

DETECTION OF THE COSMIC DUST AND MICROMETEORITES IN SEDIMENTS USING THEIR MAGNETIC PROPERTIES.

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Introduction: Earth accretes tons of extraterrestrial material every day. The compositions of this material is varied: chondrites and other silicates, glasses, sulfides and less frequently we can find metallic iron and nickel. Many of these particles have the same composition as terrestrial matter; however, we can separate the cosmic components from the terrestrial components using their unique magnetic properties such as Curie temperature (T_c).

There are a lot of examples of finding such particles in different geological objects [1, 2, 3]. Investigations of different types of sediments are shown that the quantity of cosmic dust have variations in time. It can be caused by different reasons such as different concentrations of dust in universe, by impact events and etc.

Discussion: In this work is shown the fast and reliable method for detecting the extraterrestrial matter using its magnetic properties. It is easy to detect metallic iron, nickel by using Curie temperature. Pure iron has Curie temperature between 710-770 °C, nickel ~ 360 °C and they alloys have a wide spectrum of temperatures. It means we can find such material relying on T_c .

Differential thermomagnetic analysis was carried out for tracing magnetic minerals according their Curie temperature. Measurements were made in special equipment that was created in the paleomagnetic laboratory of the Institute of Geology, Kazan Federal University - Curie express balance. This process included the measurement of the samples' induced magnetization as a function of temperature. The rate of heating was 100°C/min. The measurements made in a constant magnetic field - 400 mT. We have got thermomagnetic curves of the first and second heating up to 800°C. The weight of the sample approximately 0.1 gram [4].

Different types of samples from various places were measured on this equipment: sediment from Atlantic Ocean, Lake Baikal, Mongolian, Austrian, Russian sedimentary outcrops. As a result we have variations of quantity of cosmic dust in time. Also all samples with iron were divided into groups with different concentration of nickel.

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