THE IRON OXIDE-COPPER-GOLD (IOCG) JATOBÁ DEPOSIT, CARAJÁS MINERAL PROVINCE, BRAZIL: GEOLOGY, HYDROTHERMAL ALTERATION AND MINERALIZATION

Ângela Veloso [1]; Lena Monteiro [2]; Caetano Juliani [2]

[1] Universidade Federal de Uberlândia, Monte Carmelo, Minas Gerais, Brazil.
[2] Universidade de São Paulo, São Paulo, São Paulo, Brazil.

Similar genetic processes within a large mineral system may connect world-class IOCG deposits in the Carajás Province. The Jatobá deposit, located at Carajás, is distinct due to its Ni-Zn-enriched zones and may represent a specific portion of this IOCG system. This contribution aims to identify its paragenesis from detailed descriptions of drill cores, petrography, and SEM-EDS analyses, permitting unravel the mineral system evolution.

The Jatobá deposit is hosted by metarhyodacite (LA–ICP–MS U–Pb zircon; 2,700 ±16 Ma), amygdaloidal metabasalt, felsic metavolcaniclastic breccias, mafic metalapilli and metacrystal metatuffs, and metadiabase dikes attributed to the Itacaiúnas Supergroup. Pre-, syn- and late tectonic hydrothermal alteration associated with the Canaã shear zone development was pervasive and intense. Early hydrothermal alteration encompasses silicification, sodic (albite I, scapolite I), sodic-calcic (ferro-pargasite), and potassic (biotite I, tourmaline, Cl-apatite I, Ce-allanite I) alteration. The main syn-tectonic hydrothermal alteration stages were sodic-calcic (scapolite II), calcic (actinolite II, Cl-apatite II, Ce-allanite II, quartz), and potassic (Cl-K-hastingsite I, biotite II, quartz, Co-magnetite IV, Cl-apatite III, Ce-allanite III). Early veins with magnetite (III) and massive magnetite bodies (IV) represent proximal envelopes of mineralized zones. Pale biotite (III) and chlorite characterize late tectonic hydrothermal alteration stages.

The copper-(nickel) mineralized zones comprise swarms of vertical to subvertical orebodies. Four mineralization stages were coeval to ductile (stages I and II) and ductile-brittle deformational events (stages III and IV). The stage (I) is spatially related to massive magnetite bodies and to syn-tectonic calcic alteration. It is mainly characterized by Ni-pyrrhotite, Ni-pyrite, Co-chalcopyrite, and Co-pentlandite. The mineralization stage (II) was related to the development of the syn-tectonic potassic alteration and originated breccia zones with a matrix composed of Co-chalcopyrite (± Ni-pyrite ± Ni-pyrrhotite). The third stage is represented by veins with open-space filling textures with late biotite (III), Co-chalcopyrite and siegenite (± Co-pyrite, ±Co-magnetite, ± cassiterite). The late mineralization stage (IV), coeval to chlorite formation, was the most expressive at Jatobá. It comprises Co-chalcopyrite, siegenite, Co-pyrite, cassiterite, sphalerite, molybdenite, uraninite, monazite, monazite, and REE carbonates.

The Jatobá deposit has attributes comparable to those of relatively deep portions of IOCG mineral systems with evidence of limited input of externally-derived diluted fluids. However, preserved textures of the host volcanic and volcaniclastic rocks indicate that the Jatobá deposit was not formed in the roots of an IOCG system. Instead of that, the deposit records evolution from extremely hot deep-seated fluids, which were channeled and ascended within the shear zone. Early mineralization generates Ni-rich orebodies, whereas Cu-rich mineralization stages formed after significant cooling and exhumation.