

New tectonic and the gold mineralization understanding in the Borborema Province, NE Brazil

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The Borborema Province of northeastern Brazil is the result of the converge and collision of the São Luis - West Africa and São Francisco - Congo cratons and represents the central part of Pan-African/Brasiliano fold belt. The tectonic framework consists of the collage of displaced terranes comprising three main lithotectonic domains of different ages: (i) the Northern domain, Archaean-Paleoproterozoic; (ii) the Transversal or Central domain, Meso - Neoproterozoic; and (iii) the Southern domain, Neoproterozoic. Gold mineralization occurs as lode-gold deposits associated to Brasiliano crustal-scale shear zones that represent zones of transpressive accretion of subprovinces. The development of these structures involve horizontal shortening, uplift and extensive granitic plutonism. The mineralized veins, hosted by Proterozoic schists and gneisses which are intruded by granitic rocks, are associated to tourmaline and K-feldspar suggesting the influence of granite-related hydrothermal activity. Fluid inclusion studies have revealed a fluid variably enriched in CO₂, homogenization temperatures in the range 250-350⁰C. The data are compatible with immiscibility of H₂O-CO₂-NaCl fluids, at a pressure of ca 2 kbar. Oxygen and carbon isotopic analyses of quartz and fluid inclusions indicate that meteoric waters were incorporated into a magmatic fluid-dominanted hydrothermal system. High-K calc-alkaline and shoshonitic granites are potential sources of the mineralized fluid. Lead isotopic analyses of vein sulphides and host rocks supports the proposal that a major phase of metamorphism and Pb mobilization occurred at ca 750 Ma and that mineralization occurred after this metamorphic event.