

Solid Earth Discuss., referee comment RC1
<https://doi.org/10.5194/se-2021-55-RC1>, 2021
© Author(s) 2021. This work is distributed under
the Creative Commons Attribution 4.0 License.

Comment on se-2021-55

Anonymous Referee #1

Referee comment on "3D crustal structure of the Ligurian Basin revealed by surface wave tomography using ocean bottom seismometer data" by Felix N. Wolf et al., Solid Earth Discuss., <https://doi.org/10.5194/se-2021-55-RC1>, 2021

Overall this is a high-quality manuscript that provides information on additional pre-processing requirements for OBS data, and performs a group and shear velocity inversion using ambient noise data and teleseisms. The authors use a new OBS dataset (LOBSTER) that is located in relatively shallow water compared to previous studies (~1000 – 2000 m depth) and find the fundamental mode is not always the most prominent signal requiring a more involved processing method. The resulting maps are used to interpret the lithospheric structure beneath the Ligurian sea and Alpine Region with a particular focus on Moho depth and sediment thickness variations and use the velocity variations to determine no evidence for mantle serpentinization.

Although the paper is reasonably well written (particularly the methods section), there are areas where more information and clarity are needed, particularly for the resolution and interpretation sections. Further resolution tests are needed to determine whether the features discussed are resolvable both laterally and in-depth. This is particularly important for the teleseismic dataset and periods >20s. Depth sensitivity and resolution are not discussed. The results and interpretation raise some interesting discussion points on the variations in the lithospheric structure with a focus on sediment thickness changes and Moho depth variations, however both sections are confusing to follow and the interpretation often needs more explanation. The main problem is the use of surface waves as a direct measure for Moho depth. Surface waves should only be a proxy for discontinuities due to their broad depth sensitivity. Combining these indirect measures with more direct measure for Moho depth such as receiver functions would aid the author's interpretation and be a more compelling argument, coupled with a rigorous depth resolution analysis.

Please also note the supplement to this comment:

<https://se.copernicus.org/preprints/se-2021-55/se-2021-55-RC1-supplement.pdf>