



Campaign-style carbonate U-Pb dating in the Borborema Province, NE Brazil: preliminary results and take-home message

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7) Abstract

The orogenic basement of the Borborema Province in northeast Brazil host a series of sedimentary troughs linked to the formation of the Atlantic Ocean. These troughs favorably follow the Neoproterozoic-Cambrian orogenic fabric, marked by extensive lithospheric shear zones, capturing the sedimentary evolution spanning pre-, syn-, and post-rift stages of the Atlantic opening. Recent studies have assessed the significance of post-rift deformation within these basins and the contiguous basement. However, uncertainties persist regarding the timing and mechanisms of this reactivation.

Here, we present a campaign-style U-Pb dating of carbonates using LA-ICP-MS, coupled with a thorough examination of brittle structures, to unravel the chronology of deformation and basement reactivation. Surveying approximately 860 outcrops, we analyzed carbonate samples from 112 structural sites, encompassing faults, fractures, and veins within key shear zones like Patos, Pernambuco, Senador Pompeu, and Orós. Of these samples, 78 yield robust ages, supplementing existing data to offer a comprehensive timeline of brittle deformation and basement reactivation.

Our findings suggest an onset of brittle reactivation around 450 Ma, with distinct periods of deformation occurring at approximately 200 (pre-rift), 150–120 (syn-rift), 60–40, and 20–5 Ma (post-rift). The origins of these stresses are subject to debate, with interpretations spanning from diachronic far-field stresses associated with the opening of the Central Atlantic during the earliest deformation period (~200 Ma) to the interplay of slab-pull and ridge-push forces along the western and eastern margins of the South American plate, respectively. Carbonate U-Pb dating of fault planes and veins emerges as a valuable tool for constraining Phanerozoic tectonic events recorded within the Province's basement. However, caution is warranted due to inherent methodological limitations, including low uranium content and uncertainties regarding lead diffusion in carbonates. Consequently, we boost on comprehensive sampling strategies to mitigate the risks associated with drawing conclusions from a limited sample pool.



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Track

- 4. Low Temperature Geochronology Applied to Tectonics and Geomorphology

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