Rare earth elements in the karstic bauxites of Zagrad (Niksicka Zupa, Montenegro)

V. JOVIC[1]*, S. RADUSINOVIC AND M. PAJOVIC[2]

[1]Faculty of Mining and Geology, Djusina 7, 11000 Belgrade, Serbia (*correspondence jvidojko@eunet.rs)
[2]Geoloski zavod, Krusevac b.b., Podgorica, Montenegro

The karstic bauxite deposit of Zagrad (Niksicka Zupa, Montenegro) of Jurassic age is known after occurrence of the rare earth elements in the basal part of deposit. New mineral hydroxylbastnaesite-(Nd) is found in this deposit [1]. Mineral composition of bauxites is the following: boehmite, hematite, kaolinite, anatase, rutile, calcite, hydoxylbastnaesite. The rare earth elements and some other trace elements in bauxites (Ba, Be, Co, Cs, Ga, Hf, Nb, Rb, Sn, Sr, Ta, Th, U, V, W, Zr, Y) were analyzed – 94 samples of bauxites for 31 element. Analytical method was ICP-MS (Canada). Samples from drilling cores from the northern part of the deposit showed higher contents of lanthanides (2086 ppm), especially light ones (1763 ppm) in relation to the southern part of the deposit (total 975 ppm, light lanthanides 867 ppm). It was established that lanthanides gradually enriched toward to lower part of the deposit. Four samples of bauxites from lower part of the deposit were treated by boiling in 10 % HCl and loss of mass in the range of 37.20 to 44.00 % were established. After extraction the content of U and Y did not change, but Th, Sn, Co, V, Sr in significant proportion moved to solution. Light lanthanides (La, Ce, Pr, Ne) in a great measure (about 80%) moved to solution, confirming the suitability of the used method for extraction of lanthanides from bauxites. Some heavy lanthanides (Sm, Eu, Gd, Tb, Dy) were also extracted, but in less extent, while other lanthanides (Ho, Er, Tm, Yb, Lu) showed similar contents as in in original samples. It means that they did not or in very small quantities move to solution, Samples before and after extraction were analyzed by X-ray powder diffraction.

[1] Maksimovic & Panto (1985) *Min. Mag.* **49**, 717-720.

Petrography and chronology of lunar meteorite NWA 4472

K.H. JOY[1,2]*, R. BURGESS[3], R. HINTON[4], V.A. FERNANDES[3,5], I.A. CRAWFORD[1], A. KEARSLEY[2], A.IRVING[6] AND EIMF[4]

[1]The Joint UCL / Birkbeck Research School of Earth Sciences, Gower Street, London, WC1E 6BT UK (*correspondence: K.Joy@ucl.ac.uk)
[2]Dept. of Mineralogy, Natural History Museum London, UK
[3]SEAES, University of Manchester, UK
[4]Edinburgh Ion Microprobe Facility, University of Edinburgh, UK
[5]Berkeley Geochronology Center, USA
[6]University of Washington, Seattle, USA

Meteorite Description and Clast Provenance

North West Africa 4472 (NWA 4472) is a KREEP-rich lunar meteorite regolith breccia [1-3]. It comprises a diverse lithic clast component (<5 mm) consolidated in a fragmented clast supported matrix. Lithic fragments are compositionally affiliated with lunar High Mg-Suite (HMS), High Alkali Suite (HAS), mare basalt and impact melt lithologies. NWA 4472's bulk composition [2] is rich in incompatible trace elements, consistent with being derived from a regolith within the nearside Procellarum KREEP Terrane [4].

Chronology

The results of our *in situ* ion probe U-Pb and Pb-Pb isotopic study of phosphates [2] show that NWA 4472 has sampled a range of Pre-Nectarian (>3.92 Ga) lunar volcanic and plutonic lithologies. An evolved basalt fragment (3.93-3.94 Ga), and matrix apatite and merrillite grains (3.94-4.07 Ga) are consistent with the ages of Apollo and Luna KREEP basalts [5]. An older apatite grain dated to be ~4.34 Ga may represent the crystallization age of the HAS clast component.

Our bulk sample furnace ^{40}Ar-^{39}Ar step heating study [2] indicates that Ar is essentially a mixture of trapped and radiogenic components. Corrected Ar dates are consistent with apparent ages of 2.85-3.2 Ga and we interpret these ages to represent a partial resetting of the K/Ar system by a more recent impact event. Cosmogenic exposure irradiation (calculated from the ^{38}Ar/^{36}Ar ratio of the high temp. release steps) suggest a near surface regolith residence time of ~300 Ma; consistent with NWA 4472 being a sample of the ancient lunar regolith.

[1] Joy *et al.* (2008) *39th LPSC*. Abst. no. 1132. [2] Kuehner *et al.* (2007) *38th LPSC*. Abst. no. 1516. [2] Joy *et al.* (2009) *40th LPSC*. Abst. no. 1708. [4] Jolliff *et al.* (2000) *JGR* **105**, 4197-4216. [5] Nyquist & Shih (1992) *GCA* **56**, 2213-2234.