Comment on se-2021-101

Juan Alcalde (Referee)

Referee comment on "3D reflection seismic imaging of the iron-oxide deposits in the Ludvika mining area (Sweden) using a focusing pre-stack depth migration approach" by Felix Hloušek et al., Solid Earth Discuss., https://doi.org/10.5194/se-2021-101-RC1, 2021

Review to the article "3D reflection seismic imaging of the iron-oxide deposits in the Ludvika mining area (Sweden) using a focusing pre-stack depth migration approach", by Hlousek et al.

General remarks

This article presents the pre-stack depth imaging processing of a 3D seismic dataset acquired in the Ludvika mining area (Sweden). The article describes the processing applied to the dataset, including the comparison of two migration methods (FVM and KPSDM), and compare their results with a previous 2D dataset published in Malehmir et al., 2021. The seismic images presented are of outstanding quality, especially considering the challenging acquisition and geological conditions. In general terms, the paper is concise and well structured, and an interesting read albeit some language issues.

Having said that, I have a few issues that I consider important to be resolved to make this manuscript suitable for publication. I have outlined the major issues below and I attached a commented version of the manuscript with other specific comments.

Main issues

- There is too much detail on the methodology used and the results obtained in the introduction. IMHO the introduction should serve to introduce the reader the background, the problem(s), and how the authors are going to deal with them in the paper, but not to provide too many details on this last bit (because that's what the paper is about!). I strongly suggest to reduce the last paragraphs in the introduction by limiting the details on the methods and results obtained. Also, please use of more references in the first lines of the introduction when possible, when referring to general aspects of the mineral exploration history (e.g. need for RM, mine abandonment in the 60s and 80s…).
- You should include more geological information in the manuscript. Critically, the paper lacks of (1) a lithological column, and (2) a geological interpretation of the results. Currently, the results are only described (reflector x appears at this depth with this dip), but there is no trace of a geological interpretation of these reflectors. I understand

the value of a methodological paper like this one, especially given the excellent results that you obtain, but the readers will like to see what can you do with these results, even if the interpretation is subtle. There is only a hint of an interpretation in Figure 10, but the clarity of this image (particularly of fig. 10d) is very poor.

- Given that you compare your results with the data in Malehmir et al, 2021, I wonder if it'd be possible to have a new image explicitly comparing one of yours and Malehmir's section, so that the readers don't have to go back and forth to the other paper. -Only if there are no copyright issues-
- Same for the velocity model. It seems to be a very important input to achieve your final image, would it be possible to show a section of this model crossing the mineralisation to perceive the level of detail and resolution?
- The axes values are not readable in most figures. I couldn't read the depths in any of the figures.

Please also note the supplement to this comment:
https://se.copernicus.org/preprints/se-2021-101/se-2021-101-RC1-supplement.pdf