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NEOPROTEROZOIC AGE FOR SERIDÓ GROUP, NE BORBOREMA PROVINCE, BRAZIL

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The eastern Borborema Province can be divided into three main geographic regions: northern, north of the Patos shear zone; central, between the Patos and Pernambuco shear zones (Zona Transversal); and southern, between the Pernambuco shear zone and the São Francisco craton. The central and southern regions consist of Archean to Paleoproterozoic basement blocks with late Paleoproterozoic and late Mesoproterozoic (ca. 1 Ga) metasedimentary and metavolcanic sequences forming major fold belts between the older basement blocks. The northern region is underlain by Transamazonian to Archean basement of the Rio Piranhas and Caldas Brandão massifs (Dantas et al., this congress). Mesoproterozoic metasedimentary rocks or fold belts have not been found yet in the northern region, although they are probably present to the west in Ceará state. However, the Rio Piranhas and Caldas Brandão basement is overlain by metasedimentary rocks of the Seridó Group, which are now mostly biotite-plagioclase-quartz schists and gneisses and comprise the Seridó Fold Belt.

The age of the Seridó Group has been disputed over the past two decades, with preferred ages being either late Transamazonian (ca. 1.9 Ga) or early Brasiliano (ca. 600-800 Ma). Our recent (Van Schmus et al., 1995a) and new Sm/Nd and U/Pb results now clearly demonstrate that the Seridó Group was deposited on the older basement at ca. 750 to 800 Ma, prior to the Brasiliano orogeny. Our purpose here is to present the data that argue for a Neoproterozoic age.

The Seridó Group is composed of two main formations: the Seridó Fm. is a biotite-rich schist in the upper part of the Seridó Group, and the Jucurutu Fm. is a quartz-rich biotite gneiss in the lower part of the group; the Equador Quartzite is locally present as an upper member of the Jucurutu Fm. The Jucurutu Fm. apparently overlies Transamazonian basement of the Rio Piranhas Massif, but well preserved depositional contacts have not been clearly demonstrated due to localized deformation near the contacts. A Transamazonian augen gneiss (G2 granite of Jardim de Sá) is present locally between the Jucurutu Fm. and the older basement. This gneiss has been interpreted recently as intrusive into Jucurutu Fm., but our data argue that it most likely unconformably underlies the Seridó Group.

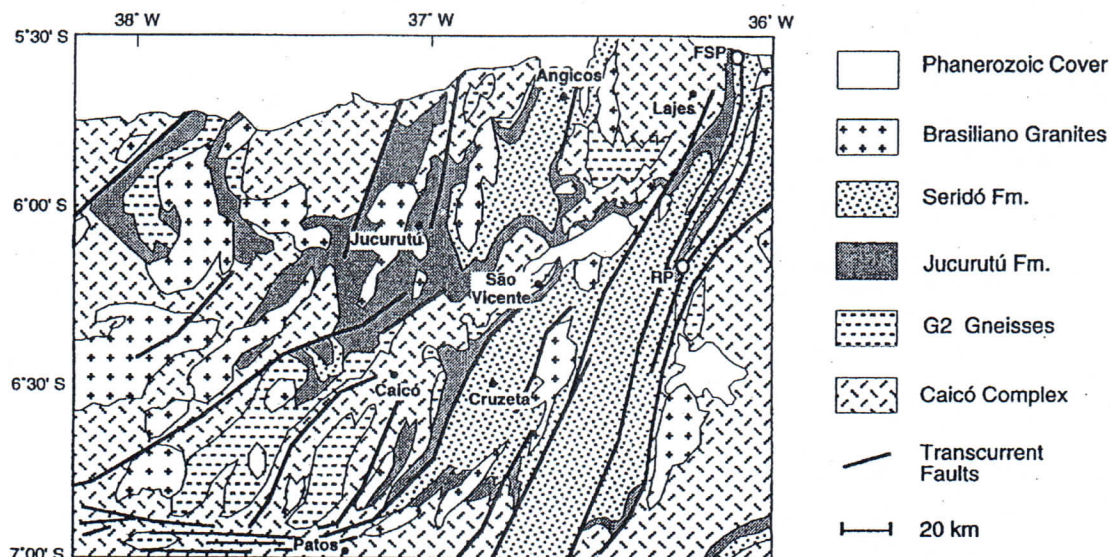


Figura 1 - General map showing simplified geology, cities, and location of Fazenda São Pedro (FSP) and Rio Potengi (RP) samples.

The most comprehensive results arguing for a Neoproterozoic (probable) or late Mesoproterozoic (maximum) age are whole-rock Sm/Nd analyses of Seridó schist and Jucurutu gneiss. Most Jucurutu samples have Nd Epsilon(t) values of -5 ± 1 at 600 Ma and corresponding TDM (crustal residence) ages of 1.6 to 1.5 Ga. Seridó schist samples have Nd Epsilon(t) values ranging from -5 to 0 , with corresponding TDM ages of 1.6 to 1.2 Ga, with a large cluster at Epsilon(t)=0, TDM = 1.2 Ga. These data set a maximum age of 1.2 Ga for the Seridó Fm. and a maximum age of 1.6 Ga for the Jucurutu Fm.

At several localities, particularly at Faz. São Pedro, east of Pedra Preta-RN and at an outcrop on BR-104, 20 km SE of Barra de Santa Rosa-PB, we sampled light-colored, sugary, fine-grained units intercalated with the schists. We tentatively concluded that these were originally air-fall tuffs by analogy with such tuffs in younger, unmetamorphosed sedimentary sequences. We extracted zircons from these "metatuffs" at both localities, as well as from typical schist at the Barra de Santa Rosa locality and from an outlier of Seridó schist west of Natal. U/Pb data for zircons from these units include at least four fractions (including two single crystals from the schist) having a concordant age of 741 ± 15 Ma. All zircon data show an array extending from about 740 Ma to about 3,000 Ma, with many analyses clustered near concordia at the lower end. We interpret these as a mixture of detrital zircons from regional basement and volcanic zircons from the tuffaceous component.

We do not believe that the 740 Ma zircons are metamorphic (wrong morphology and insufficient grade of metamorphism), so we conclude that the Seridó Fm was deposited about 740 Ma.

Several typical Jucurutu Fm. gneisses from the vicinity of Jucurutu city and from Rio Potengi have Nd Epsilon(600) near -5.0 and TDM ages of 1.5 to 1.6 Ga, which argue for a maximum depositional age of 1.6 Ga. No zircons have been analysed from typical Jucurutu biotite gneiss yet, although detrital zircons from felsic units at Faz. da Lapa (east of Ipueira-RN) are as young as 1700 Ma. Thus, we can only conclude from Sm/Nd and U/Pb data that the Jucurutu Fm. is younger than 1600 Ma. However, several samples of Jucurutu gneiss from Rio Potengi (SW of São Tomé-RN) give a Rb/Sr isochron of ca. 750 Ma, and the Sm/Nd results are similar to those found for rocks in the Pajeú-Paraíba, Piancó-Alto Brigida, and Sergipano fold belts, which contain 1.0 Ga volcanic units (Van Schmus et al., 1995b). Thus, the depositional age of the Jucurutu Fm. could be closer to 1.0 Ga than 1.5 Ga, and it may be Neoproterozoic (ca. 750 to 800 Ma).

We analysed several samples of "Jucurutu"-like gneiss included in and intruded by 1.9 Ga G2 granite SW of Angicos (Jardim de Sá, 1994). All samples have TDM ages of ca. 2.6 Ga, indistinguishable from the G2 granite and regional Transamazonian basement. In contrast, nearby samples of unquestionable Seridó schist and Jucurutu gneiss yield TDM values of 1.2 Ga and 1.5 Ga, respectively, similar to results for these formations elsewhere throughout the region. Thus, the "Jucurutu" xenoliths are probably fragments of Transamazonian basement and have no bearing on the relative age of the G2 granite and the adjacent Seridó group. We conclude that the Seridó Group is Neoproterozoic, as shown by the bulk of the data, and that it probably overlies the G2 granite in the Angicos area.

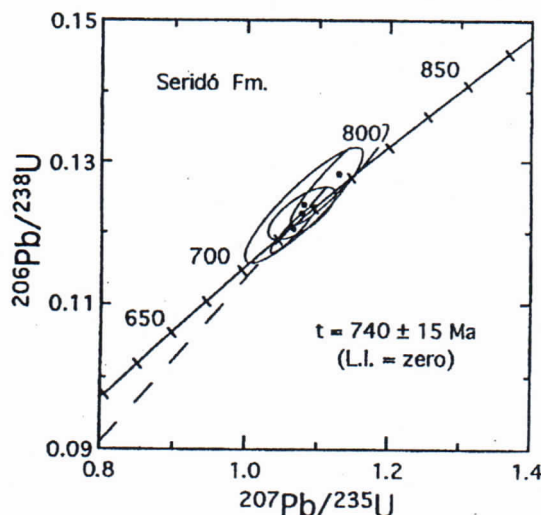


Figura 2 - Concordia diagram for selected zircon analyses from the Seridó schist and tuff(?)

We suggest that the Seridó Group was originally graywacke (turbidite) deposited upon older basement of the Rio Piranhas-Caldas Brandão massifs, in a basin receiving detritus from Neoproterozoic volcanic or magmatic terranes, with some contributions of old (1.6 Ga) crustal material. These terranes have not yet been found, but petrologic and isotopic data suggest that they could have been either magmatic arc complexes (Nd Epsilon(t) 0) accreted to the craton or large domains of intracratonic flood basalts (Nd Epsilon(t) \approx 0).

Finally, our results on the Seridó Group clearly show the importance of isotopic data for metasedimentary and metavolcanic units in regions where it is difficult to establish continuous vertical sequences and lateral correlations. Thus, refinement of the ages and stratigraphy of some rocks presently assigned to the Seridó Group will be necessary as more isotopic data are obtained.

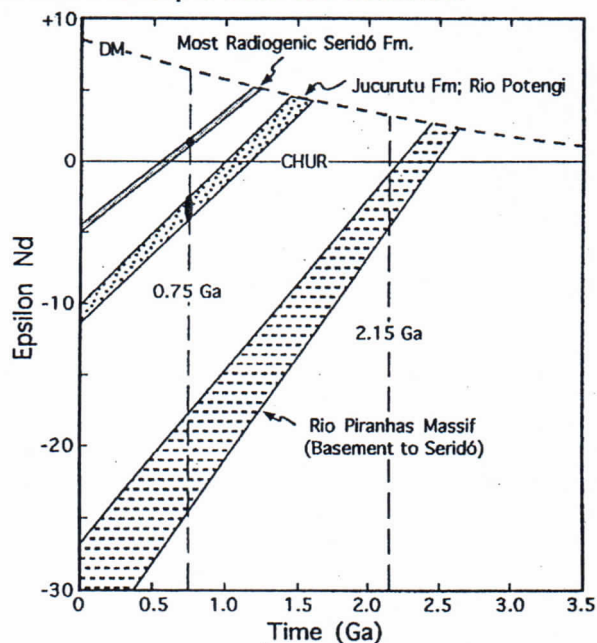


Figura 3 -
Nd evolution plot showing typical data for the Seridó schist, Jucurutu gneiss,

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