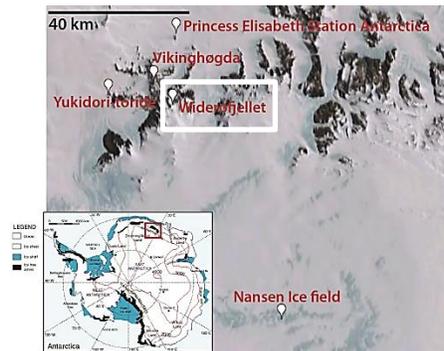


## ENVIRONMENTAL CONTROL ON ANTARCTIC MICROMETEORITE PRESERVATION STATE: THE WIDERØFJELLET MOUNTAIN CASE STUDY.

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**Introduction:** Micrometeorites (MMs) are extraterrestrial dust particles ranging in size between 10  $\mu\text{m}$  and 2 mm [1], which form the main part of the extraterrestrial flux to Earth (~40000 tons/year) [2]. Traditionally, MMs have been recovered from a variety of depositional environments including deep-seas, deserts, lakes and by melting large volumes of Antarctic ice or snow [e.g., 3-5]. Over the last decade, large and fresh accumulations of MMs have been discovered in sediment traps (e.g. joints and weathering pits) at glacially eroded granitic summits in the Transantarctic Mountains [6]. Similar deposits have also been found during the 2012-2013 Belgian-Japanese MICROMETA Expedition in the Sør Rondane Mountains, East Antarctica (Fig. 1). Here we present preliminary data of the Widerøfjellet 1 and 2 deposits, which indicate that the local, environmental conditions vary greatly and strongly influence the accumulation and preservation mechanisms of these MM deposits. A thorough comprehension of these processes is essential to validate the representativeness of MM deposits.



**Fig. 1:** Map of the MM sampling sites at the Sør Rondane Mountains, East Antarctica. The Widerøfjellet Mountains are marked with a white rectangle.

expressed by the loss and/or alteration of primary phases and (partial) encrustation of the particle surface. Micrometeorites are therefore assigned to the 2(3)-B(C) weathering grade, following the weathering scale of [7]. Particles are generally in the 20-500  $\mu\text{m}$  size range. In contrast, the Widerøfjellet 2 deposit contains fresh (weathering grade: 0(1)-A) and abundant (>1000) specimens (Fig. 2b), which span a broad size range of 20-1100  $\mu\text{m}$ . These differences in the recovered material could be attributed to a higher degree of wind-sorting, availability of fluids and longer accumulation interval for the Widerøfjellet 1 deposit. Currently, no age information is available to constrain the accumulation interval for the MM deposits from the Sør Rondane Mountains.

**Conclusions:** Local, environmental conditions control the MM accumulation mechanisms and preservation states, as indicated by the Widerøfjellet Mountain deposits. Further studies, including electron microprobe, oxygen isotopic measurements and Electron Spin Resonance (ESR) dating, are planned to fully highlight the differences between these deposits.

**References:** [1] Rubin A.E. and Grossman J.N. 2010. *Meteoritics & Planetary Science* 45:114-122. [2] Love S.G. and Brownlee, D.E. 1993. *Science* 262:550-553. [3] Engrand C. et al. 2005. *Geochimica et Cosmochimica Acta* 69:5365-5385. [4] Brownlee D.E. 1985. *Annual Review of Earth and Planetary Sciences* 13:147-173. [5] Duprat J. et al. 2007. *Advances in Space Research* 39:605-611. [6] Rochette P. et al. 2008. *Proceedings of the National Academy of Sciences* 105:47:18206-18211. [7] Van Ginneken M. et al. 2016. *Geochimica et Cosmochimica Acta* 179:1-31.

**Methods:** One half of the sediments were sieved into 6 size fractions: >2000  $\mu\text{m}$ , 2000-800  $\mu\text{m}$ , 800-400  $\mu\text{m}$ , 400-200  $\mu\text{m}$ , 200-125  $\mu\text{m}$ , and <125  $\mu\text{m}$ . The other half is kept for reference. Magnetic particles were isolated from all size fractions using a hand magnet. Micrometeorites were then extracted from the magnetic fractions through handpicking using a binocular microscope. Particles were carbon coated and imaging was performed on a JEOL JSM-IT300 Scanning Electron Microscope (SEM), equipped with an Energy Dispersive Spectrometer (EDS) for semi-quantitative analysis of the major element composition.

**Results:** Despite the limited distance (~5 m) between the Widerøfjellet 1 and 2 sampling sites, a marked difference is observed in terms of the MM preservation state (Fig. 2) and particle size distribution. The Widerøfjellet 1 deposit is characterized by moderate amounts (~250) of heavily weathered MMs (Fig. 2a). Weathering is commonly

**Fig. 2:** Comparison of the MM preservation state at Widerøfjellet sampling site 1 (a) and site 2 (b). Both images were taken in Secondary Electron Mode.

