Metallogenic environment of the Omai gold deposit, Guyana

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The Omai gold deposit is located in the Paleoproterozoic Barama-Mazaruni greenstone belt, Guiana Shield. At regional scale, the emplacement of the deposit was controlled by the Makapa-Kuribrong crustal shear zone. At local scale, the gold-bearing quartz veins are associated mainly with a quartz monzodioritic intrusive (Omai stock, Fennell ore body) and subvolcanic quartz-feldspar porphyry and rhyolite dikes, and subordinately, with intermediate volcanic flows and metasedimentary rocks (Wenot ore body). Six gold-bearing undeformed subhorizontal and subvertical vein sets can be distinguished. On the basis of their internal textures, the veins can be classified as crack-seal, laminated, breccia, and open-space-filling veins. The formation of most veins can be summarized by two filling stages and a late fracture-filling stage related to a protracted hydrothermal process. The vein mineralogy consists of various sulfides, together with tungstates, native elements, tellurides, and sulfosalts. The non-opaque gangue includes mainly quartz, and minor carbonates, albite, sericite, chlorite, tourmaline, rutile, and epidote. Wallrocks of gold-bearing veins are affected by syn-mineralization alteration, including carbonates, sericite, silica, chlorite, albite, epidote, pyrite and pyrrhotite.

Vein-forming scheelite has $^{87}Sr/^{86}Sr$ ratios between 0.7019-0.7021 and $\delta^{18}O$ values between 3.8 and 4.3‰, which suggest both consistent temperature and isotopic composition of the hydrothermal solutions during its deposition. Oxygen isotopes measured in vein quartz vary between 13.2 and 14‰, similar to the $\delta^{18}O$ values of carbonates (average 13.9‰). The carbon isotopes of carbonates range between +1.7 and +4.7‰. The $\delta^{18}O$ values of the mineralizing fluids vary between +5.6 and -2.7‰ and the δD values between -52 and +18‰. The isotopic composition of the hydrothermal fluids plots outside both magmatic and metamorphic water boxes, therefore suggesting a significant component of surface-derived water.

The Omai deposit can be considered as a Paleoproterozoic equivalent of the Archean epizonal deposits described in the Yilgarn, Zimbabwe Cratons.