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Title: A GENETIC RELATIONSHIP AMONG EPITHERMAL GOLD TELLURIDES, CALDERAS, AND THE VITI LEVU LINEAMENT, FIJI

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Abstract: The Tuvatu (reserves of 12 t Au) and Emperor epithermal gold-silver telluride deposits (production, and proven and probable reserves of 280 t Au) are the two largest gold deposits in Fiji. The deposits are 50 km apart and occur along the >250 km ENE-trending Viti Levu lineament. They are both spatially associated with alkaline rocks of almost identical age (~5.4 to 4.6 Ma). The gold mineralization in both deposits is spatially and genetically related to monzonite intrusions and to a low-grade porphyry copper-style system. The Emperor deposit occurs along the margins of the Tavua volcano whereas the Tuvatu deposit occurs adjacent to the Navilawa caldera. The Navilawa caldera lies along the same lineament as the Tavua caldera and shares many similarities. Monzonite in the caldera hosts low-grade porphyry copper mineralization near its center with epithermal gold mineralization situated along its margins at Banana Creek and North Tuvatu. Porphyry copper mineralization occurs in E-W trending veins, whereas the gold mineralization runs in N-S trending veins and shows a direct genetic relationship with the Tuvatu mineralization. Trace element data for intrusive rocks from the Navilawa caldera are consistent with an island arc source and mimic those of previously published compositions of shoshonitic lava from the Emperor deposit. At both locations, low-sulfidation, epithermal gold-telluride mineralization occurs in flat-lying veins, steep faults, shatter zones, stockworks, and hydrothermal breccias. Mineralization in both deposits formed in multiple stages and is characterized by the presence of quartz-rosoelite-telluride veins in which gold-rich tellurides were deposited prior to silver-rich tellurides. Gold tellurides and vanadium minerals were deposited at approximately 250°C from moderately saline fluids. Oxygen and hydrogen isotope compositions of ore fluids at Emperor and Tuvatu are similar to the composition of waters exsolved from arc magmas. The similar igneous lithologies of almost identical age, transition from porphyry-style to epithermal-style mineralization, paragenetic relations, and comparable fluid inclusion and stable isotope data suggest a common origin for sulfide and gold-telluride mineralization in the Tavua and Navilawa calderas. Potential exists for additional epithermal gold telluride mineralization near volcanic centers in shoshonitic rocks spatially related to the Viti Levu lineament in northern Viti Levu.