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Solid Earth Discussions

Interactive comment on "POLENET/LAPNET teleseismic P-wave traveltime tomography model of the upper mantle beneath northern Fennoscandia" *by* H. Silvennoinen et al.

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We thank Anonymous Referee #2 for useful and constructive comments on our manuscript. Hanna Silvennoinen would like to apologise the lateness of these answers. She defended her PhD thesis mid-December and that has kept her busy. Additionally a small error was found in the data file during the revision process, which did not significantly alter the results but took some time to ascertain there were no other problems. A new results figure is added to this reply to show the results with corrected dataset.

The discussion part has been rewritten with more detailed interpretation of results. Comparison of anisotropy studies of POLENET/LAPNET data to our results has been

added, as well as comparison between previous close-by tomographic studies, and anisotropy has been more clearly stated as a possible reason of the anomalies found in results.

Other points: - The abstract has been edited to contain clearer motivation for using teleseismic tomography - The number of ray-paths is equal to the number of traveltime residuals, which has been summarised in Table 1. There is no numerical signal-to-noise ratio used in data selection but events were visually selected by excluding those events that could not be reliably picked. - There were 4 sites with a seismic station operational during both SVEKALAPKO and POLENET/LAPNET acquisition periods. The data from these stations was compared and no significant difference was found in traveltime residuals in comparison with distance and back-azimuth. The comparison figures are added as supplementary material and a short paragraph has been added to the manuscript - The selection of smallest SV to be included was done simultaneously with selection of damping value, using tests with synthetic and real data to select the combination. This is now stated at the end of Chapter 4.3 - We have tested inversion initially using 2 different grids. The second one had slightly larger depth extent of 550 km. The resolution or the results were not significantly affected, though the purpose of the 2 grids was more to test the capabilities of our data in horizontal direction than in vertical and to teach Hanna Silvennoinen the basics of grid selection. - Based on RDE, ray distribution and synthetic tests, the resolution at the depth of 180 km is comparable to the layers above and below, hence we have no reason to assume our results (with very small amount of lateral velocity variation at the depth) are not as reliable as the results of other layers. However, the velocity of the layer may not be iasp91 velocity as the method has tendency to smooth the layer average out whether it is close to the starting model or not.

Tiny issues: - We have added the grid lines to figure 9 that shows the results of checkerboard test to help reader to visualise the grid - A comment on frequency content of WWSSN-SP filter has been added to the text - Seismic Handler software

has been better referenced - The typing error has been fixed in Fig 5 - Fig. 14 now uses the same colour code as the rest of velocity perturbation figures

Please also note the supplement to this comment:
http://www.solid-earth-discuss.net/7/C1667/2015/sed-7-C1667-2015-supplement.zip

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Interactive comment on Solid Earth Discuss., 7, 2527, 2015.

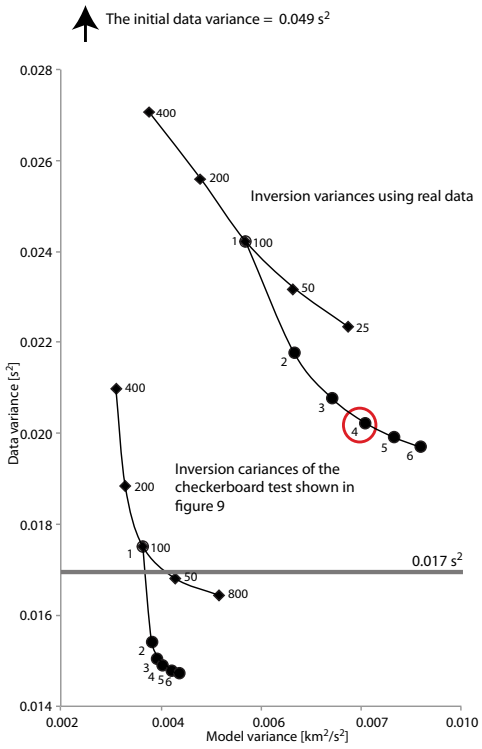

Fig. 1. Revised Fig. 5

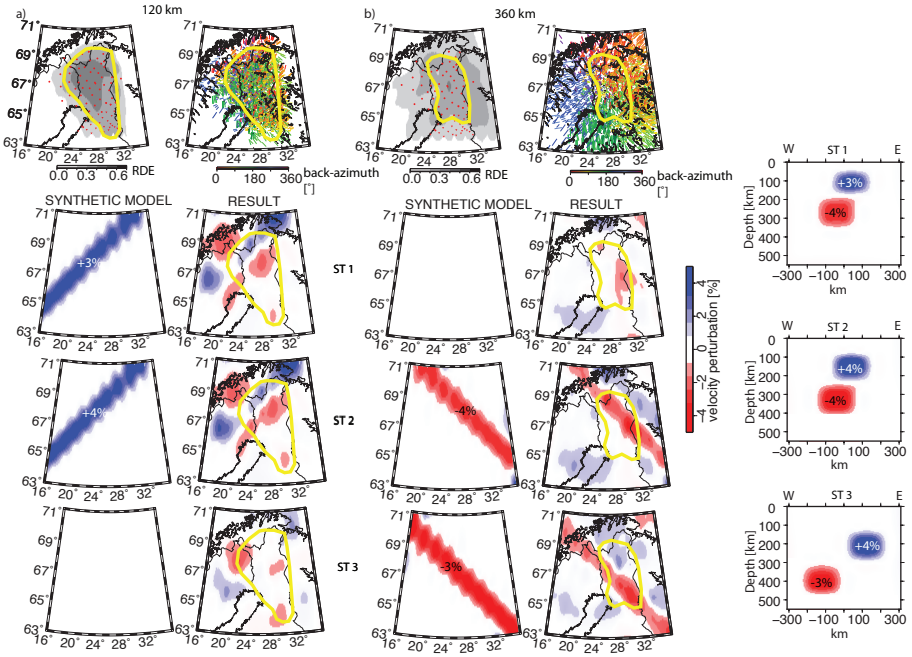

Fig. 2. New new figure 8 that is a compilation of old figures 8 and 10 with additional ray coverage information

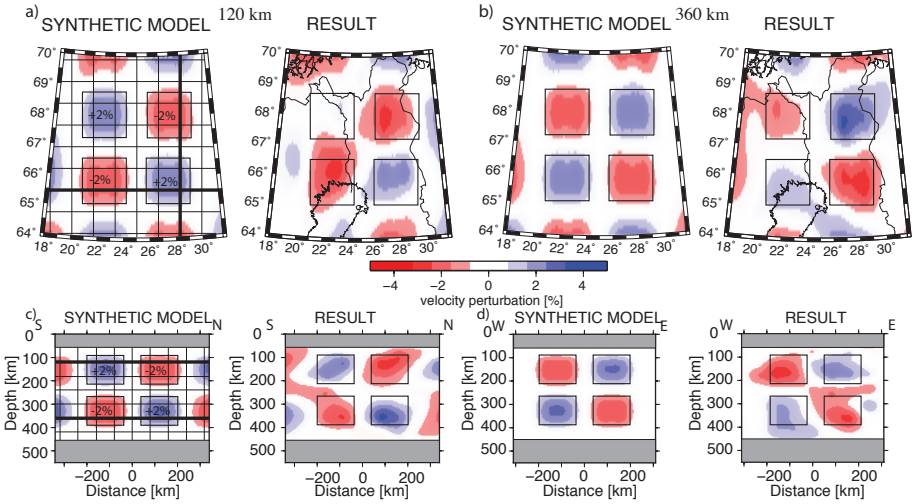

Fig. 3. Revised Fig. 9

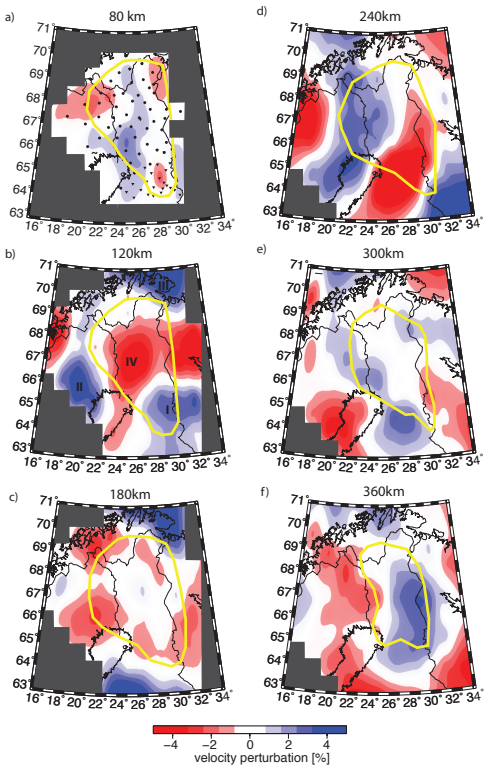

Fig. 4. Revised Fig. 11 to show the new inversion results

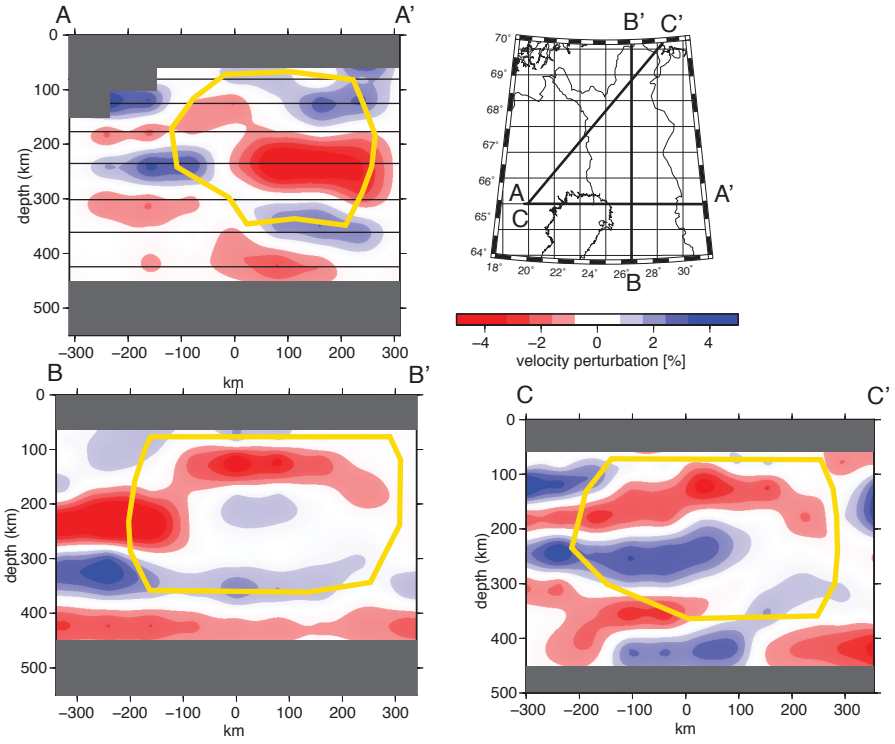

Fig. 5. Revised Fig. 12 to show the new inversion results

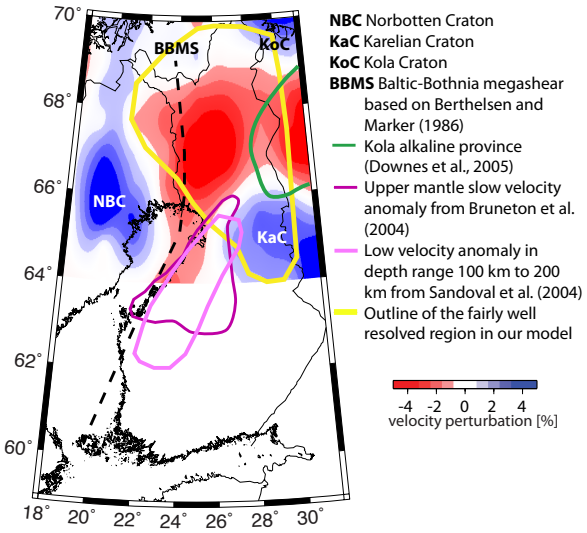

Fig. 6. Revised Fig. 14 to show the new inversion results