THE RHYACIAN-OROSIRIAN AND EDIACARAN METAMORPHIC IMPRINTS ON THE SOUTHERN SAO FRANCISCO CRATON: THE HISTORY SUPERIMPOSED OROGENS

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ABSTRACT: The 2.1-2.0 Ga metamorphic and deformational episodes recorded in the northern and southern lobes of São Francisco craton are a manifestation of a laterally extensive orogeny referred to as the Transmazonian event. Despite the large lateral extent, relatively little is known about the Paleoproterozoic metamorphic process affecting the Quadrilátero Ferrífero (QF) in the southern São Francisco craton and adjacent regions. Two facts seem to have contributed to this. First, the QF and the regions located to the east and south were subjected to the Ediacaran 630-540 Ma Brasiliano event. Second, the QF experienced a strong overprint in the aftermath of the contractional phase of the Transmazonian orogeny, an episode that is thought to result in the dome and keel geometry characteristic of this region. On the eastern edge of the QF, there is a region where Paleoproterozoic metamorphism and structures are preserved. Samples obtained from this region have the potential to record the metamorphic evolution of Paleoproterozoic events as well as the later Ediacaran Brasiliano overprint. This study investigates a series of granulite and amphibolite facies samples from the central and eastern QF. The central QF samples record clockwise P-T paths with peak conditions of 7 kbars and 700 °C at c. 2050 Ma. Amphibolite facies samples from the eastern QF contain complexly zoned garnet containing monazite, which gives ages around 2.0 Ga, whereas matrix grains give ages of c. 600 Ma. Matrix monazite from another sample give two age populations, 597 ± 3 Ma and 547 ± 5 Ma. Garnet core zonation indicates peak P-T conditions of c. 7 kbar and 650 °C for both samples. This is likely to represent Transamazonian metamorphic conditions. Granulite facies samples from the eastern QF gave monazite ages in the range of 2015-1960 Ma with discordia intercepts at c. 620 Ma. Both granulite samples preserve two metamorphic textures. Coarse grained garnet + biotite + OPX+ plagioclase + quartz + ilmenite + melt and later, fine grained garnet + biotite + amphibole + quartz which grows at the expense of OPX. Peak conditions for the earlier event were c. 750 °C and 7-5 kbar and 650 °C at 5-6 kbar for the later event. Plausibly the earlier event corresponds to the c. 2.0 Ga ages obtained from the sample, while the later event is the result of c. 600 Ma resetting. The high grade of metamorphism and range of monazite ages for the eastern region suggests long-lived high temperatures, possibly this could have contributed heat required for dome and keel formation in the central QF.

PALAVRAS-CHAVE: TRANSAMAZONIAN, QUADRILATERO FERRIFERO, SAO FRANCISCO CRATON