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Groundwater–glacier meltwater interaction in proglacial aquifers

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Table S1 Summary of sandur piezometer locations, construction and test pumping data (For more information see Ó Dochartaigh et al., 2012)

ID	Easting	Northing	screen depth (m)	Test length (min)	Test yield (m^3d^{-1})	Maximum drawdown (m)	$T(m^2d^{-1})$	Comments
U1	63.959056	-16.836639	10.9–13.9	300	95.04	3.81	100	
U2	63.959417	-16.837833	9.2–10.2; 12.2–13.2	225	138.24	0.7	600	
M1	63.954194	-16.848306	11.4–14.4	300	112.32	3.46	200	
M2	63.955000	-16.848583	12.2–14.2	225	95.04	3.7	150	
M3	63.958028	-16.850083	8.25–14.25	230	120.96	0.85	600	
L1	63.942472	-16.857083	5.5–11.5	360	43.2	7.02	80	Test results affected by poor borehole construction
L2	63.943833	-16.858222	4.8–7.8	244	157.248	0.38	2500	
L3	63.946694	-16.860500	4.9–7.9	215	150.336	0.42	2000	

Ó Dochartaigh, B.É., MacDonald, A.M., Wilson, P.R., Bonsor, H.: Groundwater investigations at Virkisjokull, Iceland : data report 2012. Nottingham, UK, British Geological Survey, 48pp. (OR/12/088), 2012.

Table S2 **Summary of saturated hydraulic conductivity measurements for sandur aquifer from direct infiltration tests to 0.15 m depth.**

Test ID	Northing	Easting	Hole depth (mm)	Hole diameter (mm)	5 cm head infiltration rate (cm s^{-1})	Kfs (m d^{-1})
Site 1	63.95299	-16.84898	120	65	0.12	14.83
Site 2	63.95345	-16.84853	140	70	0.85	96.62
Site 3	63.95390	-16.84837	100	60	0.86	109.4
Site 4	63.95451	-16.84773	140	65	1.07	124.4
Site 5	63.95491	-16.84679	120	60	0.3	36.58
Site 6	63.95500	-16.84690	140	60	0.5	59.62
Site 7	63.95700	-16.84710	140	50	0.04	5.47
Site 8	63.95511	-16.84616	100	120	1.2	72.86
Site 9	63.95634	-16.84602	120	60	0.69	77.47
Site 10	63.95759	-16.84697	120	50	0.74	94.46
Site 11	63.95760	-16.84500	150	100	0.45	30.96
28/8(1)	63.94364	-16.85847	110	80	0.21	22.03
28/8(2)	63.94381	-16.85700	140	80	0.45	47.23
30/8(1)	63.94114	-16.85653	150	60	0.08	10.96
30/8(2)	63.93800	-16.85750	150	100	0.7	59.20
30/8(3)	63.94100	-16.85781	150	70	0.12	14.27
30/8(4)	63.94092	-16.85789	150	100	0.25	21.18
30/8(5)	63.94272	-16.85789	150	70	0.42	49.84
7/9(1)	63.94261	-16.85475	110	60	0.8	108.7
7/9(2)	63.94275	-16.85450	120	70	1.07	126.9

Table S3 Summary of hydraulic conductivity measurements from particle size analysis of sandur aquifer sediment samples to 0.5 m depth. Hydraulic conductivity calculated using MacDonald et al. (2012).

Test ID	Northing	Easting	Hole depth (m)	Hole size (mm)	d10	K m/d
A1.1.1	63.95911	-16.83670	0.46	1000*500	0.67	38.25
A1.1.2	63.95911	-16.83675	0.46	1000*500	0.19	14.13
A1.2.1	63.95914	-16.83667	0.43	800*500	0.27	18.65
A1.2.2	63.95913	-16.83667	0.43	800*500	0.19	14.13
A2.1.1	63.95936	-16.83811	0.45	850*500	0.48	29.39
A2.1.2	63.95936	-16.83811	0.45	850*500	0.4	25.45
A2.2.1	63.95936	-16.83819	0.45	700*400	0.4	25.45
A2.2.2	63.95936	-16.83819	0.45	700*400	0.41	25.95
B1.1.2	63.95614	-16.84236	0.46	450*560	0.7	39.59
B1.2.1	63.95619	-16.84228	0.46	1000*650	1.8	83.50
B1.2.2	63.95619	-16.84228	0.46	1000*650	0.8	44.00
B2.1.1	63.95761	-16.84492	0.4	850*500	0.63	36.43
B2.1.2	63.95761	-16.84492	0.4	850*500	0.63	36.43
B2.2.1	63.95761	-16.84503	0.48	870*660	1.05	54.54
B2.2.2	63.95761	-16.84503	0.48	870*660	0.63	36.43
B3.1.1	63.95867	-16.84628	0.3	960*500	0.32	21.33
B3.1.2	63.95867	-16.84628	0.3	960*500	0.29	19.74
C1.1	63.95419	-16.84831	0.45	600*450	0.7	39.59
C1.2	63.95419	-16.84831	0.45	600*450	0.67	38.25
C2.1	63.95500	-16.84858	0.45		0.65	37.34
C2.2	63.95500	-16.84858	0.45		0.65	37.34
C3.1	63.95803	-16.85008	0.45	500*300	0.35	22.90
D1.1	63.94631	-16.85231	0.45	700*500	0.6	35.05
D1.2	63.94631	-16.85231	0.45	700*500	0.6	35.05
D2.1	63.94758	-16.85486	0.45	750*500	0.58	34.13
D2.2	63.94758	-16.85486	0.45	750*500	0.57	33.66
D3.1	63.94869	-16.85711	0.45	700*650	0.7	39.59
D3.2	63.94869	-16.85711	0.45	700*650	0.6	35.05
E1.1	63.94253	-16.85747	0.45	770*660	0.7	39.59
E1.2	63.94253	-16.85747	0.45	770*660	0.7	39.59
E2.1	63.94383	-16.85808	0.47	600*500	0.4	25.45
E2.2	63.94383	-16.85808	0.47	600*500	0.4	25.45
E3.1	63.94664	-16.86064	0.48	670*550	0.4	25.45
E3.2	63.94664	-16.86064	0.48	670*550	0.4	25.45
F1.1	63.93950	-16.86256	0.44	640*620	0.5	30.35

Test ID	Northing	Easting	Hole depth (m)	Hole size (mm)	d10	K m/d
F1.2	63.93950	-16.86256	0.44	640*620	0.65	37.34
F2.1	63.94044	-16.86561	0.52	610*490	0.55	32.73
F2.2	63.94044	-16.86561	0.52	610*490	0.55	32.73
F3.1	63.94142	-16.86928	0.43	560*410	0.05	4.92
F3.2	63.94142	-16.86928	0.43	560*410	0.65	37.34
F4.1	63.94197	-16.87069	0.4	440*360	0.25	17.55
F4.2	63.94197	-16.87069	0.4	440*360	0.25	17.55

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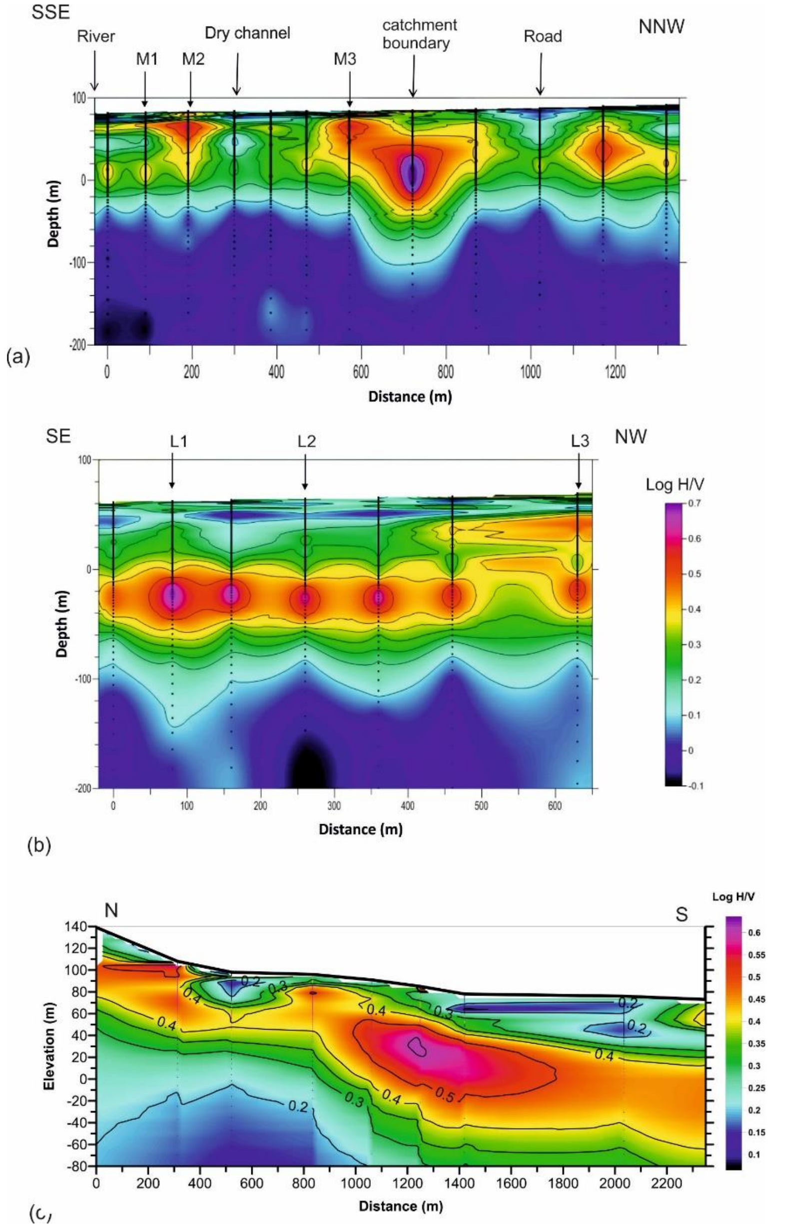

Figure S1. Log H/V from Tromino passive seismic surveys (see Methods). (a) Upper Sandur (b) Lower Sandur and (c) transect away from the glacier margin at the neighbouring sandur at Svinafellsjokul

Table S4 Summary of selected chemical parameters, temperature and stable isotopes of river water and of groundwater in sandur aquifer in individual piezometers (piezometer locations in Fig. 1) and all springs grouped together. Data from six sampling campaigns (three summer and three winter); annual means calculated by weighting seasonal means to season length (summer = 0.42; winter = 0.58), except temperature data for piezometer groundwater: data derived from continuous monitoring in piezometers at 15 minute intervals for 34 months, at 7–8.4 m depth; annual mean unweighted. sd – standard deviation of whole dataset; n – number of samples. The full dataset is available (MacDonald et al., 2019)

	SEC µS cm^{-1}			**HCO_3 mg l^{-1}**			**Temperature ˚C**			**$\delta^{18}O$‰**			**δ2H‰**		
	Mean[1]	sd	n	Mean[1]	sd	n	Mean[2]	sd	n	Mean[1]	sd	n	Mean[1]	sd	n Mean[1]
U1	62.58	14.10	6	28.77	6.23	5	2.35	0.75	115274	-10.2	0.2	6	-72.0	2.1	6
U2	98.85	10.53	5	44.42	1.03	4	4.94	0.10	115169	-8.0	0.04	5	-59.1	0.7	5
M1	69.59	8.91	5	31.49	1.71	4	5.01	1.30	115209	-9.4	0.3	5	-67.4	2.6	5
M2	78.37	13.04	5	36.51	3.13	4	5.26	1.06	115095	-8.7	0.4	5	-63.5	3.9	5
M3	78.21	13.99	5	37.03	4.02	4	4.69	1.06	114905	-8.3	0.6	5	-60.0	4.2	5
L1	62.75	6.21	5	27.33	2.72	4	3.39	0.98	114841	-10.6	0.1	5	-74.2	1.0	5
L2	55.39	6.10	5	25.59	0.3	4	3.19	1.39	114866	-10.7	0.4	5	-75.2	3.4	5
L3	96.14	6.98	5	47.68	3.58	4	4.65	0.17	114671	-8.9	0.2	5	-63.5	1.3	5
Springs	68.18	21.34	23	32.64	7.16	4	6.05	3.55	21	-9.1	1.0	23	-64.8	7.0	23
River	43.00	10.51	19	20.66	5.43	9	1.69	0.65	16	-10.9	0.4	19	-76.1	2.6	19

[1] Weighted annual mean

[2] Weighted annual mean for springs and river; unweighted for piezometers

MacDonald, A. M., Ó Dochartaigh, B. É., Fallas, H.: Water chemistry and stable isotope data, Virkisjokull Glacier Observatory, 2011-2018. British Geological Survey. (Dataset). https://dx.doi.org/10.5285/14da9c02-c5ec-4019-8e5c-06c744d8be9d, 2019.