ABSTRACT

The present thesis focused on the significance of the Rio Doce Group in the context of the geological and geotectonic evolution of the Neoporterozoic Araçuaí Orogen. This orogen extends from the eastern border of the São Francisco Craton to the Atlantic Ocean coast, between the 15° and 21°S parallels. Its tectonic evolution from the precursor basin opening to the post-collisional waning stage is bracketed between *ca*. 900 to *ca*. 490 Ma. The studies carried out on the metavolcanic-sedimentary assemblage of the Rio Doce Group were based in several detailed field sections, accompanied by structural, petrographic, geochemical and U-Pb geochronological studies. Most of the volcanic-sedimentary assemblage of the Rio Doce Group underwent amphibolite facies metamorphism, but despite this strong tectono-metamorphic overprinting the petrographical and geochemical studies revealed an important volcanogenic association, characterized by calc-alkaline, dacitic arc-related deposits. The pyroclastic association is assigned to the Palmital do Sul Formation, a dominantly epiclastic marine deposit, containing important lapilli tuffs, including well-preserved dacitic bomb-bearing agglomerates. This pile is considered to be deposited close to the volcano edifice. In addition to the pyroclastics deposits, both volcaniclastic and epiclastic sediments of similar dacitic, calc-alkaline signature were also characterized in a turbiditic deposit from the Tumiritinga Formation, representing a more distal, re-deposited sequence. The medium-K, calc-alkaline dacitic signature of the volcanoclastic rocks matches well the signature of modern (Pleistocenic) arc-related pyroclastics, as exemplified by the calc-alkaline volcanoclastics of the Slaverry Basin from the Peruvian Andean platform. The calk-alkaline signature also matches the signature of the arc-related, pre-collisional plutonic association of the orogen (G1), represented by the Galiléia (~594 Ma) and São Victor (~585 Ma) tonalitic suites. Other evidence from the association (of part) of the sedimentation of the Rio Doce Group with the magmatic arc are given by presence of turbiditic greywackian arenites from São Tomé Formation, which reveled provenience from plagioclase-rich, tonalitic sources. The U-Pb geochronological ages obtained with SHRIMP, TIMS and Laser-Ablation techniques also reinforce the connection of the Rio Doce metavolcanic-sedimentary deposits with the Araçuaí Orogen`s magmatic arc. In special, the crystallization age of pyroclastic tuffs from the Palmital Formation, dated at 585 ± 5 Ma and magmatic zircons of the similar age, dated from the volcaniclastic unit of Tumiritinga Formation. The same indication is also furnished by detrital zircons collected from arenites belonging to São Tomé Formation, dated at 594± 3 Ma. Accordingly, the main achievement of this study in addition to the discovery of the pyroclastic deposits was the characterization of the Rio Doce Group as the main components of a pre-collisional volcano-plutonic-sedimentary system, accreted to the active continental margin during the Araçuaí Orogen´s pre-collisional stage, at *ca*. 630-585 Ma. Moreover, the Rio Doce basin also received contribution of proximal deposits from fore-arc and back-arc sites. Another important achievement was the identification, based on the integration of geological sections and the geological map, of a major structural feature characterizing a tectonic inversion

zone (TIZ). This structural mark resulted from the inversion of the regional foliation vergence about the 41º30' E meridian, between Ipanema and Teófilo Otoni towns, close to Galiléia town. It resulted from the inversion of the tectonic transport in response to the syn-collisional thrusting and folding event. As a result, to the west of the TIZ the orogen records a west-verging tectonic transport towards the São Francisco Craton, whereas to the east of the TIZ, the tectonic vergence is dominantly east-directed, presumably towards to the Congo Craton. The studies also led to the establishment of a new chrono-stratigraphic succession for the Rio Doce Group. The Palmital do Sul and Tumiritinga formations were positioned as the lower section of the basin. The São Tomé and João Pinto formations were re-interpret as the upper section of the basin.