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Comment

Interactive comment on “Thickness of the lithosphere beneath Turkey and surroundings from S-receiver functions” by R. Kind et al.

Anonymous Referee #2

Received and published: 8 May 2015

Review of "Thickness of the Lithosphere Beneath Turkey and Surroundings from S Receiver Functions" by Kind et al.

General Comments:

This is an interesting paper presenting a substantial Sp receiver function data set for Turkey, aimed primarily at constraining the LAB in the region. The methods used are well-established and sound, and appear to have been applied with care (e.g. using synthetics to test the CCP image's ability to recover dipping features). I do think that there are aspects of the processing that could be a bit better explained, and that some aspects of the interpretation go a bit far given what is visible in the seismic images. I recommend publication after a minor revision to attend to the specific points noted below.

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Specific comments:

* In terms of methodology: the deconvolution approach used and the type of filters applied should be explained in a sentence or two. I mention this in particular because Figure 3 shows strong negative sidelobes on both sides of the SPn arrival. Are those a deconvolution/filtering artefact, or something related to that particular phase? If the deconvolution or filtering are introducing sidelobes, then the possibility that the lithospheric arrival is in fact a sidelobe of the Moho arrival needs to be ruled out. I don't think this is actually the case, but it should be checked.

* Some of the dashed lines on the CCP sections go beyond what the underlying seismic image seems to call for. In Fig. 5, the "Afr. Moho" and "Afr. LAB" lines are drawn with steeper dips than the data call for – the seismic image shows a break in the Moho and a deflection of the LAB, but I don't think a dip angle can really be measured here. The lines in Fig. 6 is also a stretch, given that the LAB looks fairly continuous in the CCP and time images. Given how spotty the LAB is in the CCP panel of Fig. 8, interpreting a break in it is a subjective exercise (though the time panel looks more convincing).

* Several images are unnecessarily tiny, at least in my "printer friendly" copy. Fig. 4 is almost indecipherable, particularly panel (g), and should be rearranged to take best advantage of the wider-than-tall space available on the page. The map panels in Figs 5 through 10 are also a bit small, as are the panels in Fig. 11.

* Fig. 9 shows considerable variation in the 410 depth. I agree that the 410 is not the main focus of the paper, but the ca. 50 km of topography should be addressed: do the authors think it is real, or an artifact of lateral velocity variations versus the fixed velocity structure used for imaging? If the latter, are there implications for the interpreted LAB depths?

* Page 1321, lines 13-15: "Figure 4g shows the emergent angle of the Sp converted wave at the lower boundary of the slab relative to the slab normal for the corresponding inclination angles of the slab as a function of the back azimuth." – this sentence took a

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while for me to make sense of. Maybe rephrase in a clearer way?

* A pedantic point: the CCP stacking used is referred to as "migration" in a few places. I don't insist on this, because terminologies differ, but I'm reluctant to call CCP stacking "migration", given that it doesn't correct dip angles or collapse diffractions.

* Page 1322, latter half of the paragraph: why are the criteria for including arrivals in the CCP and time images different?

* The LAB arrival seen in this paper is at a depth similar to the mid-lithospheric discontinuity seen in some continental studies. This might be worth explicitly ruling out as an explanation for the observations (though I think it's obviously an LAB and not an MLD).

Technical comments:

* Fig. 1: the black line denoting the Hellenic and Cyprean arcs is hard to see against the dark grey background.

* A few grammar/wording corrections (given in uppercase):

- Page 1316, line 10: "We did not observe changes IN LAB DEPTH across..."

line 17: "The lower boundary of the lithospheric PLATE is a very..."

- Page 1317, line 9: "...are considered TO BE the main driving processes"

line 14: "...ARE currently the major driving FORCES..."

line 19: "...except FOR localized thrust ridges..."

- Page 1319, line 9: "...the P receiver FUNCTION TECHNIQUE..."

line 19: "...the essential part of S-receiver functions CONSISTS OF weakly converted..."

- Page 1320, line 12: "A positive conversion... and a a negative... ARE clearly visible."

line 16: "...meaning that they CUT ACROSS all other phases..."

- Page 1321, line 4: "Based on AN available reference..."

line 5: "...is used as THE input model."

line 11: "...would yield identical information TO THAT obtained..."

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- page 1322, line 11: "...and the WIDTH of the section..."
- page 1323, line 25: "P-receiver FUNCTIONS are more useful for this purpose."
- page 1324, line 10: "Our observations... CONFIRM earlier results."
- page 1326, line 11: "...result from the Eratosthenes SEAMOUNT beneath Cyprus..."
- page 1327, line 1: "...we also do not observe any SIGNIFICANT contrast in the delay times..."
- line 4: "...although the data quality WORSENS..."
- line 6: "...inferred from the SKS measurements RELATIVE to the actual orientation..."
- page 1328, line 10: "...would not have been imaged by S receiver functions, HOW-
EVER."

Interactive comment on Solid Earth Discuss., 7, 1315, 2015.

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7, C623–C626, 2015

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