

## Author's reply comments

The first author takes full responsibility for the inadequacies of the 30 December 2014 submission to Solid-Earth-Discuss.net text. As an Emeritus Scientist of 22 years he did not have resources for the page and figure charges that were to commence in 2015. I have to agree with all of Reviewer #1 negative comments (except that eEarth, like Solid-Earth is[was] a peer-reviewed journal). AND, their reviews (unlike most other journals) are published and preserved.

Reviewer #2 concurs with the shortcomings pointed out by Reviewer #1 and also posits further suggestions for us to clarify in our pending revised presentation. However, in some cases, like asking us to specify where future possible Magnitude 10 earthquakes might occur, is beyond ours, or anyone else's capabilities.

I would like to use a revised paper to more clearly summarize the background information of Bowin (2010) on the gravity anomaly field of the Earth which noted that the depth of the greatest mass anomalies within the Earth (that contributes to the large degree 2-3 spherical harmonic coefficients) comes from topography at the core/mantle boundary. It also emphasized that the second largest mass anomalies within the Earth lie embedded within spherical harmonic degrees 4-10, and identifying them with the driving force for plate tectonics as the sinking of the positive phase-change mass anomaly sources of the subducted lithosphere revealed in the spherical harmonic degree 4-10 geoid field. Using the 2 Myr interval Euler pole estimates of Harada and Harmano (2000) we'll again demonstrate how plate accelerations (Bowin 2004; Bowin and Kuiper, 2005) were derived from a series of locations along the Emperor-Hawaiian Seamount Chain, and its siblings, on the Pacific Plate. The decrease in velocity, and hence also momentum, of the Pacific Plate at the south end of the Emperor Seamount Chain, at the beginning of the Hawaiian seamount trend, corresponds in time with the commencement of a previously recognized major reorganization pattern of plate motions in the southern hemisphere (Bowin, 1974). Then Bowin (2010) conclusively showed that plate tectonics conserves angular momentum over the past 68 Million years. This background further demonstrated that there is a limiting cap on the total energy involved in the Earth plate tectonics conservation of angular momentum. From this new understanding we now know that changes

in plate momentum produce the impulse (force times time) that deforms the Earth's surface, such as subsidence of basins, mountain building, and producing earthquakes. For plate tectonics the impulse force is small, but time is on the order of millions of years. Whereas in an atomic explosion the force is great, but time is extremely brief. For the past 68 Myr the total angular momentum for Earth's plate tectonics has been constant at  $\sim 1.4^{+27} \text{ kgm}^2 \text{ s}^{-1}$ .

The December annual meetings of the American Geophysical Union (AGU) continue to hold annual sessions trying to explain how and why plate tectonics functions, and the geophysical community remains largely ignorant of our 2010 eEarth solutions to those primary questions, and would thus benefit by being re-exposed to that evidence. Furthermore in the revised paper I would use our documented example of the evolution of the 'Emperor Seamount Chain' event sequence into the 'Hawaiian Seamount Chain' event sequence as an example of how to view the slow continuing shifting of perpetual Earth plate tectonic history.

I would hope that the above arguments would warrant approval for us to prepare a revised paper tentatively titled "Migration of sinking mass anomalies and plate tectonic history". I still anticipate being able to compute global normalized "deformation index" values (0.0 to 1000.0) from digital 5 arc-minute global topography data using vertical topography gradient parameters. These "deformation index" values, together with distributions of earthquakes, gravity anomalies, and magnetic anomaly patterns, may, or may not, aid in assessing likelihoods of where the next seafloor spreading sequences might develop. Appropriate text will be incorporated as applicable.

The 2 Myr interval historical absolute rotation plate data is only available for the 14 plate solutions, whereas the more detailed 52 plate absolute Euler pole solutions we calculated from Bird (2003) poles relative to a fixed Pacific plate, only apply to the present time. A problem with all my copies of our original SED submission were the small image sizes of the figures. They all looked like they were quarter or half page sized (some figures looked like postage stamp sized), and I did not understand what had happened before. In reviewing SE publications today on line, I note normal full-size pages are the norm. We would appreciate staff guidance to avoid a repeat of that formatting problem on our part again.