

Characterization and Geochronology of Mineralization in the EL02 License, Bougainville Island, Papua New Guinea

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This research focuses on the exceptional metallogenic potential of Bougainville Island, Papua New Guinea, emphasizing the characterization and timing of veins and hydrothermal alteration within the EL02 License Exploration Area. Bougainville, renowned for its world-class Panguna porphyry Au-Cu-Ag deposit, remains underexplored after decades of political conflict and restricted access. The recent granting and renewal of EL02, the first major license under the Bougainville Mining Act, marks a pivotal moment for scientific inquiry and local economic development. This research compiles new information—fieldwork, structural geology, geochemical analyses, and a magmatic fertility assessment—to understand the mineralization and economic potential of the EL02 license and support further exploration. Initial efforts by Island Passage Exploration Ltd. have delineated multiple mineralized target zones based on stream-sediment and rock geochemical anomalies, despite logistical challenges posed by vegetation and terrain. Geochemical analyses identified several key sites: Marai, Bara, Enara, Isina, and Tangka. This study uses zircon geochronology to assess the temporal evolution of intrusive rocks associated with mineralization, and to evaluate possible Australian craton assimilation via subduction during the tectonic and metallogenic evolution of Bougainville's double-subduction-arc environment. This work will constrain the evolution of the Bougainville and Solomon Islands Arcs within the complex regional tectonic history of the Southwest Pacific and Australian Plates, and its implications for the exploration of high-Cu-Au-Mo porphyry deposits. Preliminary X-ray fluorescence results from the Tangka target show potassic alteration mineralogy common in porphyry copper deposits. Socioeconomically, this study aims to support Bougainville's economic development as part of a multidisciplinary effort to bring mining activity back to the region within a sustainable framework, filling geological knowledge gaps and providing insights into the arc-related porphyry systems of Bougainville and the Southwest Pacific region, serving as a reference for future advancements.