Supporting information:

High-resolution *in situ* measurement of nitrate in runoff from the Greenland Ice Sheet

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Summary of content:

Total pages: 3 (1 Table, 2 Figures)

1. Data from analysis of supraglacial meltwater samples at KS

Location	Date	Nitrate (ppb)	Nitrate (µM)
Surpraglacial stream at KS	27 June 2017	10.28	0.17
Surpraglacial stream at KS	27 June 2017	5.21	0.08
Surpraglacial stream at KS	27 June 2017	5.78	0.09
Surpraglacial stream at KS	27 June 2017	4.65	0.08
Surpraglacial stream at KS	27 June 2017	1.83	0.03
Surpraglacial stream at KS	27 June 2017	1.83	0.03
	Mean	4.93	0.08
	Standard deviation	3.12	0.05

Table S1: Data from analysis of supraglacial meltwater samples collected from streams close to the margin at KS.

2. Details on discharge measurements at KS and LG

Both discharge records used in this study have been published through previous studies at KS[1] and LG[2], using previously published methods[3]. At both sites discharge was calculated based on rating curves established using dye-dilution experiments and coinciding river-level measurements. River level was measured every ten minutes using two HOBO® Onset water level loggers and Druck wired pressure transducers located at stable bedrock sections in the rivers. The rating curve at KS was based on 51 Rhodamine-WT dye traces conducted between 1st May and 5th August 2013. River level ranged between 28 and 91 cm, covering a discharge range of 2.4 to 57.4 m^3s^{-1}. The rating curve at LG was based on 21 Rhodamine-WT dye traces, with the stage record ranging from 8 to 242 cm. Error in discharge measurements was estimated to +/-12.1 %.

3. LOD and calibration

Limit of detection (LOD) for the LOC nitrate sensor was estimated previously[4] by taking three times the standard deviation of ten subsequent blank-corrected absorption measurements of a 0.05 µM nitrite standard, and resulted in an LOD of 0.025 µM for nitrate.

Sensor accuracy was maintained throughout both deployments by running a blank (ultrapure water) and standard (3 µM nitrate in ultrapure water poisoned with 0.1% chloroform) for every glacial meltwater sample measurement. The measurement sequence was as follows:

At KS: 1. Blank 2. Sample 3. Standard

At LG: 1. Blank 2. Sample 3. Standard 4. ~40 minute wait

The wait period at LG meant that the analyser conducted 1 measurement per hour (rather than one every 20 minutes at KS).

4. Relationship between the LOC sensor measurements at Leverett glacier and the analysis of the manually collected samples

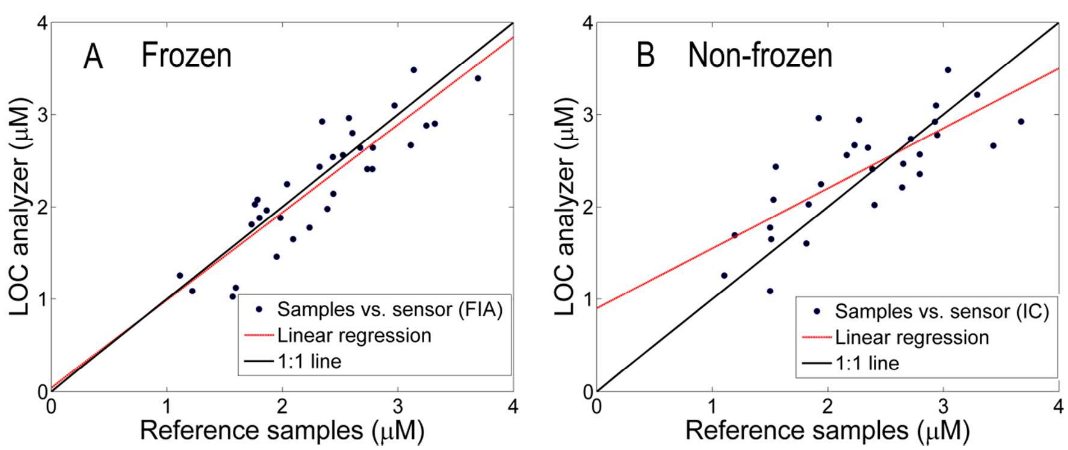

Figure S1: Relationship between the LOC sensor measurements at Leverett glacier and the analysis of the manually collected samples, comparing the frozen samples analysed using colourimetry and the non-frozen samples analysed using ion chromatography.

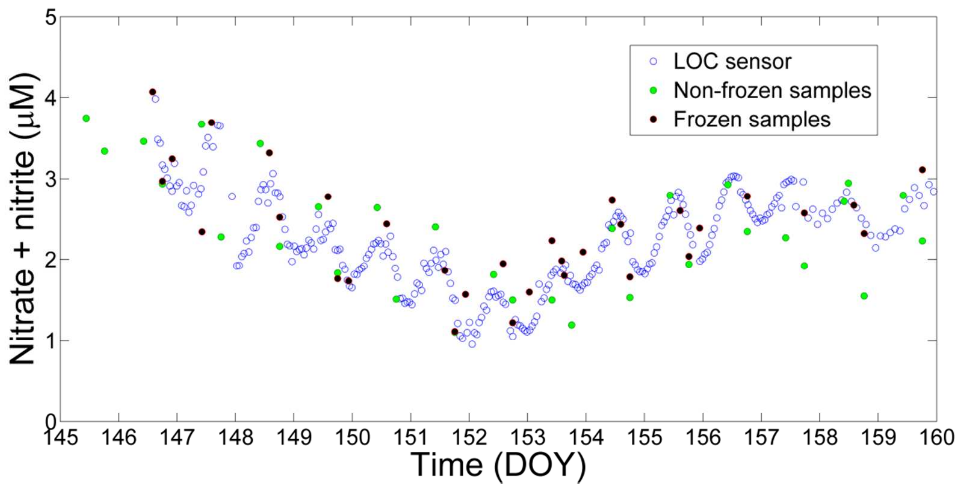

Figure S2: Time series showing both sets of reference samples plotted with the time series from the LOC analyser.

References

(1) Dubnick, A.; Kazemi, S.; Sharp, M.; Wadham, J.; Hawkings, J.; Beaton, A.; Lanoil, B. Hydrological controls on glacially exported microbial assemblages. *J. Geophys. Res. Biogeosciences* **2017**, *122* (5), 1049–1061 DOI: 10.1002/2016JG003685.

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(3) Bartholomew, I.; Nienow, P.; Sole, A.; Mair, D.; Cowton, T.; Palmer, S.; Wadham, J. Supraglacial forcing of subglacial drainage in the ablation zone of the Greenland ice sheet. *Geophys. Res. Lett.* **2011**, *38* (8), 1–5 DOI: 10.1029/2011GL047063.

(4) Beaton, A. D.; Cardwell, C. L.; Thomas, R. S.; Sieben, V. J.; Legiret, F.-E.; Waugh, E. M.; Statham, P. J.; Mowlem, M. C.; Morgan, H. Lab-on-chip measurement of nitrate and nitrite for in situ analysis of natural waters. *Environ. Sci. Technol.* **2012**, *46* (17), 9548–9556 DOI: 10.1021/es300419u.