1. Introduction: remobilisation and local geology

- Remobilisation is the translocation of pre-existing mineralisation during prograde and retrograde metamorphism (Fig. 1).
- The resulting textures and structures are an interplay between the response of competent and incompetent materials to the same P, T conditions.
- Remobilisation of sulphides can potentially form new mineralisations from a precursor. However, the distance between precursor and product mineralisation increases, the difficulty of linking them becomes more difficult (Marshall and Gilligan, 1993; Marshall et al., 1998; Marshall and Spyr, 1998).
- The aim of this poster is to document meso- and micro-scale remobilisation textures in the Rävilden Norra (BN) VMS deposit and the implications of remobilisation processes to relative mineral enrichment within the deposit.

Fig. 1. A. Geological map of the Kristineberg area with the location of BN. B. Geologic profiles showing vein-type and massive mineralisation hosted by different lithologies. C. Visible VMS deposit (BN) layers with contact relations and ore zone relationships. D. Schematic representation of remobilisation processes modified after Jansen and Persson, 2004. After primary mineralisation and volcanosedimentary rocks and ore zones experienced deformation with tight folding and faulting (Fig. 2).

2. Textures and mineralogy

- Mineralisation ~300 °C
- Massive Sp - Ball ore
- Primary deposit
- Remobilisation processes, T (°C)

3. Mineral chemistry

- Inverse correlation between Ag and Cu sulphides (atoms per formula unit) is related to substitution of Ag and Cu in the molecular structure of Freibergite (George et al., 2017; Moizo et al., 2008; Röyke, 1974).
- Correlations in Fig. 6-A-E are explained by coupled substitutions of Ag/Cu, Fe, Zn, Pb, and Bi in their respective complexes A, B, C, and D of the tetrahedral group general formula A(Fe+Cu)X2Y2Z2 (George et al., 2017; Moizo et al., 2008).
- The composition of sphalerite presents little variations within the deposit (7.75 wt. % Fe in average) and minimal re-equilibration of sphalerite composition might have played a role assuming pre-metamorphic variations during ore deposition (Scott, 1983). Future studies of sphalerite from Rävilden Norra would confirm or falsify our hypothesis.
- Samples correspond to sulphide-cemented breccia in the hanging wall, massive sulphides with ball-ore texture, semi-to-massive sulphides with foliated texture, and vein hosted chalcopyrite-pyrrhotite mineralisation.

4. Preliminary conclusions

- Sphalerite, galena and Ag-rich sulphides in the hanging wall of Rävilden Norra occurred in our observations, due to remobilisation from the massive sulphide and chalcopyrite-pyrrhotite ore lenses during metamorphism of the volcanosedimentary sequence hosting the mineralisation.
- Freibergite is most commonly hosted in galena and presents a fairly homogeneous composition with minor variations relative to mineralisation type. These variations are to a greater extent in the atomic content of Ag, Cu, and Zn with Zn, Cu, Pb, Bi and As to a lesser extent. Coupled substitutions in the internal structure of freibergite are accounted for as the main reason for such differences, being monovariant by Ag Cu the most clear trend. Moreover, freibergite from the chalcopyrite-pyrrhotite mineralisation contains more Ag than freibergite from the hanging wall and massive sulphide. A probable hypothesis is that a metamorphic solid solution of freibergite compositions has been retained to some extent even after greenstone facies metamorphism. Alternatively, freibergite might have evolved from Ag-rich galena during metamorphism removing Ag in the presence of other mobile elements such as Fe, Cu or Pb (Shobin et al., 1986; Grant, 2009). This is evidenced by the close association between galena and freibergite, and other Ag-minerals as inclusions in galena (e.g. hessite, dyscrasite). However, EMPA data in galena is needed to confirm this hypothesis.

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Fig. 2. Schematic cartoons of common textures that are the result of remobilisation process in the hanging wall and ore zones (C and D) of BN. A. Sulphide-cemented breccia with clasts of graphitic phylite-gneissic rocks. B. Chalcopyrite-pyrrhotite ore textures with pyrrhotite composed of sulphides. C. Chalcopyrite-pyrrhotite ore textures with massive sulphide clasts.

Fig. 3. A and B represent a schematic evolution model modified after Jansen and Persson, 2004. After primary mineralisation and volcanosedimentary rocks and ore zones experienced deformation with tight folding and faulting (Fig. 2).

Fig. 4. Chalcopyrite + pyrrhotite mineralisation. A. Chalcopyrite forming metaluminous graphitic phylite. B. Pyrrhotite-chalcopyrite-dolomitic host rock textures. C. Sulfide-cemented breccia with clasts of graphitic phylite-gneissic rocks. D. Chalcopyrite-dolomitic host rock textures with massive sulphide clasts.

Fig. 5. A. Chalcopyrite forming metaluminous graphitic phylite. B. Pyrrhotite-chalcopyrite-dolomitic host rock textures. C. Sulfide-cemented breccia with clasts of graphitic phylite-gneissic rocks. D. Chalcopyrite-dolomitic host rock textures with massive sulphide clasts.

Fig. 6. Schematic representation of remobilisation processes modified after Jansen and Persson, 2004. After primary mineralisation and volcanosedimentary rocks and ore zones experienced deformation with tight folding and faulting (Fig. 2).

Fig. 7. A and B represent a schematic evolution model modified after Jansen and Persson, 2004. After primary mineralisation and volcanosedimentary rocks and ore zones experienced deformation with tight folding and faulting (Fig. 2).


References

