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Процессы в срединно-океанических хребтах - что
нового дало первое десятилетие 21 века в их изучении?

Main Results in Russian Study of the Mid-Oceanic Ridge
Processes in First Decade of XXI

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Dependence of magnetic anomalies intensity at northern part of MAR axis from contents of FeO in basalt glasses

Sokolov S.Y.¹, Silantsev S.A.²

1 – Geological institute RAS,

2 – Vernadsky institute of geochemistry and analytical chemistry RAS

Dependence of magnetic field anomalies intensity (MFA) at northern part of MAR axis from contents of FeO in basalt glasses should obviously had existed. The presence of FeO contents connection with different basalt types and magnetization, measured in samples, is shown in [1]. In [2] presented the statistical contents of FeO in glasses of different basalt types: “plume” (TOR-1, TOR-K, TOR-Fe) and “spreading” (TOR-2, TOR-Na, TOR-FeTi) associations. Within the space of MAR from Iceland and its vicinities up to slow spreading Knipovich ridge could be observed a complete spectrum of all listed types. The glass chemical composition these basalt types are especially contrast by the FeO: the variation of average values consists of 4.8% (from 9.4% TOR-K to 14.2% TOR-FeTi) with root mean square deviation about 1.2%. Bigger value of variation than deviation allows to search for valuable statistical trends, in comparison to cases, when the correlation of parameters is masked by diffuse cloud of data points in limits of greater deviation interval.

Fig.1 shows the values of MFA, FeO and basalt types along MAR. It is well defined that correlation of MFA values from [3] along the profile, digitized on ridge axis line, with FeO contents exists especially to the north from 65°N. It is also could be concluded, that this correlation is comprised by the presence of contrast by FeO and by the depth basalt types. In the southern areas of MAR it were dredged the basalts with minor variation of FeO content, and therefore the clear trend with MFA could not be established.

The correlation of MFA with FeO contents in basalt glasses is presented on fig.2. Also the differentiation of types is made for points symbols. The major amount of glass samples, where were detected only small depth TOR-Na and TOR-2 data of spreading association, is expressed as condense cloud on the diagram, within the limits of which the trend could not be defined. The appearance of plume basalt types in samples, pointing on the combined magmatic process at MAR, consisting from two sources with different depth [4], and marginal type members – TOR-K and TOR-FeTi, leads to clear pseudo linear trend in variation of FeO respect to MFA, which could be evaluated quantitatively. This allows to provide in areas with plume type basalts a rough classification of magmatic basement by MFA properties, which especially significant in poorly available for bottom sampling regions of Arctic ocean.

Literature

1. Verba V.V., Avetisov G.P., Stepanova T.V., Sholpo L.E. Geodynamics and magnetism of basalts from underwater Knipovich ridge (Norwegian-Greenland basin) // *Russian Journal of Earth Sciences*. Vol 2. N 4. 2000. P. 303-312.
2. Dmitriev L.V., Sokolov S.Yu., Plechova A.A. Statistical Assessment of Variations in the Compositional and P-T Parameters of the Evolution of Mid-Oceanic Ridge Basalts and Their Regional Distribution // *Petrology*. 2006. V.14. №3. C.227-247.
3. Maus S. et al. EMAG2: A 2-arc-minute resolution Earth Magnetic Anomaly Grid compiled from satellite, airborne and marine magnetic measurements // *Geochemistry Geophysics Geosystems (G3)*, 10, Q08005. 2009. Vol.10. N.8.
4. Silantsev S.A. Geochemical and isotopic features of magmatism products of MAR rift valley in areas 12°49'-17°23'N and 29°59'-33°41'N: the evidence of two contrast sources of parent MORB melts // *Petrology*. 2008. Vol.16. N 1. P. 73-100.

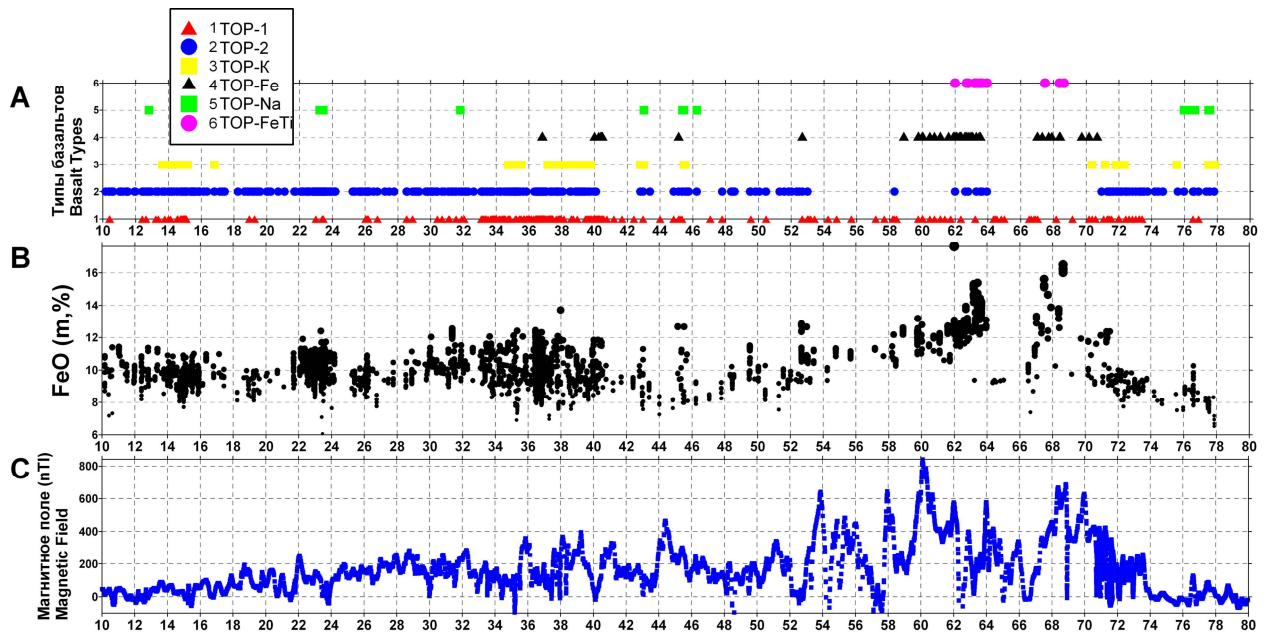


Рис.1. Distribution along MAR from 10° to 80°N: A – types of basalt magmatism of «plume» (black symbols) and «spreading» (contoured symbols) associations, B – value of FeO (m, %) in basalt glasses, C – value of MFA along MAR axis (nTl).

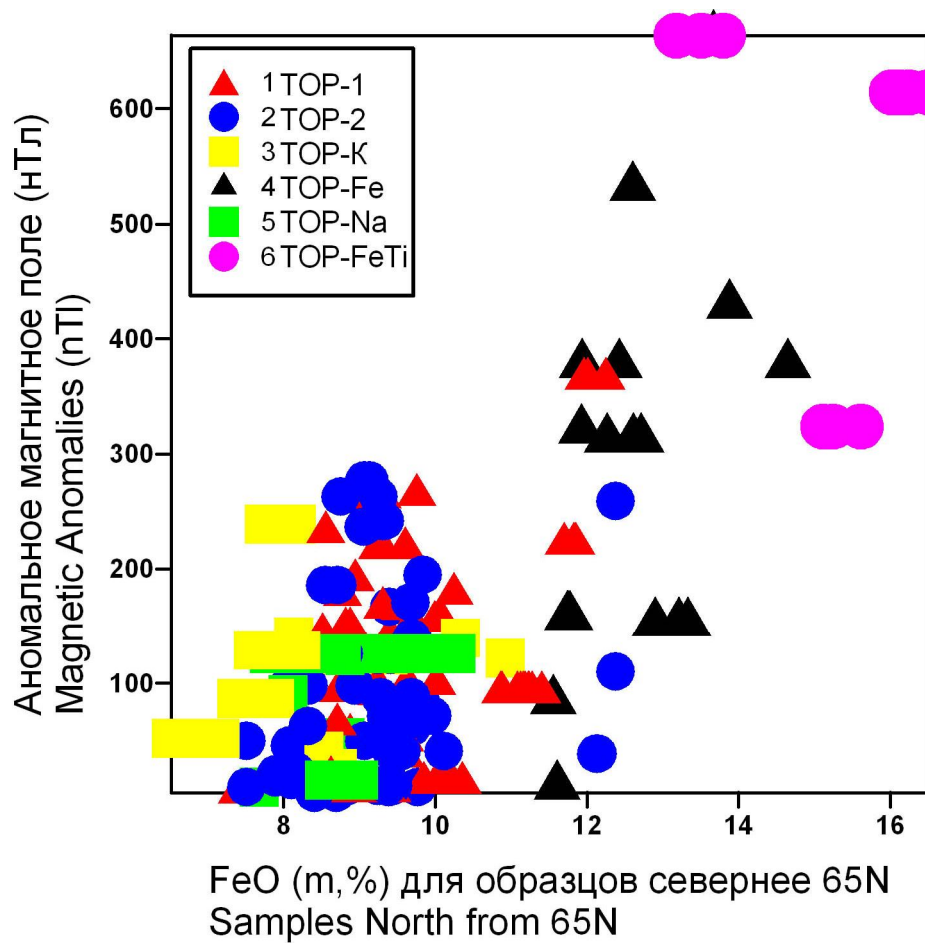


Рис.2. Correlation of MFA with FeO contents in basalt glasses with differentiation of types by point symbols.