

EXTRATERRESTRIAL MATTER FROM LAKE BOLSHOE MIASSOVO, SOUTH URAL, RUSSIA

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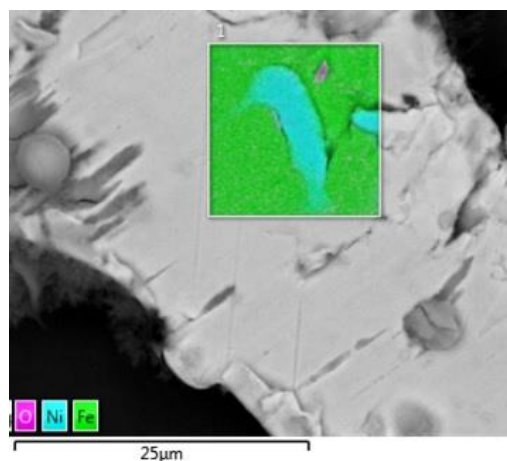
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Introduction: Previous studies [1, 2] shows that micrometeorites and cosmic dust can be found in different types of sediments and rocks. In this paper we describe scanning electron microscopy results of magnetic fraction of Lake Bolshoe Miassovo (Chelyabinsk region, Russia). It is shown that lake sediments are good archives for extraterrestrial matter.

Methods: Magnetic fraction from lake sediments were removed by using permanent magnet. 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 and surface mapping was carried out at an accelerating voltage of 20 keV with AsB mode. Microscopy investigation was performed in Interdisciplinary Center for Analytical Microscopy of Kazan Federal University.

Results: Microscopic investigations showed wide spread of micrometeorites in all studied samples. Shape of particles usually round. Size of particles varies from 5 to 30 microns. Almost all microparticles have specific wavy surface. More interesting samples are found at the depth 4 meters which corresponds to the age ~ 10 Ka. Several particles of iron composition with minor oxygen content were found. Some of them contain areas with high nickel content, up to 82% (Pic. 1). There are some small particles sized not exceed 20 µm, with nickel content up to 85%.

Conclusions: The presence of almost pure particles of iron with zones rich in nickel probably indicates a process of differentiation of a substance during entry and reheating in the atmosphere. Layers with increased quantity of extraterrestrial matter with ages ~ 10 Ka were found also in other lakes of Ural. This indicates an increased flow of cosmic matter during this period.



Picture 1. Results of surface mapping.
Green – Fe, blue – Ni.

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References: [1] Kuzina D.M. et al. 2018. *Meteoritics & Planetary Science* 53 (SI): P. 6306. [2] Murdmaa I.O. et.al., 2015. *Lithology and Mineral Resources*, 50(2): 117-133.