

# POLY-PHASE STRUCTURAL CONTROLS ON ORE DEPOSITS IN NORTHERN SWEDEN

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Northern Sweden is one of the most active mining areas in Europe and hosts several of Europe's most important ore deposits. The region is dominated by two major mining districts, the Skellefte district in the south and the northern Norrbotten mining district in the north. Important deposits include the Aitik Cu-Au-Ag-(Mo) deposit, the Kiruna and Malmberget Fe deposits and the Kristineberg Cu-Zn-Pb-(Au-Ag) deposit.

Recent and ongoing studies reconstruct the origin and evolution of ore-bearing structures in northern Sweden and revealing the tectonic framework for mineralizations. It is suggested that the majority of major shear zone systems in the region originated as syn-extensional structures forming as a response to subduction. The timing of the inferred extension is interpreted as synchronously with the deposition of ca. 1.9 – 1.89 Ga volcanic and volcano-sedimentary rocks and the emplacement of related intrusive rocks. Volcanic-hosted massive sulphide (VMS) deposits in the Skellefte district formed in a syn-extensional volcanic arc setting (Skyttä et al. 2012; Bauer et al. 2014), whereas magnetite-apatite deposits in northern Norrbotten formed in a back-arc setting (Sarlus 2016). Subsequently, the area was overprinted by at least two separate compressional deformation events. The first compressional deformation event (approx. 1.88-1.87 Ga) is suggested to result from the accretion of the Skellefte arc onto the Archean craton causing the inversion of early syn-extensional faults, closure of the back arc basin and transposition of VMS and magnetite-apatite deposits. It furthermore resulted in the formation of a strong and penetrative cleavage and related folding under greenschist to amphibolite facies metamorphic conditions, approximately increasing from south to north. Likely, the porphyry copper style mineralizations as Tallberg (Weiherd 1992) and the early phase in Aitik (Wanhainen et al. 2012) formed during this stage. A second compressional event resulted in a strong strain partitioning, folding and reactivation of shear zones that control the location of potassic-epidote-garnet alteration and relating sulfide mineralizations (e.g. Nautanen and second stage in Aitik in Wanhainen et al. 2012). The structural styles suggest deformation under upper-crustal, low-P conditions. Voluminous syn-tectonic intrusions are suggested to contribute with abundant heat for driving hydrothermal fluids that are interpreted to be responsible for a regional-scale iron-oxide copper gold (IOCG) overprint.

## References

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