

# Tectonically driven temporal and spatial controls across an accretionary orogen: tectonic setting of post-orogenic, polymetallic porphyry-style ores

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Post-orogenic polymetallic porphyry-style mineralization occurs in distinctive patterns within space and time in accretionary orogens. These patterns are controlled by the tectonic drivers for crustal melting, the presence or absence of metal sources, and the 4D tectonic architecture of the orogen which provides the pathways and channels for melt and fluids. This Targeted Geoscience Initiative activity of the Geological Survey of Canada focuses on the tectonic setting of the Appalachian orogen as a means to investigate the development and maintenance of melt and fluid pathways within an orogen's architecture. Our working hypothesis is that the evolving tectonic setting is a critical factor in focusing polymetallic porphyry-style mineralization in space and time. Towards this end, this activity focuses on the regional tectonic and local structural history of the Eastern Highlands shear zone (EHSZ) on Cape Breton Island, Nova Scotia. To establish the regional tectonic setting, research will target the magmatic, metamorphic, and cooling history of the Aspy and Bras d'Or terranes which are separated by the EHSZ. The detailed local structural history of the EHSZ is under investigation via a combined structural mapping, micro-structural analysis and geochronological study. Preliminary results confirm that the Aspy terrane experienced a rapid cooling event during the Devonian, likely accommodated by slip along the EHSZ as it was reactivated in response to outboard accretion.