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Discussions

Interactive comment on "Traces of the crustal units and the upper mantle structure in the southwestern part of the East European Craton" *by* I. Janutyte et al.

Anonymous Referee #2

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This paper deals with a tomographic study of part of the area covered by the PASSEQ experiment. The authors use the wellknown Telinv inversion code for studying the upper mantle structure across the TTZ. The paper is in general well organized, written and illustrated. The discussion of the results is reasonable, it is however the amplitudes of the observed anomalies which I have doubts on. The authors showed nicely the importance of a correct crustal correction in case of strong crustal changes as in their case. However, the remaining signals for the upper mantle are extremely large for this kind of tectonic setting and certainly would need additional explanations, especially in the light of the fact that all other tomographic experiments in the areas around (TOR, SVEKALAPKO, LAPNET) show much smaller upper mantle signals!

General comments:

As mentioned above are the "observed amplitudes" of the anomalies rather large. This immedeately to my opinion triggers a number of questions: 1. What could be the explanation for such strong signals? My first suggestion would be that the solution is not damped strongly enough (since there's quite a strong smearing in W-E direction, dipping to the east) and that the amplitudes are therefor too strong? What are the resolution kernels for the diagonal elements? The authors claim that the results are well resolved in the central part. I would suggest that a figure 2. In case that that suggestion is not correct, what could be the reason for this strong amplitudes? a. I suppose that the temperature differences are not enough to explain the anomalies. So how much can lateral heterogeneities explain? b. Could anisotropy be an option? c. Is part of the effect related to the fact that no flat-earth transformation has been applied. The size of the array is such - more than 1000km in one direction - that a flat-earth transformation should be considered, since it will change quite a bit the apparent velocities. 3. How many parameters are inverted for with the approx. 4200 data? I wonder whether the parameter-space is rather heterogeneous. A singular value decomposition could tell you better and show you whether you have a rather large ratio for the total of the eignvalues you invert for. Telinv normally includes an option to do that.

In addition do I have specific comments related to text passages: P4 paragraph 2.1 crustal limits: a velocity of 8.65-8.9km/s is suggested for the uppermost mantle. These numbers can't be correct since there's no mantle rock which could fullfil these values? P6 paragraph 2.3 line 10: .... "suggests a strike-slip character" .. Are there earthquakes to support this idea or what are the observations this is based on? P8 line 10: Why is it difficult to interpret the seismic signals coming from large-scale seismic sources? I don't agree on that but believe that that does depend on the source region and the complexity there. Figure 11 shows an extremely strong smearing dipping to the east. I think that this needs to be explored with more sophisticated synthetic modelling rather

than doing a checkerboard test.

Technical issue: A table with giving some details on the number of layers, nodes and layer velocities and eventually showing whether nodes are fixed would help.

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