K/Ar AND Pb/Pb ISOTOPIC STUDIES OF GOLD DEPOSITS IN THE PONTES E LACERDA REGION, SW OF AMAZONIAN CRATON, BRAZIL

Mauro C. Geraldes[1], *Bernardino R. Figueiredo*[1] *and Colombo C. G. Tassinari*[2]
[1]*Instituto de Geociências/Unicamp*, [2]*Instituto de Geociências/USP*

INTRODUCTION

The gold deposits of the Pontes e Lacerda region are situated in the SW part of the Amazonian Craton within the Aguapeí-Sunsás mobile belt, a N-NW trending zone of folded rocks (Fig. 1) . The geological units which outcrop in the region include the Basal Complex granulites and gneissic-migmatitic rocks, probably correlated to the 1961 Ma old Lomas Maneches Granulite Complex (Litherland et al., 1989); the Pontes e Lacerda Metavolcanic-metassedimentary Sequence (MVS) probably equivalent to the Alto Jauru greenstone belt to the east of the study area (Monteiro et al., 1986) ; the Santa Helena gneissic granite (gneissification at around 1300 Ma, Menezes et al., 1993 and Geraldes, 1996) ; the Maraboa granite (1257 Ma, Geraldes, 1996) ; the clastic sedimentary rocks of the Aguapeí Group which is equivalent to the Bolivian Sunsás Group (1300-950 Ma, Litherland et al., 1989) and; the Nené tonalite of unknown age which outcrops concordantly with the Aguapeí thrust zone and it is considered syntectonic.

MINERALIZATION

In the Pontes e Lacerda region, mineralization is associated with a 200 km long shear zone originated during the Aguapeí-Sunsás tectonic event. Tectonics involves oblique overthrusting (from NE to SW) of the metavolcanic metassedimentary unit over the Aguapeí metassedimentary rocks, which was followed by folding, faulting and formation of secondary transcurrent shear zones. These unconformities provided pathways for the ore-bearing solutions and are potential sites for gold mineralization.

Most of the gold deposits lie along the tectonic contact between the metavolcanic-metassedimentary rocks and the Aguapeí metassedimentary rocks. Secondarily, some gold deposits are hosted by clastic sedimentary rocks, schists and granitoids. Disseminated and vein controlled mineralization are commonly found in volcanic host rocks whereas sedimentary rock or granite hosted deposits are mainly formed by veins.

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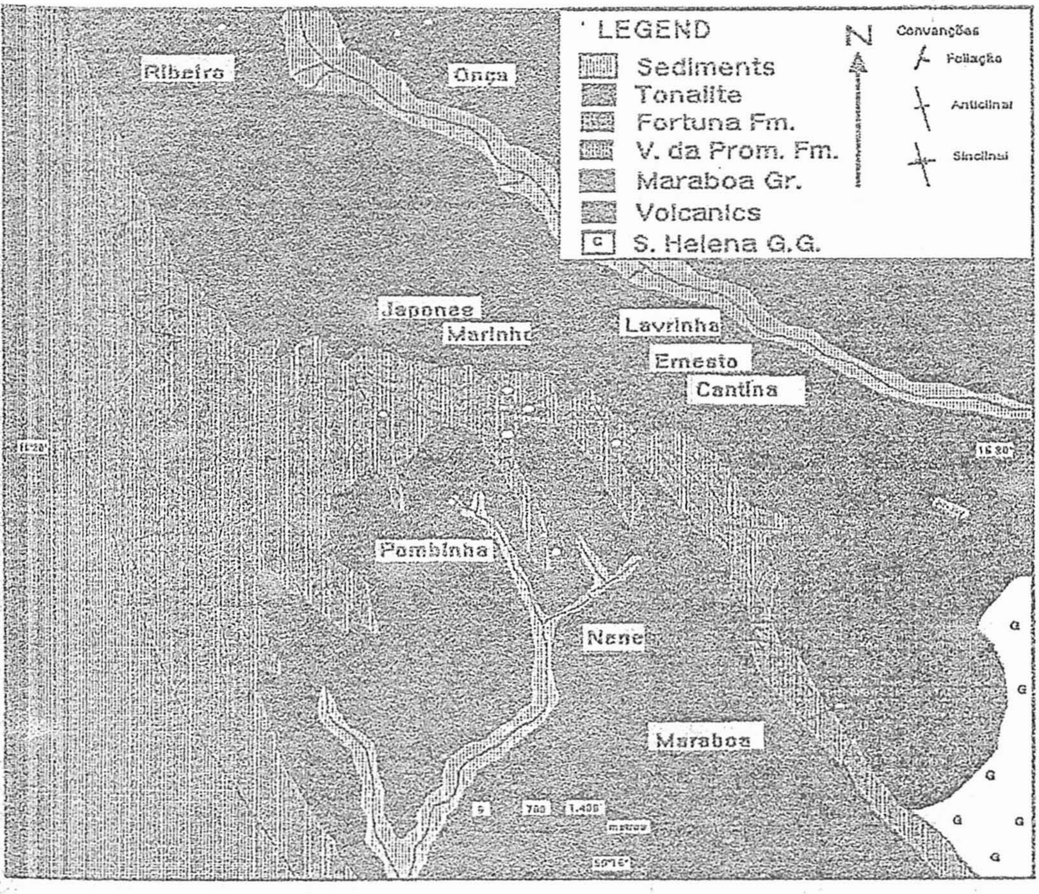

Fig 1 - Geologic map of south of Pontes e Lacerda with gold deposits.

The ores consist of quartz, pyrite and gold, and the hydrothermal alteration zones contain quartz, sericite, pyrite, and magnetite (altered to hematite) . Chalcopyrite, galena and sphalerite also occur in the Onça deposit. Minor contents of Se in pyrite and, Ag and Bi in gold have been found (Figueiredo et al., 1996, this volume)

The hydrothermal processes were responsible for enhanced concentration of K_2O, F, Fe_2O_3 and LREE, and for losses in CaO, MgO and FeO in the wallrocks. In general, these changes were related to a probable magmatic contribution to the fluids which is also suggested by positive Ce anomalies detected in some altered basalts.

ISOTOPIC DATA

Three sericite samples from the alteration halos of the Lavrinha, Ernesto and Japones deposits were analysed by K/Ar radiometric method. The K contents were determined in a Micronal B262 spectrophotometer using Li standard and the isotopic analyses were run in a gas-source Nuclide Reynolds mass spectrometer at the University of São Paulo (CPGeo-USP) laboratories. The K/Ar age values fall in the time-interval between 964±42 Ma and 918±10 Ma. Since there is no indication of a post-mineralization thermic event (T>350°C) , the K/Ar ages of sericites may represent their crystallization ages during the hydrothermal alteration process and must coincide with the ore deposit age.

Three galena samples from the Onça deposit ore were analysed for common lead isotopes in a VG 354 Micromass spectrometer with multi-detector (CPGeo-USP). The $^{206}Pb/^{204}Pb$, $^{207}Pb/^{204}Pb$ and $^{208}Pb/^{204}Pb$ ratios fall, respectively, in the intervals 17.665-17.793, 15.574-15.681 and 36.521-36.897.

These values plot along the two-stage average-crustal growth curve, indicating ages from 669 to 772 Ma, quite distinct from the sericite K/Ar age values, reported above. However, when these isotopic data are plotted on the plumbotectonic diagrams of Zartman & Doe (1981), they consistently fall within 1000-800 Ma age interval, indicating that Pb evolved in a Upper Crust reservoir. These crystallization ages for galena are broadly coincident with the probable age of the hydrothermal alteration.

In the uranogenic and thoriogenic diagrams (Fig. 2 and 3) of Zartman & Doe (1981), the galena isotope compositions strongly suggest a lead provenance from a high U/Pb and low Th/Pb upper crustal source ($9.7<\mu_1<10.2$) which is in accordance with the geochemical signature of ores and altered wallrocks.

Thus, the Pontes e Lacerda gold deposits must have formed in the course of the Aguapei-Sunsás event which coincided with an extentional tectonic period in the SW part of the Amazonian Craton. This tectonic period also represents an important metallogenic epoch in the Pontes e Lacerda region in the Middle Proterozoic.

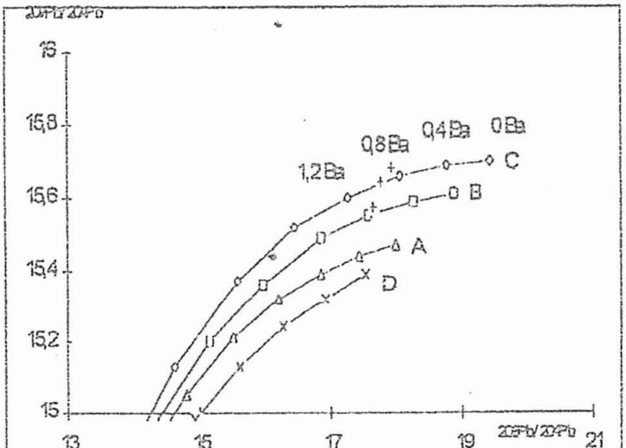

Fig 2 - Uranogenic lead isotope growth curve graphic.

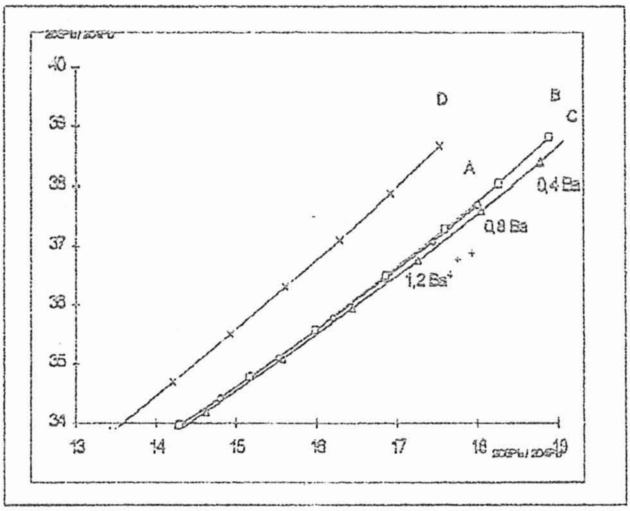

Fig 3 - Thoriogenic lead isotope growth curve graphic.

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