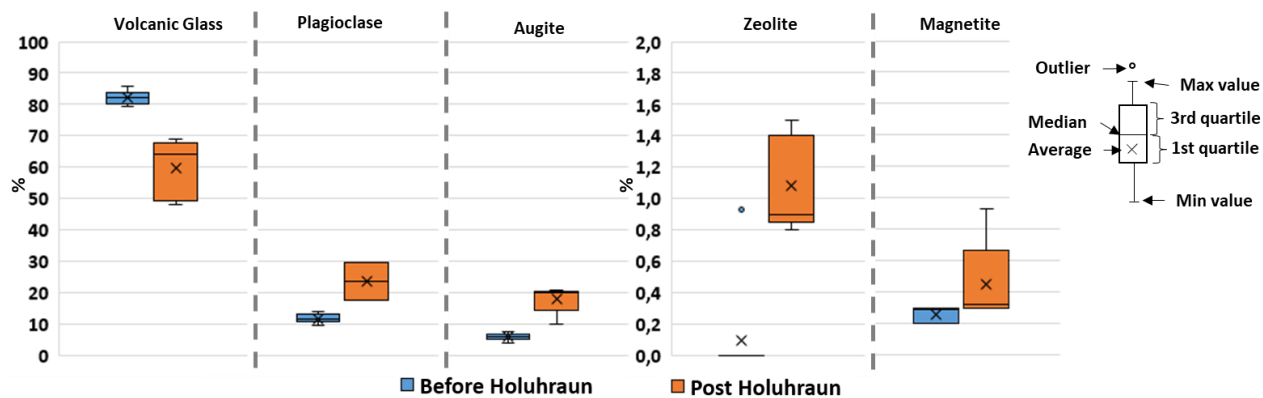
Supplementary material

5 **Figure S1.** Weight in mass % contents of volcanic glass and crystalline mineral species in crust samples from the
6 Jökulsá á Fjöllum basin pre- and post-Holuhraun field lava (natural dam).

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25 **Table S1.** Wavelengths used in calculation of band depths for spectral features used to analyze visible-shortwave
26 infrared spectra measured in the field, using formula 1-R/Rc, where R is the reflectance value at the center
27 wavelength and Rc is the value of a continuum at the center wavelength calculated as a straight line between
28 the given points. All values used in the calculations are the mean of five consecutive bands centered around the
29 given wavelength.

Band depth	Center wavelength (nm)	Left continuum (nm)	Right continuum (nm)	Description
BD1035	1035	710	1575	Electronic transition due to Fe^{2+}
BD1920	1920	1840	2140	H_2O combination band
BD2210	2210	2150	2345	Si-OH or Al-OH combination band

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Table S2. Mineral contents (%wt) of samples from the Jökulsá á Fjöllum basin. *R.S.C is the Random Sampling Composite sample, obtained after mixing an equal batch of each type of sample*. The contents are in % of mass. V. G.: volcanic glass, An: anorthite, And: andesine, Agt: augite, Mag: magnetite, M-Ca: mordenite-Ca, Anl: analcime. C: crust, S: underlying fluvial sediment, R: eolian ripple, Av.C: Average of the crusts, Av.S: Average of the fluvial sediments, Av.R: Average of the Ripples.

Latitude	Longitude	Sample number	Type		Plagioclase		Pyroxene		Zeolites		
				V. G.	An	And	Agt	Mag	M-Ca	Anl	Distance to Glacier (km)
64,91	-16,78	1	C	79	13	<0.1	7.4	<0.5	<0.1	<0.1	16.0
64,91	-16,78	2	C	86	9.8	<0.1	4.0	<0.5	<0.1	<0.1	15.5
64,84	-16,98	9	C	83	11	<0.1	5.4	<0.5	<0.1	<0.1	2.0
64,89	-16,88	12	C	83	11	<0.1	5.8	<0.5	<0.1	<0.1	9.5
64,91	-16,83	14	C	85	9.6	<0.1	5.5	<0.5	<0.1	<0.1	13.0
64,91	-16,77	15	C	83	12	<0.1	5.0	<0.5	<0.1	<0.1	16.0
65,23	-16,19	26	C	69	18	<0.1	9.9	0.93	<0.1	0.90	72.5
65,26	-16,12	27	C	48	30	<0.1	21	<0.5	<0.1	0.90	76.5
64,91	-16,77	29	C	80	13	<0.1	6.0	<0.5	<0.1	<0.1	15.5
64,91	-16,77	30	C	79	14	<0.1	6.6	<0.5	<0.1	<0.1	15.5
64,91	-16,77	31	C	82	11	<0.1	6.7	<0.5	<0.1	<0.1	15.5
66,03	-16,44	109	C	64	<0.1	14	20	<0.5	0.80	<0.1	176.0
66,09	-16,48	110	C	66	<0.1	13	19	<0.5	1.0	0.50	183.0
66,18	-16,51	111	C	51	<0.1	28	20	<0.5	0.60	0.70	194.0
64,92	-16,78	R.S.C	C	82	12	<0.1	5.9	<0.5	<0.1	0.93	15.5
64,91	-16,78	3	S	83	11	<0.1	5.4	<0.5	<0.1	<0.1	15.5
64,89	-16,88	13	S	88	7.4	<0.1	4.0	<0.5	<0.1	<0.1	9.5
64,91	-16,77	16	S	89	7.7	<0.1	3.5	<0.5	<0.1	<0.1	16.0
65,23	-16,19	25	S	76	16	<0.1	7.3	0.60	<0.1	<0.1	72.5
65,26	-16,12	28	S	51	31	<0.1	16	<0.5	<0.1	1.0	77.5
64,91	-16,77	32	S	83	11	<0.1	6.2	<0.5	<0.1	<0.1	16.0
64,91	-16,77	33	S	84	10	<0.1	5.4	<0.5	<0.1	<0.1	16.0
64,92	-16,78	R.S.C	S	85	9.6	<0.1	4.9	<0.5	<0.1	0.84	15.5
64,83	-17,01	4	R	90	6.4	<0.1	3.4	<0.5	<0.1	<0.1	1.0

64,83	-17,01	6	R	90	6.6	<0.1	3.5	<0.5	<0.1	<0.1	1.0
64,84	-16,98	10	R	88	8.7	<0.1	3.6	<0.5	<0.1	<0.1	2.0
64,86	-16,95	11	R	89	8.3	<0.1	3.5	<0.5	<0.1	<0.1	4.5
64,91	-16,77	17	R	85	10	<0.1	4.5	<0.5	<0.1	<0.1	16.0
64,92	-16,76	18	R	82	11	<0.1	6.4	<0.5	<0.1	<0.1	16.0
64,95	-16,55	19	R	76	16	<0.1	8.0	<0.5	<0.1	<0.1	27.0
64,91	-16,77	34	R	85	10	<0.1	5.3	<0.5	<0.1	<0.1	16.0
			Av.C.	75±12	11±7.4	3.6±8.1	9.9±6.4	<0.5	0.16±0.34	0.26±0.40	
			Av.S.	80±12	13±7.7	<0.1	6.6±4.0	<0.5	<0.1	0.23±0.43	
			Av.R.	86±4.7	9.6±2.9	<0.1	4.8±1.7	<0.5	<0.1	<0.1	

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61 **Table S3.** Mineral contents (%wt) of samples from different locations (Loc.) Dyngjusandur (Dyn), Dyngjuvatn (Dvt), Landeyjarsandur (Lan), Mýrdalssandur (Mýr), Skaftarsandur
62 (Ska), Mælifellsandur (Mæl) and Hagavatn (Hgv), Average icelandic crust (Av.I.C.). V. G.: volcanic glass, An: anorthite, And: andesine, Di-Fe: Fe-diopside, Agt: augite, Qtz:
63 quartz, Fo: forsterite, Hem: hematite, Mag: magnetite, Py: pyrite, M-Ca: mordenite-Ca, Anl: analcime, Wrk: wairakite.

Latitude	Longitude	Sample number	Loc.		Plagioclase		Pyroxene				Iron Oxides			Zeolites		
				V.G.	An	And	Di-Fe	Agt	Qtz	Fo	Hem	Mag	Py	M-Ca	Anl	Wrk
64,92	-16,78	R.S.C.	Dyn	79	13	<0.1	<0.1	7.4	<0.1	<0.1	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1
64,91	-16,78	1	Dyn	86	9.8	<0.1	<0.1	4.0	<0.1	<0.1	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1
64,91	-16,78	2	Dyn	83	11	<0.1	<0.1	5.8	<0.1	<0.1	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1
64,89	-16,88	12	Dyn	85	9.6	<0.1	<0.1	5.5	<0.1	<0.1	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1
64,91	-16,83	14	Dyn	83	12	<0.1	<0.1	5.0	<0.1	<0.1	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1
64,91	-16,77	15	Dyn	82	12	<0.1	<0.1	5.9	<0.1	<0.1	<0.5	<0.5	<0.5	<0.1	0.93	<0.1
64,91	-16,77	29	Dyn	80	13	<0.1	<0.1	6.0	<0.1	<0.1	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1
64,91	-16,77	30	Dyn	79	14	<0.1	<0.1	6.6	<0.1	<0.1	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1
64,91	-16,77	31	Dyn	82	11	<0.1	<0.1	6.7	<0.1	<0.1	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1
64,98	-16,57	20	Dvt	87	8.0	<0.1	<0.1	5.0	<0.1	<0.1	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1
65,00	-16,55	21	Dvt	92	4.4	<0.1	<0.1	1.4	<0.1	<0.1	<0.5	<0.1	<0.5	<0.1	0.70	<0.1
63,53	-12,67	92	Lan	35	48	<0.1	14	<0.1	<0.1	<0.1	1.3	1.9	<0.5	<0.1	<0.1	<0.1
63,56	-12,72	93	Lan	40	41	<0.1	<0.1	16	0.40	<0.1	<0.5	<0.5	<0.5	0.60	0.70	<0.1
63,43	-12,53	94	Mýr	85	9.0	<0.1	<0.1	5.4	0.65	<0.1	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1
63,60	-12,35	95	Mýr	67	23	<0.1	<0.1	7.7	1.2	<0.1	<0.5	1.1	<0.5	<0.1	<0.1	<0.1

63,81	-13,03	99	Mýr	74	15	<0.1	<0.1	8.8	0.80	<0.1	<0.5	1.1	<0.5	<0.1	<0.1	<0.1
63,79	-12,94	102	Ska	67	<0.1	11	<0.1	13	1.8	<0.1	<0.5	<0.5	1.2	1.2	<0.1	4.4
63,82	-12,89	103	Mæl	80	11	<0.1	7.5	<0.1	<0.1	<0.1	<0.5	1.1	<0.5	<0.1	<0.1	<0.1
63,68	-13,78	104	Mæl	78	15	<0.1	6.1	<0.1	<0.1	<0.1	<0.5	0.86	<0.5	<0.1	<0.1	<0.1
63,67	-13,93	105	Mæl	84	11	<0.1	5.1	<0.1	<0.1	<0.1	<0.5	0.80	<0.5	<0.1	<0.1	<0.1
64,46	-14,30	106	Hgv	10	<0.1	52	<0.1	31	<0.1	6.2	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1
64,45	-14,31	107	Hgv	28	<0.1	43	<0.1	25	<0.1	4.0	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1
64,46	-14,86	108	Hgv	<0.1	<0.1	65	<0.1	31	<0.1	3.9	0.5	<0.5	<0.5	<0.1	<0.1	<0.1
			Av.I.C.	68±26	15±11	7.4±19	1.4±3.4	8.6±9.0	0.21±0.47	0.61±±1.7	<0.5	<0.5	<0.5	<0.1	0.11±0.28	0.19±0.92

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76   **Table S4**. Fe mode of occurrence of different samples along the Jökulsá á Fjöllum basin. R.S.C is the Random
77   Sampling Composite sample, obtained after mixing an equal batch of each type of sample. The contents are in
78   %wt for total Fe (FeT) and in % of FeT for the respective forms of occurrence. FeA: content of readily
79   exchangeable Fe, FeD: Fe content from hematite, goethite and pyrite, FeM: Fe content from magnetite, FeS: Fe
80   content from non Fe minerals as Fe-silicates and volcanic glass. *Median Fe mode of occurrence extracted from
81   González-Romero et al. (2023).

Latitude	Longitude	Sample number	Type of sample	FeT (%wt)	FeA (% FeT)	FeD (% FeT)	FeM (% FeT)	FeS (% FeT)
64,91	-16,78	1	C	9.2	2.2	7.7	25	65
64,91	-16,78	2	C	9.7	0.75	1.4	12	86
64,84	-16,98	9	C	8.9	1.4	1.8	23	74
64,89	-16,88	12	C	9.6	0.79	2.2	14	83
64,91	-16,83	14	C	9.4	0.79	2.8	14	82
64,91	-16,77	15	C	9.4	1.3	3.8	22	73
65,23	-16,19	26	C	9.4	0.97	3.1	9.9	86
65,26	-16,12	27	C	10.1	1.1	3.4	8.7	87
64,91	-16,77	29	C	9.3	1.2	4.5	19	75
64,91	-16,77	30	C	9.3	1.6	4.4	23	71
64,91	-16,77	31	C	9.2	1.1	3.1	17	79
66,03	-16,44	109	C	10.2	1.7	3.1	11	84
66,09	-16,48	110	C	9.5	1.6	3.7	12	83
66,18	-16,51	111	C	10.2	1.6	4.5	11	83
64,92	-16,78	R.S.C	C	9.0	1.3	2.9	19	77
64,91	-16,78	3	S	9.5	1.9	5.4	22	71
64,89	-16,88	13	S	8.9	1.5	1.5	27	70
64,91	-16,77	16	S	9.8	0.84	1.2	13	85
65,23	-16,19	25	S	10.1	1.1	1.9	11	86
65,26	-16,12	28	S	9.3	1.8	2.9	14	81
64,91	-16,77	32	S	9.7	0.83	1.3	0.42	97
64,91	-16,77	33	S	9.6	0.92	1.7	14	84
64,92	-16,78	R.S.C	S	8.9	1.0	1.7	16	81
64,83	-17,01	4	R	9.7	0.88	1.6	21	77
64,83	-17,01	6	R	9.7	0.90	1.8	14	83

64,84	-16,98	10	R	9.7	0.69	0.64	17	82
64,86	-16,95	11	R	9.6	0.69	0.73	18	81
64,91	-16,77	17	R	8.8	1.0	1.3	21	77
64,92	-16,76	18	R	9.6	0.72	1.0	16	83
64,95	-16,55	19	R	9.1	0.64	0.95	18	80
64,91	-16,77	34	R	8.8	1.3	1.3	16	81
			Average crust	9.5±0.39	1.3±0.39	3.5±1.5	16±5.4	79±6.5
			Average sediment	9.5±0.43	1.2±0.44	2.2±1.4	15±7.8	82±8.7
			Average ripples	9.4±0.41	0.85±0.22	1.2±0.41	18±2.4	80±2.4

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Table S5. Fe mode of occurrence from different locations (Loc.) Dyngjusandur (Dyn), Dyngjuvatn (Dvt), Landeyjarsandur (Lan), Mýrdalssandur (Mýr), Skaftarsandur (Ska), Mælifellsandur (Mæl) and Hagavatn (Hgv), Average icelandic crust (Av.I.C.). The value of every mode of occurrence is in % of total Fe content. FeA: content of readily exchangeable Fe, FeD: Fe content from hematite, goethite and pyrite, FeM: Fe content from magnetite, FeS: Fe content from non Fe minerals as Fe-silicates and volcanic glass. The contents are in %wt for FeT and as % of FeT for the respective forms of occurrence.

Latitude	Longitude	Sample number		FeT (%wt)	FeA (% FeT)	FeD (% FeT)	FeM (% FeT)	FeS (% FeT)
64,92	-16,78	R.S.C.	Dyn	9.2	2.2	7.7	25	65
64,91	-16,78	1	Dyn	9.7	0.75	1.4	12	86
64,91	-16,78	2	Dyn	9.6	0.79	2.2	14	83
64,89	-16,88	12	Dyn	9.4	0.79	2.8	14	82
64,91	-16,83	14	Dyn	9.4	1.3	3.8	22	73
64,91	-16,77	15	Dyn	9.0	1.3	2.9	19	77
64,91	-16,77	29	Dyn	9.3	1.2	4.5	19	75
64,91	-16,77	30	Dyn	9.3	1.6	4.4	23	71
64,91	-16,77	31	Dyn	9.2	1.1	3.1	17	79
64,98	-16,57	20	Dvt	9.1	1.7	3.4	13	82
65,00	-16,55	21	Dvt	5.5	2.6	11	7.6	79
63,53	-12,67	92	Lan	9.3	1.4	5.8	7.2	86
63,56	-12,72	93	Lan	8.5	2.3	8.7	12	77
63,43	-12,53	94	Mýr	10.7	1.4	2.4	18	78
63,60	-12,35	95	Mýr	10.0	1.8	4.8	15	78
63,81	-13,03	99	Mýr	10.8	1.1	2.5	14	82
63,79	-12,94	102	Ska	9.4	2.6	4.4	13	80
63,82	-12,89	103	Mæl	11.6	0.88	2.4	7.8	89
63,68	-13,78	104	Mæl	10.7	1.3	2.8	15	81
63,67	-13,93	105	Mæl	11.3	1.8	3.9	14	80
64,46	-14,30	106	Hgv	8.1	1.6	8.0	10	80
64,45	-14,31	107	Hgv	8.3	3.1	12	9.4	76
64,46	-14,86	108	Hgv	5.6	3.4	11	14	71
			Av.I.C.	9.3±1.5	1.6±0.74	5.0±3.1	15±4.8	79±5.4