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Assessment of Gold Systems in Brazil: Major Deposits, Camps, and Future Exploration Potential

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Gold has had a significant historical role in Brazil since discoveries of deposits by so-called *bandeirantes*, initially in Minas Gerais (MG) and Bahia, then Goiás and Mato Grosso states. The famous, world-class Morro Velho (Quadrilátero Ferrífero (QF) Province, MG) was the largest underground mine in Brazil, starting operation in 1834 and ending in 2003. Figure 1 provides an overview location of the main gold deposits, mine camps, and provinces, some discussed below.

Brazil is number thirteen among sixteen leading gold producers worldwide, having four world-class gold deposits (>3.2 Moz) in production (Moz): Morro do Ouro (8.9), Cuiabá (6.3), Crixás (4.6), and Fazenda Brasileiro (3.2). Two additional, Morro Velho (11.9 Moz) and Igarapé-Bahia (3.12 Moz), are presently closed but still have resources at depth. Today's resources for the Salobo IOCG deposit (1.94 Moz), operating since 2012 in conjunction with other IOCG deposits (Cristalino, Sequeirinho-Sossego, Alemão), all in the Carajás Province (Amazon region), should make these an additional example of Brazil's world-class gold system. Potential, future world-class deposits presently in operation are Jacobina (2.20 Moz) and Chapada (1.64 Moz).

Brazilian gold systems are dominated by orogenic gold deposits, formed mostly in Neoproterozoic and Paleoproterozoic greenstone belts, similar to Canada and Australia. A few orogenic gold deposits formed in Neoproterozoic metasedimentary belts including Brazil's largest gold deposit (Morro do Ouro). From the three major cratons, São Francisco, Amazonas, and Rio de la Plata, most gold deposits are associated with the former and its neighboring orogenic belts. The São Francisco and Rio de la Plata cratons are surrounded by Neoproterozoic (900-550 Ma) orogenic belts, whereas the western and northwestern Amazon Craton are surrounded by late Mesoproterozoic belts (~1020 Ma).

Brazil's most important gold systems today are as follows (Fig. 1):

- 1- Au-only orogenic gold in Archean granite-greenstone belts stands out in the QF (Cuiabá deposit) and Crixás regions; the latter also has Paleoproterozoic-aged belts.
- 2- Au-rich Archean and Paleoproterozoic IOCGs (various deposits in Carajás).
- 3- Paleoproterozoic Itapicuru greenstone belt, Bahia (Fazenda Brasileiro deposit).
- 4- Sedimentary rocks overlying greenstone belt, Bahia; quartz-pebble conglomerate, Jacobina.
- 5- Neoproterozoic metasedimentary belts with large, low-grade (<1 g/t Au), phyllite-hosted orogenic gold (Morro do Ouro).
- 6- Neoproterozoic rocks containing an earlier-emplaced porphyry system, subsequently overprinted by an orogenic gold system (Chapada deposit, Mara Rosa camp).

Some future exploration potential (Fig. 1):

- (I) Paleoproterozoic plutonic-volcanic rocks in the Tapajós and Alta Floresta-Juruena gold provinces (Amazon) with Au-Cu, Au-Ag systems, where numerous *garimpos* and small deposits are presently operating.
- (II) Archean orogenic systems in the QF, including Raposos, São Bento, Córrego do Sítio, and smaller older deposits to be reevaluated. Resources increasing in deposits in the western QF sector (e.g., the Turmalina) along the Pitangui greenstone belt.
- (III) Paleoproterozoic greenstone belts in Bahia, Goiás, Tocantins, Pará, and Amapá states should be

further investigated for their potential.

(IV) Au-rich IOCGs in the Carajás greater, extended region.

Finally, it is noteworthy that Brazil contains supergene, lateritic enrichments of hypogene gold systems in Cenozoic cover rocks and recent sediments in many parts of the country.

