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Ore body shapes versus regional deformation patterns as a base for 3D prospectivity mapping in the Skellefte Mining District, Sweden

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The current work in progress is based on detailed structural analysis carried out during the last years, which unravels the crustal evolution of the ore bearing Palaeoproterozoic Skellefte District in northern Sweden. The shape and orientation of the volcanic-hosted massive sulfide (VMS) ore bodies through the district is modeled in three dimensions and reflected against the regional deformation patterns. By doing this we aim to understand the coupling between the transposition of the ore bodies and the deformation structures in the host rocks, honoring both local deformation features and regional structural transitions.

The VMS ore bodies are modeled in gOcad (Paradigm) visualizing both the strike and dip of the ore lenses as well as their dimensions. 25 deposits are currently available in 3D and modelling of the remaining 55 deposits is planned or partly in progress. The ore deposits and mineralizations are classified according to their shape and size. The complexly deformed ore bodies are described each independently. Subsequently, the VMS deposits are plotted on the structural map of the Skellefte district displaying their size and strike, dip and plunge values in order to show their spatial distribution and their relationship with shear zones.

The preliminary results show a good correlation between the shape and orientation of the ore bodies and the related structures. Plotting the VMS deposits on a structural map clearly demonstrates the close spatial relation of the ore deposits and regional scale shear zones. Furthermore, the deformation style within the ore deposits generally mimics the deformation style of the shear zones, e.g. the plunge of elongate ore bodies parallels the mineral lineation of the related shear zone. Based on these results, the location and shape of ore deposits may be estimated, which is an important tool for prospectivity mapping and near mine exploration of ore districts.