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Interactive comment on "Crustal-scale depth imaging via joint FWI of OBS data and PSDM of MCS data: a case study from the eastern Nankai Trough" *by* Andrzej Górszczyk et al.

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This is an excellent manuscript that presents a new concept to analyse seismic multi-channel seismic (MCS) and ocean bottom seismometer (OBS) data. It fits well to the scope of Solid Earth and is presented already in a good quality. The authors show that the Pre-Stack Depth Migration (PSDM) of MCS data can significantly benefit from an integrated analysis of Full Waveform Inversion (FWI) of OBS data and PSDM images. They emphasize that in future 3D OBS experiments should be preferred over 2D experiments. FWI is capable to image crustal structures in complex settings as in the case study presented by the authors at the eastern Nankai Trough. In general

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Discussion paper

the manuscript is well written and easy to read, methods are well explained and the manuscript is in a very good state. Only minor revisions and English language editing should be done before publication.

A few comments can be found in the commented manuscript. I recommend an extra editing for the language, i.e. missing “a”, “the” or “,” (not marked in the commented manuscript). If wished, I can provide more language comments. A few questions remain after reading the manuscript that could be better explained by the authors:

How true are the small scale structures in Fig. 3b? A Fig. 3c showing plain MCS data or MCS data overlaid by the transparent FWI velocity field, could be useful for the reader. For presenting seismic velocity fields gained by traveltime modelling it is common to show an image of a resolution test would. The low velocity zone (LVZ) (in Fig. 3b) in the west (15-35 km profile distance and 15 km depth) does look like an artefact. How robust is the LVZ between 35-50 km profile distance at 10 km depth?

Figure 3 shows that only 100 km of the profile is covered by OBS. This means we would expect a rather bad resolution at the profile with distances larger than 100 km. By that I would be careful with the low velocity zone found in this portion of the model.

How do the authors interpret the high positive velocity gradient directly on top of the subducting Moho? Underplating of the subducting plate? (Fig. 11b)

Oceanic crust in general shows high lateral variation in composition and resulting seismic velocities. So, not necessarily a volcanic ridge is needed to explain the variations in the seismic velocity field at crustal level.

In the section 3.2.4 “Backstop area” the authors state that they cannot put their results into the context with geologic studies. However, I think this section need to have a comparison to the findings of the original studies and their interpretation.

Please also note the supplement to this comment:

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https://www.solid-earth-discuss.net/se-2019-33/se-2019-33-RC2-supplement.pdf

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