Annexe D. Table results giving the He isotopic compositions and total masses deduced by size range of cosmic dust extracted from the CONCORDIA snow

Size range / Results	62 µm	62-25 µm	25-5 µm	< 5 µm	**Total snow tank**
Mass of steel filters and aluminium capsules (mg) Tank F4 – 15,852 g Tank F6 – 14,981 g Tank F1 Sac 1 – 3,353 g Sac 2 – 2,023 g Sac 3 – 2,006 g Sac 4 – 3,064 g	551 503 403 427 419 482	327 375 527 440 478 489	991, 880 and 910 848, 936 and 946 903 903 850 990	598 297 338	-
[^{3}He] (at g^{-1} of snow) (1)	$(1.46\pm0.04)\times10^{3}$ $(1.34\pm0.03)\times10^{3}$ $(2.51\pm0.11)\times10^{2}$ $(4.54\pm0.71)\times10^{1}$ $(1.84\pm0.52)\times10^{1}$ $(3.14\pm0.47)\times10^{1}$	$(2.00\pm0.03)\times10^{3}$ $(1.46\pm0.02)\times10^{3}$ $(1.15\pm0.02)\times10^{4}$ $(3.07\pm0.06)\times10^{3}$ $(1.47\pm0.03)\times10^{3}$ $(3.08\pm0.05)\times10^{3}$	$(1.34\pm0.02)\times10^{4}$ $(9.68\pm0.13)\times10^{3}$ $(3.37\pm0.04)\times10^{3}$ $(5.02\pm0.09)\times10^{3}$ $(1.08\pm0.01)\times10^{4}$ $(5.96\pm0.07)\times10^{3}$	40.20 ± 0.03 ∅ 47.4 ± 3.3	$(1.26\pm0.01)\times10^{4}$ $(1.25\pm0.01)\times10^{4}$ $(1.52\pm0.01)\times10^{4}$ $(8.18\pm0.11)\times10^{3}$ $(1.23\pm0.01)\times10^{4}$ $(9.12\pm0.09)\times10^{3}$
[^{4}He] (at.g^{-1} of snow) (1)	$(6.74\pm0.03)\times10^{7}$ $(3.63\pm0.02)\times10^{7}$ $(5.20\pm0.04)\times10^{7}$ $(1.06\pm0.13)\times10^{7}$ $(6.6\pm12)\times10^{5}$ $(4.09\pm0.07)\times10^{7}$	$(5.21\pm0.01)\times10^{7}$ $(5.51\pm0.02)\times10^{7}$ $(1.66\pm0.01)\times10^{8}$ $(2.25\pm0.02)\times10^{8}$ $(2.22\pm0.02)\times10^{8}$ $(7.32\pm0.08)\times10^{7}$	$(3.76\pm0.001)\times10^{8}$ $(8.27\pm0.05)\times10^{7}$ $(3.70\pm0.01)\times10^{7}$ $(1.84\pm0.03)\times10^{8}$ $(2.81\pm0.03)\times10^{8}$ $(1.24\pm0.02)\times10^{8}$	$(8.11\pm0.52)\times10^{5}$ ∅ $(1.47\pm0.02)\times10^{7}$	$(3.78\pm0.01)\times10^{8}$ $(1.61\pm0.01)\times10^{8}$ $(2.69\pm0.01)\times10^{8}$ $(4.34\pm0.03)\times10^{8}$ $(5.19\pm0.03)\times10^{8}$ $(2.53\pm0.02)\times10^{8}$
^{3}He/^{4}He (.Ra^{-1}) (2)	15.7 ± 0.4 26.6 ± 0.7 3.5 ± 0.2 3.1 ± 0.7 20 ± 37 0.6 ± 0.1	27.7 ± 0.4 25.0 ± 0.4 50.3 ± 0.6 9.9 ± 0.2 4.8 ± 0.1 30.4 ± 0.6	25.8 ± 0.3 84.6 ± 1.3 65.7 ± 1.7 19.8 ± 0.5 27.7 ± 0.4 34.8 ± 0.6	35.8 ± 2.3 ∅ 2.0 ± 0.2	-

$^3He_{ET}$ fraction (%) (3)	99.88±0.06 99.93±0.03 99.44±0.28 99.36±0.34 99.91±0.19 99.4±1.9	99.93±0.03 99.93±0.04 99.97±0.02 99.81±0.10 99.59±0.20 99.94±0.03	99.93±0.03 99.98±0.01 99.98±0.01 99.91±0.05 99.94±0.03 99.95±0.02	99.95±0.02 ∅ 99.03±0.49	-
[^4He] Terrigenous (at.g^{-1} of snow)	$(6.21\pm0.27)\times10^7$ $(3.15\pm0.24)\times10^7$ $(5.11\pm0.04)\times10^7$ $(1.04\pm0.13)\times10^7$ $(6\pm11)\times10^5$ $(4.08\pm0.01)\times10^7$	$(4.49\pm0.36)\times10^7$ $(4.82\pm0.26)\times10^7$ $(1.24\pm0.01)\times10^8$ $(2.14\pm0.02)\times10^8$ $(2.17\pm0.02)\times10^8$ $(6.20\pm0.08)\times10^7$	$(3.28\pm0.24)\times10^8$ $(4.8\pm1.8)\times10^7$ $(2.49\pm0.08)\times10^7$ $(1.65\pm0.03)\times10^8$ $(2.42\pm0.03)\times10^8$ $(1.02\pm0.02)\times10^8$	$(6.66\pm0.85)\times10^5$ ∅ $(1.45\pm0.02)\times10^7$	$(3.33\pm0.17)\times10^8$ $(1.16\pm0.18)\times10^8$ $(2.06\pm0.01)\times10^8$ $(3.92\pm0.03)\times10^8$ $(4.62\pm0.04)\times10^8$ $(2.09\pm0.02)\times10^8$
$^3He_{ET}$ flux (pico cc STP.cm^{-2}.ka^{-1})	0.15±0.01 0.13±0.01 $(2.51\pm0.14)\times10^{-2}$ $(4.56\pm0.73)\times10^{-3}$ $(1.84\pm0.53)\times10^{-3}$ $(3.16\pm0.47)\times10^{-3}$	0.20±0.01 0.15±0.01 1.16±0.04 0.31±0.01 $(14.8\pm0.6)\times10^{-2}$ 0.31±0.01	1.35±0.05 0.97±0.04 $(33.9\pm1.3)\times10^{-2}$ 0.51±0.02 1.08±0.04 0.60±0.02	$(4.04\pm0.15)\times10^{-3}$ ∅ $(4.16\pm0.36)\times10^{-3}$	1.27±0.05 1.25±0.04 1.52±0.05 0.83±0.02 1.23±0.04 0.91±0.03
	$\overline{\text{Flux}}$ (pico cc STP.cm^{-2}.Ka^{-1}) **1.25±0.03 (weighted mean±1SD)**				

ET mass flux (μg.m^{-2}.a^{-1}) (4)	18±6 16±5 3.1±1.0 0.56±0.20 0.23±0.10 0.39±0.13	1.28±0.35 0.94±0.25 7.40±1.99 1.97±0.53 0.95±0.26 1.98±0.53	0.24±0.05 0.17±0.04 0.06±0.01 0.09±0.02 0.19±0.04 0.11±0.02	(2.84±0.41)×10^{-7} ∅ (2.92±0.49)×10^{-7}	22±6 18±5 10±2 2.6±0.6 1.4±0.3 2.5±0.6
	$\overline{\text{Flux}}$ (μg.m^{-2}.a^{-1}) 14±5	1.73±0.84	0.17±0.08	(2.86±0.69)×10^{-7}	
	16±5 (weighted mean±1SD)				
Mass flux of terrestrial silicate particles (mg.m^{-2}.a^{-1}) (5)	1.42±0.06 0.72±0.43 1.17±0.03 0.24±0.03 0.01±0.03 0.93±0.04	6.15±0.50 5.07±0.36 16.98±0.35 29.3±1.9 29.7±1.8 8.6±0.3	77.2±5.7 11.2±4.1 5.86±0.23 39.0±2.7 57.1±3.6 24.14±0.85	0.29±0.04 ∅ 6.33±0.29	16.2±1.1 17.0±4.1 26.8±0.4 69.4±3.3 87.8±4.0 35.4±0.9
	$\overline{\text{Flux}}$ (mg/m²/an) 1.46±0.05	11.5±0.4	39.0±3.0	1.96±0.09	
	44±3 (weighted mean±1SD)				

The results in color correspond to the snow tanks filtered into different size ranges, as indicated in the second line of the first column, along with the respective total masses of the tanks in this table. The snow masses were weighed prior to undergoing the melting stages. The size range labeled '< 5 µm' shows results for evaporated meltwater in aluminum capsules. In one of the three capsules, ^3He was not detectable, as it was above the aluminum blank level ([$^3He_{ET}$] = (6.06±0.54)×10^5 at·g^{-1}). Arithmetic means of the $^3He_{ET}$ flux and total cosmic dust mass were calculated across the snow tanks and integrated over the size ranges. Units are highlighted in bold and placed in brackets in the first column, following the estimated names. Errors are reported at the 1σ level and were calculated using Taylor's uncertainty propagation. The symbol 'Ø' indicates abundances below the blank level.

(1) *He isotopic abundances obtained over total snow masses (see,* ***Annexe A*** about exposure-parameters relative to snow tanks used*).*
(2) *He isotopic ratios in Ra, the Earth atmospheric ratio (Ra = 1.384±10^{-6}, Ozima and Podosek, 2002).*
(3) $^3He_{ET}$ fractions calculated using a two components mixing equation (e.g., Marcantonio et al., 1995; McGee and Mukhopadhyay, 2013) (($^3He/^4He$)extraterrestrial = 0.02 Ra (Benkert et al., 1993; Heber et al., 2009, 2012) ; ($^3He/^4He$)terrigenous = 200 Ra; (e.g., Marcantonio et al., 1995; Farley and Patterson, 1995; Winckler et al., 2005).
*(4) Cosmic mass fluxes are calculated from measured $^3He_{ET}$ abundances measured in the filters and using the [$^3He_{ET}$]-Mass empirical relationship obtained from the exhaustive database (**Fig.6**). Masses were finally converted into fluxes taking into account the snow accumulation rate **R_{snow} = 2.7±0.1 g.cm^{-2}.a^{-1}** (Frezzotti et al., 2005; Le Meur et al., 2018). Uncertainties of the cosmic dust density were computed considering two endmembers: (0.8 g.cm^{-3} (cometary dust 67P-Churyumov-Gerasimenko, Fulle et al., 2016) to 2.2 g.cm^{-3} (carbonaceous chondrites mean-density, Consolmagno et al., 2008; Flynn and Sutton, 1991; Joswiak et al., 2007; Love et al., 1994)) and propagated using parent body contributions from Carrillo-Sánchez et al., 2021.*
(5) Mass flux of terrestrial dust was calculated considering [^4He] concentrations in dust from McGee et al., 2016.