

Interactive comment on “Plate tectonics conserves angular momentum” by C. Bowin

Anonymous Referee #1

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I have reviewed the manuscript "Plate tectonics conserves angular momentum" by C. Bowin.

The manuscript deals with computation of individual and total angular momentum of tectonic plates since 68 Ma, based on one particular kinematic reconstruction of plate motions. The author argues for conservation of the total angular momentum over the studied period, despite observed variations in the kinematics of individual plates.

While the subject is interesting in itself, I find the arguments here not soundly convincing and therefore cannot regard this study as a significant advance in the field. Total angular momentum is computed with one single kinematic reconstruction by Harada & Hamano (2000), but I wonder whether the result still holds using other, more recent global reconstructions such as the one of the the Caltech group or the one from Trond

C5

Torsvik.

Furthermore the author favors a view of lithosphere dynamics in which plates are driven primarily by subducting slabs, whereas spreading ridges, transform faults and the mantle have a more passive role. However, as a physicist I take conservation of the total angular momentum as evidence of a closed system, where the individual angular momentum of one plate may vary in response to acceleration or deceleration of a distant plate also through shear stresses at the base of lithosphere transmitted through the convecting mantle.

I also would like to see less historical notes in favor of a more detailed description of the computation of the moment of inertia. For instance, were variations of lithospheric thickness due to aging and subsidence taken into account?

I suggest not to use quotes from other published or unpublished papers. I would also suggest to gather all the electronic material cited (movies and/or additional figures) within the supplementary section of the journal rather than having it on institutional websites.

Furthermore, I think most of the description of various procedures belong to the supplementary section as well.

Here are some minor changes that I suggest performing -p. 24, l. 16: perhaps "a mean" -p. 24, l. 16 - 20: put some references -p. 27, l. 5 - 21: try to shorten

As a final remark, I would recommend publication only if the author may address the issues above as well as comparing results when other global kinematic reconstructions are used.

Interactive comment on eEarth Discuss., 4, 21, 2009.