X-MINE

NEWSLETTER – May - 2021

X-MINE supported Masters Thesis and 3D-model by Iris van der Werf.

In the H2020 X-MINE-project, the Geological Survey of Sweden (SGU) is leading the work in WP1 that aims to, among other tasks, develop geological 3D-models for the four mine sites involved in the project. The 3D-models serve as the background for the evaluation and further development and implementation of new technologies, tools and equipment based on X-Ray technology, XRF (X-Ray fluorescence) and XRT (X-Ray tomography). In Sweden, the producing zinc-lead-silver mine Lovisagruvan is partner in the X-MINE project and SGU has together with the mine developed an in-mine, a near-mine- and a semi regional 3D-model for the project area.

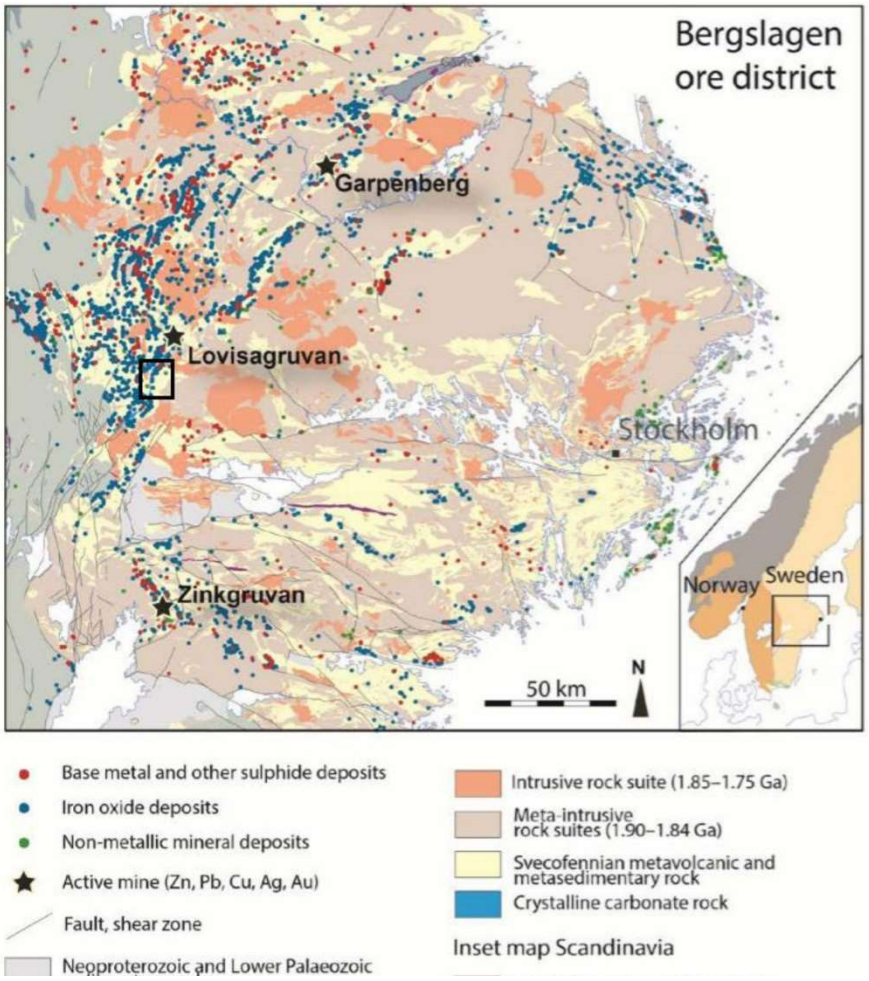

Figure 1. The Bergslagen ore district. The black square within the Figure outlines the exact location of the fieldwork area which is shown in greater detail in Figure 4 (Modified after Luth et al., 2019).

Adjacent to the project study area, a student, Iris van der Werf from the Vrije Universiteit in Amsterdam, has performed a master thesis on the Leja area southwest of Lovisagruvan.

To synchronize and for mutual benefit, X-MINE partner, SGU structural geologist Stefan Luth has been one of three supervisors. Through the collaboration, the X-MINE project regional 3D-model has gained wider geographical and structure geological support.

The thesis is entitled ***"3D structural framework of the Leja Cu-Zn-Pb deposit and hosting Guldsmedshyttan syncline, Bergslagen, Sweden"*** and is available for download from this link:
https://www.researchgate.net/publication/351871504_3D_structural_framework_of_the_Leja_Cu-Zn-Pb_deposit_and_hosting_Guldsmedshyttan_syncline_Bergslagen_Sweden

One of the key findings of Ms van der Werf is that the mineralisation at Leja includes three distinctive mineralized layers with variable contents of the metals Zn, Pb, Cu, and Au. Of particular interest is that the highest metal concentrations within each ore layer occur in the vicinity of fault systems, suggesting a spatial relationship between faults and ore bodies. Ms van der Werf suggest that the faults acted as conduits for metal-bearing hydrothermal fluids, which reacted and partly transformed the precursor carbonate dominated rock into skarn and zones of Zn-Pb-Cu-Au mineralization during multiple phases of deformation. According to Ms van der Werf, intersections between major faults, in particular occurring within marbles, should therefore be considered important criteria for exploration in the search for similar ore deposits within the study area and its direct surroundings.

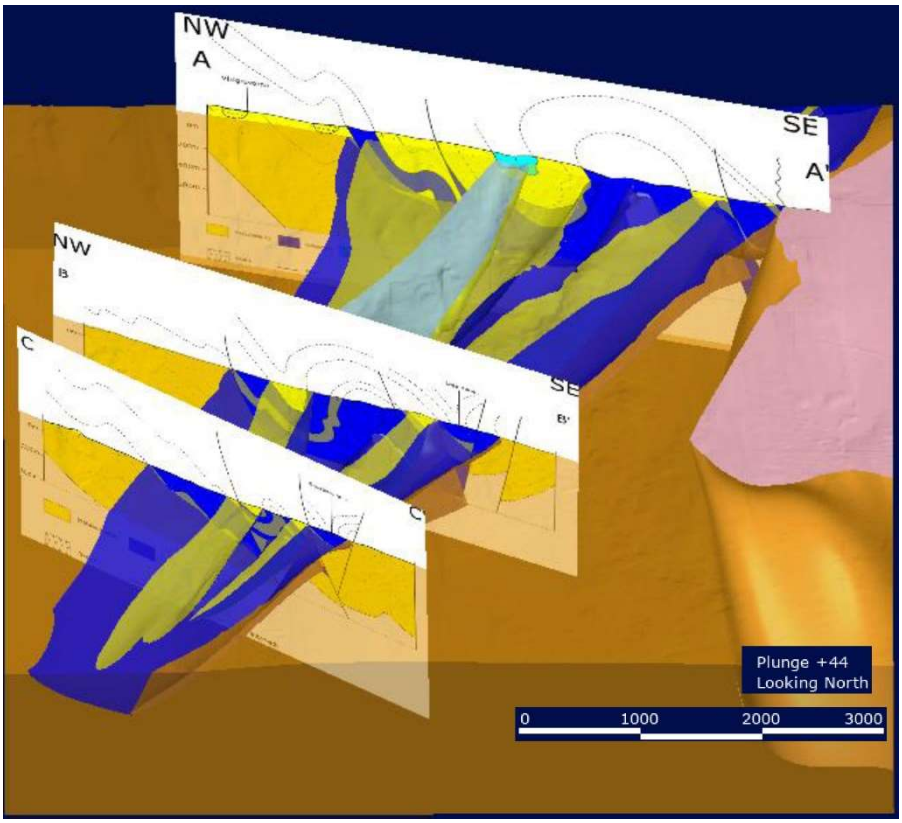

Figure 2. Figure 12 of Iris van der Werf. Regional geology visualized in a 3D model including the Lejagruvan in the east-flank in cross-section B and the Siggabodagruvan in the east-flank in cross-section C. Please see the original text for full explanation.

A key conclusion of Ms van der Werf is that the mineralisation at Leja includes three distinctive mineralized layers with variable contents of the metals Zn, Pb, Cu, and Au. Of interest is that the highest metal concentrations within each ore layer occur in the vicinity of fault systems, suggesting a spatial relationship between faults and ore bodies. The interpretation is that the faults acted as conduits for metal-bearing hydrothermal fluids, which reacted and partly transformed the marbles into skarn and zones of Zn-Pb-Cu-Au mineralization during multiple phases of deformation. Ms van der Werf suggest that intersections between major faults, in particular occurring within marble, should therefore be

considered important criteria for exploration in the search for similar ore deposits within the study area and its direct surroundings.

The results of Ms van der Werf have been evaluated and in part have also contributed to the semi-regional model of the Lovisagruvan area (Luth et al 2019) and can be used for near-mine exploration and in-mine exploration (drillhole targeting).

Ms van der Werf thesis may be studied in a broader context with recent publications from the immediate neighboring Lovisagruvan area by Jansson et al (2018) and X-MINE partners Sahlström et al (2019, Luth et al (2019) and Andersson et al (2020).

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This project has recieved funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 730270

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