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Interactive comment on "Evaluation of global seismicity along Northern and Southern hemispheres" *by* Olaide Sakiru Hammed et al.

Y. Kamer (Referee)

yaver.kamer@gmail.com

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The presented manuscript investigates the supposed b-value variation with geographical latitude speculating that low b-values are an indication of high tectonic stress and concluding that there are more earthquakes in the southern than in the northern hemisphere. The paper fails most criteria for a scientific publication, with the exception of a sufficiently clear presentation.

The main problem is that the authors fail to pose a scientific question, a falsifiable hypothesis. Obtaining a data set and applying numerical methods to it will almost always yield results: divide a data set into two, calculate the averages (indeed b-values $\approx$ 1/average magnitude) and you will obtain two different values. Divide the data set

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into N sets, you will obtain N different values. Discussing the obtained differences can be regarded as a scientific act only in the presence of a motivated and falsifiable hypothesis that is posed beforehand.

In this regard the presented manuscript is an example of the ongoing crisis is the field of seismology. Kagan highlighted this crisis in his 1999 paper entitled "Is Earthquake Seismology a Hard, Quantitative Science?", arguing that "Higher standards for research in earthquake seismology must be enforced. Authors should adopt a more rigorous style of scientific investigation, and reviewers and editors of geophysical journals should reject manuscripts which do not satisfy the above requirements"

Therefore I recommend the authors to formulate a clear hypothesis, for instance:

-"B-values increase as a function of latitude"

-"Latitudinal b-values variation is significant and therefore provides improved earthquake forecasting performance"

Based on the propose hypothesis the authors should then propose a method to test their hypothesis, for instance:

- Divide the dataset into training and validation and perform a pseudo-prospective test

- Use statistical significance tests to compare the obtained distributions

- Use information criteria to penalize for model complexity (i.e number of subsets) and evaluate the model fit.

I would also like to acknowledge that it is rather unfair that researchers from prestigious institutions often get away with publishing similarly sub-standard research (no hypothesis, no tests), setting a bad example and creating the illusion that such work is acceptable.

With regards to the technical details of the paper, I agree with the points raised by the other reviewers:

- Use Aki's maximum likelihood method to fit b-value

- Bin magnitudes to account for magnitude errors and correct the b-value estimate to account for the binning

- Perform goodness of fit tests that answer the question "how plausible is the proposed b-value as a generating process for the observed magnitudes"

- Perform bootstrapping to evaluate parameter uncertainties

Yavor Kamer

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