

# ***Interactive comment on “What can seismic noise tell us about the Alpine reactivation of the Iberian Massif? An example in the Iberian Central System” by Juvenal Andrés et al.***

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This manuscript investigates the reflectivity of the Iberian crust along a dense transect crossing the Iberian Central System (ICS) and adjacent foreland basins. Interestingly, the authors utilize autocorrelation functions (ACFs) of ambient seismic noise recorded at a number of short-period ( $f > 2$  Hz) stations. The ACFs are obtained after stacking a number of daily phase autocorrelograms in the 1.5-4 Hz frequency range with phase weight for each station. A reflectivity cross-section is then built from the juxtaposition of single-station ACFs and interpreted in terms of past and present tectonic processes.

Overall, I found the manuscript to be correctly structured, well written and appropriate

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for the broad readership of Solid Earth. I have, nonetheless, two main concerns about methodology and interpretation:

(i) Given the large variability in the number of days utilized to construct the final ACFs at different stations (28-60 days), and the relatively small number of days in all of them, shouldn't the stability of the ACFs have been investigated before attempting any interpretations? One way of doing that would be to compute ACFs with an increasingly larger amount of (random) days to see whether the stacked autocorrelograms converge to a stable time series or not.

(ii) The interpretation of the final cross-section (Fig 4b) seems to be strongly guided by a coincident cross-section published by the same lead author, which was obtained from the autocorrelation of telesseismic waveforms. I think it would help to add that cross-section to Fig 4 (as Fig 4c) to better illustrate the choices made by the authors in Fig 4b. In addition, that would also help highlight what 'seismic noise can really tell us about the Alpine reactivation'; without that additional piece of information, it is sometimes unclear whether a specific feature is a new finding from ambient seismic noise or just confirmation of something that was reported elsewhere.

Finally, I have a number of minor concerns/suggestions:

P2L35 - For completeness, I think the following manuscript should be added to the list of lithospheric studies:

Julià, J. & Mejía J. (2004). Thickness and  $V_p/V_s$  ratio variation of the Iberian crust, *Geophys. J. Int.* 156, 59-72.

P6L156-157 - Could the authors be a bit more specific about how the final frequency range (1.5-4 Hz) was selected? Just saying that 'it provides good reflectivity ... with consistent daily stacks' is not very informative.

Figure 3 - Why are the reflections at 2.5 s, 13.5 s and 17 s not selected? To me, they seem as good as the ones with an arrow.

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P8L185 - Why is the crust-mantle boundary interpreted at 10-12.5 TWT? I see a stronger reflection at 8-9 TWT along most of the profile; moreover, this feature is not interpreted under the Duero Basin (Fig 4b). Is it for consistency with the teleseismic ACF cross-section?

Figure 4 - I do not see any depth scale in this figure; however, the authors claim the conversion to depth was done (P8L175-177). Could a depth scale be added to Fig 4?

P9L206-P10L218 - This text is duplicated. Please, remove.

P10L237-240 - Could that 'opposite polarity' be some sort of cycle skipping? That region seems to be structurally complex (Fig 5) and I wonder if a migration to depth would somehow shift the traces enough to place them 'in phase'.

P13L325-326 - Could the location of the 'Schist-Graywake Complex' be indicated in Fig 5?

P15L364 - Perhaps the text after line 365 could be under a new subsection (i.e. 6.1.3. Moho).

P16L420 - What 'other possibilities' exist? As they 'cannot be ruled out', I think those should be explained here.

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