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Interactive comment on "Seismic imaging of dyke swarms within the Sorgenfrei Tornquist Zone (Sweden) and implications for thermal energy storage" *by* Alireza Malehmir et al.

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M. Majdanski (Referee #3) The article presents an interesting case study conected to important problem of the thermal energy storage. The authors use variety of geophysical methods in well thought out analysis that gives an interesting conclusions. Also the study area with dykes directly observed in quarry is a difficult, but interesting case. Gathered data, a combination of wide-angle refractions and reflections, are also good quality and has been collected with state of the art equipment and techniques. The manuscript is in general written with clear and easy to understand language, at least for not native speaker. I have seen those results before at the conference, and had a

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Discussion paper

positive impression about the whole concept. However, I got a few comments that, in my opinion, should improve the overall good level of the article.

(Referee #3) 1) Seismic has been measured with two types of the equipment, cable and wireless system. What was the frequency of the cable system geophones? Was is also 10 Hz as wireless described in text? Why is the noise level so different between the observations with as presented in Fig.5 and 6?

(Authors) Both systems used 10 Hz. They were acquired in different days. Traffic and wind noise was stronger.

(Referee #3) 2) In paragraph 3.2 authors describe processing steps. Unfortunately, important prestack data enhancement is not described in details (only mentioned in table 2). What has been used in this step? Also paragraph mention importance of the velocity analysis, but in all processing a constant velocity has been used. Why tomographic results has not been utilised to create a velocity model for further processing steps?

(Authors) For the NMO correction, a variable velocity was used to honor the steeply dipping reflections. This was not a constant velocity. Future studies could benefit from using the tomography data. Here, we kept the processing conventional as already good images are obtained.

(Referee #3) 3) Fig.7 - why noisy part of the data is totally muted? It is a critical part of the results. I understand its quality is poor, but at least there should be a hint of the structure.

(Authors) It is quite noisy and make the main reflection quite weak. We can add another figure but this make the article unfocused. We wish to keep it as it is.

(Referee #3) 4) Fig.9 P2 and P3 tomographic results shows very deep and sparse penetration of rays. This might lead to artificial increase of velocities in places marked as B2 and B3, that is further used in the interpretation. This tomographic inversion should be calculated with limited space preventing rays from escaping downwards.

Only P4 tomographic results looks realistic.

(Authors) This is a good point and we agree. We do not have any critical interpretation below the bedrock level. Rays have channelled as spotted by the reviewer due to likely starting model but also 3D nature of the tomography.

(Referee #3) Some small technical and typographical corrections:

(Authors) Page 13, line 20 – reference do fig. 12 should be added

(Referee #3) Page 14, line1: alone > along

(Authors) Followed.

(Referee #3) Fig.14 colour scale is missing, isolines are not described

(Authors) Figure has been reworked with numbers showing water table label at different locations. .

(Referee #3) Page 20, line 9: also be dipping -> also to be dipping

(Authors) Followed.

(Referee #3) Page 21, line 9: Could you please describe what filters has been used?

(Authors) Followed.

(Referee #3) Page 21, line 17: I see no red dashed lines in Fig.16

(Authors) It is in Figure 16a in the middle of the seismic image.

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