

Constraints on the Statherian evolution of the intraplate rifting in a Paleomesoproterozoic paleocontinent: New stratigraphic and geochronology record from the eastern São Francisco craton

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RESUMO: An integrated approach of stratigraphic analysis and U–Pb age dating reveals some information on the tectonosedimentary evolution of the Statherian cover of the São Francisco craton in the so-called Espinhaço basin (Atlantic shield in eastern Brazil). Here, continental sedimentation patterns, such as alluvial fan, braided-plain and lacustrine facies associations, with associated volcanic rocks are documented in two superposed basin fill-successions, which are defined as the Algodão and Sapiranga Synthem and grouped in the Botuporã Supersynthem. Both studied units consist mainly of conglomerates and cross-bedded sandstones and minor amounts of mudstones, sedimentary breccias, volcanic lava beds and volcanoclastic rocks, which were deposited in a rift basin – the Botuporã rift – during two syn-rifting phases. The Algodão Synthem represents the first rifting phase. The basal synsedimentary conglomerates of this unit were deposited mainly by subaerial debris flows, most likely along and near a rift border fault. The framework of this rock consists of only crystalline rock clasts from the basement and no fragments of volcanic rocks. Detrital zircon grains that were extracted from this facies show ages older than 2.05 Ga. The remainder of the section is dominated by fluvial sandy lithofacies with minor conglomerate lenses and sandstone–mudstone heterolithic lithofacies, which represent distal, waning-flood deposits in a lacustrine environment. The upper section also contains hummocky cross-stratified sandstone lithofacies, which are related to a storm-influenced deposition. On top of the Algodão succession, the volcanic rocks were dated at 1775 ± 7 Ma, which was interpreted as the near final age of the first rift-phase. Representing the second rift-phase, the Sapiranga Synthem shows similar sedimentation patterns to the Algodão Synthem. The Sapiranga Synthem rests directly on the volcanic rocks of the Algodão Synthem, and its basal conglomerates (which are most likely also related to a master fault) contain voluminous clasts of volcanic rocks, sandstones and crystalline rocks. The detrital zircon grains that were extracted from this facies show ages of 1741 ± 14 and 1766 Ma as well older than 2.05 Ga. The volcanic rocks on the upper succession of the Sapiranga Synthem record ages of 1740 ± 10 Ma, which finalized the Botuporã rift evolution. A preliminary geochemical study of volcanic rocks from the Botuporã Supersynthem showed that these rocks are alkaline rocks with high K_2O/Na_2O ratios, which belong to an ultrapotassic suite. The low concentrations of MgO wt.% suggest a felsic ultrapotassic character. The Botuporã Supersynthem is unconformably covered by a volcanosedimentary rift-succession of EoCalyymmian age — the Pajeú Synthem, which represents the second rifting stage of the Espinhaço basin. Several Statherian-related volcanosedimentary sequences and anorogenic granitoids occur dispersed in the São Francisco block, which requires a regional geologic model to explain the extensional and magmatism process during this time. We used the last Columbia paleocontinental reconstruction to constrain these processes by relating them to far-field continental extensional and magmatic record as part of a silicic LIP, which was triggered by the convection-driven tectonic-plate motion on the western border of the Atlantica block inside of the Columbia supercontinent.

PALAVRAS-CHAVE: ESPINHAÇO, SÃO FRANCISCO CRATON, STATHERIAN RIFT.