

Solid Earth Discuss., referee comment RC1
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Comment on se-2021-54

Anonymous Referee #1

Referee comment on "Deformation-enhanced diagenesis and bacterial proliferation in the Nankai accretionary prism" by Vincent Famin et al., Solid Earth Discuss.,
<https://doi.org/10.5194/se-2021-54-RC1>, 2021

This paper reports a series of microstructural and chemical analyses of samples derived from cores taken from the Nanka accretionary prism in SW Japan. Key results from these analyses are 1) an increase in the precipitation of pyrite in deformation bands and 2) an increase in the illite crystallinity in deformation bands. Both diagenetic reactions may be explained by local bacterial proliferation. These reactions may reduce the chlorinity of pore water from accretionary prisms because they produce fresh water. In addition, the explanation of illitization via metabolic processes is significant as this process is usually explained as the result of a temperature increase.

This is a well-written paper that combines a number of analyses to shed new light on the interpretation of deformation bands in accretionary prisms. The research presented is original and of importance to geoscientists concerned with deformation, chemical and diagenetic processes in accretionary prisms. I therefore feel that this work should be published, after minor revisions as detailed below.

- My main concern is about the number of samples/analyses presented to arrive at the conclusions listed above. Notably, the inference of the increase in illite crystallinity in deformation bands is based on XRD analysis of one sample and analysis of the trace elements in one other sample. This is very limited evidence. In the absence of more supporting data, I feel that the authors should weaken some of their statements and make it clear that they are speculating.
- Line 30: please add a reference after "in the accretionary prism".
- Line 30-31: please add references for the "large amount of work".
- Line 81-82: please mention that the specifics of the samples studied can be found in Table 1.
- Methods section: it would be helpful if sub-sections would be added.
- Line 112: "Secondary" presumably "Scanning" is meant?
- Line 138: please replace "the analysis on" by "the analysis of".

- Line 153: please define "BIR".
- Line 158: please clarify "those samples".
- Line 165: please clarify "indifferently".
- Line 182: please replace "An example of SEM element map" by "An example of an SEM element map".
- Line 188: "S" this element is not shown in Figs. 7 and 9.
- Line 207-208: "This greater compaction is seen in the SEM and XRF maps." Please explain what observations lead to this statement.
- Line 212: please replace "confirms" by "supports".
- Line 257: please replace "show" by "suggest".
- Line 270: "reach" should probably be replaced by "obtain".
- Line 280: please clarify "their".
- Line 295: please replace "show" by "suggest".
- Line 320: please replace "tiny" by "microscopic".
- Figure 1c: Please clarify the right most part of the figure, notably "Nb". Presumably this is "number", which is usually abbreviated as "Nr".
- Table 2: the volume percentages are reported down to the third decimal, which seem improbably precise to me. What precision can be expected from the analysis by ImageJ?
- Table 3: where is the data from the other 2 samples that have been analysed by EPMA according to Table 1?
- Table 4: where are the results of the other sample that was analysed by HC-LA-ICPMS according to Table 1?