

Title: U-Pb LA-ICPMS detrital zircon geochronology for the São João del Rei and Carandaí basins: new clues for intermittent Proterozoic rifting in the São Francisco paleocontinent

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Abstract: The Tiradentes Formation (São João del Rei tectonic basin) is an up to 1000 meter thick shallow marine quartzite succession that crops out in the southern end of the São Francisco Craton. It is covered in angular unconformity by fault-bounded diamictites (Carandaí Formation), limestones (Barroso Formation) and pelites (Prados Formation) which fill a NE-SW aulacogen. Detailed field geology and U-Pb LA-ICPMS detrital zircons ages from basal and top Tiradentes quartzites and from the Carandaí diamictite support the interpretation that these units are genetically associated with Mesoproterozoic rifting episodes. The initial phase of the extensional regime was dated as young as 1536 ± 33 Ma, as recorded in zircon grains extracted from the Tiradentes quartzites, whereas the second phase is recorded in the Carandaí diamictite, whose youngest zircon grains show ages as young as 1379 ± 3 Ma. Whereas these age patterns allow a tectonic relationship with the recognized basin cycles of the nearby Espinhaço intracratonic system, the predominant peak ages from 1.97 to 2.17 for all these metasedimentary sequences reveal main derivation from the Rhyacian/Orosirian crust (Mineiro belt), although Archean sources are also present. The geologic inferences indicate that the Barroso carbonates represent a sag shallow basin over the rift succession while the Prados deep-water pelites may represent renewed rifting at approximately 1000 Ma ago genetically related to the Andrelândia passive margin metasedimentary sequence. The latter unit extensively overlies the older rift-related units and the Mineiro belt. A maximum depositional age of 1156 ± 32 Ma was obtained for a sheared quartzite probably related to the Andrelândia sequence, which can be again correlated with the youngest basin cycle of the Espinhaço system, according to geologic and geochronologic evidences. The closure of the São João del Rei and Carandaí basins took place during the Neoproterozoic (Brasiliano) orogen, and produced weak deformation and greenschist-facies metamorphism in the related sequences at 600-590 Ma ago. From the tectonic perspective, we believe that distinct Mesoproterozoic rift sequences extend to the south of the Espinhaço range, allowing an opportunity to study intermittent extensional and basin formation in the São Francisco/Congo paleocontinent at that time.