SUPPLEMENTARY MATERIALS

Measurement report: Spatial variations in snowpack ionic chemistry and water stable isotopes across Svalbard

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Keywords

Snow, Svalbard, Arctic, inorganic ions, water isotopes

Figure S1. Pie diagrams showing relative ionic composition in the snow pits dug in the accumulation zones of the studied glaciers.

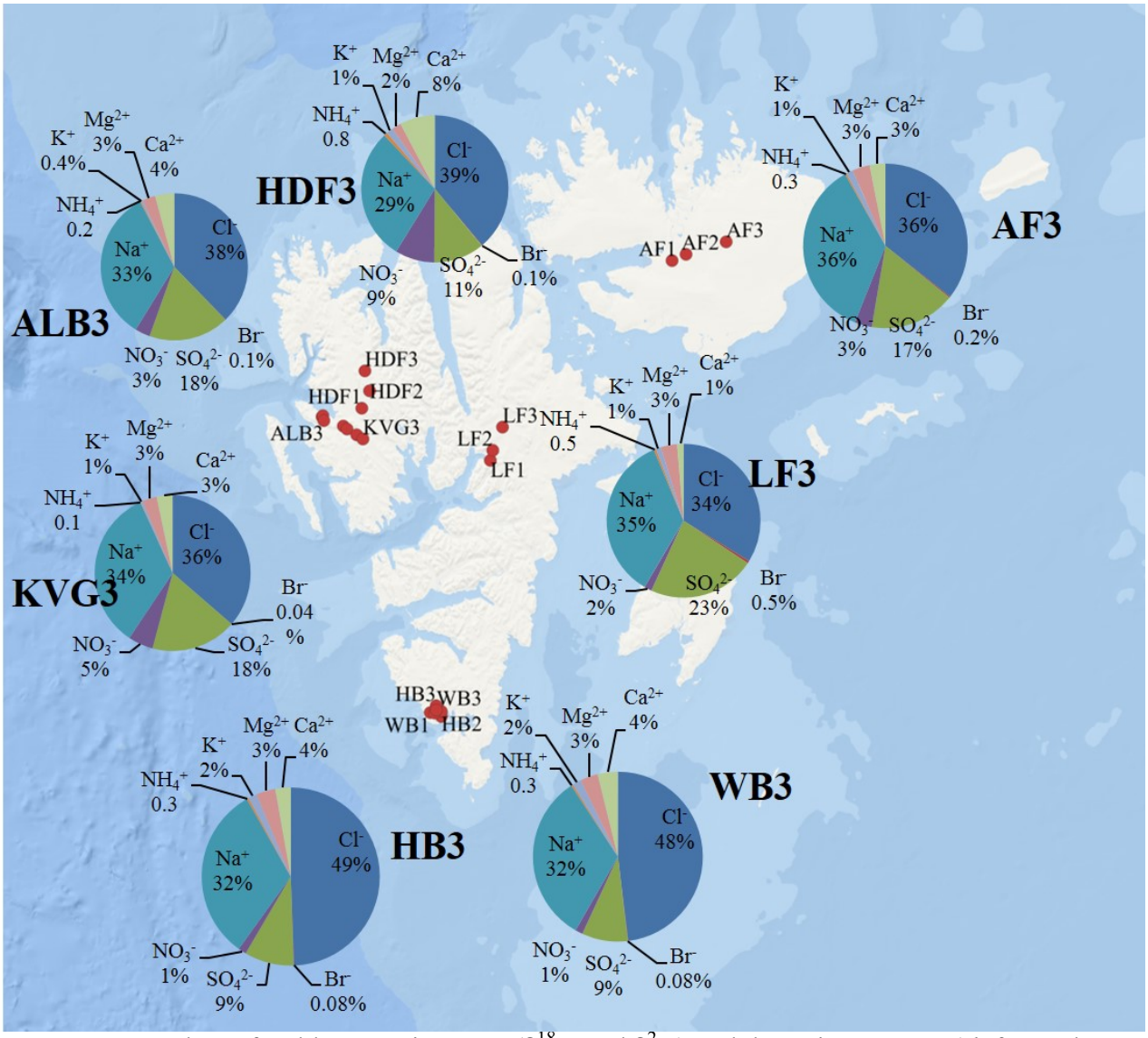

Figure S2. Box plots of stable water isotopes ($\delta^{18}O$ and $\delta^{2}H$) and deuterium excess (*d*) for each snow pit.

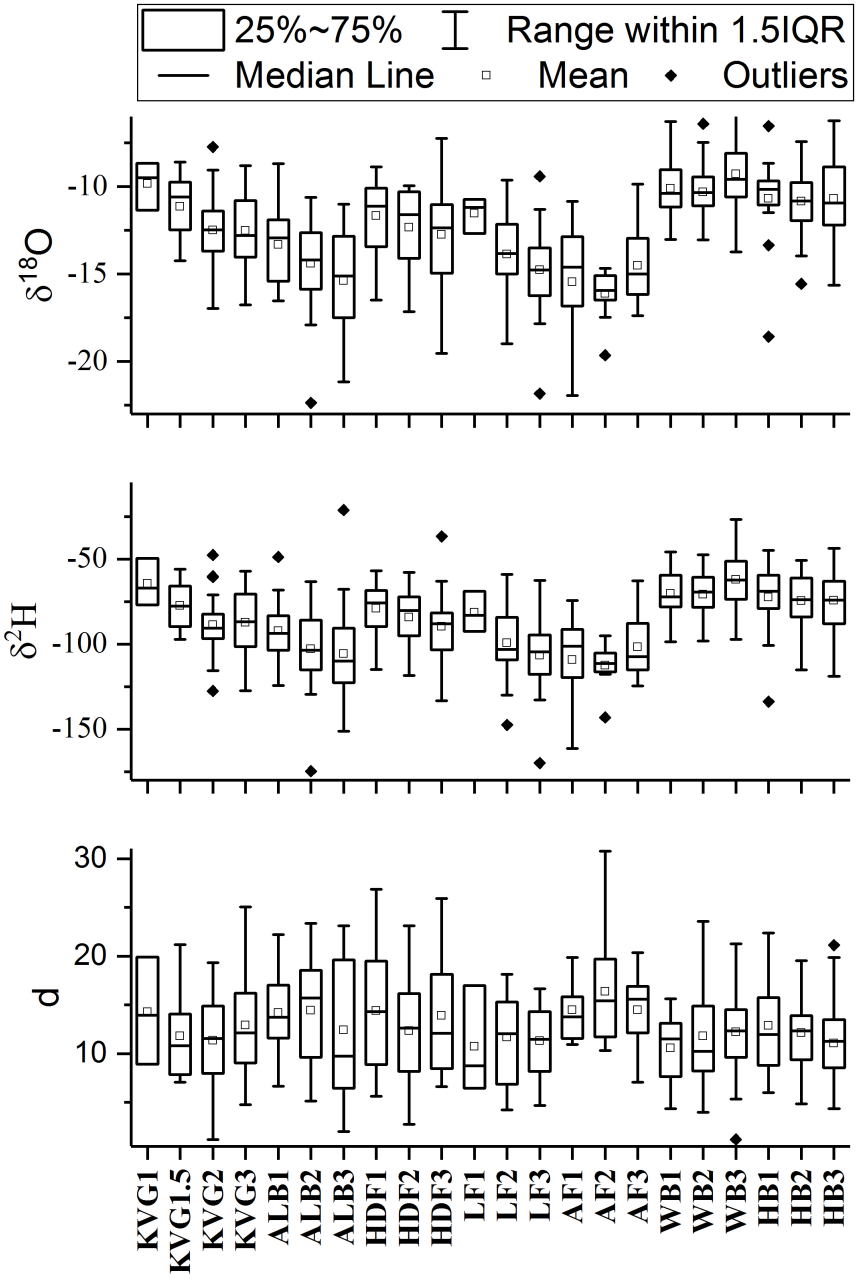
25%~75%
Range within 1.5IQR
Median Line
Mean
Outliers
δ18O
-10
-15
-20
δ2H
-50
-100
-150
d
30
20
10
KVG1
KVG1.5
KVG2
KVG3
ALB1
ALB2
ALB3
HDF1
HDF2
HDF3
LF1
LF2
LF3
AF1
AF2
AF3
WB1
WB2
WB3
HB1
HB2
HB3

Figure S3. Ion balance of the total load for each glacier sampled during the C2S3 project. X^- denotes missing anions in the balance. Frequently in natural waters X^- is found to be composed mostly of HCO_3^-, which cannot be determined with ion chromatography.

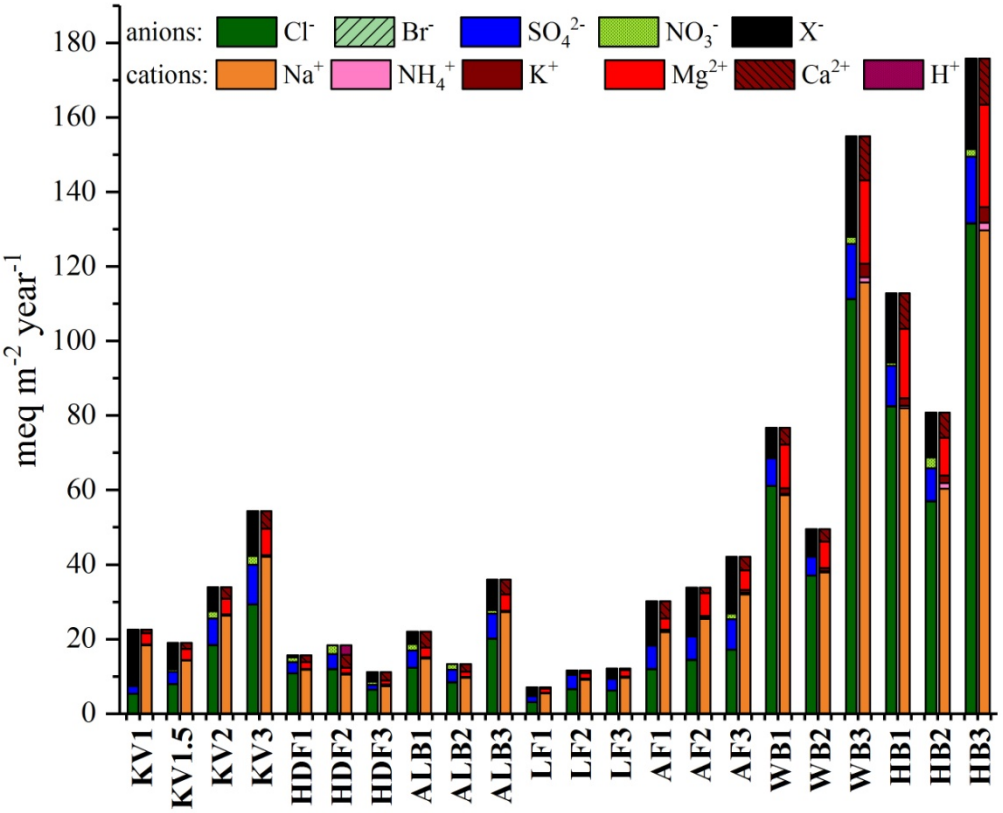

Figure S4. North Atlantic Chlorophyll-a concentration in April and May 2016. The data were obtained via an Aqua/MODIS NASA satellite continually orbiting the globe (https://neo.sci.gsfc.nasa.gov/view.php?datasetId=MY1DMM_CHLORA) with 1-month resolution and plot on © Google Earth platform. The data provides an estimate of the near-surface concentration of chlorophyll, calculated using an empirical relationship derived from in situ measurements of chlorophyll-a and remote sensing reflectance (Rrs) in the blue-to-green region of the visible spectrum.

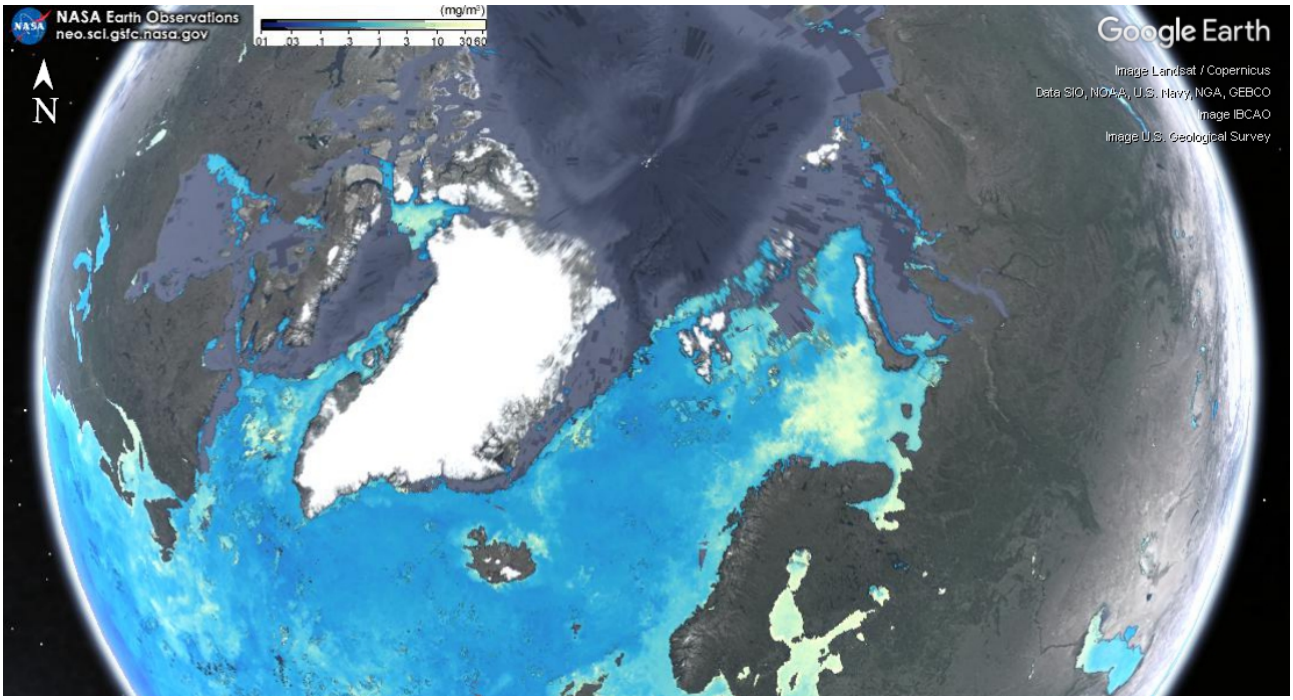

Figure S5. Bromide enrichment (Br_{enr}), calculated for each glacier. The snow pits have been ordered from lower to higher Br_{enr} value (bottom panel; the dashed line indicates the referenced Br\Na sea water ratio). The uppermost panel compares the Br_{enr} and the altitude, the upper middle with longitude, and the lower middle with latitude.

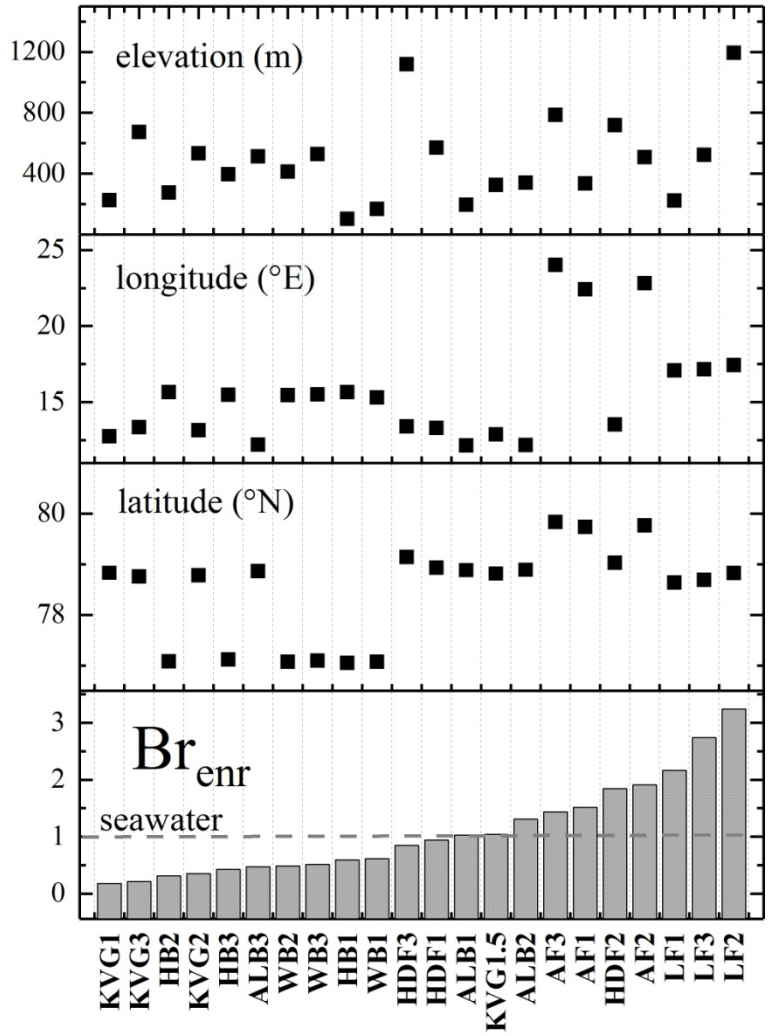

Table S1. Performance of analytical methods applied at Hornsund, Venice and Uppsala laboratories. Method detection limit (MDL) was calculated as three times the standard deviation of procedural blank (ultrapure water). Error (%) and relative standard deviation (RSD%) were determined to evaluate the trueness and precision of each method, respectively.

	Hornsund method				**Venice method**				**Uppsala method**			
	Linear range mg/L	MDL (mg/L)	Error %	RSD %	Linear range mg/L	MDL (mg/L)	Error %	RSD %	Linear range mg/L	MDL (mg/L)	Error%	RSD %
Cl^-	0.003-20	0.003	-3	5	0.001-4	0.2	-9	7				
Br^-	0.004-1	0.004	0	1	0.002-0.2	0.002	-5	6				
SO_4^{2-}	0.003-20	0.003	-3	2	0.002-8	0.07	4	3				
NO_3^-	0.006-10	0.006	-2	1	0.002-2	0.04	-8	4				
Na^+	0.03-15	0.03	0	2	0.1-10	0.05	4	4	0.001-1	0.004	< ±5%	1
NH_4^+	0.02-2	0.02	n.d.	n.d.	0.1-10	0.005	n.d.	n.d.	0.001-1	0.001	n.d.	0.5
K^+	0.05-5	0.05	-1	2	0.1-10	0.02	-8	1	0.001-1	0.002	< ±5%	2.0
Mg^{2+}	0.05-5	0.05	-20	3	0.1-10	0.007	-9	1	0.001-1	0.001	< ±5%	0.4
Ca^{2+}	0.08-25	0.08	-2	2	0.1-10	0.04	-1	1	0.001-1	0.006	< ±5%	5