Relative timing and structural controls on gold mineralization along the Porcupine-Destor Deformation Zone, Hislop Township, Matheson, Ontario.

I Chappell[1], B Lafrance[1], D Kontak[1]

[1]Mineral Exploration Research Centre, Department of Earth Sciences, Laurentian University, Sudbury, Ontario

The Porcupine-Destor Deformation Zone (PDDZ) is a long-lived and complex structure that stretches from the Swayze greenstone belt to the west and to the Grenville front in Quebec to the east. The PDDZ hosts several of Canada's most large gold deposits. Despite the rich history of exploration and mining along this structure, determining the relative timing and structural controls on mineralization have remained elusive and as such how and when mineralization was emplaced is not completely understood. Much of the previous research has focused on the Timmins and Val D'Or camps leaving many smaller deposits between the two camps largely under-studied. In this study, detailed analysis of the Black Fox mine, Hislop mine and Grey Fox exploration property will provide new insights on a segment of the PDDZ where active exploration is ongoing. Gold mineralization at the Black Fox mine occurs within an up 100 m-wide ankerite alteration zone forming as low sulphide-bearing quartz-carbonate veins within fuchsite-altered ultramafic volcanics, within disseminated fine-grained pyrite crystals in carbonate-sericite-altered, sheared mafic volcanics, and within silicified and quartz-carbonate-veined felsic intrusives. Mineralization within the Hislop East pit and Grey Fox exploration properties occurs as laminated open-space-filling quartz-carbonate veins hosted by variolitic volcanics, mafic volcanics, and silicified felsic intrusive units commonly associated with phyllic alteration halos. The gold mineralization at the Black Fox mine is orogenic gold related to longitudinal shear zones whereas the gold mineralization at the Hislop and Grey Fox site are sourced from magmatic fluids. By comparing relative timing of deformation events at each site, we can identify sequences of events leading to the emplacement of gold mineralization, subsequent remobilization and post mineralization movement. Understanding the deformational history of these mines and properties will provide paramount information for the active exploration, future initiatives, and may re-open research on other similar regions along the PDDZ.