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Geoscientific Instrumentation Methods and Data Systems Discussions

Interactive comment on "A comprehensive data quality evaluation method for the current of marine controlled-source electromagnetic transmitter based on Analytic Hierarchy Process" *by* Rui Yang et al.

Rui Yang et al.

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Dear Axel Djanni. Thank you very much for your comments and suggestions on the details of our manuscript, which have greatly improved the quality of our manuscript. We reply the comments point by point in this letter after our discussion and modification, the marked-up manuscript and reply with two pictures version are both in the supplement file.

1) 1- I know English is not the first language of the authors but I may suggest writing

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your article in the following tenses: **) As the subject of your sentence is mostly about the study you have carried out, then you should use the present tense. **) Your conclusion and interpretation of the results should be written ONLY in the present tense.

Reply: Thank you very much for your suggestions on writing tenses. We checked the whole manuscript carefully and corrected the tense problem. The corresponding changes have been marked in the manuscript (Abstract.line_22, section2.line_22, section3.2.line_26, section3.6.line_24, section3.7.line_18, section4, section5 and conclusion). Thank you for your reminding. We will pay more attention to writing from now on.

2) Abstract: The first 4 lines should be removed. They don't give any new information that we don't know. I suggest starting with something like: "We present a QC methodology ...". After "...within 2%.", I suggest starting with "The key ïňĄndings are that ...".

Reply: This is a very good suggestion. We simplify the first several lines and start with "We present a QC methodology for the current of electromagnetic transmitter of marine controlled-source electromagnetic." And then change the end to "The key ïňĄndings are that the QTC index changes to more than 4% and some curvilinear features are observed if the transmitting current quality is poor. These results will provide a positive, significant guide for the evaluation and monitoring of transmitting current data in marine experiments."

3) Introduction: There are typos errors that I can t go through each of them unfortunately. Please read it again! After, "Mittet et al., 2008". You stated that "there is no..."...Are you sure about this afiňĄrmation? To make your point clear, I suggest starting the sentence with the name of the authors you are citing: for example – Edward, 2005 states that ....

Reply: We checked these places carefully and there was no problem. Most of them are unrecognized names. After, "Mittet et al., 2008". What we meant was that we haven't

found a paper about current quality control yet. But maybe our translation is not good and the expression is not very accurate. We change the sentence to “Edwards, 2005, He, 2009 and Luan, 2018 states some data processing methods of controlled-source electromagnetic, but they do not make too much research on current quality.” now.

4) Transmitting current analysis “The MCSEM operation data processing ...”, this sentence does not make sense. Can you please re-write it? Do you mean that the transmitting current quality inïňĆuences the inversion?

Reply: We are sorry that we didn’t translate the meaning clearly. Yes, what we meant was that the transmitting current quality influences the data pre-processing and inversion. Now we rewrite it with “The MCSEM data pre-processing and inversion are influenced by the transmitting current quality.”.

5) Frequency stability: Please clarity what frequency you evaluate in ai...is it the fundamental or the harmonic?

Reply: Both. Although most frequencies are useless for us, we have designed the algorithm that can analyze all frequencies. Because we want to calculate the frequency spectrum of QTC to compare the stability of different frequencies like Fig3(c). It mainly shows the changes in the QTC index with frequency and time. Blue indicates smaller stability values and more stable transmitting current, whereas red indicates the opposite.

6) Positive and negative amplitude: Can you please clarify how you obtain b1 = 0.001?? Also, it should be b0? Same for c1

Reply: We’re sorry we didn’t explain b1 clearly. It is the stability of the first data block according to the definition, but we design this parameter to identify changes, so the first data is meaningless. Then we give this initial value within 1%, which has no practical significance and do not affect the final overall data. This was not specifically stated in the previous manuscript, and we now add the explanation in section3.2 and section3.3.

Thank you very much for your reminding.

7) Ideal waveform difference: In thefirst sentence, what d you mean by “single square wave frequency”? Did you mean: "fixed period”? Also, the computation of di is a little problematic...it will always average to 0. Or am I wrong? What if the noise is correlated? I will suggest to compute the square roots of the output instead. The same observation goes to equation (6). Waveform repetition: I guess b is the number of samples per period or? Please clarify.

Reply: (a) In the first sentence, what d you mean by “single square wave frequency”? Did you mean: “fixed period”?

It means “square wave of a single frequency signal”. We’re trying to explain that we use two kinds of signals alternately in our experiments. Maybe our translation is not very accurate. Now we rewrite it with “square wave of a single frequency signal”.

(b) Also, the computation of di is a little problematic...it will always average to 0. Or am I wrong? What if the noise is correlated? I will suggest to compute the square roots of the output instead. The same observation goes to equation (6)

Yes. The di is related to noise. So, it is almost impossible to be equal to 0. Now our transmitter is equipped with a channel to record ideal control waveform data. We can directly see the difference between the two by reading data, and di is to quantify it. Computing the square roots is a very good suggestion and we will consider this way. Thank you very much.

(c) Waveform repetition: I guess b is the number of samples per period or? Please clarify.

Yes, it is. We explain b in the last sentence of section3.5. “b is the number of each cycle of the transmitting waveform.”. We use one or more transmitting waveform periods as one sample data. The b is the number of it. We rewrite it with “and b is the number of samples per cycle of transmitting waveform.”.

8) Conclusion You should explain the ideal waveform your methodology works effectively and suggest the error one can have using other types of waveforms. Also, during the ïňĄeld trial, what device have you used to measure the current? How accurate is it?

Reply: We are not very clear what you mean here. Do you mean the error between ideal waveform and working waveform? Or the difference between good waveforms and poor waveforms? We explained this criterion in the conclusion. QTC indices less than 2% are normal and those more than 4% indicate current data is poor which require correction in a timely manner. The current sensor we used is a device manufactured in China. It is a closed-loop Hall current sensor, as shown in the picture in the supplement file. And its accuracy is $\pm$0.4% at 25°C.

If there is anything we don't explain clearly, welcome to discuss. Thanks again for your kind reminding and very helpful suggestions.

Please also note the supplement to this comment:
https://www.geosci-instrum-method-data-syst-discuss.net/gi-2019-16/gi-2019-16-AC2-supplement.pdf

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