THE EDIACARAN SERRA DO CAVALO MAGRO OROGENIC GOLD DEPOSIT, RIBEIRA BELT, BRAZIL: ORE FLUID EVOLUTION AND P-T DEFORMATION

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The Serra do Cavalo Magro orogenic gold deposit is located in the southern Ribeira Belt, Brazil. Gold-quartz veins are hosted by Calymmian (1500-1450 Ma) metasedimentary and metabasic rocks and Ediacaran (610-600 Ma) granitic rocks. Petrological modeling indicates peak metamorphic conditions from 560 ºC and 7 kbar (chlorite-biotite phyllite) to 625 ºC and 6.8 kbar (garnet-biotite phyllite) recorded in immediate host rocks. Gold mineralization occurs in extensional and shear quartz veins, structurally controlled by NE-trending, second- and third- order sinistral, transcurrent shear zones. The NNW-trending, vertical and subhorizontal extensional veins are oriented 55-85º in relation to the fault planes, indicating that the shear zones were severely misoriented due to frictional reactivation. Deformation within the shear zones was accommodated by bulging recrystallization of quartz aggregates, while feldspar aggregates from granitic protoliths underwent cataclastic flow or were replaced by sericite-epidote, producing phyllonites. Gold precipitated during stages of vein deformation within microfractures in mylonitized shear veins with quartz previously subjected to bulging recrystallization. Ore fluids are recorded in coexisting CO_2-N_2, H_2O-NaCl-$CaCl_2$ and H_2O-CO_2-N_2-NaCl-$CaCl_2$ fluid inclusions of low to moderate salinities (1-18 wt.% NaCl eq.). Microthermometric data indicate entrapment conditions of 240-260 ºC and 0.4-2.5 kbar, recording hydrostatic to supralithostatic fluid pressure conditions. High-temperature H_2O-NaCl-$CaCl_2$-KCl brine inclusions (up to 475 ºC, 25-33 wt.% NaCl eq.) are considered unrelated with gold mineralization. Strong fluid pressure fluctuations from 0.4 to 1.6 kbar are associated with earthquake cycles and the fault-valve behavior. In this scenario, gold mineralization was associated with fluid immiscibility. There is evidence for restricted fluid mixing, but this process is interpreted as unrelated with gold mineralization. Available geochronological data and structural-petrological relationships with host rocks and shear zones indicate that mineralization was formed within 580-540 Ma in post-peak metamorphic episodes. The hydrothermal ore-fluids were likely produced by devolatilization reactions during prograde metamorphism at deeper levels. Subsequently, the metamorphic-hydrothermal fluids were channeled upwards within the strike-slip shear zones into rocks that have been metamorphosed and devolatilized at earlier times.