

Interactive comment on “Multi-scale analysis and Modeling of aeromagnetic data over the Bétaré-Oya area in the Eastern Cameroon, for structural evidences investigations” by Christian Emile Nyaban et al.

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General comments The article aims to provide new insights on structural features of the Bétaré-Oya area in Cameroon through the use of different potential field transformation and modeling from aeromagnetic data. I am not very familiar with the geological context of the area so I will focus my review on the methodological aspects and on the interpretation of the magnetic data. I find the approach interesting and interpretations are mostly coherent. Unfortunately the methodology is not well described and some assumptions are not explained enough. The paper would need a strong revision on

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this aspect to provide a solid base for the discussion. In addition, some references are missing in the reference list. In its present state, it is hard to evaluate the validity of the discussion.

My advice would be to review the literature on aeromagnetic methods starting with Nabighian et al (2005), The historical development of the magnetic method in exploration, *Geophysics* 70 (6). 33ND-61ND <https://library.seg.org/doi/10.1190/1.2133784>

I provide more details in the specific comments section.

In the future, it would be useful to provide the DOI of the references, it is easier to find them that way.

Specific comments L 36 – 39 You should provide an explanation on why you want to achieve that in your particular case. It reads as if removal of large wavelength is always done on aeromagnetic dataset, but it depends on the application. Moreover, Ndougua et al 2007 is about gravity and not magnetic data. L 39 – 40 Here it also reads as if in the general case shallow bodies are associated to iron deposits. It obviously depends on the context, I think you should make an argument for your special case and context. L 47 - 49 Verduczo et al 2004 did not develop tilt derivative but discuss its use, please read the suggested reading provided at the end of the paper to correct your statements. Also the tilt is used as an edge detector for vertical contacts, not for all shapes. L 50 – 53 I think you should say why you do not use the method from Salem et al 2008 which seem well suited to what you want to do, is it because of the use of second order derivatives and your signal/noise ratio? L 142 what does it mean a sensitivity of 0,5 nT? Is it only the sensor? What about the FOM? What is the overall precision (differences at the crossing points?). Also, I could not find the reference, is it an internal report? If so could it be published on an open archive in order to be available? L 144 is there any special reason for a grid step of 850 m? (it is common to use half the profile spacing or the profile spacing) L144 – 145 Is it relevant to precise that the digitization was well done? L146 why do you use IGRF 1984 and not the latest available? (also you should

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cite the associated publication) L 150 – 153 Blakely describes the upward continuation, not how to remove the regional effect, also the upward continuation was proposed by Henderson and Zietz (1949) <https://library.seg.org/doi/10.1190/1.1437560>. Please be more precise L 163 – 164 this works for vertical contacts, how do you deal with non vertical edges? Or what is your argument for an assumption of only vertical contacts? L 166 – 169 I do not understand how coupling upward continuation and tilt do what you say, the advantage of tilt is that it is not dependent of depth of sources. Could you explain better? L 198 – how does reduction to equator gives position? Why don't you use reduction to the pole (there are many techniques to deal with proximity to equator, please see Nabighian 2005), how can you assume only induced magnetization? (you cannot reduce to the pole/equator with remanent magnetization) L 203 – 221 “positive” or “negative” anomaly has no sense, a magnetic anomaly has always a positive and a negative parts. Also what do you mean by bipolar? Is it dipole? You should reformulate this section to make it more scientifically correct. L 241 – 249 Why don't you use the IGRF as regional field? Zeng (1989) is not in the reference list. I had never seen this method, could you provide references and/or an explanation on why you choose this technique? L 322-326 It works only for vertical contacts L 524 -525 “data available upon request” is not an open science statement. Could you upload the data on an open archive (such as zenodo) or are they confidential?

Technical corrections You use sometimes modelling (British english), and sometimes modeling (US). Please choose one. L 43 – Oruç et al is not in the reference list L 44 “In the last few year” and then you cite literature from 1985. Would be more accurate to reformulate that. Fig 1B I cannot see well the faults as indicated in the legend. Also, what are “tectonic lines” L 149 I would remove “theory” as you do not discuss the theory behind it L 150 the first sentence is not understandable

Please also note the supplement to this comment:

<https://se.copernicus.org/preprints/se-2020-111/se-2020-111-RC1-supplement.pdf>

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Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2020-111>, 2020.

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