U-PB AGES AND HF ISOTOPIC RECORD OF ZIRCONS FROM CARLOS CHAGAS BATHOLITH: IMPLICATIONS FOR TECTONO-METAMORPHIC EVOLUTION OF THE ARAÇUAÍ OROGEN (SOUTHEASTERN BRAZIL)

Melo, M.G.[1]; Lana, C.[1]; Stevens, G.[2]; Alkmin, L.A.[1]; Gerdes. A.[3]; Nalini Jr, H.A.[1]; Gonçalves, G.O.[1]; Alkmim, F.F.[1]; Teixeira, L.[1]; Silva, J.P[1]; Silveira, G.[1]; Fadul, C.[1]

[1]Universidade Federal de Ouro Preto; [2]Stellenbosch University; [3]Goethe-Universität Frankfurt

The Carlos Chagas batholith (CCB), focus of this study, represents one of the most significant expressions of the G2 supersuite formed during the collisional stage (ca. 585-545 Ma) of the Araçuaí orogen (AO). The CCB rocks correspond to S-type granites which generally contain K-feldspar megacrysts and variable content of garnet and biotite. In this work, we carried out a detailed geochronological and Hf isotopic study by LA-ICP-MS in zircons from the CCB in order to evaluate the tectono-metamorphic evolution of the AO. In addition, analysis of rare earth elements (REEs) and Ti were performed on distinct domains of zircon for a better understanding of the petrologic conditions that affected the batholith during the high-grade metamorphic events. All samples show CL-defined inherited cores and have similar age patterns, with dominant peak between 600 and 637 Ma. Subordinate peaks are recorded at 644-678 Ma, 693-739 Ma and 826 Ma. The U-Pb analysis performed on magmatic zircon grains yield a weighted mean age of 583 ± 6 Ma. Analyses in rim domains indicate two distinct metamorphic populations, with weighted mean ages of 562 ± 6 Ma and 515 ± 6 Ma. The inherited cores yield initial $^{176}Hf/^{177}Hf$ ratios ranging from 0.282233 to 0.282366, with εHf(t) values between -6.7 and -1.8. The distribution of model age (T_{DM}) spans from 1350 to 1580 Ma. Spot analyses done on magmatic zircons gave initial $^{176}Hf/^{177}Hf$ ratios ranging from 0.282201 to 0.282386 and εHf(t) between -8.2 and -1.8, while analyses performed on metamorphic domains yield initial $^{176}Hf/^{177}Hf$ ratios between 0.282203 and 0.282381. Regarding REEs, zircon grains presented lower HREE in the metamorphic rims (Gd_N/Lu_N = 0.05-0.50) than in the inherited/magmatic cores (Gd_N/Lu_N = 0.02-0.10). Both domains display negative Eu anomaly, with Eu/Eu* = 0.03-0.09 (inherited and magmatic) and 0.02-0.52 (metamorphic). Inherited cores have 9-143 ppm Ti, corresponding to Ti-in-zircon temperatures of 732-975 ºC. Magmatic cores and metamorphic rims gave Ti contents of 8-85 ppm (724-918ºC) and 11-71 ppm (755-970ºC), respectively. Based on the main age peak of the inherited zircons, we infer that these minerals are from Rio Doce and/or Rio Negro magmatic arcs. The abundant occurrence of inherited zircon cores in the CCB may indicates Zr saturation in the melt and/or that melt generation and extraction from the source was fast enough to limit the dissolution of these inherited grains. Most of the inherited and magmatic zircons have homogenous Hf isotopic composition and similar enrichment in HREE patterns. Petrological and geochronological data show that the metamorphic zircon grew at granulite-facies conditions in equilibrium with peritectic garnet. The U-Pb ages and initial $^{176}Hf/^{177}Hf$ ratios from distinct domains indicate a complex metamorphic history during the Araçuaí orogeny, associated to the zircon formation by different mechanisms of metamorphic recrystallization and growth/overgrowth at high temperatures, as indicated by Ti-in-zircon thermometer. The authors acknowledge FAPEMIG for providing financial resources for the foment of this abstract.

PALAVRAS-CHAVE: U-PB, LU-HF, ARAÇUAÍ OROGEN