Interactive comment on "Time difference of arrival estimation of microseismic signals based on alpha-stable distribution" *by* Rui-Sheng Jia et al.

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Q1: The key variable φ is never given a name, nor explicitly related to probabilities. R1: Because there is no unified probability density function expression for α-stable distribution, which only has a unified eigenfunction expression. The key variable φ is a value of the eigenfunction. We added a description of φ in the paper, please refer to P4L98. Thank you for your reminding.

Q2: It is stated that: "the maximum difference between the number of positive and negativevalues is 92. Compared with the 3000 of sample data, this can be approximately considered as 0." This is a standard problem in nonparametric statistical testing. It is equivalent to asking what is the maximum excess of heads with respect to tails if a coin

is tossed 3000 times. The authors' result (92) does not strike me as so negligible. But even then if it is, a statistical test could only reject the hypothesis that the distribution was symmetric, not to accept it. The authors could use a standard maximum likelihood estimator for the parameters, thus giving standard errors for their parameter estimates. R2: Thank you for your constructive suggestions. We have adjusted the research idea and proved the symmetry of microseismic signal by using maximum likelihood estimation. For detail, please refer to P6L155-P6L157. Accordingly, we modified the content of Fig. 5, please refer to Fig. 5 in P17.

Q3: The authors do not show the evidence they used to estimate their key alpha values. This is such an important part of the paper that they should show a graph tending to support the validity of their technique. Alternatively, they could use the standard maximum likelihood method. R3: It is really true as Reviewer suggested that the alpha values is a key parameter. Because of the complexity of microseismic signals, each microseismic signal corresponds to a different alpha value. We have discussed the estimation method of alpha in Section 3.2. Please refer to P7L187 – P8L214.

We tried our best to improve the manuscript and made some changes in the manuscript. These changes will not influence the content and framework of the paper. And here we did not list the changes but marked in red in revised paper. We appreciate for Editors' warm work earnestly, and hope that the correction will meet with approval. Once again, thank you very much for your comments and suggestions.

Please also note the supplement to this comment:
https://www.nonlin-processes-geophys-discuss.net/npg-2017-49/npg-2017-49-AC3-supplement.pdf