

Interactive comment on “Regional scale analysis of landform configuration with base-level maps” by C. H. Grohmann et al.

J.-D. Champagnac (Referee)

champagnac@gmail.com

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Grohmann et al. explain in this paper a method (that I was not aware of), namely base level mapping, that would help to extract geomorphic signature of existing tectonic structures, rock type contrasts, or any other morphological contrast. They explain clearly the method and some of its limitations, briefly show some examples of successful use of this method, and apply the method in northern Brazil, where, I guess, field mapping of active structure is not easy. I personally think that topography s.l. contains a lot of information, and I am always happy to see methods that aim to extract this information out of noise. However, without a detailed discussion on the tectonic regime and the age(s) of the deformation(s), coupled with a more detailed analysis of the “structures” and “anomalies” observed, it is hard for the reader familiar with fault mapping

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to 1) really believe that the mapping is univocal, and 2) to understand -in this specific case study- what are the insights given by the method (the “structures” detected are either already known, either not discussed in details. S. Castelltort in his comment, suggests that the tectonics is active there. I don’t know much about South America, but I doubt that any seismic or geodetic activity is recorded in this area. This raise two points: Authors should precise the tectonic activity of the region for reader not familiar with this area, and 2) if tectonic activity is slow / null, what is/are the possible origin(s) of the observed structures?

Detailed comments:

Abstract The abstract present the findings described in the paper, but may (should?) be written with more details, avoiding general statements and vague formulations. - Line15: why anomalies with no mapped structure would be more recent? Is the large scale tectonic setting supporting “more recent” (and how recent?) tectonic activity with surface expression? -Line 17-18: this sentence is too general. What kind of geophysical anomalies? What is a geophysical anomaly? How “good” is the correlation with the geophysical anomalies?

Introduction The first part of the introduction acknowledges (a lot of) previous work, back in the past. The last part (beginning line 15 page 91) suggest a new formulation, and at line 21 (page 91), authors develop some general suggestion about how should be interpreted base level map. This section should be removed from the intro, and dropped into section 2. A quick introduction about the geomorphological / geological / tectonic setting of the studied area is missing in the Introduction.

2. base level maps - Author should acknowledge that stream order depends on the scale of the map /DEM used. - section 2.2 application is a suite of several (7) studies that are using similar or approaching method. Either each subsection (each example) is too long or too short. Too long, I think, and the entire section could fit with a few concise sentences, or each example should be developed with a critical view of the

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detail of the method used, limitations, and results. I think that a section of more modern morphometric analysis is missing.

3. Method I am not sure that a single researcher on earth still uses manual detection of rivers and Strahler ordering. The first sentence is therefore probably not needed. However, SRTM resolution should be corrected (resolution is more ~900m than 1km). Reviewer#1 say that authors have used SRTM90m, which I think is not the case. This suggests that authors where not clear enough on this point. I do not understand the sentence “The extracted drainage network is compatible with a 1:100000” (line 20 page 95). What compatibility the authors are talking about?

4. Results and discussion Line 8 page 96, Authors should be more precise when they are talking about “structures” or “morphostructures”. What kind if structures? Faults? Folds? Bumps? Lithological contratsts? Etc. Again “anomalies” should be detailed / précised (height, wavelength, orientation etc.) Line 16 (page 96). What is the “recent” tectonic activity of the studied area? How recent is “recent”? Line 20 (page 96). You should help the reader not familiar with the Barzilian geology, and precise the age of the Parnaiba Sedimentary Province, since some “structure” seem to be younger that this sediments. Line 9 page 97, authors write that observed anomalies “can be interpreted as a SW dipping normal fault”, without discussion of regional tectonic and / or stress field. Moreover, this finding is not related to the method described in the paper (base level maps), but well-known and quite straightforward swath profile.

The end of this section briefly argue that anomalies observed in base level maps “correspond” to anomalies observed in geophysical maps, without a complete discussion. This is way too short.

5. conclusion This section is just an abstract of the section 4. I suggest merging discussion and conclusion, and using available space to develop points that are treated too quickly.

Figures: Figure 1: I suggest the use of a DEM (color figures are not expensive in

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a online-only paper...), that would give much more information than a simple hydrographic map.

Figure 3 is too small. It is a key figure of this manuscript, and should be easy to read.

Figure 6 : typo: 24nd instead of 2nd order in the caption. I have a major concern with this figure: I don't understand how these "structures" are deduced from fig 5B. Are they faults ? strike slipe? Why are they cross cutting to each other without offset? I feel that this figure is highly speculative, and I suggest that author give Fig5B to someone that don't know anything about Brazilian geology (a structural geology which has training in fault mapping, for instance), and ask him (her) to draw "structure" on fig5B or 5C. I doubt that he (she) will provide a map similar to Fig6A.

Figure 7: the inset is too small (draw the swath on Fig 1 or Fig 5A. I fear that the interpretation by a normal fault is no univocal: the same swath profile may be obtained with other tectonic structures (N-dipping reverse fault, anticline growth north to the northern part of the profile...)

Figure 8: It is hard to see on this figure where are the structures mapped in Fig6A. I suggest a composite figure that would help the reader to better understand your points.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 89, 2011.

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