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Provenance of the Placer Gold-Bearing Banket Conglomerate, Iduapriem, Ghana: Constraints from Morphology and Oxygen Isotope Characteristics of Quartz Pebbles

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Economic gold mineralisation of the Tarkwaian Group in Ghana is restricted to the Banket quartz-pebble conglomerate. No oxygen isotopic studies have been conducted to unravel the provenance for the gold-bearing Banket conglomerate of Ghana. Quartz is very resistive to alteration and can retain its original isotopic composition, even after low temperature fluvial transport and overprinting low-grade metamorphism. Hence, the current study at the Iduapriem Mine in Tarkwa area analysed oxygen isotopic values in the quartz pebbles that constitute the placer gold-bearing Banket conglomeratic reefs A, B, and C. The oxygen isotope data, together with petrography and geochemical assay values, were used to elucidate the provenance of the Banket conglomerate and also the environment of deposition of quartz veins oxygen isotopic studies that could supply the quartz pebbles in the gold-bearing Banket conglomerates based on temperatures of 350-450°C for hydrothermal gold mineralisation and oxygen isotope fractionation. The results show the oxygen isotope data of the Banket conglomerate quartz pebbles range from +11.2 to +13.2‰ to be lower than the oxygen isotope data for quartz veins related to gold deposits along the left flank of the Ashanti metavolcanic belt. Since the oxygen isotopes values are considered representative of the original formation characteristics, this difference implies that the Banket conglomerates were not erosional derivatives of the existing Birimian lode-gold deposits. It is likely that older, potentially large early Paleoproterozoic gold-rich terranes existed in Ghana prior to the formation of the gold-bearing Banket conglomerate and the existing Birimian lode gold-deposits on the west flank of the Ashanti metavolcanic belt. Based on the structural and geophysical works of previous workers, the inferred sources from the east of the Ashanti Volcanic belt could explain the reason for the very few existing gold deposits to the east of the Ashanti metavolcanic Belt, in contrast to the west.