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Discussions

Interactive comment on "Measuring and crust-correcting finite-frequency travel time residuals – application to southwestern Scandinavia" *by* M. L. Kolstrup and V. Maupin

M. L. Kolstrup and V. Maupin

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We would like to thank Nicholas Rawlinson for his comments. We reply to the comments below.

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Comments by N. Rawlinson (Referee) nrawlinson@abdn.ac.uk

In this study, the authors compute frequency-dependent relative arrival-time residuals from teleseismic events in Scandinavia, and investigate the validity of ray-theoretical crustal corrections in finite-frequency tomography. Overall, I found this to be a high

quality article (some slight improvement in the written English will improve it even more) that has produced original and scientifically robust results. As such I recommend publication with only minor corrections. Below, I list a number of comments/suggestions, mostly related to the written prose.

- Page 1912, line 17: Replace "non-adequate" with "inadequate"

- Page 1912, line 19: Replace "with main applications" with "with applications mainly"

- Page 1912, line 26: Replace "the necessity to apply frequency-dependence" with "the need to apply frequency-dependent"

- Page 1913, line 5: Replace "on seismological" with "to seismological"

- Page 1913, line 14: Should be "a major step to make the procedure"

-Section 2.3: Section 2.3: ICCS sounds rather like the adaptive stacking procedure of Rawlinson and Kennett (2004), although it has a built-in rejection criteria, whereas the adaptive stacking procedure assigns high picking error values to incoherent waveforms (which can be rejected depending on a chosen noise criteria).

- Page 1917, line 27: Should be "regional body wave tomography".

- Page 1918, line 9: Should be "does not take"

- Page 1919, line 1: Should be "body wave tomography".

- Page 1923, line 7: Should be "benefits measurements"

- Page 1923, line 10: Should this be "waveform or their cross-correlations"?

- Page 1924, top: Section sub-heading should be "crust-correcting residuals"

- Page 1924: The use of station terms in the tomographic inversion is fairly commonly done, as mentioned here. Although I view them with suspicion, I guess that if a crustal model is used as well as stations terms, then there is possibly some potential for the errors introduced by the use of ray theory to correct for known crustal structure to be

absorbed into this term, thereby reducing its influence on the mantle structure that is retrieved. The authors may (or may not) wish to comment on this further.

- Page 1924, line 3: Should be "In order to avoid absorbing...."

- Page 1924, line 24: Should be "takes into account all crustal reverberations".

- Page 1924, line 26: Should be "thinner crust e.g. oceanic crust".

- Page 1925, line 9: Should be "compared to ray theory predictions".

- Page 1925, line 11: "fall back to" - meaning? Do you mean "are consistent with"?

- Page 1925, line 20: "ex." is not an acceptable contraction of "example"

- Figures: While I don t consider it mandatory at all, it would be nice to show a cross-section or two through the crustal model that is used for the corrections.

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Replies

Thank you for the detailed English suggestions. We have implemented all of them. We reply below to the three other comments.

- Sections 2.3: Yes, ICCS is very similar to the adaptive stacking procedure of Rawlinson and Kennett (2004), and we have added a sentence that states this and the small difference between the two methods.

- Page 1924: It is true that the error could be absorbed in station correction terms provided they are made frequency-dependent. To have frequency-dependent station terms does not quite seem to be the best way to tackle the crustal correction problem, but we have commented this possibility in the text, especially for S waves corrections, since we expect they are the most challenging.

- Figures. We prepared a figure showing the depth variation of the models at a selection of stations located along two profiles in the model. It is the closest we could come to

cross-sections as we do not build a 3-D model of the crust but have individual 1-D models at each station.

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