

MICROMETEORITES FROM LAKE TURGOYAK, SOUTH URAL, RUSSIA

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Introduction: Sediments of Lake Turgoyak were studied for detection extraterrestrial matter. Turgoyak (55°09'14.2"N, 60°03'52.6"E) is a lake in Chelyabinsk Oblast, Russia. Length of investigated core 5.68 meters. Seismoacoustic investigations shows that sediments are stratified and not disturbed at the sampling point. Previous studies [1, 2, 3, 4] shows that micrometeorites and cosmic dust can be found in different types of sediments and rocks and that magnetic properties can be used for choosing reliable samples for further investigations. Firstly magnetic measurements were carried out for 115 samples of collection. Six of them which is showing presence of iron-nickel alloys (Curie temperature higher than 690 °C) and in some cases magnetite (Curie temperature ~580 °C) were chosen for magnetic separation and further investigations. Samples are distributed along the core in different depth.

Methods: Differential thermomagnetic analysis was carried out for tracing magnetic minerals according their Curie temperature. Measurements of the samples' induced magnetization as a function of temperature were made in a heating rate of 100°C/min up to 800 °C. The measurements made in a constant magnetic field - 400 mT. The morphology and elemental composition of magnetic separates 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 was carried out at an accelerating voltage of 20 keV with AsB mode. For the studying inclusions and internal structure in micrometeorites computed X-ray tomography (CT) was performed on Phoenix v|tome|x s (General Electrics).

Results: Microscopic investigations showed wide spread of micrometeorites in all studied samples. Shape of particles from round to egg-shape. Size of particles varies from 5 to 30 microns. Almost all microparticles have specific wavy surface. Results of CT showed that some microspherules are heterogeneous inside, there are regions with different densities. In the interior of some spheres, voids are found. Finding differences in extraterrestrial matter in time would be helpful for understanding changes in material falling to the Earth's surface.

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