<u>Responses to reviewer Bruno Gavazzi comments on the paper titled</u>: Multi-scale analysis and Modeling of aeromagnetic data over the Bétaré-Oya area in the Eastern Cameroon, for structural evidences investigations.

Dear Chief Editor,

In general, all the reviewer (cited above) remarks, and recommendations have been taken into consideration. The authors make changes and suggestions in yellow in the MS text, but in blue below responses are given to all the remarks. The authors are indebted to him for his valuable remarks.

<u>General comment and remarks</u>

1. The revised manuscript that was strongly improved from the first version. Corrections suggested by the reviewers have been nicely implemented and the methodology part is now more detailed.

   a)- Nonetheless, I think the paper needs some precisions on the tilt method before publication: I understand you use the tilt depth method on data reduced to the equator (RTE), but Salem et al 2007 described the tilt derivative on data reduced to the pole (RTP) and stated that this necessity is one of the limits of their method. You should explain how it works with your RTE data and what the limits of such an approach are compared to tilt on RTP data (and why you can use it for your case). I deduced that you can consider that the shallow contacts are vertical and that therefore you can use tilt to map them. But I think it is not stated clearly enough: please make it clear that you have proofs or strong hypothesis that the contacts are vertical before mapping them: The RTE operator acts like the RTP's one, that means, it allows the tilt of the magnetization to be removed. This thus brings the anomaly of the magnetic field in line with the causative source (Salem et al., 2012; Feumoe et al., 2012). But, in the case of low latitude areas between -15° and 15° as is the case for our study area, the N-S directions are amplified by the reduction at the pole and there is a higher risk of an exaggerated reinforcement by amplifying a pre-existing noise. When applying the RTP operator in low latitude areas, as in our case, the map obtained is instable, a little fuzzy, and more gives anomalies values that do not correlate with those from the aeromagnetic maps of the adjacent areas (Feumoe et al.,2012, Owono-Amougou et al., 2019 & 2020) where the RTE was applied. It is necessary to mention that, in the case of the adjacent areas situated just below (Feumoe et al.,2012, Owono-Amougou et al., 2019 & 2020) our study area, the RTP was tested by the concerned authors, their maps were fuzzier, and the noise is highly amplified. To solve that problem in low latitude regions, it is better to apply the reduction to the equator (Feumoe et al., 2012, Owono-Amougou et al., 2019 & 2020).

Concerning our hypothesis for the vertical contacts, we used the results from surroundings areas where the RTE was applied and we combined those results based on the same hypothesis with geological facts derived from field observations (Soba, 1989) covering our study area.

Concerning the limits of the tilt derivative on data RTE, we do the constatations cited below:

- With the RTE, we used the hypothesis of a magnetic induced anomaly, which has the same direction as the geomagnetic field, given by the global geomagnetic field models (IGRF), and we ignore/neglect its remanent part in the rock.
- To have satisfactory results using the tilt angle on magnetic data analysis and modelling, especially in the determination of the vertical contacts in low latitude areas, the RTE operator becomes a mandatory constraint.

In our case, investigating a low latitude area we engaged the:

- Use of the Euler deconvolution to identify various potential contacts including the vertical one and then compare them with those derived from the tilt results.
- Care to correlate our results with the previous geological investigations over and outside on one hand and geophysical studies over adjacent areas particularly the aeromagnetic investigations on the second hand.

Technical corrections and suggestions

2. I also provide hereafter some technical corrections and suggestions:

L 39: These: Done.

L 118: “were” instead of “are”?: Done.

L134 to 136: is is plural (and should be “...maps have been…”) or a singular map (and it should be “The aeromagnetic...”: Done.

L142: I think you should replace “fields” (general case) with “magnetic field”) your case: Done.

L145: “their effect” instead of “regional effect”? The regional effect might be defined as something different, using their (the deep sources) avoids the confusion : Done.

L155: I would add “vertical” before “contacts” (because for non-vertical contact h=+/-90): Done.

L168: it could be understood that the operator highlights only the vertical contacts (it is not true, but for the other the position depends on the slope angle), I could propose: “Computed the position of the contacts considered as vertical...”: Done.

L 197: it reads as if the operator has been done in 1970, could you rephrase that it is clear that it was performed with the inclination and declination of 1970, the ref to the latest IGRF would be appropriate here (IGRF-12, Thébault et al 2015):
a)-Reformulations done.
b)- Our choice which is based on the use of the corresponding IGRF, by inserting into Oasis Montaj 8.4, the data collection date (1st dd/mm/yy), has led to declination and inclination values for the IGRF, which is included in the interval of validity defines by the latest IGRF-12 (Thébault et al.,2015).

L216: "magnetization" (remanent+induced) instead of "susceptibilities" (only induced) (strictly speaking it is even contrast of magnetization of the causative bodies with the neighboring/surrounding materials): Done.

We humbly hope that the clarifications and the corrections made after receiving the reviewer remarks & recommendations are satisfactory.

Your kind reaction is awaited.

Sincerely yours