

## ***Interactive comment on “One second vector and scalar magnetic measurements at low latitude observatory, CPL” by Phani Chandrasekhar Nelapatla et al.***

**Anonymous Referee #1**

Received and published: 19 April 2017

Review of 'One second vector and scalar magnetic measurements at low latitude observatory', CPL by Phani Chandrasekhar Nelapatla et al., submitted for publication in Geosci. Instrum. Method. Data Syst.

The manuscript describes the Chouattupal (CPL) geomagnetic observatory and its instruments. This is an important and laudable endeavour. I have, though, serious doubts if this manuscript really is contributing to the existing knowledge in our field or if it could be instructive to newcomers to the field. Therefore, I suggest major revisions and substantiate this suggestion by the following major and minor comments. I would like to encourage the authors to improve the manuscript considerably in form and content.

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There are several misconceptions in the manuscript that already become clear in its abstract. Firstly, 1 second data is not 'in lieu of' (as claimed on page 1, line 15), but an addition to 1 minute data; the latter remains being the primary product of any INTERMAGNET observatory. Secondly, the authors claim that 1 second data is more compatible with measurements from LEO satellites (line 17) and contributes to the development of space weather forecasts (line 19). The authors do not give any evidence of these claims. I am not aware of examples that would support these claims and I had hoped the authors could educate us in this respect. Similarly, on page 2, line 16 to 19 the authors give examples for relevant science areas. However, all these science goals are easily achievable with standard equipment like FGE magnetometers.

What is the purpose of Fig. 5?

A major problem of the manuscript is that it presents technical data and screenshots of commercially available products. These figures and tables likely come together with these commercial products in the form of advertisement material or manuals. We learn very little about the source of these figures and the validity of the experimental procedures and analysis methods on which they are based (e.g. Figs 4, 6).

Also, it is not possible to evaluate the information collected and presented by the authors. For example, the temperature stability of their enclosure design can not be evaluated since only 1 day of temperature data is presented. We wonder, how stable the temperature in the variometer enclosure is in the long term, say during weeks or even a year. Judging from the baselines presented in Fig. 13 (changes of 5 nT in Z and 8 nT in H, D is illegible, so we don't know), the quality of the variometer or the temperature stability of its enclosure must be poor. Please present convincing temperature data over the course of several months or a year. Please present stable baselines if you want to advocate your mode of operations and the instruments you use.

Figures are illegible (Figs. 1, 6, 9, 10) or hardly legible (Figs. 11, 12, 13), invalidating any information that they might contain about the quality of the 1 second data presented

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here.

Please mention the Narod magnetometers (page 4, line 7).

Please use SI units (e.g., page 4, line 19).

A variometer oriented to magnetic north should not compensate the magnetic field at its Y sensor (page 5, line 29), because standard methods of calibration will then fail to orient the horizontal sensors correctly. What precautions/methods have been used in this respect to guarantee correct calibration at CPL?

From reading the text, I don't understand the filter procedure described in paragraphs 2.2, 3.1 and 3.2. Looking at the figures helps little to understand the situation at CPL since the axes labels are too small to be readable and I don't know the time scales of Figs. 9 and 10. Please make clear what part of text is a general description of the commercial products on the one hand (and avoid writing too much about them, if possible) and what part of the text is describing the settings you chose for CPL (and please explain why they were chosen, how they were realised and what the results are). A cut off frequency of 0.005 Hz (200 seconds?) is mentioned in paragraph 3.1. Is this used in CPL and why was it chosen? The plot in Fig. 4 suggests that the signal is essentially zero at 0.2 Hz. My major concern here is that this is still part of the INTERMAGNET 1 second standard pass band and that the signal should not be altered here (a maximum gain/attenuation of 3 dB is foreseen in the pass band, see [http://www.intermagnet.org/publications/im\\_tn\\_06\\_v1\\_0.pdf](http://www.intermagnet.org/publications/im_tn_06_v1_0.pdf)).

General remarks to the data processing: I would expect that the de-spiking is performed at a primary sampling rate (100 Hz), and not at the 1 Hz sampling rate. Also, my feeling is that the filtering used here is just smearing out spikes rather than removing them. Finally, I am in doubt about the use of the Magrec 4 data logger here. It looks like the time stamping and the filtering is already done by the variometer (which has a digital output), thus main features of the Magrec remain unused and it is questionable why using such a sophisticated data logger for the simple task of saving and

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transferring data.

I don't see a proper analysis and discussion of socio-economic-political factors in the manuscript and would remove this part from the conclusion. Where there any low-latitude aspects in the manuscript that would justify the title of the paper?

The English needs considerable improvement.

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Interactive comment on Geosci. Instrum. Method. Data Syst. Discuss., doi:10.5194/gi-2017-16, 2017.

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