

Re/Os Analysis of Arsenopyrite from Meguma Lode Gold Deposits: Implications for Timing of Gold Metallogeny and Age of Acadian Deformation in the Meguma Terrane, Nova Scotia¹

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Meguma lode gold deposits (MLGD) occur within Cambro-Ordovician metaturbidites of the Meguma Group, which were deformed into upright, northeast-trending box and chevron-type folds during the Devonian Acadian Orogeny. The MLGD are dominated by quartz veins with associated carbonate and arsenopyrite and trace Fe, Pb and Zn sulphides. Geological mapping and structural analysis of several gold districts indicate that bedding concordant, discordant, en echelon and saddle reef vein types dominate and that they can be related kinematically. In addition, the mutual cross-cutting relationships of all vein types suggest a similar time of emplacement, which is inferred to have been late in the folding history of the host rocks. This timing of vein emplacement is consistent with the following observations: (1) veins locally crosscut hornfels adjacent ca. 375 Ma granites (e.g., Mooseland and Beaver Dam districts); and (2) ca. 375 Ma ⁴⁰Ar/³⁹Ar plateaux ages for hydrothermal vein minerals (amphibole, biotite, muscovite) from several gold districts (n=7). In order to further constrain the timing of vein formation, we have undertaken Re/Os analyses of vein and wallrock arsenopyrite from three gold districts where the absence of hydrothermal vein minerals preclude dating by the ⁴⁰Ar/³⁹Ar method - The Ovens, Dufferin, and the Touquoy Zone (Moose River district). Whereas The Ovens and Dufferin are similar geologically (i.e., hinge area of anticlines) and contain all vein types typical of MLGD, the Touquoy Zone represents vein-free, disseminated style gold mineralization. The results of Re/Os analyses indicate ages of 408 ± 4 Ma for The Ovens and 381 ± 3 Ma for Dufferin and Touquoy. These data along with previous ⁴⁰Ar/³⁹Ar ages have implications for gold metallogeny and tectonism within the Meguma Terrane: (1) vein formation and, hence, gold mineralization is coincident with two widespread events within the Meguma Terrane, namely regional deformation and felsic plutonism; and (2) the timing of regional deformation is now constrained to ≥408 Ma, which contrasts with current estimates based on ⁴⁰Ar/³⁹Ar whole rock and mineral ages (i.e., ca. 400-390 Ma). The difference in time of deformation is considered to reflect the higher blocking temperature of the Re/Os chronometer in arsenopyrite compared to the K-Ar system in mica and clearly demonstrates the need for additional high-temperature chronology to better constrain the absolute timing of deformation and gold mineralization in the Meguma Terrane.

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