The importance of granites for complex gold deposits in the Pitangui Greenstone Belt, Brazil

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The term “complex gold deposits” refers to deposits that exhibit a combination of several geological factors, such as the presence of multiple mineralization stages, deformation events (polytectonic evolution), ore-related assemblage, and host rocks along terrains with protracted tectonic-metamorphic evolution. This complexity is often related to an increase in permeability along shear zones, fluctuations in the pressure-temperature gradients facilitating fluid migration, reverse of the metamorphic gradient through thrusting or extensional shearing, and initiation of crustal anatexis accompanied by the emplacement of granites, which are important sources of heat and fluids. However, this is not the unique reason why granites are particularly important for the genesis of complex gold deposits at the Pitangui Greenstone Belt (PGB). They often work as shields, protecting or inducing controlled deformation of host rocks. This role is played by both the Casquilho Granite (K-rich, 2711±4 Ma, U-Pb) at the Turmalina Mine (MTL) trend and the Jaguara Granite (TTG affinity, 2728 ± 10 Ma, U-Pb), at the São Sebastião gold deposit, in the Onça de Pitangui Project (both belonging to Jaguar Mining Inc.). At the MTL trend, Casquilho has shielded the tabular-shaped A, B, C, and D orebodies (the closest ones to the granite) from the NW-SE Palaeoproterozoic orogeny’s strain along its pressure shadow. In contrast, the Faina and Pontal deposits (further away from the granite’s shadow) were folded with an NE-plunging axis by this same orogeny. At São Sebastião, the gold-bearing banded iron formations were compressed against the Jaguara Granite. Therefore, their geometries (with a 314/15 fold axis) are conformable along strike to the rigid wall of the granite. Finally, the thermal effect of the emplacement of both Casquilho and Jaguara has likely impacted the refractoriness of the gold ore. At the MTL trend, the high-temperature löllingite-rich sulphide assemblage (of A, B, and C orebodies) has greater metallurgic recoveries than the low-temperature arsenopyrite-rich sulphide assemblage observed at Faina and Pontal.