

Solid Earth Discuss., editor comment EC1
<https://doi.org/10.5194/se-2021-58-EC1>, 2021
© Author(s) 2021. This work is distributed under
the Creative Commons Attribution 4.0 License.

Comment on se-2021-58

Anne Paul (Editor)

Editor comment on "Imaging structure and geometry of slabs in the greater Alpine area – a P-wave travel-time tomography using AlpArray Seismic Network data" by Marcel Paffrath et al., Solid Earth Discuss., <https://doi.org/10.5194/se-2021-58-EC1>, 2021

Dear authors,

Your replies to the reviewers' questions solve most of the problems and questions raised by the first version of your paper. I therefore encourage the submission of the revised version, which should take into account all reviewers' comments.

However, I would like to stress the issue of resolution in the uppermost mantle, that is at the transition between the base of the imposed crustal model (at depth < 77.5 km according to l. 214 of your text) and the upper mantle (130 or 150 km depth, that are the minimum depths documented by the checkerboard tests of Figures 8 and 9). Both reviewers asked questions and made comments on this point, in particular on Fig. 10. The changes you propose to apply to Fig. 10 and in the text will certainly be useful. They may however not be sufficient to answer the critical question of the resolution between 80-130 km, which cannot be easily assessed from the depth maps of Figs. 8 and 9 and the single cross-section of Fig. 10. I would suggest showing the results of the checkerboard test(s) on additional sections, for example an E-W section at 45°N, which goes through the high-velocity crustal anomaly of the Ivrea body and the strong low-velocity anomaly of the Po basin. Another section along the EASI line (and the eastern part of the Swath-D array) where your station coverage is densest would also be useful to assess the influence of station density on the resolution at shallow depth. If you consider that these additional sections don't bring enough interesting information, you can put them in a supplementary information file.

On the same topic, you write in l. 303-304 that the checkerboard anomalies leak vertically to at least 20 km below the crust, that is to ~150 km depth. Is that right everywhere in your study region, or in areas with average station spacing? I mean that you probably have better resolution at shallow depth beneath the dense Swath-D or EASI arrays (see my comment on additional sections above). If this is right (almost) everywhere, I agree with Rev. 1 that the depth slice at 90 km should not be shown and discussed as a result of your tomography, or with much caution. Same remark for the anomalies located at depths shallower than ~150 km, such as for example the "W" and "D" anomalies of Figs. 13a and 14a (see comment 11 by Rev. 1).

With a few additions and clarifications, your manuscript has the potential to provide reliable and important answers on key issues on the structure of the upper mantle beneath the Alps. I look forward to the revised version.

Regards