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Assessing the rift to sag evolution of Parnaíba Basin, NE Brazil, through U-Pb detrital zircon geochronology and provenance

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¹ São Paulo State University (UNESP), Institute of Geosciences and Exact Sciences, Rio Claro, Brazil. Nowadays one of the most prolific topics in the geological sciences is the origin of intracratonic basins. Despite many Paleozoic examples in which rift systems occur under these basins, there is no consensus about how these mechanical subsidence basins influenced the origin of continental-scale intracratonic basins. Due to its inherent complexity, the understanding of this problem only comes from integrated studies based in multi-proxy analysis, placing it on the frontier of modern science. In the northeast part of Brazil, the Late-Precambrian to Early-Cambrian Jaibaras Basin is interpreted as the precursor rift of the Parnaíba intracratonic Basin, following a simple model of mechanical-to-thermal subsidence evolution. In order to assess the provenance patterns and maximum depositional ages (MDA) between the rift and cratonic phases of these basins, we present a novel detrital zircon U-Pb ages of rocks from the Aprazível and Ipu formations. The main goals of this approach is to identify provenance changes (or similarities) between the last rift related sedimentary unit of the Jaibaras Basin and the first intracratonic related sedimentary unit from the Parnaíba Basin, thus allowing to test the rift-to-sag hypothesis. The MDA for the Aprazível Formation (ca. 499 ± 5 Ma, Furongian to Miaolingian) indicates a Late Cambrian age for the upper part of the Jaibaras Basin. The Ipu Formation records a MDA of ca. 528 ± 11 Ma (Terreneuvian to Series 2, Early Cambrian). However, due to its stratigraphic position relative to the lower Aprazível (499 ± 5 Ma) and upper Tianguá (Early Silurian, Llandovery) formations, the depositional age of this unit is probably younger (Late-Cambrian to Early-Ordovician). Thus, the successions deposited in the end of the rift and the beginning of the sag phase are clearly separated by a regional unconformity (10 to 30 Ma). We also identify the complete absence of Cambrian zircons followed by a significant increase in Paleoproterozoic ones in the Ipu Formation. Although these units were significantly sourced by Neoproterozoic terrains (especially Ediacaran), this modification indicates an interesting change in provenance between the rift to sag basins. The detrital zircon provenance, helped by a consistent paleocurrent analysis, reveal local source areas for the Aprazível Formation and a consistent distal sedimentary transport towards NW for the Ipu Formation. This suggests that the primary sources for the first cratonic unit of Parnaíba Basin were located at the orogenic areas related with the Neoproterozoic Brasiliano/Pan-African Orogeny at the south/southern of

Borborema Province (e.g. Rio Preto, Riacho do Pontal and Rio Grande do Norte metamorphic belts). Unlike the alluvial-related Aprazível Formation, the Ipu Formation characterizes a huge fluvial system that flowed towards NW, probably following a homoclinal ramp-like tilted and opened to the paleomargins of Gondwana.