

## **METAMORPHISM AND EXHUMATION OF BASEMENT GNEISS DOMES IN THE QUADRILÁTERO FERRÍFERO: PROTEROZOIC REWORKING OF AN ARCHEAN DOME-AND-KEEL PROVINCE**

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**ABSTRACT:** The formation mechanisms of dome-and-keel provinces in Archean cratons has been connected with the initiation of plate tectonics on Earth because these features seem to have only formed in Archean age rocks. This suggests that dome-and-keel provinces result from conditions unique to Archean geology. The dome-and-keel province of the Quadrilátero Ferrífero in Brazil has been identified as a dome-and-keel province for more than three decades. The current prevailing model for its formation suggests that it occurred in the Paleoproterozoic, during the Rhyacian orogeny, making it unique among dome-and-keel provinces in the world. This study unravels metamorphic conditions for the Quadrilátero Ferrífero and contributes to the scarce metamorphic data available for dome-and-keel provinces in general. Two garnet bearing, amphibolite facies samples from the Bação dome have a clockwise pressure-temperature path with peak conditions of 8-9 kbar and 650-700 °C corresponding to zircon age of ca. 2775 Ma. A third sample contains a coarse grained clinopyroxene and melt bearing assemblage with peak P-T conditions of 5-7 kbar at 700-750 °C. Zircon obtained from the leucosomes of this sample give U-Pb ages of ca. 2730 Ma. A fine grained epidote, titanite and amphibole bearing assemblage occurs on the rims of coarse clinopyroxene and amphibole grains. This fine grained assemblage produces peak conditions of 8-9 kbar at 550 °C corresponding to a titanite age of ca. 2040 Ma. A fourth garnet bearing amphibolite facies sample experienced peak conditions of 5-6 kbar and 650-700 °C on a near isobaric pressure-temperature path. This sample contained both zircon and titanite that gave U-Pb ages of ca. 2050 Ma. The Archean event is consistent with pressure-temperature paths obtained from other dome-and-keel provinces plausibly as a result of partial convective overturn. The Paleoproterozoic event is interpreted as a reactivation of the dome-and-keel formation structures during the Rhyacian orogeny, putting the cooler keel rocks in contact with the hot domes. The results of this study suggest that dome-and-keel formation in the Quadrilátero Ferrífero initiated in the Archean and was reactivated in the Paleoproterozoic. The dome-and-keel structure was likely the result of Archean rock properties under a horizontal plate tectonic regime.

**KEYWORDS:** U-PB ZIRCON, DOME AND KEEL FORMATION, P-T PSEUDOSECTIONS