

Comment on egusphere-2022-279

Anonymous Referee #1

Referee comment on "Comparison of straight-ray and curved-ray surface wave tomography approaches in near-surface studies" by Mohammadkarim Karimpour et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-279-RC1>, 2022

The submitted manuscript focuses on comparing the straight-ray and curved-ray-based surface wave tomography using four data sets under the near-surface condition. The surface wave tomography technique is a well-established method in regional and global seismology, introducing this technique to near-surface applications could be beneficial for accurately investigating the shallow target, and this topic is within the scope of the journal. However, some points should be addressed before a possible publication. Moreover, there are lots of typos in the manuscript that should be revised properly. The English also needs improvement. I would recommend moderate revision before publication.

Following, I listed some comments regarding the manuscript.

- Line 75, Page 3. Here the authors state the V_p and density are assumed to be known as prior information but in the result section (such as in the figure caption of Fig 2) the term "Poisson ratio" is used instead of the V_p . It is recommended to keep the full text consistent.
- Section 3.1. It is recommended to provide the elastic parameters of the Blocky model to help readers better understand what the model is like.
- Line 115, Page 5. It may simply be stated that 16 shots were chosen to generate the raw data after optimized design. The 441 shots may make the readers confusing.
- Line 130, Page 6. What do the red text 'a', 'b', and 'c' and red arrows in Fig 1a represent? They should be demonstrated in the figure caption.
- Line 140, Page 7. "The same initial model is used as the starting model for the SWT inversion in both straight- and curved ray methods". It is recommended to show the readers the iteration curves and inversion parameters (damping factor and weights used in the regularization matrix). In fact, the inversion parameters of the two inversions should be the same for the sake of comparison.
- Figure 6. For the current version, the red arrow and text are confusing for the readers. It is recommended to look for a better way to show the plot.
- Line 180, Page 12. It is not easy for readers to identify that the boundary in the curved-

ray tomogram is clear than the one in the straight-ray tomogram. Providing the model error in this area might be better to support this conclusion.

- Figure 10. Again, it is recommended to provide the iteration curves and inversion parameters. It seems that the inversion using the straight-ray method becomes unstable and there are some outliers in the tomogram. Do these two methods use the same weights in the smooth regularization?
- For some plots, such as in Figure 12, it is recommended to indicate which data set the plot is related to in the figure caption.
- Line 280, Page 20. Please delete the redundant sentence "For each parameter, the values ..."
- Table 3. The abbreviation CR and SR should be mentioned in the context, also, the formula for calculating CR-SR should be demonstrated.
- Line 295, Page 21. Again, please delete the redundant sentence "For each parameter, the values ..."
- Please check the sentence above section 4.3: Table 3 that using curved-ray SWT has increases the computational cost by an average of 23 %.