

The manuscript “Wave-equation based travelttime seismic tomography – Part 2: Application to the 1992 Landers earthquake (Mw 7.3) area” applied the seismic tomographic method described by Tong et al. (2014) to construct a 3D Vp, Vs, and Poisson’s ratio map of the southern California area. This study reveals high-resolution crustal structures around where the earthquakes occurred and helps our understanding of the physical mechanism of earthquakes. I would recommend this paper for publication after some moderate modification. However, I do see that the writing and/or grammar need to be corrected in many places, such as “The recovery are ...”. Also I suggest to use the current tense rather than the past tense when just describing the work. Some general writing rule: a comma is usually used before which, such as “... to obtain the final tomographic models, which cost around 10000 CPU h.” Please check the entire manuscript and correct correspondingly.

Here are some of my general comments/questions:

1. The manuscript has been using lots of acronyms, some of which to my opinion are not necessary. For example, ECSZ is shown in page 2569 but is not used for the rest of the manuscript. Another one is NCF in the Conclusion. Please only use acronyms when highly repeated in the context.
2. The authors describe the comparison of travel times from the SCSN catalog and their own picks. Please explain how the authors define the time window of the signal and how the first arrivals are identified as this is important to know since the time difference is neglectable as stated.
3. The author addressed that an undulated Moho is enforced here. I am curious why not using the observed Moho depth distribution from other studies (such as receiver functions or seismic refraction/reflection), which in my opinion should be a better choice. Also in Figs 14 and 15, where are the Moho depths from?
4. In section 2.2, the authors mentioned that inversion grid spacing is much larger than that of the forward modeling grid. Please explain why and how this is related to the resolution ability.
5. In page 2578, the authors state that the prior data/model covariance matrix is not considered in this study. What does this mean?
6. Page 2580: magnitude of the model variance in Line 18 is very different as Figure 7. There are a few magnitude orders of difference. Please make sure this is right.
7. In section 3.2, the authors mentioned that the checkerboard patterns are almost recovered at the first iteration. However, Figure 7 shows that the model variance is greatly reduced from model 2 to model 4. Please explain why.
8. Please address the meaning of the second term 0.5 in equation 14.
9. In section 4.1, the authors mentioned that the searching range for the damping parameters is 6-40. However, in Fig. 7 it shows the damping parameter as 0.42 for all the three iterations. This is really confusing. I suggest the authors check the unit and magnitude of the damping and

- smoothing parameters, and the data and model variances carefully to avoid any mistakes.
10. Section 4.2 compared the results of the iterations. Why the velocity anomaly magnitude gradually increases at all depths from model 2 to model 4. Except to match the data, are there any other reasons to be considered?
 11. Also as this study is to verify the WETST method, it will be useful if the authors can compare their model resolutions/structures with previous studies.
 12. Figure 12. It seems that the authors put the wrong figure here. The current figure is same as Figure 8, which in fact should be the P-wave tomographic imaging. Please correct. Also because of this, it is impossible for me to really read through section 4, which is heavily based on Figure 12.
 13. Page 2585, Line 10-13, the authors state that high P-vel structures are revealed in the middle and low crust. However, by looking at Fig. 13, the S-vel is still slow, at least in 13m-n. Please explain why.

Here are my minor editorial comments:

Page 2568

Line 4: please delete "as developed in the first paper" in the Abstract.

Line 10: it should be "which cost ..."

Line 20: The recovery of these strong heterogeneous structures is ...

Line 22: hereinafter

Page 2569

Lines 7-8: involving large data sets, which is important ...

Line 14: on June 28, 1992

Line 15. ... and North America Plates

Page 2574

Line 17: , and has considerable effects

Line 20: by adding an undulated Moho ...

Page 2577

Line 17: at the depths of 1, 5, ...

Page 2580:

Line 17: is chosen as ...

Table 2. Please explain why the SSIM values for Model 2 in both P and S models are higher than Model 3. And why all SSIM values at 28km are lower than at 40km? Can this be because of the selection of Moho? What if the authors use the observed Moho depth distribution from other studies?

Figure 2. What is the importance to show the earthquake epicentral distributions in two plots? Unless there is any specific reason, I think one simple subplot should be enough.

Figures 5 and 6: Please rewrite the figure caption of Fig. 5a and 6a to explain what the figures are. Especially, please specify what is the difference of these two figures, for example, what are the receivers and the earthquakes?

Figure 7. The damping parameters are the same for all the subplots. Is this correct? Also the value is not within 6-40 as stated by the author. See my comment #8.

Figure 12. Please upload the right P-vel model.

Figure 14. I would suggest to make this figure a bit bigger. It is difficult for me to see the velocity structures.

Figure 15: Figure caption: it should be Fig. 14 rather than Fig. 15.