

NATIVE GOLD IN A HAWAIIAN ALKALIC MAGMA

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Abstract

Native gold found in fresh basanite glass from the early submarine phase of Kilauea volcano, Hawaii, may be the first documented case of the transport of gold as a distinct precious metal phase in a mantle-derived magma. The gold-bearing glass is a grain in bedded volcanic glass sandstone (Japan Marine Science and Technology Center (JAMSTEC) sample S508-R3) collected by the submersible Shinkai 6500 at 3879 m depth off Kilauea's south flank. Extensive outcrops there expose debris-flow breccias and sandstones containing submarine-erupted alkalic rock fragments and glasses from early Kilauea. Precipitation of an immiscible gold liquid resulted from resorption of magmatic sulfides during crystallization-differentiation, with consequent liberation of sulfide-hosted gold. Elevated whole-rock gold concentrations (to 36 ppb) for fresh lavas and clasts from early Kilauea further show that some magmas erupted at the beginning stages of Hawaiian shield volcanoes were distinctly gold rich, most likely owing to limited residual sulfide in their mantle source. Alkalic magmas at other ocean islands may also be gold rich, and oceanic hot-spot provinces may contain underappreciated gold resources.

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