

**STUDY OF MICROMETEORITES AND COSMIC DUST FROM ANTARCTICA**R. F. Muftakhetdinova<sup>1</sup>, D.M. Kuzina<sup>2</sup>, S. A. Bulat<sup>1,3</sup> and V. I. Grokhovsky<sup>1</sup>

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**Introduction:** More than 5,200 tons of extraterrestrial material (12-700 mkm) fall out to the Earth each year [1]. A fraction of this dust that hits the ground could be collected at the Earth's surface in the form of microscopic particles (<2 mm) called micrometeorites. The most common archives of micrometeorites are deep-sea sediments, snow, ice, and sediments in polar areas [2]. Antarctica and its ice cover is a unique place for collecting micrometeorites and cosmic dust, due to the absence of terrestrial and industrial dust. The study of extraterrestrial matter is of considerable importance because they are the best-preserved materials of the early Solar System available [3].

**Samples and Methods:** In this work, we present investigations of two types of samples. The first is the collection of magnetic micrometeorites on a small neodymium magnet (30 x 20 x 10 mm) in a string exposed on a triangle that stands 4.6 km from station Vostok for one year. Magnets were wrapped into the tape to prevent gluing samples to the magnet. The second is the samples of blue ice originating from different horizons near the Voltat massif and Lomonosov mountains. Magnetic fractions (nanoscale cosmic dust) from melted ice were removed by using a permanent magnet.

The morphology and elemental composition of magnetic separates were studied using scanning electron microscopy "Merlin" Carl Zeiss equipped with an energy-dispersive spectrometer "Aztec X-Max" Oxford Instruments. Surface morphology was investigated at an accelerating voltage of 5 keV on SE mode (secondary electrons). Elemental analysis and surface mapping were carried out at an accelerating voltage of 20 keV with AsB mode.

**Results:** Microscopic investigations showed widespread micrometeorites in all studied samples. Magnetic particles collected on magnets represented micrometeorites, mostly spherules, curved fragments, and magnets themselves. Analysis of particles showed that particles were presented mostly by iron oxides, with a low content of other elements (Mg, Si, Cr, Ca, etc.). Particles containing Nd, Fe, Dy were originating from the magnet itself. For future work, the tape should be changed to another material to prevent contamination by the magnet itself which is resolved now in ongoing expositions using the same type of magnets but covered with Teflon (Loctite LB 8192). The chemical analysis of nanosized dust from the ice showed chromic iron which could justify the background magnetic component of the cosmic dust. Nanoparticles in the form of spherules were not observed.

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**References:** [1] Rojas et al (2021) *Earth and Planetary Science Letters* 560: 116794. [2] Folco, Cordier (2015) *EMU Notes in Mineralogy*, 15(9):253–297. [3] Bulat et al. (2012) *Journal Ice & Snow* 4 (120): 146-152.