5.7.P10

Pb-Hf-Nd isotope compositions of Tertiary Lower Silesia basalts (SW Poland)

A. LADENBERGER[1,3], D.W. PEATE[2,3], J.A. BAKER[3], M. MICHALIK[1]

[1] Institute of Geological Sciences, Jagiellonian University, Kraków, Poland (berg@geos.ing.uj.edu.pl)
[2] Dept. of Geoscience, University of Iowa, Iowa City IA 52242, USA
[3] Danish Lithosphere Centre, Øster Voldgade 10, 1350 Copenhagen, Denmark

The Lower Silesia basalts (LSB; 40-5 Ma) form the easternmost part of the Central European Volcanic Province (CEVP). They comprise a range of mafic volcanic types (basanites, nephelinites, olivine basalts) [1]. The location of LSB volcanism is governed by deep basement structures that were activated during Paleozoic tectonic activity associated with uplift of the Alpine fold belt. One major question, therefore, is whether the local crustal structures have played a significant role in influencing the magma compositions.

40 representative samples have been analysed for Nd-Hf and high-precision Pb isotopes (using a ^{207}Pb-^{204}Pb double spike) by MC-ICP-MS. In general, the LSB show HIMU-like characteristics, with radiogenic ^{206}Pb/^{204}Pb (19.3 to 20.8) and Nd-Hf isotope ratios that plot below the main mantle array. Compared to other suites within the CEVP, the LSB have much higher ^{206}Pb/^{204}Pb than lavas from the Eifel and Vogelsberg regions (Germany), but quite similar isotopic compositions to the Massif Central lavas (France). In detail, the LSB isotope data show systematic geographical variations. Most of the LSB samples have a restricted range in eps-Hf (+6.0-+7.9) and eps-Nd (+3.5-+5.0), but samples from the central region (the Fore-Sudetic block) have higher eps-Hf (+10.8-+13.1) and eps-Nd (+5.9-+7.4) and lower ^{208}Pb/^{204}Pb (for a given ^{206}Pb/^{204}Pb). The westernmost LSB samples show lower eps-Hf (+4.7-+5.9) and eps-Nd (+2.5-+3.2) and higher ^{208}Pb/^{204}Pb (for a given ^{206}Pb/^{204}Pb).

The HIMU-like Pb-Nd-Hf isotopic characteristics could be connected with recycled Hercynian oceanic lithosphere or by crustal contamination of melts derived from the asthenosphere [2]. Additional analyses (in progress) of Sr isotopes and trace elements should allow a better resolution of the effects of assimilation of local crust, so as to determine whether the geographical variations in isotopic characteristics are influenced by different crustal compositions in the different basement domains.

References

[1] Blusztajn J, Hart S. (1989) *GCA* **53**, 2689-2696.
[2] Wilson M., Downes H. (1991) *J.Petrol.* **32**, 811-849.

5.7.P11

Dykes from Bermuda: Melilitites and nephelinites

S.D. OLSEN[1,2], S. BERNSTEIN[3], P.M. HOLM[2], C.K. BROOKS[1,2], T.K. KOKFELT[1], D.W. PEATE[1], B.M. GUNN[4]

[1] Danish Lithosphere Center, Øster Voldgade 10L, 1350 Copenhagen K, DK (simun@geologist.com)
[2] Geological Institute, University of Copenhagen, Øster Voldgade 10, 1350 K, DK
[3] Geological Survey of Denmark and Greenland, Øster Voldgade 10, 1350 Copenhagen K, DK
[4] Centre For Volcanic Data Research, Wanaka, New Zealand

The basement rocks of Bermuda and the origin of the Bermuda Rise have remained puzzles in the context of ocean spreading since no obvious plume tracks can be related. A few tens of meters of coral limestone cap the igneous platform and prevent sampling except by drilling. The Bermuda Deep Drill 1972 (carried out by F. Aumento of Dalhousie University) resulted in 772 m of igneous core showing a series of ultramafic dykes emplaced into strongly chloritised MORB-type pillow lavas. We present new petrological and geochemical data of the dykes from the Bermuda pedestal. The rocks are aphyric to phyric and granular, and have been subjected to hydrothermal alteration to various extent. Clinopyroxene together with olivine pseudomorphs are common phenocrysts. The groundmass predominantly consist of clinopyroxene, pseudomorphed olivine, mica (biotite – phlogopite), apatite, titano-magnetite, titanite, and nepheline. The rocks have been classified as melilitites and melilite-nephelinites. Geochemically they are primitive (Mg# 74) to somewhat evolved (Mg# 44, (MgO from 18 wt.% to 4.3)). The strongly silica undersaturated rocks have a SiO_2 range from 36 wt.% to 43.4 wt.% ; the alkalis are both high and low, with Na_2O/K_2O = 0.13 - 43.8, reflecting the variation in degree of alteration. Incompatible trace element concentrations are highly variable: Sr from 319 - 1344 ppm, Ba 150-2457 ppm, and Nd 35 - 129 ppm.

High titanium and total iron (FeO_{tot} =10-15 wt.%), high absolute content of incompatible elements and high Nb/Yb ratios suggest an origin of small degree melt at elevated pressure. The chemical similarities to East Greenland melilitites and nephelinites and to the melilitites of SW Africa show these to be highly LILE enriched member in the melilititic-nephelinitic series.