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NEOPROTEROZOIC SUBDUCTION AT THE WESTERN GONDWANA MARGIN: GEOCHRONOLOGY, GEOCHEMISTRY, AND GEOPHYSICAL EVIDENCE

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The agglutination of western Gondwana resulted from the closure of the Goiás-Pharusian Ocean and collision between the São Francisco, Amazonian, and São Luiz cratons, along with the Borborema Province. The subduction record in NE Brazil has been marked by arc magmatism (Santa Quitéria Magmatic Arc-SQMA) and coesite-bearing retrograde eclogites exposed along the arc to the east and west, suggesting models with opposing double subductions. Geochemical and isotopic data indicate that the genesis of the protoliths of ultra-high-pressure (UHP) and high-grade metabasites is not related to the development of the SQMA. Chondrite-normalized RRE diagrams of retroeclogites and other metabasites exhibit flat REE patterns. This behavior is typical of MORBs, suggesting affinity with depleted mantle sources and relative compositional homogeneity. In multi-element diagrams normalized to MORB, eclogites from the eastern portion maintain a flat pattern, reinforcing the MORB-like affinity. In contrast, retroeclogites from the western portion exhibit significant enrichment in HFSE elements and in large ionic radius (LILE) lithophile elements, configuring a pattern compatible with the incorporation of a crustal component. Sm–Nd isotopic data reinforce the individualization of the coesite retroeclogites from the west in relation to the other UHP and high-grade metabasites surrounding the SQMA. U-Pb geochronological dating of zircon, rutile, and titanite indicates that the HP-UHP metamafic rocks crystallized between 1.6 and 1.5 Ga and underwent metamorphism in the Neoproterozoic. The model ages (T_{DM}) of this group are around 2.1 Ga, while those of the other metabasites range from 1.5 to 1.6 Ga, indicating differentiated evolutionary histories. The crustal architecture of the subduction complex is reinforced by magnetotelluric data acquired along a 90 km NW–SE transect cutting the SQMA and its enclaves. Five conductive and five resistive domains were identified. The most prominent anomaly (C1), located east of the arc and dipping westward, is interpreted as the geoelectrical expression of a fossil subduction zone with westward polarity. The combined data highlight the polarity of the unique subduction zone to the west, and that the eclogites from the west were exhumed by diapirs. [The first author acknowledges financial support from FAPESP (Grant 2023/15595-1) and CNPq (Research Fellowship 310860/2022-9)].