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Comment

# ***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.**

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We thank the anonymous reviewer for the constructive comments, and provide our explanations and corrections below:

1) The weighting factor was set according to the time error observed during the manual picking procedure of the P wave arrivals, which is presented in Table 1 (pg. 1007). The larger distortion of the phase (compared to the reference trace), the larger the error of the picking, the lower the quality factor to the pick is assigned (1 for the best quality to 3 for the poor quality data, in sense of S/N ratio). The teleseismic tomography code TELINV used in our study takes into account the weighting factor of the picks which

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have different influence to the final results of the inversion: the better the quality, the larger the effect is has. The weighting should reduce uncertainties which arise due to the picking error; however, we did not perform any inversions which neglect the weighting factor to check the difference.

2) We agree that the size of Fig. 12 (in paper) is too small to observe the resolved details. We provided the figures in high enough resolution which is good for the full-size figure and it was a decision by the SE service to make it smaller. However, we hope that the Fig. 12 (in paper) will appear in full-size in the final version. We also agree that it might be useful to provide the back-to-back figures with the results in order more clearly observe the effect of the crustal TT corrections (possibly in the same color scale). There are some important differences between the results presented in Fig. 1. Although the distribution of the high and the low velocity areas do not vary significantly, please mind the different color scales, as the velocity contrast obtained during the inversion without crustal TT corrections (Fig. 1 left) is in total up to about 4 % higher compared to the one obtained using the crustal TT corrections. Moreover, in the TESZ area there is a large sedimentary basin up to 20 km thick, thus, it is important to correct the TT there (as the seismic velocities are lower in the sedimentary layers). The effect of the crustal TT corrections is visible in Fig. 1 where the higher velocity area is bordering the TTZ (W-NW part of the study area marked in green – Mid Poland): in the results obtained without the crustal TT corrections (left) we see the lower velocities (which is a leakage from the crust due to thick sediments), while in the results obtained with the applied crustal TT corrections (right) we already observe the higher velocities (significantly reduced effects from the crust). The other significant difference is visible in the NE part of the study area where we have a sedimentary cover up to 2 km due to the Baltic sedimentary basin. In the results with the applied crustal TT corrections we see the reduced lower velocities in this area (W-NW Lithuania) as well (brown circle).

3) In teleseismic tomography always occur effects of the rays coming from different directions which are somehow distorted due to heterogeneities along their paths outside

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the study area; this effect is also mapped in the final results of the inversion. Our initial velocity model has 16 layers from 0 km down to 700 km. Inversion was performed for the layers from 60 km down to 350 km where we have good ray coverage; the deeper not inverted layers ensures the stability of the inversion. The velocity model is large and sufficient enough for the inversion. It has been proven with checkerboard tests presented in the paper.

4) We agree that abbreviation EEC should be explained in the abstract. As for the TELINV, this is a name of the code and needs no other explanation.

5) That is right, it should be “high signal-to-noise ratio”.

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Interactive comment on Solid Earth Discuss., 6, 985, 2014.

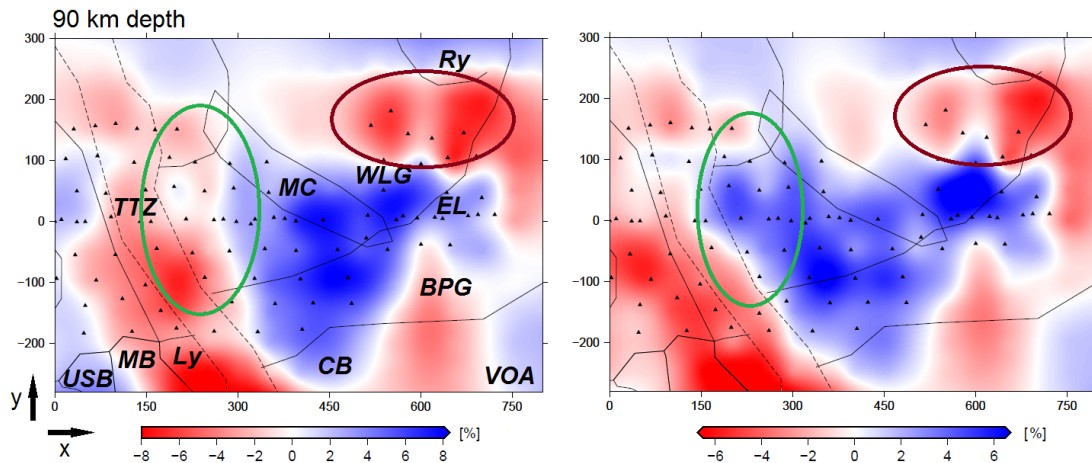
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**Fig. 1.** Depth slice at 90 km of result of inversion with (left) and without crustal TT corrections (right). The colorful circles mark the significant influence on the final result due to crustal effects.

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