LARKMAN NUNATAK MICROMETEORITES, A STATISTICAL STUDY.

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Introduction: Any collection technique for the recovery of micrometeorites (MMs) contains inherent biases. This is evident from the many historic MM collections each exhibiting differing relative abundances of cosmic spherule (CSs) types. Factors including site location, collection and separation techniques, storage and analysis procedures all bias recovery [1,2]. This study reports the first detailed account of a new MM collection, recovered from moraine at Larkman Nunatak, within the Transantarctic mountains. The mechanisms of accumulation and preservation within moraine are evaluated and the statistics of the collection compared against alternative collection sites and recovery methods.

Methods: During the 2007 ANSMET expedition [3], 3 kilograms of moraine sediments were collected from Larkman Nunatak's aeolian traps, preliminary extraction yielded over 1000 MMs and an abundance of microtektites. This study considers 825 CSs, generating statistics on the composition, petrological features, size distribution and weathering condition of the Larkman collection. A metadata analysis compares the Larkman collection against several well-characterised and disparate collections, providing insights into the nature of MM preservation.

Results: While the Larkman collection is underrepresented in unmelted and scoriaceous particles, the relative abundances of cosmic spherule populations compare favourably against deep sea [4], Greenland lake [5] and unbiased Antarctic snow collections [1]. Approximately one third of particles show near pristine preservation despite an estimated residence time of up to 800Ka on the Antarctic surface and interaction with liquid water. Size-frequency distribution calculations produce a slope exponent of ~3, indicating a bias towards mid-sized particles (100-310μm). Relict grain bearing porphyritic spherules are common among the collection comprising ~23% of collected MMs, while coarse grained particles and chondrule fragments are rare at <3%.

Discussion: The ease of extraction, availability of collection sites and rapid separation of extraterrestrial material confer significant advantages on moraine localities. Although biases impact the collection, depleting unmelted, scoriacoues and small MMs otherwise common among ice derived collections, moraines exist as a pragmatic option for MM recovery. Despite strong differences in collection conditions, even among Antarctic sites, good agreement in CSs population dynamics implies that MM recovery is sampling the true flux of cosmic dust.

By reconstructing the modern day cosmic spherule flux and understanding the how different environments impact preservation we pave the way to better interpret the wealth of future fossil MM collections stored within the geological record.

References: [1] Taylor S. et al. 2000. *Meteoritics & Planetary Science* 35:651-666. [2] Suavet C. et al. 2009. *Polar Science* 3:100-109. [3] Connolly H. et al. 2007. *Meteoritics & Planetary Science* 42:1647-1694 [4] Prasad M. S. & Rudraswami N. G. 2013. *Journal of Geophysical Research: Planets*, 118:2381-2399. [5] Taylor S. & Brownlee D. E. 1991 *Meteoritics* 26:203-211.