Evolution of the auriferous Cachimbo shear zone, Transbrasiliano Lineament, Central Brazil: mineral chemistry and microstructures

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The medium grade Cachimbo Shear Zone from Transbrasiliano Lineament at Tocantins state, Brazil provides important insights into the link between hydrothermal alteration, deformation and gold deposit formation at higher temperatures. There are important and extensive studies of shear zones nevertheless the complexity of the limits between hydrothermalism and metamorphism as to form hydrothermal staurolite mineral has been an open problem of interest. The protolith rocks are metagranites of the Manduca suite of granulite facies. Several shear rocks are found: muscovite (mu) mylonite, garnet-phengite (gt-ph) phyllonites, staurolite-paragonite (st-pr) phyllonites, ph phyllonite, graphite (gr) phyllonite, and qz veins. Gn-ph phyllonites is composed of qz-alm-ch-mu/ phe-tourmaline. Garnet occurs as trails of porphyroblasts marking the mylonitic foliation in pressure shadow composed of ch, mu and calcite (cc). St –paragonite (pr) phyllonites have an assemblage of qz- st-ch-pr-tr ±cc. Hydrothermal st (ferric type) occurs as 5cm long porphyroblasts parallel or cross-cutting the mylonitic foliation. Pressure shadow is composed of ch, mu, chpy and sph, and py veinlets mark the grain boundary. Garnet and tourmaline are common inclusions and usually mark the mylonitic foliation. The ph phyllonite developed a simpler assemblage of ch-ph-py-chpy. Gr phyllonite, which marks the potential mineralized zone, hosts a complex quartz vein system with the assemblage of gr±py±chpy±gold. Enclosing some discussions, tourmaline inclusions in staurolite characterize the porphyroblasts as syn to post kinematic to the phyllonite formation. Garnet and staurolitr indicate amphibolite facies conditions in the staurolite zone (between 500º e 550ºC and minimal P of 3kbar) for the hydrothermal- metamorphism. High crystallinity of graphite is similar to the spectrum of amphibolite facies, staurolite zone conditions. The paragenesis gr-qz seems to demonstrate the persistence of hydrothermal- metamorphic conditions during the CSZ evolution. The oxygen fugacity for the gr formation is low, 10^{-24} to 10^{-22} , and indicates a reduced environment for gold precipitation.