Early Proterozoic zircons in Variscan gabbros from central Spain: Evidence of an Icartian magmatic event at mantle depths?

C. VILLASECA[1], D. OREJANA[1], R.A. ARMSTRONG[2], C. PÉREZ-SOBA[1] AND E. MERINO[1]

[1]Department of Petrology and Geochemistry. Complutense University of Madrid. Spain (granito@geo.ucm.es)
[2]Research School of Earth Sciences. Australian National University. Canberra. Australia

Three gabbro massifs from the Spanish Central System (SCS) were sampled for this study (Talavera, La Solanilla and Navahermosa). Age determinations were made using SHRIMP analyses. Most of the analyzed zircons gave Variscan ages (300 to 305 Ma) in agreement with previous estimates (Zeck *et al*., 2007 [1]). Only two zircon crystals from La Solanilla massif gave discordant Paleoproterozoic ages (1700 to 2100 Ma). Such a spread of ages could reflect heterogeneities of the source of these zircon xenocrysts.

Zircon inheritances in mantle-derived rocks can be explained by: i) contamination with crustal material during transport, ii) delaminated lower crustal slices at mantle depths, iii) incorporation of xenocrysts from metasomatized subcontinental mantle. The inherited zircons have similar trace element composition, zonation patterns and Th/U ratios than associated magmatic zircons. This, combined with the lack of Paleoproterozoic rocks either at outcropping areas or at lower crustal levels, suggests that entrapment of zircon during magma transport is an unreliable origin. The similar zircon chemistry of inherited and magmatic grains indicates that xenocrystic zircon was more likely derived from a mantle source and not from recycled crustal material.

No evidence of basic magmatism of Early Proterozoic age has been found in the Central Iberian Zone (CIZ) to speculate on its chemical affinity. Inherited Icartian ages have been also recorded in Neoproterozoic to Palaeozoic metasediments and Low Palaeozoic orthogneisses from the CIZ (e.g. Fernández-Suárez *et al.,* 2000 [2]). Although there is a low amount of inherited Icartian ages in these crustal materials, their T_{DM} ages suggest an important juvenile addition during the Early Proterozoic, in agreement with our results on mantle-derived rocks.

[1] Zeck, H.P., Wingate, M.T.D. and Pooley, G. (2007), *Geol. Mag.* **144**, 157-177. [2] Fernández-Suárez, J., Gutiérrez-Alonso, G., Jenner, G.A. and Tubrett, M.N. (2000), *Precambr. Res.* **102**, 185-206.

Constraints on ^{26}Al and Mg isotopic distribution in the early solar system from high precision ^{26}Al-^{26}Mg systematics

J. VILLENEUVE[1]*, M. CHAUSSIDON[1] AND G. LIBOUREL[1,2]

[1]CRPG-Nancy Université-CNRS, BP20, 54501 Vandoeuvre lès Nancy, France (* johanv@crpg.cnrs-nancy.fr)
[2]ENSG-INPL, BP40, 54501 Vandoeuvre lès Nancy, France

With a half-life of 0.73 Ma, ^{26}Al is potentially a high resolution relative chronometer for objects formed early in the solar nebula and would be able to provide strong constraints on models of the protosolar nebula. A recent bulk-rock isochron from Allende CAIs shows a $(^{26}Al/^{27}Al)_0$ ratio of 5.23 (± 0.13) × 10^{-5} and $\delta^{26}Mg^*_0$ of -0.040 (±0.029)‰ [1]. Chondrules show lower $(^{26}Al/^{27}Al)_0$ ratios (< 2 × 10^{-5}) than CAIs [2-4 and references therein]. However, since the initial Mg isotopic compositions of chondrules have never been determined precisely, the evolution of Mg isotopes in the solar nebula cannot be discussed.

Here we report the first high precision ion probe analysis of Mg isotope composition (and Al/Mg ratio) in chondrules, which allows to determine precisely both the slope and the initial of the ^{26}Al isochrons. Measurements were performed with the CRPG-CNRS ims 1270 ion microprobe in multi-collection mode, using four Faraday cups.

Our Al-Mg data can be compared to that for bulk CAIs in a simple model of closed system evolution of Mg isotopes in the protosolar disk and allow to demonstrate that ^{26}Al was distributed homogeneously in the inner solar system. These results provide very new constraints for astrophysical models, e.g. timescales for the formation of chondrules and their precursors, for their preservation in the disk as single floating objects and on the mixing processes in the disk.

[1] Jacobsen *et al*. (2008) *EPSL* **272**, 353-364. [2] Russell *et al.* (1996) *Science* **273**, 757-762. [3] Mostéfaoui *et al*. (2002) *MAPS* **37**, 421-438. [4] Kurahashi *et al.* (2008) *GCA* **72**, 3865-3882