Supplementary material to: "Cryoconite: an efficient accumulator of radioactive fallout in glacial environments"

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In the following list the references whose data were used to create **Fig. 4**, are reported. Studies concerning sites where nuclear explosion tests and accidents occurred, were not taken into account. In addition to the listed studies, also the following references cited in the main text were used: Aarkrog and Dahlgaard, 1984; Kim et al., 1997, Kirchner et al., 2002.

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	Morteratsch	Forni
^{137}Cs (Bq kg^{-1})	2,650 ± 3,800	2,000 ±2,800
^{207}Bi (Bq kg^{-1})	9.4 ± 6.6	5.7 ± 2.4
^{238}Pu (Bq kg^{-1})	2.6 ± 2.5	0.22 ± 0.08
^{239,240}Pu (Bq kg^{-1})	78 ± 77	4.9 ± 0.9
^{241}Am (Bq kg^{-1})	30 ± 36	4.4 ± 1.6
^{40}K (Bq kg^{-1})	810 ± 55	750 ± 200
^{238}U (Bq kg^{-1})	68 ± 14	61 ± 22
^{234}Th (Bq kg^{-1})	88 ± 15	65 ± 17
^{214}Pb (Bq kg^{-1})	57 ± 7	44 ± 11
^{214}Bi (Bq kg^{-1})	57 ± 8	45 ± 12
Supp. ^{210}Pb (Bq kg^{-1})	69 ± 6	55 ± 17
Unsupp. ^{210}Pb (Bq kg^{-1})	2,700 ± 750	6,100 ± 1,850
^{232}Th (Bq kg^{-1})	65 ± 9	72 ± 6
^{228}Ac (Bq kg^{-1})	47 ± 5	53 ± 12
^{224}Ra (Bq kg^{-1})	34 ± 12	38 ± 17
^{212}Pb (Bq kg^{-1})	50 ± 3	54 ± 12
^{212}Bi (Bq kg^{-1})	52 ± 7	60 ± 15
^{208}Tl (Bq kg^{-1})	49 ± 5	50 ± 12
Organic Carbon (m/m %)	4.7 ± 0.8	3.6 ± 0.5
Elemental Carbon (m/m %)	0.49 ± 0.25	0.21 ± 0.12

Tab. S1 Average composition of cryoconite from the Morteratsch and Forni glaciers. Average data (± standard deviations) concerning the activity concentration of radionuclides and of carbonaceous matter are reported with respect to the two glaciers considered in this study.

Decay Chain	Radionucl.	$T_{1/2}$	γ-line energy (keV)	Eff. · B.R. (%)	Minimum Detectable Activity (Bq kg^{-1})	Average Uncertainty (%)
^{238}U – natural	^{210}Pb	22.3 yr	46.5	2.8	17.3	5.9
none – artificial	^{241}Am	432.2 yr	59.5	28.2	1.7	13
^{238}U – natural	^{234}Th	24.1 d	92.3-92.8	2.8	17.7	13
^{232}Th – natural	^{212}Pb	10.64 hr	238.6	24.6	1.9	7.8
^{232}Th – natural	^{224}Ra	3.66	241.0*	25.8	21.1	35
^{238}U – natural	^{214}Pb	26.8 min	295.2	9.5	4.7	12
^{232}Th – natural	^{228}Ac	6.15 hr	338.3	4.2	11.5	17
^{238}U – natural	^{214}Pb	26.8 min	351.9	15.0	3.1	9.1
^{232}Th – natural	^{208}Tl	3.05 min	583.2	3.2	7.4	16
^{238}U – natural	^{214}Bi	19.9 min	609.3	5.2	4.6	13
none – artificial	^{137}Cs	30.07 yr	661.7	20.4	0.7	5.5
^{232}Th – natural	^{212}Bi	60.55 min	727.3	1.1	11.2	27
^{232}Th – natural	^{208}Tl	3.05 min	860.6	0.6	17.1	39
^{232}Th – natural	^{228}Ac	6.15 hr	911.2	3.7	2.9	13
none – artificial	^{207}Bi	31.55 yr	1063.7	4.5	2.6	32
none – natural	^{40}K	$1.3 \cdot 10^9$ yr	1460.8	1.3	6.6	7.4
^{238}U – natural	^{214}Bi	19.9 min	1764.5	1.6	4.4	15
^{232}Th – natural	^{208}Tl	3.05 min	2614.5	0.7	7.9	28

Tab. S2 Details about γ-spectrometry. For each of the analysed nuclides the relevant analytical information is reported. B.R. corresponds to branching ratio. For the emission at 241 keV from ^{224}Ra (marked by an asterisk), a correction was needed to remove an interfering contribution from ^{214}Pb.