

The Diverse Structure of Archean Lode Gold Deposits of the Southwest Mosquito Creek Belt, East Pilbara Craton, Western Australia

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Abstract

The Mosquito Creek belt has been the largest source of metasediment-hosted lode Au in the southeast Archean Pilbara Craton. Most of the deposits lie along the belt-parallel structures of the Middle Creek line (Au) and the Blue Spec line (Sb-Au), which strike as a mostly open arc in an approximately east-west orientation. The metasedimentary rocks were multiply deformed, with five deformation phases recognized. Despite being aligned along these trends, in detail the deposits vary significantly in their mineralization style over short distances along strike. These styles include a competence-controlled strata-bound disseminated style (Golden Eagle), a competence-controlled crosscutting tensional vein-fault style (Otways-Shearers), and a shear zone-hosted style (Barton's-Hopetoun North).

Controls on mineralization can be attributed to changes in lithology and the partitioning of strain during late-stage regional shortening (D_{4c}) that was oriented north-northwest at around ~2900 Ma. The development of veins and associated faults at a high angle to the main D_{4c} trend may reflect a later deformation event (D_5), which resulted in brittle faulting under mostly north-northeast compression.

The structural chronology of overprinting relationships established for the Mosquito Creek belt is consistent with that determined in other parts of the Pilbara Craton (e.g., Mallina basin). This coherent structural pattern, together with consistent mineralization ages, suggests that far-field forces controlled deformation and raises the prospectivity of the Pilbara Craton for lode Au systems elsewhere (e.g., the Mallina basin).