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Lower Neoproterozoic and Mesoproterozoic Records in Metassedimentary Sequences of the Paranaguá Terrane (S-SE Brazil): U-Pb detrital zircon geochronology

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INTRODUCTION:

The aim of this work is the presentation of a synthesis of geochronological data (ICP-MS-laser ablation, zircon) for the metassedimentary sequences which occur in the Paranaguá Terrane in southeastern Brazil (figure 1).

The Paranaguá Terrane (Cury, 2009) is composed of precambrian geological units distributed in a NE-SW elongated swath, about 250 Km long and 30 Km wide, in south-southeastern Brazil, within the states of São Paulo, Paraná and Santa Catarina. This terrane is constituted mainly by an igneous complex, represented by the Morro Inglês, Rio do Poço and Canavieiras-Estrela suites. The country rocks of these granites (*s.l.*) are gnaissic and gnaissic-migmatitic rocks of the São Francisco do Sul Complex and associated metasedimentary rocks (Rio das Cobras and Turvo-Cajati Sequences). In the Paranaguá Terrane, greenschist (biotite zone) and anfibolite/granulite (kyanite-garnet-sillimanite-KFeldspar) parageneses are present in metassedimentary sequences. The Morro Inglês granite complex (~ 600 Ma) is intrusive in the metassedimentary sequences.

U-PB DETRITAL ZIRCON GEOCHRONOLOGY

For the geochronological provenance study, zircon grains were extracted from four predominantly quartz siliciclastic schist tectono-stratigraphic (greenshist and anfibolite/granulite facies) units in south-southeastern Brazil.The radiometric analyses were carried out at the Center of Geochronological Research (CPGeo) of the Geoscience Institute at the University of São Paulo–Brazil, using ICP-MS-laser ablation, according to the procedures presented by Sato et al (2009). The standard "GJ" was used for the isotopic corrections.

Common Pb corrections are based on measured ^{202}Hg and ^{204} Pb and on the common Pb composition at the approximate time of rock formation (Stacey and Kramers, 1975). The ages were calculated using the decay constants and the present value for the ^{238}U/^{235}U ratio recommended by Steiger and Jäger (1977). Cathodolumenescence images were used to choose sites for dating. The zircon grains are on average rounded, about 0,1mm long, and have overgrowths.

The majority of detrital zircon grains in all four samples have ages between 1.000 – 900 Ma , 1.300-1200 Ma and 1.500-1.400 Ma. All four samples contain zircon grains that gave ages between 2.200-1.900 Ma. In two samples zircon grains were found with a older Archaean age (3.000-2.600 Ma). Late Neoproterozoic ages of about 600 Ma are found in overgrowths on zircon separated from high-grade sediments, and are related to metamoephism a that time.

DICUSSION:

The age of sedimentation of the metasedimentary sequences which occur in south-southeastern Brazil (Paranagua Terrane) cannot be older than approximately 800 Ma, as indicated by the youngest detrital zircon.

The basement rocks (Luis Alves and Curitiba Microplates) on the South American side are characterized by having Archaean and Palaeoproterozoic ages. Mesoproterozoic and lower Neoproterozoic ages are characteristically absent in the zircon U-Pb age patterns throughout southeastern Brazil, except for the Apiaí Terrane (Siga Jr et al, 2010). On the African side rocks with ages in the range 900-1.200 Ma are mainly found in the Gariep Belt in SW Africa, which may be associated with the Rocha Group in Uruguay and the Dom Feliciano Belt in Brazil (Basei et al., 2005, 2009). In contrast the basement rocks of the Kaoko Belt (SW Congo Craton, NW Namíbia) are characterised by having Mesoproterozoic ages 1.520-1.450 e 1.700-1.750 Ma (Kröner et al, 2004; Goscombe and Gray, 2007) These ages are mainly found in granitic to granodioritic gneisses which underwent migmatization during the Neoproterozoic.

The presence of 900-1.200 Ma –old zircon in the studied area suggests that the meta-sediments in the Paranaguá Terrane were deposited during the break-up of Rodinia. A study of the basic rocks which are often found as enclaves within the igneous complexes would be fundamental to a better understanding of their source. The source rocks for zircon with mesoproterozoic ages between 1.400 and 1.700 Ma are probably found in the Kaoko Belt, presently on the African side of the Atlantic Ocean.

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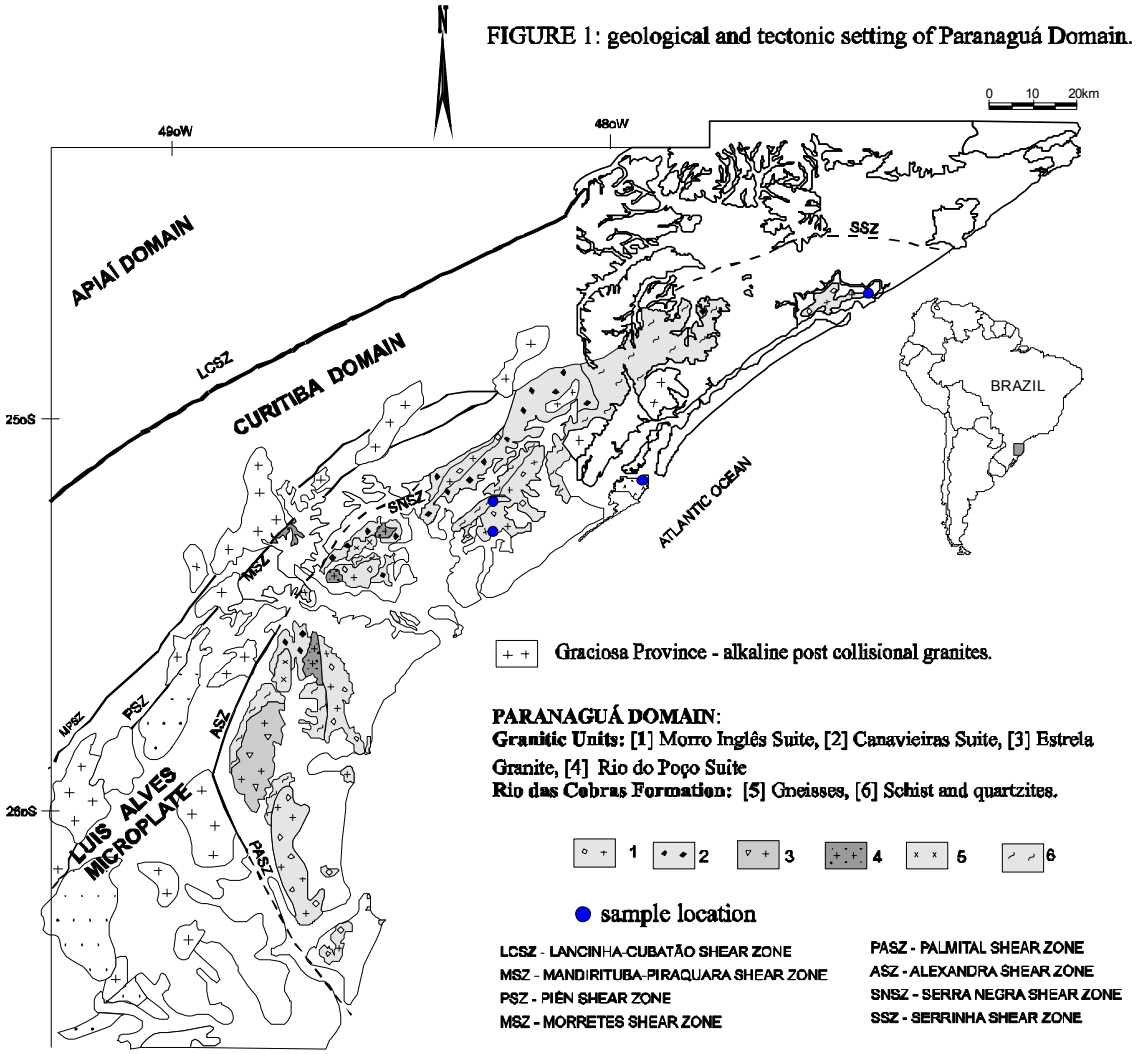

FIGURE 1: geological and tectonic setting of Paranaguá Domain.