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Native iron and other magnetic minerals in the sediments of the northwestern Atlantic: Thermomagnetic and microprobe evidence

Pechersky D., Gil'manova D., Markov G., Murdmaa I., Nurgaliev D., Tsel'movich V., Sharonova Z.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

The thermomagnetic and microprobe analyses of sedimentary samples from DSDP 386, 387, 391A, and 391C boreholes in the northwestern Atlantic reveal the ubiquitous occurrence of particles of native iron. The concentrations of native iron are bimodal everywhere with the zero mode necessarily present. The nickel admixture in native iron forms two groups, one represented by pure iron and the comprising native iron with 5-6% Ni. The redeposition of iron particles manifests itself in the correlation between the concentrations of these particles and terrestrial minerals (magnetite), as well as in the equalization and reduction of the concentration of the iron particles. Pyrite and pyrrhotite are widespread in the studied sediments, and the distribution of native iron does not depend on the presence of pyrite (i.e., on redox conditions) in them. At the same time, the distributions of pyrite and particles of magnetite + titanomagnetite are inversely correlated, which can probably be accounted for by the partial dissolution of magnetite and titanomagnetite in the reducing conditions. The increased concentration of particles of volcanogenic homogeneous titanomagnetite is revealed in the volcanoclastic turbidites of the Oligocene and early and middle Miocene age at the base of the Bermuda Rise (borehole 386). The titanomagnetite composition is characteristic of the basalts of plume magmatism; it corresponds to the depth of the magmatic source in the interval of 50-25 km. © 2013 Pleiades Publishing, Ltd.

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