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U-Pb Geochronology and Trace Elements of Zircons from the Paita Granite and Host Rocks

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The Paita Granite, located in northwestern Peru within the Amotape-Tahuín Block, is a peraluminous intrusive body characterized by tin (Sn) anomalies in its composition, emplaced into Paleozoic metasedimentary rocks. Its age and tectono-magmatic significance remain uncertain, with published geochronological data ranging from Triassic to Cretaceous. This ambiguity limits our understanding of its role within regional magmatic events and its potential metallogenic significance.

This study constrains the crystallization age and petrogenetic evolution of the Paita Granite and its host rocks using U-Pb zircon geochronology and trace element geochemistry, providing insights into its timing, magma sources, and evolutionary processes. Zircon crystals from both the intrusion and surrounding units will be analyzed using LA-ICP-MS techniques. Trace element signatures, including rare earth element (REE) patterns and key elemental ratios, will be used to assess magmatic differentiation and tectonic setting.

A robust crystallization age will allow evaluation of whether the Paita Granite is temporally linked to peraluminous magmatism along the southern Eastern Cordillera associated with the Permo-Triassic rift system. This distinction is critical, as such magmatism is commonly associated with Sn-fertile granites and economically significant tin mineralization in this tectonic setting.

By integrating geochronological and geochemical data, this study seeks to assess whether the Paita Granite may represent a previously unrecognized component of Sn-fertile magmatism. The results are expected to refine genetic models of peraluminous granitoids and provide new insights into the metallogenic Sn potential of northern Peru, with implications for mineral exploration.