Second review of 'Inverting Rayleigh surface wave velocities for crustal thickness in eastern Tibet and the western Yangtze craton based on deep learning neural networks'

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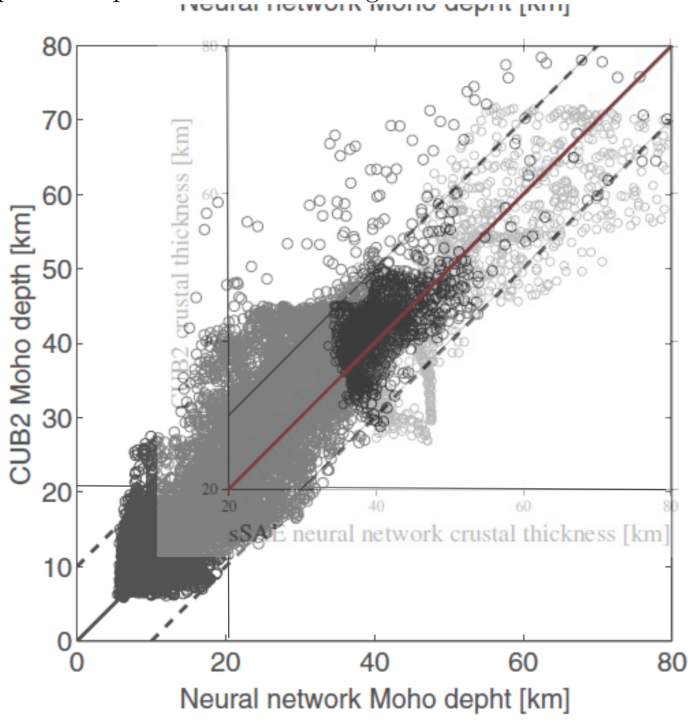
The revised manuscript addresses some of the issues raised during the review process: inclusion of noise in training data, conversion from group velocity to phase velocity, unattributed quotations, and quality of writing. However, the new manuscript still has some flaws which should be addressed before this work is published.

Firstly, the manuscript does not mention non-uniqueness, which is a crucial part of this inverse problem. The authors should at least discuss the possible errors introduced by neglecting non-uniqueness.

The most serious issue regards the key proposition of the paper: that deep neural networks can perform a better inversion than similar, but simpler, existing methods using shallow neural networks. This point is not convincingly

shown. For example, the if we overlay the comparison between the new model and the CUB2 model (figure 8, right panel) with the same figure from Meier et al. (2007; figure 16, middle panel), there is no apparent difference between the two approaches (see figure below). In addition, figure 9 shows misfits of 2 to 9%, which are large compared to the data uncertainties reported by Xie et al. (2013, figure 4), which are 0.5 to 2%. To demonstrate that the new method is an improvement, the authors should present similar plots for (1) an optimised shallow neural network (2) their optimised deep neural network. These should be accompanied by histograms of the fractional error in crust thickness, and examples of dispersion curves showing the model fit.



Lastly, the systematic east-west variation in misfit is not explained. In figures 6 and 7, we see a comparison with the model of Shapiro and Ritzwoller (2002), and it seems that the crust is much thicker in Tibet for the new model, which may explain the large errors. This is typical for crust thickness inversion using

group velocity in Tibet (see Meier et al., 2007, middle row of first panel of figure 15). The authors should inspect the dispersion curve fits and try to explain the source of the misfit.

1 References

Meier, Curtis & Trampert (2007), https://doi.org/10.1111/j.1365-246X.2007.03373.x

Shapiro & Riztwoller (2002), https://doi.org/10.1046/j.1365-246X.2002.01742.x

Xie et al. (2013), https://doi.org/10.1002/jgrb.50296