

Title: The role of pre-existing veining in the localization of auriferous vein systems: Examples from the Canadian Shield.

Orogenic gold deposits exhibit spatial association with crustal-scale faults and are the product of protracted deformation and hydrothermal mineralization. A common theme to large deposits is the superposition of vein systems within the same fault network. The introduction of quartz/carbonate veins into altered schists creates large competence contrasts between the veins and surrounding schists promoting positive feedback for incremental deformation and mineralization. Depending on their geometry, pre-existing veins will fold/boudinage/fracture creating favourable low stress sites for subsequent mineralization. This promotes localization of subsequent veins into the same structural site during incremental deformation/hydrothermal activity and leading to the formation of complex superposed vein systems. Pre-existing veins may be barren or auriferous, whereas the younger veins are often highly enriched with gold, impacting significantly the local grade of a deposit.

The interaction between the deformed and the younger vein systems has a strong control on the geometry and plunge of the auriferous zones. In deposits that have not experienced a large amount of strain after the deposition of auriferous veins, the ore plunge is controlled by the intersection between extensional and fault-fill veins (i.e. the "B" axis). Where incremental strain is more severe, specific structural features of the deformed vein system (fold/boudin axes) will rotate sub-parallel to the transport direction (i.e. stretching lineation). Where a deformed vein system has been overprinted by a younger vein system, the resulting vein system may exhibit complex geometries involving features of both end members. It is important to map in space and time the evolution of the vein system and recognize the contribution of each vein system to the gold endowment.

This paper will outline the controls on such vein systems, their control on ore plunge, with examples from gold districts in the Canadian Shield.

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