

Interactive comment on “Analysis of geomagnetic measurements prior the Maule (2010), Iquique (2014) and Illapel (2015) earthquakes, in the Pacific Ocean sector of the Southern Hemisphere” by Enrique G. Cordaro et al.

Anonymous Referee #2

Received and published: 3 April 2019

This paper focuses on an interesting science topic of the geomagnetic field variations prior to earthquakes. The authors analyzed the geomagnetic field records for three major earthquakes occurred in South America and showed geomagnetic field anomalies as earthquake precursors. I think the science results delivered by the paper does not meet the quality per the Journal requires. In addition, the text and figures contain many typos/errors, which makes them difficult to read.

My major concern is that the relation between the magnetic field variations shown and the earthquakes are not convincing. It might be that the magnetic field variations are

C1

irrelevant to earthquakes, or the analysis method needs to be improved. The magnetic field data seems to be oscillating at all times, weak or strong. It is difficult to identify the changes prior and related to earthquakes if the black lines were not drawn in Figure 2 to guide eyes.

More importantly, the variability of the ground magnetometer data could be caused by many factors other than the earthquakes. One would argue that space weather induced impacts can be more direct and significant on the geomagnetic field. The authors made a fair attempt to show and analyze the Kp index, in order to rule out the variations due to space weather. However, the evidence is not convincing. Kp index is only one of many indicator of the geomagnetic activity. It is a global and daily index that may not reflect localized changes at times of interest. Therefore, more evidence is necessary to state “The magnetic records for the Bz component show little external influence.” and “This would indicate that the main source of anomalies could be in the lithosphere and not in outer space”.

Other comments include:

1. Section 1, what is the reason for the different frequency ranges for Fourier and spectrogram analysis; And what are the implications of the different frequencies?
2. Section 3, lines 18-22 on page 4: these do not read correct. The dates/years may be wrong.
3. In Section 4, the Dst index $< 10\text{nT}$ could mean geomagnetic activity as it can go negative. I think the authors wanted to say the absolute value of Dst $< 10\text{nT}$. In addition, what does it mean with “the DST for 2015 is less precise”?
4. The discussion and conclusion section should include limitations of the presented analysis and alternative explanations of the magnetic field anomalies if there is any. Moreover, what is the major contribution of this work?
5. The figure numbering does not match the main text and captions. All figure captions

C2

need to be more descriptive and explain the legends on each figure. The dates on Figure 1 seems wrong.

6. It would be better to have a figure that shows the geographic locations of the earthquakes and the locations of the stations from which the geomagnetic data were obtained and analyzed.

Interactive comment on Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2019-9>, 2019.