PALEOVOLCANOLOGY, GEOCHEMISTRY, ZIRCON U-PB GEOCHRONOLOGY AND LU-HF ISOTOPY OF THE EDIACARAN CAMPO ALEGRE-CORUPÁ BASIN, SOUTHERN BRAZIL: VOLCANO-TECTONIC CYCLES AND SETTINGS DURING WESTERN GONDWANA

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The Campo Alegre-Corupá Basin (CACB) records multiple volcano-sedimentary episodes, owing to specific periods of crustal extension during syn- to post-collisional tectonic stages of consolidation of the Western Gondwana Supercontinent. Stratigraphic and lithofaciological studies, combined with geochronological, Lu-Hf isotopic, petrological, and compositional data support a more complete understanding of the tectono-magmatic cycles and volcanological evolution of the CACB. At least two volcano-sedimentary stages have been detailed in this study, registering the transition from late-convergent to extensional post-collisional tectonic settings. During the Basin Stage (605-590 Ma), the collisional tectonics is responsible to initiate the sedimentary cycle, through the installation of alluvial fans and braided rivers at the northern limit of the basin that progressively evolves into a lake during the installation of the rift structure. Hf-isotope signatures of the detrital zircon assemblage reveal that the sediments derived mostly from the Paleoproterozoic basement of the Luis Alves Terrane, associated with contributions from the nearby Piên Magmatic Arc and possibly from the Curitiba Terrane, whereas some outliers suggest incipient coeval volcanic activities. The sedimentary strata are progressively covered by transitional to mildly alkaline OIB-like basalts, occurring mostly as lava flows with structural aspects suggestive of subaqueous to subereous environments. Trachydacites can occur interbedded to OIB-like basalts, as well as crystal-rich stratified “surge-like” pyroclastic deposits. Large volumes of widespread densely welded to rheomorphic ignimbrite sheets within the CACB attest to its evolution during the Caldera Stage (583-577 Ma) through the withdrawal of silicic magmas from shallow reservoirs during caldera collapse. The outpouring of trachytic/trachydacitic and very subordinated IAB-like basaltic lava flows attests to the growth of the magma reservoirs, probably resulting in bimodal syenites to granites at depth with subordinate mafic components. The caldera eruption seems to initiate by the production of pumiceous fallouts during an early Plinian period of decompression of the shallow magma chambers. These deposits are characterized by pumice-rich ash fall and flow sequences of rhyolitic composition, usually intrinsically associated with rhyolitic lava domes. The general distribution of volcanic facies within the rift-related structural framework suggests that the master faults developed during the Basin Stage might have controlled the collapse of the caldera, which supports its classification as a graben-like caldera/cauldron. Compositional and isotopic signatures suggest lithospheric mantle sources and the connection between basic-intermediate and silicic rocks from both bimodal stages through fractional crystallization. Geochemical, geochronological, and Hf-isotope signatures attest to the cogenetic nature between the silicic rocks from the Caldera Stage and the alkaline association of A-type granitoids from the plutonic Graciosa Province.

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