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	551 503 403 427 380 482	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 Ø 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)	$(6.74\pm0.03)\times10^7$ $(3.63\pm0.02)\times10^7$ $(5.20\pm0.04)\times10^7$ $(1.06\pm0.13)\times10^7$ $(4.2\pm0.9)\times10^6$ $(4.09\pm0.07)\times10^7$	$(5.21\pm0.01)\times10^7$ $(5.51\pm0.02)\times10^7$ $(1.66\pm0.01)\times10^8$ $(2.25\pm0.02)\times10^8$ $(2.22\pm0.02)\times10^8$ $(7.32\pm0.08)\times10^7$	$(3.76\pm0.001)\times10^8$ $(8.27\pm0.05)\times10^7$ $(3.70\pm0.01)\times10^7$ $(1.84\pm0.03)\times10^8$ $(2.81\pm0.03)\times10^8$ $(1.24\pm0.02)\times10^8$	$(8.11\pm0.52)\times10^5$ Ø $(1.47\pm0.02)\times10^7$	$(3.78\pm0.01)\times10^8$ $(1.61\pm0.01)\times10^8$ $(2.69\pm0.01)\times10^8$ $(4.34\pm0.03)\times10^8$ $(5.19\pm0.03)\times10^8$ $(2.53\pm0.02)\times10^8$
^{3}He/^{4}He (.Ra^{-1}) (2)	15.7 ± 0.4 26.6 ± 0.7 3.5 ± 0.2 3.1 ± 0.7 3.2 ± 1.1 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 Ø 2.0 ± 0.2	-

$^3He_{ET}$ fraction (%) (3)	99.88±0.06 99.93±0.03 99.44±0.28 99.36±0.34 99.38±0.98 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 Ø 99.03±0.49	-
[^{4}He] Terrigenous (at.g^{-1} of snow)	$(6.21\pm0.27)\times10^{7}$ $(3.15\pm0.24)\times10^{7}$ $(5.11\pm0.04)\times10^{7}$ $(1.04\pm0.13)\times10^{7}$ $(4.1\pm0.9)\times10^{6}$ $(4.08\pm0.01)\times10^{7}$	$(4.49\pm0.36)\times10^{7}$ $(4.82\pm0.26)\times10^{7}$ $(1.24\pm0.01)\times10^{8}$ $(2.14\pm0.02)\times10^{8}$ $(2.17\pm0.02)\times10^{8}$ $(6.20\pm0.08)\times10^{7}$	$(3.28\pm0.24)\times10^{8}$ $(4.8\pm1.8)\times10^{7}$ $(2.49\pm0.08)\times10^{7}$ $(1.65\pm0.03)\times10^{8}$ $(2.42\pm0.03)\times10^{8}$ $(1.02\pm0.02)\times10^{8}$	$(6.66\pm0.85)\times10^{5}$ Ø $(1.45\pm0.02)\times10^{7}$	$(3.33\pm0.17)\times10^{8}$ $(1.16\pm0.18)\times10^{8}$ $(2.06\pm0.01)\times10^{8}$ $(3.92\pm0.03)\times10^{8}$ $(4.62\pm0.04)\times10^{8}$ $(2.09\pm0.02)\times10^{8}$
$^3He_{ET}$ 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	$(4.04\pm0.15)\times10^{-3}$ Ø $(4.16\pm0.36)\times10^{-3}$	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 from weighted mean ($\mu g.m^{-2}.a^{-1}$) (4)	40^{+11}_{-8} 36^{+10}_{-7} $6.7^{+1.9}_{-1.4}$ $1.2^{+0.4}_{-0.3}$ $0.5^{+0.1}_{-0.2}$ $0.9^{+0.2}_{-0.2}$	$0.16^{+0.20}_{-0.04}$ $0.12^{+0.15}_{-0.03}$ $0.9^{+1.2}_{-0.2}$ $0.2^{+0.3}_{-0.1}$ $0.12^{+0.15}_{-0.03}$ $0.2^{+0.3}_{-0.1}$	$0.5^{+0.4}_{-0.2}$ $0.4^{+0.3}_{-0.1}$ $0.1^{+0.1}_{-0.4}$ $0.2^{+0.2}_{-0.1}$ $0.4^{+0.4}_{-0.1}$ $0.2^{+0.2}_{-0.1}$	--- $\emptyset$ ---	44^{+11}_{-8} 37^{+10}_{-7} $8^{+3.2}_{-1.4}$ $1.7^{+0.8}_{-0.3}$ $1.0^{+0.6}_{-0.2}$ $1.3^{+0.8}_{-0.2}$
	$\overline{\text{Flux}}$ ($\mu g.m^{-2}.a^{-1}$) 31^{+9}_{-8}		$0.21^{+0.3}_{-0.1}$	$0.37^{+0.4}_{-0.2}$	---
	32^{+9}_{-8} (weighted mean$\pm$1SD)				
ET mass flux from regression ($\mu g.m^{-2}.a^{-1}$) (4)	18 ± 6 16 ± 5 3.1 ± 1.0 0.6 ± 0.2 0.2 ± 0.1 0.4 ± 0.1	1.3 ± 0.4 0.9 ± 0.3 7.4 ± 2.0 2.0 ± 0.5 1.0 ± 0.3 2.0 ± 0.5	0.24 ± 0.05 0.17 ± 0.04 0.06 ± 0.01 0.09 ± 0.02 0.19 ± 0.04 0.11 ± 0.02	$(2.84\pm0.41)\times10^{-7}$ $\emptyset$ $(2.92\pm0.49)\times10^{-7}$	22 ± 6 18 ± 5 10 ± 2 2.6 ± 0.6 1.4 ± 0.3 2.5 ± 0.6
	$\overline{\text{Flux}}$ ($\mu g.m^{-2}.a^{-1}$) 14 ± 5		1.73 ± 0.84	0.17 ± 0.08	$(2.86\pm0.69)\times10^{-7}$
	16 ± 5 (weighted mean$\pm$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 Ø 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 different snow tanks. Data are reported for different particle size ranges. The snow masses were weighed prior to melting. The size range labeled '< 5 µm' shows results for evaporated meltwater in aluminum capsules. In one of the three capsules, ^{3}He was below the aluminum blank level ([^{3}He$_{ET}$] = (6.06±0.54)x10^5 atoms of ^{3}He.g_Al^{-1}). Arithmetic means of the ^{3}He$_{ET}$ flux and total cosmic dust mass were calculated across the snow tanks and integrated over the particle size ranges. Two ET mass flux estimates are provided: one using the weighted mean of ^{3}He$_{ET}$ for each size range and, and the second one from [^{3}He$_{ET}$]-Mass regression described in **Fig.6**. Units are given in brackets in the first column. Errors are 1σ and were calculated using Taylor's uncertainty propagation. The symbol 'Ø' indicates abundances below the blank level.

(1) *Helium isotopic abundances obtained from total snow masses (see,* ***Annexe A*** gives exposure-parameters for each snow tank*)*

(2) *He isotopic ratios in Ra, the Earth atmospheric ratio (Ra = 1.384×10^{-6}, Ozima and Podosek, (2002))*

(3) *^{3}He$_{ET}$ fractions calculated using a two components mixing equation (e.g., Marcantonio et al., (1995); McGee and Mukhopadhyay, (2013)) ((^{3}He/^{4}He)extraterrestrial = 0.02 Ra (Benkert et al., (1993); Heber et al., (2009), (2012)) ; (^{3}He/^{4}He)terrigenous = 200 Ra; (e.g., Marcantonio et al., (1995); Farley and Patterson, (1995); Winckler et al., (2005)).*

(4) *Cosmic mass fluxes are calculated from ^{3}He$_{ET}$ abundances measured from the filters and using the [^{3}He$_{ET}$]-Mass empirical relationship obtained from the exhaustive database (**Fig.6**). Masses were converted into fluxes taking into account the snow accumulation rate of* ***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*