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Precambrian greenstone belts and associated metallogeny (Convenors: A. Kröner, N. Arndt and G. Gaal)

19/1 THE PYROXENE-AMPHIBOLE CONVERSION IN KOMATIITE FROM THE TYPE LOCALITY

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In thin sections of komatiite from the Komati River valley (South Africa) amphibole pseudomorphous after pyroxene has been found. HRTEM images of these pseudomorphs show that the formation of amphibole at the expense of pyroxene by chain doubling starts simultaneously in several places within one pyroxene. This leads in general to the formation of amphiboles with mosaic structures, from the subboundaries of which rows with even broader chains may grow.

The ultimate pyroxene relics in the amphiboles contain hardly any lattice errors, because of the fact that the chain broadening starts just in positions rich in such errors.

19/2 SHEAR ZONE HOSTED GOLD DEPOSIT IN THE RIO ITAPICURU GREENSTONE-BELT, BRAZIL

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The Fazenda Maria Preta gold deposit is located at 300 km NW from Salvador, capital of Bahia State, Brazil. Three different gold-bearing structures, developed in a shear deformation context, are recognized: Antas I, Antas II and Antas III. They occur in the middle part of the northern portion of the Lower Proterozoic Rio Itapicuru Greenstone-Belt, constituted by felsic volcanic (agglomerates, tuffs, dacites and andesites) and metasedimentary rocks, intruded by a diorite body. They are associated with two parallel N-S striking shear zones, steeply dipping west, ranging from 50 to 100m in width and more than 10 km in length.

Strain analysis lead to identify two phases of deformations: the first one (D_1) develops synschistous folds with axial planes dipping 60°W to subvertical and N-S axes; the second phase (D_2) is related to a sinistral N-S brittle-ductile shear zone. In Antas I area, an early N60-45E quartz vein is folded by D_1 phase and sheared by several D_2 shear zones; in Antas II area, the shear zone affects carbonatized meta-andesites with minor clastic and chemical (mainly metacherts) metasedimentary intercalations, with the ore quartz veins being emplaced during this phase; in Antas III area, the mineralization is represented by silicified pyrite and carbonate bearing sheared dacite cross-cut by late quartz veinlets.

The study of the deformation-related structures do not provide by itself all the constraints for the timing of mineralization. The simplest hypothesis is that mineralization was synchronous of or post-dated the shearing. In this scheme, the earlier Antas I quartz vein was used as a pre-existant fractured reservoir, while the pervasive silicification, pyritization and carbonatization of dacites and the vein filling of Antas II fractures were most probably contemporaneous of the mineralization event.

19/3 FLUID INCLUSION CONSTRAINTS ON THE ORIGIN OF FAZENDA BRASILEIRO GOLD MINE

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Fazenda Brasileiro Gold Mine (Brazil) is located within a 8 km shear zone, in the "Rio Itapicuru" Greenstone Belt, hosted in iron-rich sheared chloritic schists (Santos et al., 1988).

The thermometric and Raman spectroscopic analyses of fluid inclusions were made in syn to late F2 mineralized quartz-vein samples, according to the structural evolution of the Fazenda Brasileiro Gold Mine (Reinhardt and Davison, 1989):
- thin S1-concordant veins, which were boudinaged and subsequently folded by F2 and F3, present very small phenoclasts, almost all recristallized (Q1 generation);
- "en échelon" S1-discordant veins and irregular lenticular "masses" localized in F2 fold hinge zones show abundant well developed phenoclasts with corroded borders (Q1 generation). A recrystallized quartz matrix (Q2 generation) always develops at the expense of quartz Q1; auriferous sulfides and free gold appear spatially related to the Q2 generation.

According to quartz fabrics, fluid inclusion distribution and composition, two main groups of inclusions are recognized:
i) primary fluid inclusions in residual Q1 generation quartz phenoclasts frequently contain graphitic compounds. Their gas-content is CO_2-dominant with minor $CH_4 \pm N_2$. Their water meniscus is almost never visible.
ii) primary inclusions related to the recrystallized quartz grains (Q2), localized within the neograins or at their boundaries never contain graphitoïds. Their gas-content show a larger dispersion close to the CO_2-CH_4 and CH_4-N_2 joints. Additionnally, some inclusions contain $CH_4 \pm N_2$ and no CO_2. All $CO_2 \pm CH_4 \pm N_2$-bearing inclusions in Q2 quartz have variable aqueous filling. A mm- to cm-wide alteration halo develops around Q2 veins, characterized by the assemblage quartz-calcite-sphene-chlorite-albite-pyrite and arsenopyrite with pyrrhotite and chalcopyrite inclusions. Gold is found as inclusions and in fractures in pyrite and arsenopyrite, as well as in quartz. Inclusions related with quartz Q2 probably represent the ore forming fluids. Fluids trapped in phenoclasts are thought to be result from earlier volatilization reactions.

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