

Interactive comment on “Distribution, microphysical properties, and tectonic control of deformation bands in the Miocene accretionary prism (Whakataki Formation) of the Hikurangi subduction zone” by Kathryn E. Elphick et al.

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General comments

The study proposed by Elphick et al. appears to perfectly fit with this Special Issue of SOLID EARTH. The paper describes for the first time deformation bands in syn-subduction turbidites of the Hikurangi margin (New Zealand) and brings insights concerning their relation to deformation episodes that have affected the subduction wedge. This study is original in New Zealand and for such a geological context and relies on re-

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cent development concerning the understanding of deformation bands. In my opinion, emphasis should be given on: 1) the geological context, and above all, 2) the turbidites which are particular host rocks for deformation bands. The paper is well written with globally a well-organized and clear structure even if some specific and technical points have to be amended to improve the manuscript (see next section and annotation in the PDF file).

Specific comments

- As accretion did not occurred all across the thrust wedge, I rather prefer to avoid the use of accretionary prism to talk of the entire deformed area between the trench and the Forearc basin (please, see also my point of view on that in the PDF file of the manuscript).
- An absolute porosity reduction of ca. 10% (from $\sim 20\%$ to 10%) is given in the conclusions whereas between 5 and 14% is given in the abstract. Also, c.a. 9 m is given in the conclusions while 10 m is given in the abstract for the spacing between faults. I think it can be clearer to give the same values in both the abstract and conclusions.
- The Background section could be clarified with a better separation between what concern the geological context and what concern deformation bands.
- Proto-Deformation Bands (section 4.4.3.3): The description is quite short, could you give us more detail and explain more clearly why you interpret these as proto-DB?
- It is said in the discussion that deposition of the Whakataki Fm occurred till the end of D2. As far as I know, it's not the case, the typically thin-bedded turbidites of that Formation being Waitakian-Otaian in age, so latest Oligocene to earliest Miocene.
- The section 5.4. Implications for fluid flow is very general and could be consolidated a little bit, notably incorporating references to papers that specifically deals with fluids on the Hikurangi margin – that literature is abundant so only a few key papers could be cited: (e.g. See annotation in the manuscript for suggestion of references). That

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would give weight to the consequences of the compartmentalization demonstrated in the paper on reservoir properties and for pressure regimes.

- The paper could gain from a last figure acting as a synthesis summarizing most of the observations and results, on a 3D block for example. Such a figure could highlight the work and make it more visible.

- Some figures deserve to be more cited in the text (e.g. fig. 15 is not cited at all) and some more precisely (i.e. what part of the figure is used).

- References: some inconsistencies are still present in the list and a few references could be added. Please, verify all the references to be sure that they are OK.

Technical corrections

Technical suggestions are annotated in the PDF file of the manuscript.

Considering all the points raised above and those annotated in the PDF File of the manuscript, I recommend moderate revision for that paper proposal.

Thank you for having proposing me that review, Best Regards,

Julien Bailleul

Please also note the supplement to this comment:

<https://se.copernicus.org/preprints/se-2020-80/se-2020-80-RC2-supplement.pdf>

Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2020-80>, 2020.

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