In situ LAM-ICPMS zircon U-Pb and Lu-Hf analyses of high-grade mafic-ultramafic rocks in central Brazil: implications for the evolution of the Neoproterozoic Brasilia Belt

MÁRCIO M PIMENTEL*, BERNHARD BUHN, SERGIO L. JUNGES AND MASSIMO MATTEINI

Geochronology Laboratory, Universidade de Brasília, Brasília-DF, Brazil, 70910-900 (*correspondence: marcio@unb.br)

A new multi-collector LAM-ICPMS coupled to a Nd:YAG 213nm laser microprobe was recently installed at the Geochronology Laboratory of the Universidade de Brasília and has been in use for U-Pb and Lu-Hf *in situ* analyses. In this paper we present a summary of the methodology and settings used, as well as new U-Pb and Lu-Hf isotopic data to constrain the age and nature of the high-grade rocks of the large Barro Alto mafic-ultramafic complex in the Brasília Belt, central Brazil. The Barro Alto Complex is the largest of the three mafic-ultramafic layered complexes and is formed by two different magmatic series: the Serra de Santa Bárbara Sequence or Lower Series (LS) is made of a thick mafic unit made dominantly of gabbronorites and a less important ultramafic unit made of pyroxenite and peridotite; diorites are alsopresent in the upper section of this series; (ii) the Serra da Malacacheta Sequence or Upper Series comprises mainly metagabbro (the Cafelândia Amphibolite), troctolite and anorthosite. Rocks of the LS display metamorphic assemblages indicating granulite facies metamorphism with local paragenesis of UHT metamorphism.

New ID-TIMS and ICPMS data for selected rock units of the large mafic-ultramafic Barro Alto Complex are presented and confirms the Neoproterozoic age (780-800 Ma) for the Lower Series of the complex and the Mesoproterozoic age (ca. 1.25 Ga) for the Upper Series and associated Juscelândia volcano-sedimentary sequence. These are comparable to U-Pb data for corresponding series of the Niquelândia and Canabrava complexes, further to the northeast. Lu-Hf and Sm-Nd data indicates that the original magmas of the Lower Series have been strongly contaminated with older continental crust, whereas rocks of the Upper Series have been derived from a depleted mantle source, with limited crustal contamination.

Emplacement ages of ca. 0.79 and 1.25 Ga are unusual in the Brasilia Belt and suggests that the terrain which includes the Barro Alto complex represents an allochthonous block accreted to the orogen during the Neoproterozoic.

Nanoscale effects of dissolved silica on the growth of calcite {104} faces

C.M. PINA[1], C. MERKEL[2] AND G. JORDAN[2]

[1]Dept.Cristalografía y Mineralogía, Universidad Complutense de Madrid, 28040 Madrid, Spain (cmpina@geo.ucm.es)
[2]Dept. Geo- u. Umweltwiss., LMU München, Germany (Casjen.Merkel@lrz.uni-muenchen.de, jordan@lmu.de)

Some anomalous non-crystallographic morphologies of carbonate minerals are frequently considered as evidences of biological activity. However, also dissolved silica has the ability to strongly modify the growth behaviour of carbonate minerals and to generate biomorphs without any participation of biological processes [1,2]. Here we present new *in situ* Atomic Force Microscope (AFM) observations of the effect of silica on the motion and generation of steps on calcite {104} faces. Calcite {104} surfaces grew from supersaturated aqueous solutions ($\beta_{calcite} = ([Ca^{2+}][CO_3^{2-}])/K_{sp,calcite} \leq 30$), with silica concentrations ranging from 10 to 200 ppm at pH 10.2. Results show that dissolved silica species significantly interact with acute calcite steps and, to a lesser extent, with obtuse steps. This leads to a progressive change in the morphology of both monolayer two-dimensional islands and hillocks (see Fig.1). The different effect of silica on obtuse and acute calcite steps will be discussed on the basis of theoretical growth impurity models.

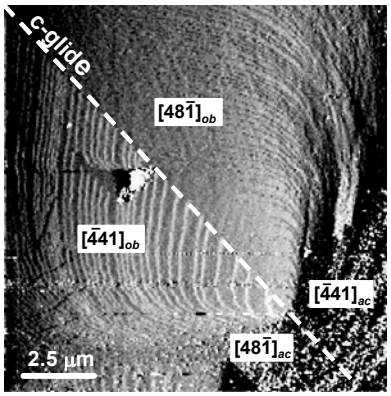

Figure 1: AFM image of calcite (104) hillock during growth from a solution with a supersaturation of $\beta_{calcite} \approx 30$ and containing 10 ppm of silica.

[1] H. Imai *et al*. (2003) *Chem. Commun* 484-485. [2] J.M. García-Ruiz *et al.* (2003) *Science* **302,** 1194-1197.