

Interactive comment on “Fault Network Reconstruction using Agglomerative Clustering: Applications to South Californian Seismicity” by Yavor Kamer et al.

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Thank you for your time in reviewing our paper. Below is our response to your comments and description of the modifications we made to address them.

I would expect a more deterministic approach to validate the resulted faults geometry. I think that exploring a small region using FMS data + mapped fault will be much appreciated to judge, is method is more capable to detect the natural faults network?

We agree with the sentiment that focal mechanism solutions (FMS) can reveal impor-

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tant information regarding the geometry of the faults under investigation. Deterministic measures that investigate the compatibility between reconstructed faults and the focal mechanisms of the events have been introduced and extensively studied by our group in research by Wang et al 2013. The FMS are greatly dependent on the location and the velocity model used for the inversions. Thus it would be inconsistent to use the solutions obtained using cross-correlation based relative locations with our absolute location catalog obtained using a different velocity model. That is why we focused on validations based on information criteria and cross correlation.

In an effort to address your comment we updated Figure 5 (now Figure 6) by adding the fault trace of the Landers fault as obtained from the Community Fault Model of southern California. We also added the following text to inform the reader about FMS based validation approaches.

“It is also possible to employ metrics based on consistency of focal mechanism solutions to evaluate the reconstructed faults. For a detailed application of such metrics the reader is referred to the detailed work by Wang et al.(2013). In this study, since we do not have focal mechanism solutions for our target catalog, we focus on information criteria metrics and out of sample forecast tests.”

Specific comments: L. 33: The use of “large durations” is confusing. Please clarify. Fig. 10: It seems that the colors of the ellipses is correlated with the size of the kernel. If so, a color bar is useful here.

We have clarified the term to express catalogs covering long time spans. In Figure 10 (now Figure 11) have added a color bar and also supplemented the figure caption to indicate that the color axis unit.

“Clusters are colored according their density (data point per km³) where the volume is estimated as the product of standard deviations along the principal component axes.”

References:

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Wang, Y., G. Ouillon, J. Woessner, D. Sornette, and S. Husen (2013), Automatic reconstruction of fault networks from seismicity catalogs including location uncertainty, *J. Geophys. Res. Solid Earth*, *118*(11), 5956–5975, doi:10.1002/2013JB010164.

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