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## ***Interactive comment on “Quantizing Earth surface deformations” by C. O. Bowin et al.***

### **Anonymous Referee #2**

Received and published: 4 May 2015

Although I am not a geophysical expert, I accepted to review the submitted paper by C.O. Bowin et al. mainly because of its interesting title and promising abstract. I however did not encounter much discussion on the impact of the new details and quantizing of surface deformations along the many (interesting/active) plate boundaries using the latest 52 plate tectonic model by Bird (2003). The submitted paper at present looks more like a technical reflection/summary of work (to be) done than a final scientific paper. The authors hereby also propose/support a different viewpoint regarding the driving mechanism for plate tectonics. They hereby build their case almost entirely on the relative motion of the Pacific and Australian plates. Unfortunately their arguments are not supported (in the paper) by a proper scientific discussion and comparison (including proper referencing) to previous models. As such I am not convinced and as a reader I think the title of the paper does not cover the present content of the paper.

I also took notice of the interactive comments made by referee #1 and I largely agree

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with his comments.

- Does the paper address relevant scientific questions within the scope of SE?

Yes, it surely does. The driving forces behind surface deformations are of importance to geophysical models, especially those tailored to study plate boundary deformation zones.

- Does the paper present novel concepts, ideas, tools, or data?

The paper does try to employ different concepts to a more refined tectonic plate model. At least that is what the paper abstract claims. The authors seem to have done extensive analyses but there is little discussion on their actual new findings.

- Are substantial conclusions reached?

No. The paper looks more like a work in progress as the authors are still continuing to test different deformation index cases while the present paper version is being reviewed.

- Are the scientific methods and assumptions valid and clearly outlined?

No. The paper just briefly summarizes previous work done whereby the reader is referenced more than once to figures in other papers without a clear explanation on this previous work. Readers should consult references for additional information and not to find out why the authors refer to them. Some figures should probably also be included in the attachment, especially those of own previous publications.

- Are the results sufficient to support the interpretations and conclusions?

No. The results (condensed in Figures 2-5) might be sufficient (although they need to be better presented) but they are not really interpreted in the paper (besides in an illustrative way for 2 regions) and hence also no conclusions can be / are presented.

- Is the description of experiments and calculations sufficiently complete and precise

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to allow their reproduction by fellow scientists (traceability of results)?

No. Some computations are described but there is no way to verify all claims made by the. For example the authors statement that at most very low magnitude 10 earthquakes can occur. Where can these earthquakes occur? What relative plate motions, what maximum length of the (to be) fractured fault? Also what GPS time series sensitivity (mm/yr) they assume at presently is achievable? Finally Bowin (2010) demonstrated that it is the sinking of positive phase change mass anomalies of the subducted lithosphere that drives plate tectonics. Then my logical question is what initiated plate tectonics as initially I assume there was no subducted lithosphere present at the Pangea continent.

- Do the authors give proper credit to related work and clearly indicate their own new/original contribution?

No. Related work is mainly credited in a general way, and most references in the paper are to own previous publications.

- Does the title clearly reflect the contents of the paper?

No. As stated above the title suggests the paper will quantify surface deformations in a new/different/better way but it does not. Especially the area in S.E. Asia surrounded by the Indian, Australian, Philippine, Pacific and Eurasian plates seems very interesting (also in the presented Figures 2-4) but is not discussed at all. Also Table 1 list the 52 tectonic plates but without proper legend it is hard to see where these plates are actually located (in Figure 1) and how relevant the extra (small) plates are for this study.

- Does the abstract provide a concise and complete summary?

Yes, although the abstracts suggests more scientific findings are discussed in the paper than there in fact unfortunately not are.

- Is the overall presentation well structured and clear?

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No, the paper presents mainly a summary of previous technical findings that will be applied using a more extensive tectonic plate model but never arrives at the point where new findings are discussed and compared/validated with/against other existing hypotheses.

- Is the language fluent and precise?

I am not a native English speaker, but the language appears fluent. I would however prefer the authors try explaining a bit more their concepts/ideas in a way they are easier comprehensible to non-specialist readers. Maybe that can also help to make the contents a bit more precise and less vague. . .

- Are mathematical formulae, symbols, abbreviations, and units correctly defined and used?

Yes, I hereby trust the expertise of referee # 1.

- Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated?

Yes, the paper definitely needs to clarify and reference to own/other work more. Figure 1 and 2 are not clear, and captions should provide some more explanations on them. Table 1 should include the legend for the plate names, and their location should be visible (at least for the relevant/major plates) in Figure 1.

- Are the number and quality of references appropriate?

No. I fully agree with referee #1. Too few references especially to other previous work done in this field (a pot of chicken noodle soup does not credit the majority of the geophysical community in my opinion).

- Is the amount and quality of supplementary material appropriate?

No. Besides that the main pdf is empty (or blank overwritten) the other files are not described in the paper of cover letter.

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Interactive comment on Solid Earth Discuss., 7, 1059, 2015.

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7, C584–C588, 2015

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