Solid Earth Discuss., 6, C1383–C1386, 2014
www.solid-earth-discuss.net/6/C1383/2014/

Solid Earth
Discussions
Open Access

Interactive comment on "A 3-D shear velocity model of the southern North America and the Caribbean plates from ambient noise and earthquake tomography" *by* B. Gaite et al.

Anonymous Referee #2

Received and published: 2 December 2014

This paper investigates the 3-D shear velocity structure of the southern North America and Central America using both ambient noise tomography and surface wave tomography. To better constrain both the crust and upper mantle structures, we need highly accurate dispersion information in a wide frequency range that cannot readily be derived only from either ambient noise or surface waves. Thus, the joint use of the ambient noise and seismic surface waves, like the approached taken in this study, should be of help for the better understanding of the crust and uppermost mantle structures. The method and data used in this study are explained clearly, providing interesting results that represent apparent correlations with the tectonic features of this region. This paper is well written, providing interesting results of the velocity structure and some insightful

discussion, although additional explanations and information are necessary in some parts as suggested below. Most of my comments are rather minor, and I recommend the acceptance of this paper with minor revision.

- Some major comments:

1. Page 2975 line 14-21

The current figure on the model resolution (Fig 4) is invisible. It is better to be displayed in color. It may also be better to add equations for resolution kernels or refer to a relevant reference(s).

2. Page 2977 line 13: "3 velocity measurements"

What do you mean here by "3 measurements"? (Phase/group velocities at 3 discrete frequencies?) It is somewhat ambiguous. Give more clear explanations.

3. Page 2978 line 12: "Inversion tests show that our Vs model is sensitive to 5km-thick layers"

Add the results of these tests.

4. Page 2981 line 3-5: ... in crustal thickness between ...

Why not show the Moho depth map in Fig 11?

5. Page 2982 line 16-21: "At 30 km depth . . . a narrow NNE high velocity area . . ."

This is an interesting feature if it is real, but this high velocity anomaly does not appear in the group velocity maps in Figs 3 and 6. Is there any possibility that this feature is an artifact due to the relatively sparse path coverage or lower resolution of this area in the ambient noise data? (e.g., Fig 6b shows that ANT cannot resolve this area.) Also, the authors have mentioned that the achieved horizontal resolution of their model is about 2 degrees, but this linear high velocity feature seems to be as narrow as 100 km or so. Can you really resolve it? Furthermore, as far as I see the phase and group

velocity maps of Gaite et al. (2012), which is the original ANT models used in this study, I cannot see such linear high velocity anomalies. So, I strongly suspect that this is an artifact generated during the inversions for the local shear velocity structure. The interpretation of this feature should be made more carefully.

- Minor comments / suggestions for corrections:

6. Page 2975 line11: ". . . frequency-dependent sensitivity of surface waves"

How did the authors determine the width of the Gaussian smoothing across the path? Additional explanations will be helpful.

7. Page 2975 line 17: ". . . lower or equal than" => ". . . lower than or equal to"

8. Page 2975 section 3.2:

Add some more explanations on the ambient noise tomography, e.g., stations info, spatial coverage and resolution, etc.

9. Page2976 line 16: ". . . due in part to"

=> ". . . due in part to the fact that"

10. Page 2976 line 18: use to be => are

11. Page 2977 line 5 and 9: Where => where

12. Page 2977 line 20: . . . shows the misfit geographical distribution.

=> . . . shows the geographical distribution of the misfit.

13. Page 2978 line 21-22: "... their different origin and tectonic evolution."

Add relevant references.

14. Page 2978 line 25: ... North America => ... North American

15. Page 2980 line 5: ... the western of ... => ... the west of ...

16. Page 2981, line 15: Jalisco block

A label for this block is missing in the maps.

17. Page 2981, line 17: North America plate => North American plate

18. Page 2982, line 25: ... Veracruz basin

A label is missing in the maps.

19. Page 2983 line 4: high number => large number

20. Page 2983 line5: ... on western => in the western

21. Page 2983 line 6: ... on central-east => in the central-east

22. Page 2983 lines18-19: ... coincide with a lack of active volcanism

It may be better to plot the locations of active volcanoes in Fig 11 or in a relevant figure.

23. Page 2984 line 13: ... actual => ... present

24. Page 2984 line 14: ... showed on => ... shown in

25. Page 2984 line 15-16: ... seismic features => ... seismological features

---

Interactive comment on Solid Earth Discuss., 6, 2971, 2014.