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Structural Controls and Timing of Orogenic Gold Mineralisation in the Baie Verte Peninsula of Newfoundland, Canada

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This study is the first to robustly tie paragenetic associations of gold in the Baie Verte Peninsula (BVP) of Newfoundland, Canada, with regional- and deposit-scale structural observations and in situ geochronology. The BVP is one of the richest auriferous regions within the Newfoundland Appalachians, hosting more than 100 economic and sub-economic gold occurrences. The geological setting of the BVP resulted from the accretion of several micro-terranes of Iapetus origin to the Laurentian margin during the Ordovician Taconic Orogeny. Subsequent deformation developed under a sinistral transpressional setting during the Silurian Salinic Orogeny, followed by a complex dextral transpressional to transtensional tectonic regime during the Devonian Acadian and Neo-Acadian orogenic events. The studied gold occurrences, Stog'er Tight, Argyle, Romeo & Juliet, Deer Cove, and Pine Cove, lie along splays of the Baie Verte Line, the suture between the Laurentian margin and the accreted island arcs. All are currently either mined or under exploration by Signal Gold Inc..

New structural, mineralogical, and geochronological data has been collected through geological mapping, optical and SEM/CL investigations of mineralized samples, and in situ LA-ICP-MS U-Th-Pb geochronology of monazite, xenotime, and titanite. The structural data show that at least three deformational events (D₂-D₄) influenced the formation and present geometry of the gold deposits. Mineralogical and geochronological data reveal complex paragenetic sequences in each deposit and at least two periods of gold precipitation.

We interpret the first episode of gold mineralization to have occurred between ~420 and 400 Ma, broadly synchronous with development of E-W–striking and south-verging thrusts formed during D₂ progressive deformation. A later fluid phase was introduced in the system between ~390 and 370 Ma, during the D₃ and/or D₄ deformational events when the deposits were subsequently folded and faulted. Currently, it is unclear whether this fluid augmented the existing gold endowment or remobilized pre-existing gold.