U-Pb age of a syn-collisional lower continental crust anatetic event, Socorro-Guaxupé *Nappe*, SE Brazil

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The Southern Brasília Orogen, SE Brazil, accurs along the southern border of the São Francisco Craton and is structured as a pile of Ediacaran syn-metamorphic thicked-skinned nappes that diachronically migrate towards the cratonic margin. The Socorro-Guaxupé Nappe (SGN) is the older and upper allochthon that represents an Andean-type magmatic arc [1]. U-Pb ages in zircon from charnockites, mangerites and Grt-granulites [1] indicate an arc activity around 670 Ma in a subduction-related orogenesis followed by ultra-high-T metamorphism and plutonism lasting until 625 Ma. This age is thought [2] to represent the metamorphic peak of the SGN. In the present study we report on new *in situ* U-Pb and Lu-Hf analysis (both LA-ICP-MS) in zircons from syn-tectonic charnockitic leucosomes that comprise the metatexitic unit of the SGN.

Charnockitic leucosomes were generated under Hbl dehydration melting conditions following the reaction Hbl + Qtz ⇔ Opx + Cpx + Pl ± Melt, which implies minimum temperatures of 850ºC. The leucosomes presented two zircon tipologies. The first comprises bipyramidal-prismatic grains with oscilatory zoning and high luminescence, sometimes preserving low-luminescence cores with 670 Ma. These high luminescene and oscilatory zoning grains show 19 concordant ages at 621 ± 16 Ma. The second tipology of zircons are isometric and *soccer-ball*-type. These grains show sector zoning and a concordia age of 608 ± 4 Ma. Th/U ratios from the *soccer-ball* grains vary from 1.378 to 2.107, whereas prismatic grains vary from 0.118 to 1.774. Some authors also reported high Th/U values from demonstrably syn-metamorphic, high-T melts [3]. ε_{Hf} signatures between -13 and -21 in both tipologies of zircon grains provide evidence of crustal reworking. Despite the 16 Ma error in the age of the prismatic grains, Th/U values clearly sperate the two tipologies of zircon. The older prismatic grains may be related to the onset of the metamorphic peak (~625 Ma), whereas the isometric ones provide evidence of long-lived high-T conditions until ~608 Ma.

[1] Campos Neto *et al*, (2011) *JSAES* **32**, 393-406. [2] Janasi (2002) *Prec. Res.* **119**, 301-327. [3] Hakoda & Harley (2004) *JMPS* **33**, 180-190.

Physico-chemical evolution of Fe-Si-rich interfacial layers during olivine carbonation reactions

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Several recent investigations of mineral carbonation reactions have shown that the formation of Si-rich protective layers at the interface between olivine and aqueous solution can significantly slow down olivine dissolution, thus limiting the rate of conversion to Mg-carbonates.

The experiments conducted on natural Fe-bearing olivine in flexible Au-bags at 90 and 150 °C and with CO_2-saturated fluids show that the presence of Fe in the mineral+fluid system favors the formation of Fe-Si-rich protective layers. The passivating properties of these coatings originate from the strong interaction between Fe(III) and silica and their action is linked to the permanence of oxidizing conditions in the aqueous fluid.

Transmission electron microscope (TEM) analysis of FIB thin sections of the mineral interfacial region allowed us to study the chemical compositon and the physical properties of Fe-Si-rich layers as a function of the progress of the carbonation reaction. In particular, a series of batch experiments of different duration was performed on a natural olivine powder (150-300 μm) at 150 °C and $p\mathrm{CO}_2$=100 bar to describe the evolution of the olivine/water interface over an overall period of one month. During the initial stage of the reaction, the olivine surface is affected by the incipient precipitation of Fe oxide particles, in association with small amounts of amorphous silica, which cover in a non-uniform fashion the mineral surface and prompts the formation of a Fe^{3+}-Si layer. The oxidation of the Fe(II) released by dissolution gradually consumes the oxygen initially dissolved in the aqueous volume, leading to reducing conditions. The change of redox conditions brings about the breakdown of the Fe-Si-rich layer and re-activates the dissolution of the coated olivine surface. Increased concentrations of Fe^{2+} and Mg^{2+} and $SiO_{(aq)}$ accelerate the rates of the carbonation process by the formation of Mg-Fe carbonate solid solutions which cover the olivine grains on top of a relatively porous (~2μm thick) residual coating, composed of abundant amorphous silica.

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