

## Cosmogenic isotope constraints on the origin of micrometeorites

ENGUERRAND CARLIER<sup>1</sup>, CAROLINE FITOUSSI<sup>1</sup>,  
CECILE ENGRAND<sup>2</sup>, GRANT RAISBECK<sup>2</sup> AND LUCIE  
DELAUCHE<sup>2</sup>

<sup>1</sup>LGL-TPE, ENS de Lyon

<sup>2</sup>IJCLab, CNRS/Univ. Paris-Saclay

Based on observations of the zodiacal cloud coupled with atmospheric entry models of micrometeoroids, four main sources of cosmic dust accreted by the Earth have been identified [1,2]: (i) an asteroidal source; (ii) a Jupiter-family comet (JFC) source; (iii) a Halley-type comet (HTC) source and (iv) an Oort cloud comet (OCC) source. Models predict that ~70% of the micrometeorites could originate from JFCs [2], but when one considers direct observations of micrometeorites, there is no clear consensus on the proportions of these sources, and on the fractions of solid and vaporized fluxes [2,3].

The origin of micrometeorites has also been constrained with cosmonuclide budgets as a method to link micrometeorites to their parent reservoir [4,5,6]. We revisit this question by analyzing, by Accelerator Mass Spectrometry (AMS), <sup>10</sup>Be and <sup>26</sup>Al produced in dust grains by spallation in the interplanetary medium. We studied batches of polar micrometeorites that were sorted according to their size, together with analyses of individual large micrometeorites. By modeling both the cosmogenic production during pre-exposition on the parent-body and during their travel to the Earth, it is possible to link the cosmogenic nuclide signature to its origin. We will present AMS data of tens of individual cosmic spherules over 400 µm in diameter and of several batches of cosmic spherules sorted by size from 100 to 400 µm and by sampling site (Greenland and Antarctica). This represents approximately 1500 cosmic spherules altogether, which will allow us to draw a broad picture of the origin of cosmic spherules.

### References:

- [1] Carrillo-Sánchez, J.D. *et al.* (2016) *Geophysical Research Letters*, 43, 11,979-11,986.
- [2] Carrillo-Sánchez, J.D. *et al.* (2020) *Icarus*, 335, 113395.
- [3] Rojas, J. *et al.* (2021) *Earth and Planetary Science Letters*, 560, 116794.
- [4] Raisbeck, G.M. *et al.* (1985) *Proceedings of IAU Colloquium n°85*, R. H. Giese and P. Lamy, eds., D. Reidel, 169-174.
- [5] Nishiizumi, K. *et al.* (1995) *Meteoritics*, 30, 728–732.
- [6] Feige, J. *et al.* (2024) *Philosophical Transactions of the Royal Society A*: 382, 20230197.