

ECTASIAN MESOPROTEROZOIC U-Pb AGES (SHRIMP II) FOR THE METAVOLCANO-
SEDIMENTARY SEQUENCES OF JUSCELÂNDIA AND INDAIANÓPOLIS AND FOR HIGH
GRADE METAMORPHOSED ROCKS OF BARRO ALTO STRATIFORM IGNEOUS
COMPLEX, GOIÁS STATE, CENTRAL BRAZIL

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Keywords: U-Pb SHRIMP, Juscelândia, Indaianópolis, Barro Alto, Mesoproterozoic.

The Juscelândia (Fuck *et al.*, 1981), Indaianópolis and Palmeirópolis (Ribeiro Filho and Teixeira, 1981) metavolcano-sedimentary sequences occur respectively at the West borders of Barro Alto, Niquelândia and Cana Brava mafic-ultramafic stratiform complexes in Central Brazil. Together they form a 300 km long, N-NE-trending belt crossing Central Goiás and Tocantins states. The nature of the geological contact (tectonic or igneous) between these igneous intrusions and the metavolcano-sedimentary sequences remains under debate. Igneous crystallization ages for the complexes are thought to be early Mesoproterozoic (Ferreira Filho *et al.*, 1994; 1570-1600 Ma, Calymmian Period) to Paleoproterozoic (Fugi, 1989; Correia *et al.*, 1996, 1997a, 1997b; Orosian Period). For the metavolcano-sedimentary sequences the dating consists of a Rb-Sr

WR isochron of $1,157 \pm 150$ Ma ($R_0 = 0.0740 \pm 0.0020$, Girardi *et al.*, 1978) obtained for schists and gneisses of Palmeirópolis and Pb-Pb model ages in the range 1170-1270 Ma for galenas from Zn-Cu-Pb massive sulphide mineralization hosted by this unit (Araújo *et al.*, 1996).

New U-Pb SHRIMP II determinations were obtained on zircons from one para-gneiss from Indaianópolis (NQ1577), one sheared garnet micaschist from Juscelândia (TC3), and on two samples from Barro Alto: TC2 is an acid granulite with quartz, cordierite, sillimanite, plagioclase and mesoperthite and BA1546 is a metagranite with kyanite. Apart from BA1546, which comes from central northern part of Barro Alto, all of the samples come from close to the contact between the sequences and the layered intrusions.

Zircons from Indaianópolis sample NQ1577 are euhedral-subhedral prismatic grains or fragments with high U content (ugly aspect and dark color under transmitted light microscope). The dark colour of these zircons made it difficult to discern the presence of zonation or cores to the grains. The concordia diagram (Fig. 1) shows one major zircon population with a concordant upper intercept close to 1,300 Ma (calculated $^{206}\text{Pb}/^{238}\text{U} = 1299 \pm 39$ Ma), and a scatter of discordant ages down towards 700 Ma.

Clear and beautiful euhedral prismatic zircons with continuous zonation from the TC2 paragranulite (Fig. 2) display very complicated systematics. The main group spreads subparallel to the concordia from 1,300 Ma towards 1,150 Ma (best estimate $^{207}\text{Pb}/^{206}\text{Pb} = 1286 \pm 13$ Ma). A second group including several rim analysis lies very close to, or on, the concordia at 1,000 Ma. A third group plots along concordia from

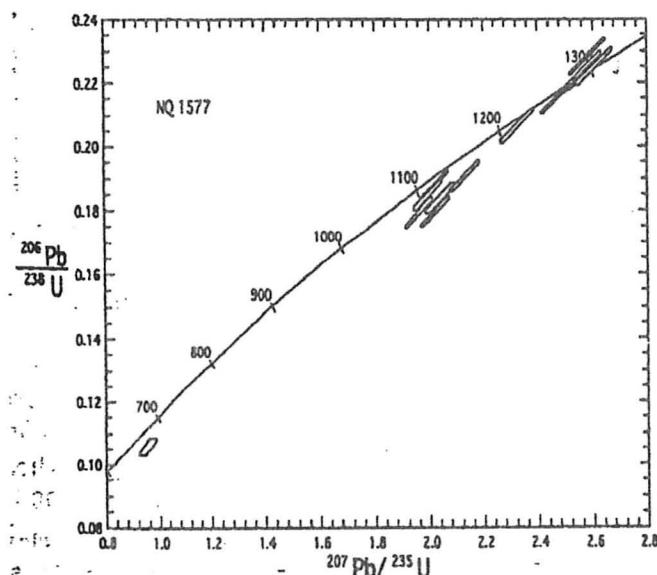


Fig. 1: Concordia diagram for sample NQ1577 from Indaianópolis.

900 to 750 Ma including more rim analyses. There is also a scattering of older, probably inherited, grains

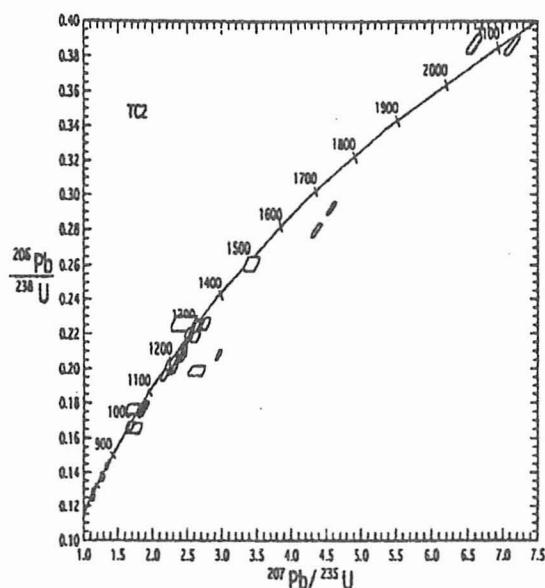


Fig. 2: Concordia diagram for sample TC2 from Barro Alto.

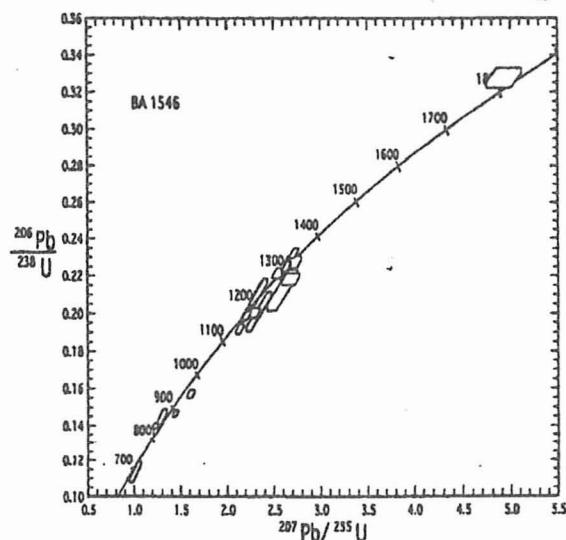


Fig. 3: Concordia diagram for sample BA 1546 from Barro Alto.

BA1546 metagranite (Fig. 3) displays a similar, but simpler, distribution of points to the TC2 plot. These zircons are also mostly clear prismatic euhedral grains with single continuous zonation. 13 new analyses together with 6 obtained previously (Correia *et al.*, 1997b) better constrain the main group

with ages from 1,500 - 2,100 Ma.

concordant ages at $^{207}\text{Pb}/^{206}\text{Pb} = 1302 \pm 32$ Ma instead of 1235 ± 120 Ma as previous published.

Finally, TC3 zircons are prismatic euhedral: subhedral and rounded grains with continuous zonation. Some of the grains (both prismatic and rounded) are clear and some are dark with high U content. The concordia plot (Fig. 4) reveals a concordant main population with $^{207}\text{Pb}/^{206}\text{Pb}$ age of 794 ± 14 or $^{206}\text{Pb}/^{238}\text{U}$ age of 782 ± 16 Ma. Two older determinations (shaded areas in Fig 4), corresponds to cores of inherited grains.

Since Hasui and Almeida (1970) the influence of more than one tectonic cycle over the main geologic units of Central Brazil has been recognized. Further works better settled the importance of the Urucuano (ca. 1300 Ma: Fuck *et al.*, 1989; Correia *et al.*, 1997a), and Brazilian (ca. 780 Ma: Ferreira Filho *et al.*, 1994; Saita *et al.*, 1994; Correia *et al.*, 1996) tectonic cycles on the area.

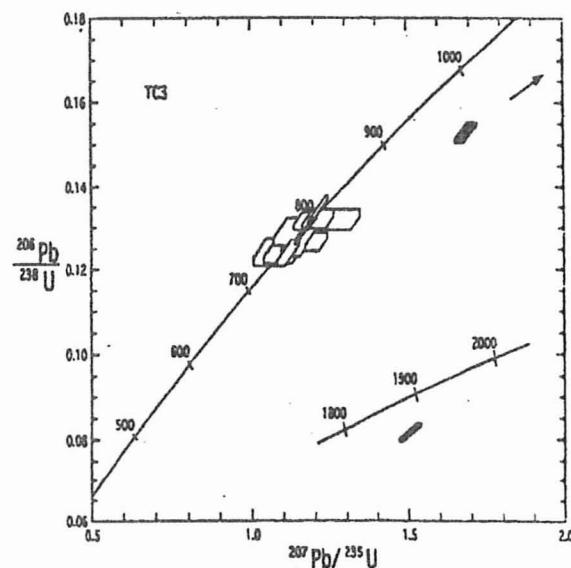


Fig 4: Concordia diagram for sample TC3 from Juscelândia

Based on previous geochronological data from various isotopic systems (Rb-Sr, Sm-Nd, Re-Os and U-Pb) obtained for samples from Barro Alto, Niquelândia and Cana Brava, Correia *et al.* (1996, 1997a,b) suggested a tectonic polycyclic and polymetamorphic evolution for the region, with a primary protolith formation episode associated with lithospheric extention around 2.0 Ga, follow-

ed by metamorphic events associated with the shortening and thickening of the lithosphere during the Mesoproterozoic (1.3-1.2 Ga) and Neoproterozoic (0.8 - 0.7 Ga).

The new data here presented fits in a comprehensive way to this scenario. Although it is not possible to be sure about the igneous or metamorphic origin of the zircons from NQ1577 we suppose it is logical to attribute this age population to the same event which is expressed in the main group ages of TC2 and BA1546 samples, rather than as an indication of the age of the volcanism associated with the Indaianópolis Sequence.

The younger Neoproterozoic age for the correlated TC3 schist from Juscelândia may, however, be interpreted as the resetting of the U-Pb system during shearing processes present in this location, associated to the later Neoproterozoic tectonism.

The distribution of several analyses subparallel to the concordia between the Urucuano and Brasiliano ages is not easily explained. However, we suppose that more detailed geological field information will provide a solution to this puzzle. In particular, once the closure behaviour of the various isotopic systems is correlated with detailed tectonic information, including the speed of the exhumation process and the relative positions of the units during the tectonic cycles, we may better understand the significance of the age distribution.

ACKNOWLEDGEMENTS:

Thanks are given to Cia. Niquel Tocantins for all facilities provided during field work. We also want to mention that this research was supported by the

Brazilian Agency FAPESP, thematic projects numbers: 95/4652-2 and 97/00640-5.

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