

A Prolonged Magmatic History to the Dismembered Mid Miocene Arc, Manus Island, Papua New Guinea

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Papua New Guinea's Manus Island is today an isolated segment of a previously dismembered volcanic arc on the Pacific plate. Remnants of arc magmatism are preserved within a series of middle Eocene to early Miocene volcanic and volcanoclastic packages (Tinniwi Volcanics) and a northwest-southeast trending belt of middle Miocene age intrusive rocks (Yirri Intrusive Complex). Exploration has revealed several porphyry Cu-Au and epithermal Au occurrences spanning the width of the island. Given the isolation of Manus Island today from other parts of the arc, linking magmatism to other regional tectonic events is difficult, and the evolution of the arc remains unclear. We present new U-Pb geochronology of magmatic zircon and high precision Re-Os geochronology of molybdenite to (1) examine the age of magmatic rocks across the Yirri Intrusive Complex, and (2) constrain the age of Cu-Au porphyry mineralisation from known prospects. Results demonstrate a prolonged continuation of magmatism and associated Cu-Au porphyry mineralization that migrated over time from the northwest to the southeast within the Yirri Intrusive Complex. Younger ages from the southwestern segment of the Yirri Intrusive Complex extend the magmatic history on Manus Island from that previously known and potentially provide new age constraints on the cessation of southward dipping subduction and the docking of the Ontong Java Plateau. Results improve the constraints on the tectonic reaction to the docking of the Ontong Java Plateau, propagating outwards along the arc from the proximal trench zone, westward to the location of Manus Island at the time.