Solid Earth Discussions

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Comment on se-2021-55

Anonymous Referee #2

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-RC2, 2021

The paper shows a novel set of data that hopefully can providing new insights on the crustal structure in the northern portion of the Liguro-Provençal basin. Particular emphasis is given to the acquisition and processing phases, given the challenges posed by OBS data when trying to obtain meaningful ambient noise recording.

Results are presented thoroughly as opposed to the discussion where the authors do not sufficiently investigate the implication of their finding.

ABSTRACT

L26: "no hint OF mantle…"

INTRODUCTION

L37: The term "collision" is improper for describing the emplacement of the Sardinia-Corsica block in its current position. Rather, this block is crustal remnant left behind during the opening of the Tyrrhenian Sea .

L57: In reality, the paper mainly focuses on the results and does not investigates the geodynamic implication of these (will it be part of a later work?). Thus, I'd rephrase the "To better understand the evolution of the Ligurian Basin and the processes driving its formation".

FIGURE1 : Remove the decimal digits in thick labels.

In the map in the bottom-left corner, just show the European continent.

DATA

L76: Can you explain why some of the stations/data where not recovered? What were the issues?

METHOD

L113: "horizontal signal…" —> horizontal movement

Majority of readers are used to land data. It'd be interesting to show an example of OBS data before and after tilt/compliance correction. Would you please provide that?

FIGURE 2: please use a color for the stations that gives more contrast with the background (red/white). Tip: you can use shaded black lines (transparency set to 0.3-0.5) for the line connecting the stations. This will immediately gives an idea of ray density…

FIGURE 4: there is a remnant label "180"…

L188: In the frequency range that is common to both ambient noise and telesismic events, what did you do to calculate the group velocity? Average? Weighted-average? According to several papers, when using teleseismic events one systematically over-estimate group/phase velocity (several explanation have been hypothesized as a reason for this, fist of all: off-path arrivals). It might be worth having a look to Magrini et al. 2019 (10.1093/gji/ggz560) where they deal with this issue.

FIGURE 5: y-axis label: put a space between “group” and “velocity”. Use some transparency for the curve to make them all visible…What is the error on the group velocity estimation? How is it estimated? Can you shrink the x-axis? The curve is not really appreciable and seems really flat.

L223: Can you provided some more details on the inversion code? Is it stochastic or linearized? Are data uncertainties accounted for and, if yes, how?

RESULTS

FIGURE 6: show colorbar only once and make it bigger

FIGURE 7: again, show colorbar only once and make it bigger

FIGURE 8: “depth inversion”?. It’s rather an inversion from group-velocities to shear-wave velocities. There’s no need to repeat the colorbar 8 times if it is the same.

L313: why is the RMS here? Please move it to the method or result part.

DISCUSSION

Here I suggest to comment further on the implication of the results obtained. For example: is there’s no serpentined mantle in the basin centre, what causes such high-velocities directly underneath the sediments? Can these be caused by thick oceanic crust? What does that mean in the context of the evolution of the Liguro-Provençal basin?