

Interactive
Comment

Interactive comment on “Structural evolution of the VMS-hosting Kristineberg area, Sweden – constraints from structural analysis and 3-D-modelling” by P. Skyttä et al.

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Dear editor and reviewers, We appreciate the comments by A. Brogi and an anonymous reviewer and give our response below.

Response to comments by A. Brogi

Organization: We agree that the organization of the paper may be substantially improved and that the suggested modifications will result in a better paper. In specific, the suggested new paragraph to illustrate the MT and seismic data will be helpful. The focus of this new paragraph will be in presenting the MT data since the seismic data has already been published (Dehghannejad et al., 2012) and cited in this manuscript.

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We will make sure that the presented geophysical data will be properly described, is relevant for this study, and will contribute in constraining the structural data towards the depth.

Structural data: We agree that the use of stereograms will help in presenting the structural data. We will also provide constraints on the metamorphism vs. deformation by better documentation and presentation of the structural data and by comparison with the previous studies from the central parts of the Skellefte District (Skyttä et al., 2012) and Kristineberg Skyttä et al., 2010). Any new significant field-based constraints are few since the area is devoid of porphyroblasts, the rocks are heavily altered, and the outcrop density for observations is very sparse (< 1 % of the area and the distribution is far from even). The last point will also greatly affect the presentation of the stereograms.

3D-modelling: We do not agree that we have just been dealing with “3D-viewing” since we have developed a new 3D-model of the study area comprising 3D-surfaces of the most significant lithological contacts, high-strain zones and structural surfaces. The model has been developed from integration of the structural data from the area (based on outcrop mapping and data from geological sections and plan drawings from the VMS deposits and their vicinity) with in-depth geophysical data. Integrating such datasets into a 3D structure is indeed 3D-modelling. Admittedly, the models are rough and may not be properly geometrically validated or balanced. Therefore, their validity will be discussed in the light of the recent advances of the Skellefte district geology instead (e.g. Skyttä et al., 2012). The schematic and regional modeling approach arises from the lack of regional marked horizons and the poor outcrop density. This will be better highlighted in the revised manuscript – sparse data will not allow detailed 3D-model construction or geometrical restorations. One more aspect of the 3D-model is the 3D-PDF file provided as an electronic supplement to the paper, which we consider a good way to illustrate complex 3D structural relationships.

Focus of the paper: We do not want to go into details about the deposit-scale geology

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since this would require quite a different approach and scale. Therefore, the focus of the paper will be slightly shifted towards complementing the available structural model from the central parts of the Skellefte district (see Skyttä et al., 2012). However, the deposits and their geometry will be still used in constraining the structural orientations at depth. Shifting the focus of the paper is nicely made possible by the setting of the Kristineberg area at a lateral termination of the major WNW-ESE high-strain zone (Skyttä et al., 2012), as inferred in this manuscript. Due to the new focus of the paper, the chapters “Introduction” and “Geological setting” may be partially rewritten (condensed) and will hence improve the structure of the paper. To further clarify the focus of the paper, we change the title into “Strain partitioning and its influence on the 3D-geometry of the crust at the lateral termination of a regional-scale transpressive high-strain zone – example from the western Skellefte district, Sweden”.

After the revisions listed above, we consider that the paper will be significantly improved and will hence complement the structural evolutionary model of the well-known the Skellefte VMS district in Sweden. Therefore, we consider the paper worth revising and re-evaluating to be published in Solid Earth.

Response to comments by an anonymous reviewer

We consider that the planned revisions arising from the criticism by the other referee (A. Brogi) will answer to the questions presented by the anonymous reviewer. In specific: 1) The focus of the paper will be slightly modified towards a regional-scale synthesis, 2) The presentation of the structural data will be enhanced by showing stereograms; However, already now we have shown the pattern of coexisting domains of coaxial and non-coaxial deformation (the N and S antiforms, which we consider strong evidence for the presence of the inferred transpressional structural regime. Linking the small-scale with large-scale is common practice in geology and will be used here as well. 3) We give a new paragraph describing the MT and seismic results used as constraints for the 3D-modelling in this study. Furthermore, figs. 3 and 8 will be more properly explained and their significance highlighted.

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