svalbard	Kongsfjorden	48	Previously reported for Fe	Hopwood et al., 2017, 2019

Supplementary Table 1. Details of all samples referred to (inclusive of prior literature).

Runoff Location	**dSi / µM**	**NO_x / µM**	**PO_4 / µM**
Beagle Channel (close to Pia fjord), n=2	38.79	3.57	0.29
Beagle Channel Yendegaia fjord, n=3	44.34	2.82	0.34
Saqqarleq Fjord–Saqqarliup Sermia (close to Jakobshavn Isbræ, west Greenland), n=2	18.83	0.65	0.17
Doumer Island (close to South Bay, Western Antarctic Peninsula), n=10	1.20	0.17	0.02
Kongsfjorden (Svalbard), n=37	4.12	2.50	0.12
Saqqap Sermersua (Nuup Kangerlua, southwest Greenland) n=3	33	2.50	0.30

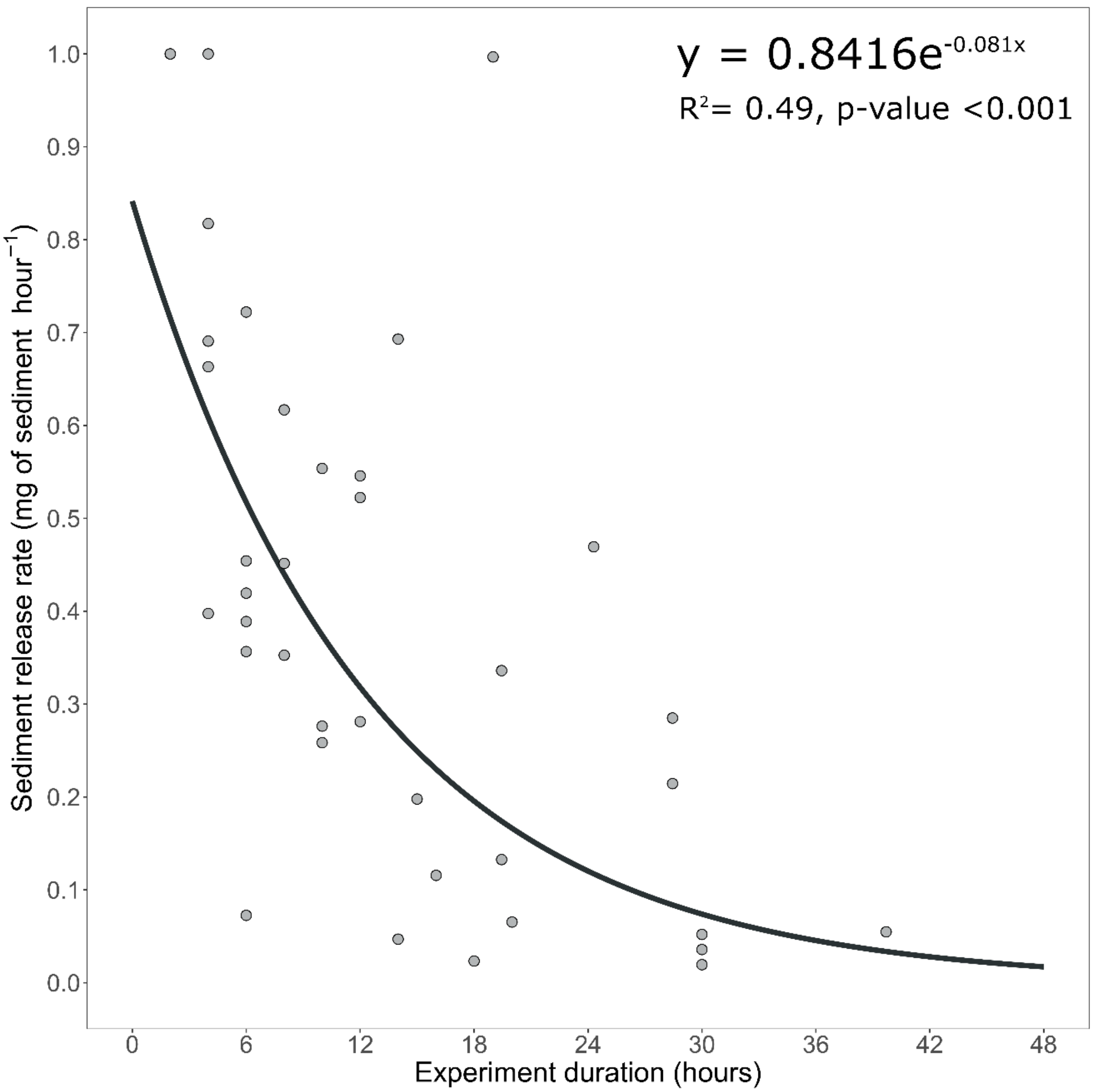
Supplementary Table 2. Runoff concentrations corresponding to iceberg collection sites. Doumer Island data from Krause et al., (2021). Kongsfjorden data from Cantoni et al., (2020). Nuup Kangerlua data from Meire et al., (2016).

Zone	**Ice origin**	**NO_x (µM)**	**PO_4 (µM)**	**dSi (µM)**
Coastal	Eqip Sermia (n=43)	0.61 ± 0.50 (0.57)	0.04 ± 0.01 (0.03)	0.15 ± 0.56 (0.03)
	Ilulissat Icefjord (n=14)	1.09 ± 0.43 (1.14)	0.09 ± 0.07 (0.09)	0.05 ± 0.03 (0.04)
Offshore	Iceberg 'Beluga' (n=12)	0.97 ± 0.41 (1.03)	0.09 ± 0.06 (0.07)	0.16 ± 0.38 (0.05)
	Iceberg 'Narwhal' (n=18)	1.16 ± 0.31 (1.10)	0.01 ± 0.01 (0.01)	0.01 ± 0.04 (0.00)

Supplementary Table 3. Nutrient concentrations in ice from four distinct zones within Disko Bay. Zones as per Fig. 3. Summarized as mean ± standard deviation (median), 'n' is the number of samples.

(Micro) Nutrient	May 2014 (n=13)	July 2015 (n=21)	August 2018 (n=9)	May 2019 (n=18)	September 2019 (n=22)
dFe / nM	37.86 ± 88.94 (12.15)	n/d	12.65 ± 9.68 (17.14)	10.82 ± 11.27 (5.32)	6.57 ± 2.58 (6.08)
TdFe / nM	306.78 ± 491.61 (94.82)	520.04 ± 1127.44 (27.54)	47.69 ± 60.33 (27.96)	n/d	32.48 ± 36.22 (20.30)
dMn / nM	n/d	n/d	0.87 ± 0.70 (0.67)	0.82 ± 0.66 (0.71)	n/d
TdMn / nM	n/d	n/d	1.52 ± 1.25 (1.06)	n/d	1.14 ± 0.65 (0.95)
PO_4 / µM	0.03 ± 0.04 (0.02)	0.04 ± 0.02 (0.04)	0.05 ± 0.10 (0.00)	0.02 ± 0.06 0.00	All b/d
NO_x / µM	1.96 ± 1.68 (1.59)	1.79 ± 0.97 (1.77)	0.79 ± 0.51 (0.69)	0.49 ± 0.63 (0.27)	0.62 ± 0.40 (0.64)
dSi / µM	All b/d	0.25 ± 0.22 (0.19)	0.61 ± 0.73 (0.32)	0.22 ± 0.54 (0.09)	0.57 ± 0.45 (0.64)

Supplementary Table 4. (Micro)nutrient concentrations in ice from repeat sampling of ice in Nuup Kangerlua (southwest Greenland), otherwise known as Godthåbsfjorden. Concentrations summarized as mean ± standard deviation (median), 'n' is the number of nutrient samples. 'n/d' represents no data, 'All b/d' means samples were all below the detection limit. 2014 data are from Hopwood et al., (2016). 2015 Fe data are from Hopwood et al., (2019).



Supplementary Figure 1. Sediment released from large (10–45 kg) fragments of ice collected in Maxwell Bay, which were specifically targeted as pieces with visible embedded sediment layers and no surface sediment. Ice fragments were boxed in opaque containers and allowed to melt at an ambient temperature of 5–10°C. Total volume loss over 48 hours was ~20% of ice volume.

Supplementary References

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