

ESTIMATING CONDITIONS OF BASALT MAGMA FORMATION BY CLINOPYROXENE COMPOSITIONS

Migdisova N.A.¹, Sushchevskaya N.M.¹, Arto V. Luttinen², Mikhalsky E. V.³

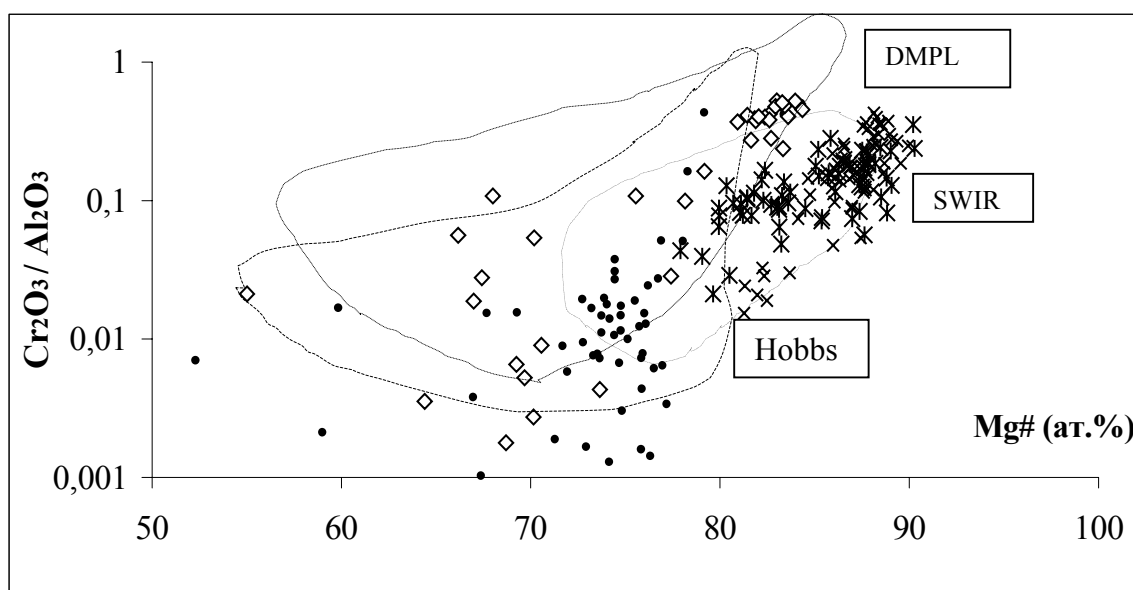
¹Vernadsky Institute of Geochemistry and Analytical Chemistry, RAS, Russia
nadyas@geokhi.ru

²Department of Geology, University of Helsinki, Finland

³Vniioceangeologiya, St.- Petersburg

We have compared a lot of compositions of clinopyroxene from different types of basaltic lavas. We have studied tholeiites, traps and alkaline magmas that are common in Antarctica and nearby region of Southern Atlantic. Grains of clinopyroxene were picked from basaltic magmas of different ages: from tholeiites formed in the region of Western End of South-West Indian Ridge (SWIR) [1] to Cenozoic alkaline lavas erupted in the segment of Hobbs Coast (Western Antarctic) [2] and Mesozoic basaltic flows related with traps in the region of Dronning Maud Land Province (DMLP) [3]. All magmas are of olivine-bearing type. The petrogenetic compare of clinopyroxene from basalts from the Spiess Ridge and from the segment of Southwest Indian Ridge in the Bouvet region showed that paragenesis of minerals is similar and consists of olivine, plagioclase and clinopyroxene.

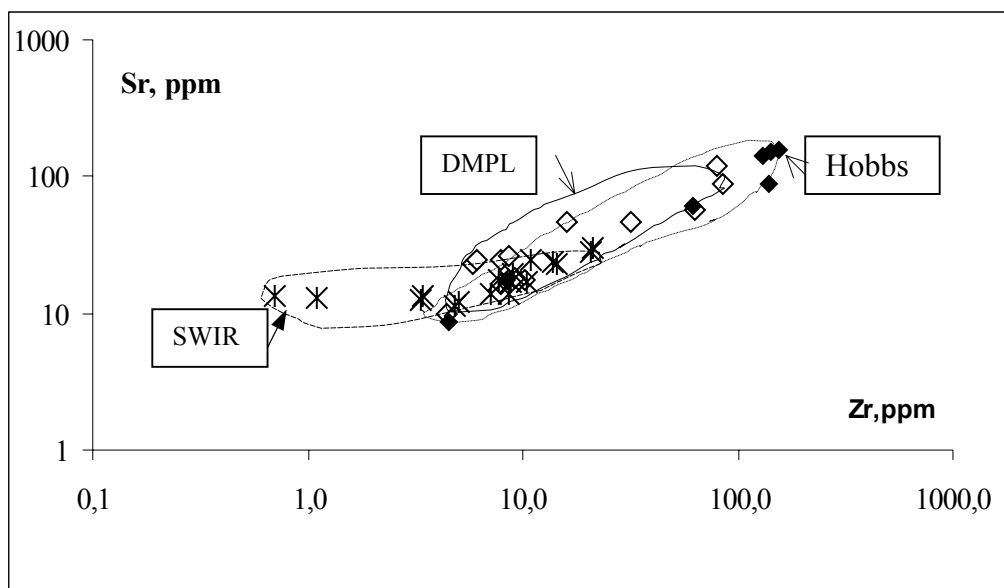
Composition of clinopyroxenes from the Hobbs Coast and DMLP are similar by Mg# (interval–50-85). Clinopyroxenes of SWIR different by more Mg# up to 76-90. Clinopyroxenes from alkaline Hobbs Coast province enriched by Al₂O₃, Na and depleted by Cr. Variations of Cr₂O₃ / Al₂O₃ for the analyzed clinopyroxenes are shown in fig.1. The DMLP clinopyroxenes distinguish by more high level of Cr₂O₃ / Al₂O₃ for clinopyroxenes with Mg# = 80-85.



Using method for determent the pressures of fractionation of melts by Nimis [4], which are based on the abundance of major elements in clinopyroxenes, we had estimated that pressures of fractional liquid crystallization under the Spiess Ridge and in the Bouvet segment (SWIR) are similar. The depth of crystallization into magma chamber was 10 to 15 km. And the analogous estimates for Hobbs Coast and Dronning Maud Land were 3-12 km and 1-6 km respectively.

The variations of most incompatible - element abundance in clinopyroxenes determined by ion microprobe analysis have similarly trends for all studying regions and show good correlation on the graphs Mg# - element. At the same time the clinopyroxenes from the alkaline magmas from Hobbs Coast Province had visible enrichment in Ti, Sr,Zr.

During the process of differentiation of magmas the maintenance of incompatible elements increased as well as increased the ratios of the most incompatible elements to less incompatible.



In fig.2 can be seen the correlation between Sr and Zr in clinopyroxene from difference type of basalts. Notably, SWIR magmas have lower concentrations of these elements. Estimated Cpx-melt partitioning coefficients for alkaline basalt of Hobbs were demonstrated what Cpx-melt partitioning was in the order of magnitude from Ba to Yb with minimum on Zr and Sr. These coefficients are similar with experimental data [5].

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