

DETRITAL ZIRCON AND HF RECORD OF THE HIGH-GRADE ACAIACA COMPLEX AND PEDRA DOURADA GRANULITE

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ABSTRACT: The Acaiaca Complex and Pedra Dourada Granulite are two granulite facies complexes that outcrop within the largely amphibolite facies Mantiqueira Complex. The Acaiaca Complex and Pedra Dourada Granulite both consist of para and orthogneisses while the Mantiqueira Complex is largely composed of orthogneiss. Existing monazite U-Pb data from several workers suggest that all three units experienced the same metamorphic event at ca. 2050 Ma, producing peak conditions of 750-800 °C and 6 kbar in the granulite facies terrains and 6 kbar and 700 °C in the Mantiqueira Complex. Presently U-Pb zircon data has only been obtained from the Mantiqueira Complex. In this study, U-Pb LA-MC-ICPMS zircon data were obtained from the Acaiaca Complex and Pedra Dourada Granulite. Two samples were used for each unit, one mafic and one felsic. Combined, the four targeted samples yield cores with ages between 3.5 to 2.2 Ga and a large proportion of metamorphic grains and rims at ca. 2.05 Ga. This is quite similar to the U-Pb zircon data obtained from the Mantiqueira Complex (zircon rim crystallisation ages of 2.2-2.05 Ga and inherited Archean cores of 3.2-2.6 Ga). All of the samples were also found to contain rims which gave ages <2.0 Ga, suggesting some resetting during the Neoproterozoic Araçuaí – West Congo orogen. Hf isotopic data was collected by LA-MC-ICPMS analysis on the dated zircon grains. The results of this indicate fairly evolved sources for the Acaiaca Complex and Pedra Dourada Granulite. This is consistent with the suggested origin of the Mantiqueira Complex as Archean crust that was reworked during the ca. 2.1 Ga Transamazonian orogeny. These results are also consistent with Sm-Nd data from the Mantiqueira Complex obtained by other workers, which also indicates recycling of older continental material from the São Francisco Craton. The similarity between the detrital zircon signatures and sources of the Mantiqueira Complex, Acaiaca Complex and Pedra Dourada Granulite indicates that these three units are identical to each other, and the Acaiaca Complex and Pedra Dourada Granulite are high-grade equivalents of the Mantiqueira Complex. The results of this study are consistent with the prevailing theories for the formation of the Mantiqueira Complex and the role of Transamazonian orogenesis.

KEYWORDS: U-PB ZIRCON, TRANSAMAZONIAN OROGENY, HF ISOTOPES