Geoscientific Instrumentation Methods and Data Systems Discussions

Geosci. Instrum. Method. Data Syst. Discuss., referee comment RC2
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Comment on gi-2021-33

Anonymous Referee #2

Referee comment on "Leveling airborne geophysical data using a unidirectional variational model" by Qiong Zhang et al., Geosci. Instrum. Method. Data Syst. Discuss., https://doi.org/10.5194/gi-2021-33-RC2, 2022

This is definitely a good presentation of a new method for airborne geophysical surveys. Since the volume of the measurements carried out by airborne geophysical methods for various tasks increases continuously, airborne data require new processing techniques, and their productivity and robustness are of great importance, especially in the data leveling procedure.
I highly appreciate the clear and in-depth mathematical description of the new leveling technique and the artful display of the results of its application on various ariborne geophysical data (electromagnetic, magnetic, apparent conductivity) presented in this manuscript, and my remarks are focused on several specific issues that, in my opinion, should be clarified before publication.

First of all, please clarify the word "gradient" in Section 2, Is it a spatial derivative or (I guess) is it simply a difference or an anomalous component of a total field? Anyway, this should be clarified (defined), so that most readers could understand it clearly at once before they see the maps with the "nT" labels at color bars.

Next, in the Discussion section where the results are discussed and compared to the similar leveling results obtained by other methods, it is recommended to add some quantitative estimates for the comparison (RMS, for instance) to fully display the advantages of the new method.

Specific comments:
Line 26: "... temperature has seasonal fluctuations even regional fluctuations" should be changed to "... temperature has seasonal fluctuations and even regional fluctuations"

"Temperature variations can change the configuration of used survey aircraft, and the

collected data as well..."
I recommend rewriting this statement, for example: "Temperature variations can change the configuration of the used survey aircraft, affect its measuring hardware and the collected data".

Other corrections (some of them are recommendatory):

Line 33: "are also happened" should be changed to "also take place"

Line 37-38: it is better to say "... relatively more sensitive"

Line 41: It's better to rewrite it: "...it is hard to quantitatively calculate..."

Line 120: "which has" should be changed to "which have"

Line 137: "greater" should be changed to "is greater"

Line 145: "...and spatially..." should be changed to "... and the spatially..."

Line 168-169: "proposed a unidirectional variational..." ... model?

Line 185: "In unidirectional variational method,..." Should be changed to "In the unidirectional variational method,..."

Line 194: "result" should be changed to "resulting"

Line 215: "data.Figure 3" should be changed to "data. Figure 3" (a space is missing)

Line 228: "Both the methods" should be changed to "Both methods"

Line 241: "the parameters of unidirectional variational model algorithm" should be changed to "the parameters of the unidirectional variational model algorithm"

Line 266: "presented" should be changed to "presents"

Line 291-292: "Then unidirectional variational model is applied on the smooth field, considering that the directional distribution property
discussed above."

Possibly this should be rewritten this way: "Then the unidirectional variational model is applied to the smooth field, taking into account the directional distribution property discussed above."