

ISOTOPIC (U-Pb AND $^{40}\text{Ar}/^{39}\text{Ar}$) CONSTRAINTS OF THE CABAÇAL GOLD DEPOSIT, SW AMAZONIAN CRATON

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The Cabaçal gold deposit is located in the SW Amazonian craton, Mato Grosso State, Brazil, where the Alto Jauru orogenic rocks (U-Pb ages from 1790 Ma to 1744 Ma) and Cachoeirinha orogenic rocks (U-Pb ages from 1580 Ma to 1520 Ma) occur. The mineralization is hosted by felsic volcanic and volcanoclastic rocks and occurs as (i) bands concordant with the mylonitic foliation, (ii) breccias, (iii) quartz-carbonate veins and (iv) disseminated. The ore is polymetallic and comprises of chalcopyrite, pyrite, marcasite, pyrrhotite, sphalerite, and minor galena, bismuth, selenides and tellurites. The mineralization is related to hydrothermal alteration and includes quartz, chlorite, carbonate, sericite and biotite.

Relatively few U-Pb ages exist from older rocks of the Alto Jauru rocks. Zircons recovered from a banded silicic volcanoclastic metasediment from the Cabaçal gold mine yielded an U-Pb age of 1758 ± 7 Ma, which we interpret as the crystallization age for the zircons; this age is probably close to the depositional time of the metasedimentary sequence. U-Pb SHRIMP data reported in the literature for individual zircons from a metavolcanic unit in the area yielded two age grouping of 1769 ± 29 Ma and 1724 ± 30 Ma. These results are consistent with volcanism and deposition at ca. 1750 Ma, and could be related to the Alto Jauru geologic evolution. The Sm-Nd T_{DM} model age of 1.87 Ga with ϵ_{Nd} of +2.4 determined on these metasediments, indicates that the its source was largely juvenile at 1750 Ma.

Detailed petrologic and geochemical investigations indicate that gold deposition is associated with metamorphic fluids migrating along regional shear zones. We have analyzed sericites from the hydrothermal zones by the $^{40}\text{Ar}/^{39}\text{Ar}$ method, using laser step-heating dating in single grains. One sample is from a bore hole 107 m deep and yielded a plateau age of 1521.3 ± 1.3 Ma. Another sample is 36.6 m deep, and yielded a plateau age of 1510.4 ± 1.2 Ga. The same samples were dated by K-Ar method, and the ages obtained are 1643 ± 78 Ma and 1615 ± 65 Ma, respectively.

Pb-Pb model ages for the Cabaçal gold deposit reported in the literature indicate 1.7 Ga, with two sources: one more radiogenic ($^{206}\text{Pb}/^{204}\text{Pb}$ from 15.941 to 16.600 and $^{207}\text{Pb}/^{204}\text{Pb}$ from 15.527 to 15.600) and other less radiogenic ($^{206}\text{Pb}/^{204}\text{Pb}$ from 15.650 to 15.843 and $^{207}\text{Pb}/^{204}\text{Pb}$ from 15.318 to 15.376). Sr/Sr results have two signatures: concordant carbonate veins yielded values from 0.705 to 0.7029 and discordant carbonate veins yielded values from 0.7144 to 0.7119, also suggesting two sources or remobilization.

These studies reveal that Cabaçal gold deposit may be originated during the Alto Jauru orogen (1.79-1.74 Ga) and later on underwent to an important remobilization process. With the available data is not possible to define if these second event was related to the late evolution of the Alto Jauru orogen, recorded by the 1724 ± 30 Ma U-Pb SHRIMP age, or linked to the Cachoeirinha orogen (1.58-1.52 Ga).

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