Paleoproterozoic gold-rich porphyry systems in the Alta Floresta Gold Province, Amazon Craton (Brazil): the examples of the Pé Quente and X1 deposits.

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The Alta Floresta Gold Province (Mato Grosso State, Brazil) extends between the Ventuari-Tapajós (1.95-1.8 Ga) and the Rio Negro-Juruena (1.8-1.55 Ga) geochronological provinces, southeastern portion of the Amazon Craton. This province consists of plutono-volcanic sequences generated in continental arc settings during the Paleoproterozoic. Within the province, a significant number of disseminated gold deposits display a close spatial relationship with granitic plutons along a NW-SW striking belt (Peru-Trairão belt). Among these deposits, Pé Quente and Alvo X1 are two of the most important examples of disseminated gold mineralization in granitic systems within the province. These deposits are hosted in unevolved to moderately evolved, oxidized (magnetite-bearing), calc-alkaline to slightly subalkaline, medium-K, meta- to peraluminous granitic rocks, probably generated in the onset of volcanic arcs.

The Pé Quente deposit comprises several orebodies hosted by fine to medium-grained quartz-monzodiorite-leucomonzonite-albitite and medium-grained biotite-tonalite. U-Pb zircon dating by LA-ICPMS of the quartz-monzodiorite gave a crystallization age of 1.979 ±31 Ga. Its hydrothermal alteration sequence include: (1) sodic with albite; (2) potassic with

orthoclase+microcline; (3) sericitic; (4) carbonate; (5) pervasive to vein-type coarse-grained muscovite-quartz; (6) silicification with breccia and comb-texture veins; (7) magnesium-rich chlorite; (8) quartz-albite veinlets; (9) propylitic; and (10) epidote-chlorite veins with narrow orthoclase haloes. Gold mineralization is temporarily associated to sodic and muscovite-quartz alterations, as well as to albite-quartz veinlets. Pyrite with minor concentrations of barite, hematite, chalcopyrite, Te-Bi-bearing phases, monazite, galena and wulfenite ($PbMoO_4$) represent the main ore association. Gold (Ag=14-60wt%) occurs as small inclusions within pyrite.

The Alvo X1 deposit is hosted by biotite gradodiorite and a quartz feldspar porphyry intrusion of tonalite composition, both of unknown age. The hydrothermal sequence is temporally characterized by pervasive potassic alteration with K-feldspar, followed by quartz+muscovite+sulphide-rich zones, and finally by late and more regional propylitic alteration. Based on the ore mineral association and geochemical signature, gold mineralization exhibits strong correlations with Ag+Bi±Ag±Cu. Gold (Ag=20-30%) occurs as inclusions in pyrite together with tsumoite (BiTe), hessite (Ag_2Te), galena, monazite, sphalerite and apatite.

Fluid inclusion assemblages in quartz from Alvo X1 deposit reveal the presence of two types of fluids: (1) aqueous two-phase inclusions with wide salinity (2.1-26.1 wt.% eq. NaCl) and homogenization temperatures ranging from 126.5°C to 268.4°C; and (2) H_2O-CO_2 (0.35-0.77 g/cm^3) inclusions of low salinity (6.1-8.9 wt.% eq. NaCl) and higher homogenization temperatures (251.6-334.6°C). At the Pé Quente deposit, however, preliminary fluid inclusion investigations reveal that the ore related to the sodic alteration exhibits the coexistence between aqueous-carbonic and two-phase aqueous fluids. These data are suggestive of heterogeneous entrapment, possibly by immiscibility processes in a deep magmatic-hydrothermal system.

Collectively, the close spatial relationship with relatively oxidized I-type granitic plutons emplaced in a volcanic arc setting, the distribution of the hydrothermal alteration, the ore mineral association and the coexistence between aqueous-carbonic and two-phase aqueous fluids, suggest that Pé

Quente and X1 deposits may be genetically linked to the root zones of a magmatic-hydrothermal system, similar to gold-only, Cu-poor porphyry systems. In this context, the ore precipitation might have taken place by fluid immiscibility followed by fO_2 increase (barite-hematite stables) in a system with a gradual drop at the pressure. *Acknowledgements: INCT-Amazônia, METAMAT and FAPESP (2009/04438-5).*

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