

Biogeosciences Discuss., referee comment RC1 https://doi.org/10.5194/bg-2021-332-RC1, 2022 © Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.

Comment on bg-2021-332

Anonymous Referee #1

Referee comment on "Fossilization of Precambrian microfossils in the Volyn pegmatite, Ukraine" by Gerhard Franz et al., Biogeosciences Discuss., https://doi.org/10.5194/bg-2021-332-RC1, 2022

Comments and revisions for Franz et al. manuscript to Biogeosciences – January 2022

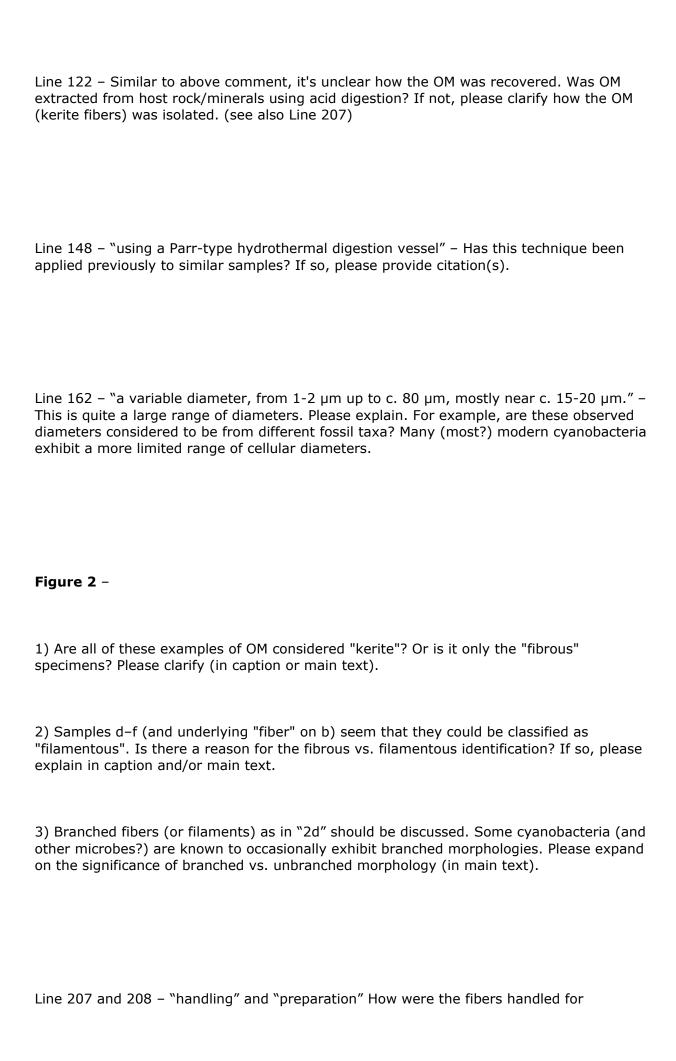
GENERAL COMMENTS

This manuscript provides an important contribution to studies of Precambrian fossilization processes, and describes a unique environment for preservation in the continental subsurface. The overall theme of the paper fits well within the context of the journal *Biogeosciences* and would make a valuable addition to the literature in this field. This paper will be well-suited for publication following minor revisions, as discussed below. It is my hope that the authors find these comments constructive and improve the quality of the manuscript and presentation of the research findings.

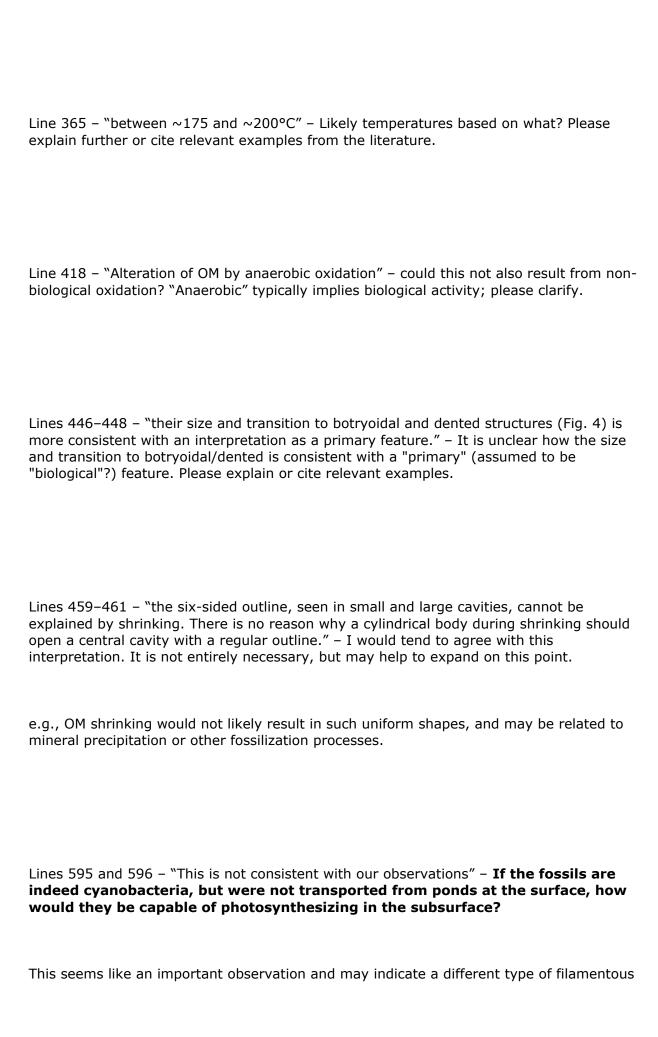
SPECIFIC COMMENTS Line 63 – says high N-content is typical for the OM, but Line 33 describes loss of N (and S) due to anaerobic oxidation. Please clarify. Is the N content low from oxidation, but still high enough to be "typical" for OM? Line 83 – refers to "long cooling history" – is there an estimate on what amount of time is considered "long" (thousands of years? millions?); or at what depth this cooling might have occurred (meters?) Line 93 – OM is referred to as "highly mature" based on pyrolysis and TEM results. What about these results indicates the OM is highly mature? This sentence could also be moved to the results or discussion section where these findings are covered in more detail. Line 95 - "partly failed" - how did the Pb analyses partly fail? It is unclear here, please expand. Line 108 – "sampled in situ from the pegmatites" – how was the kerite (OM) sampled? Is

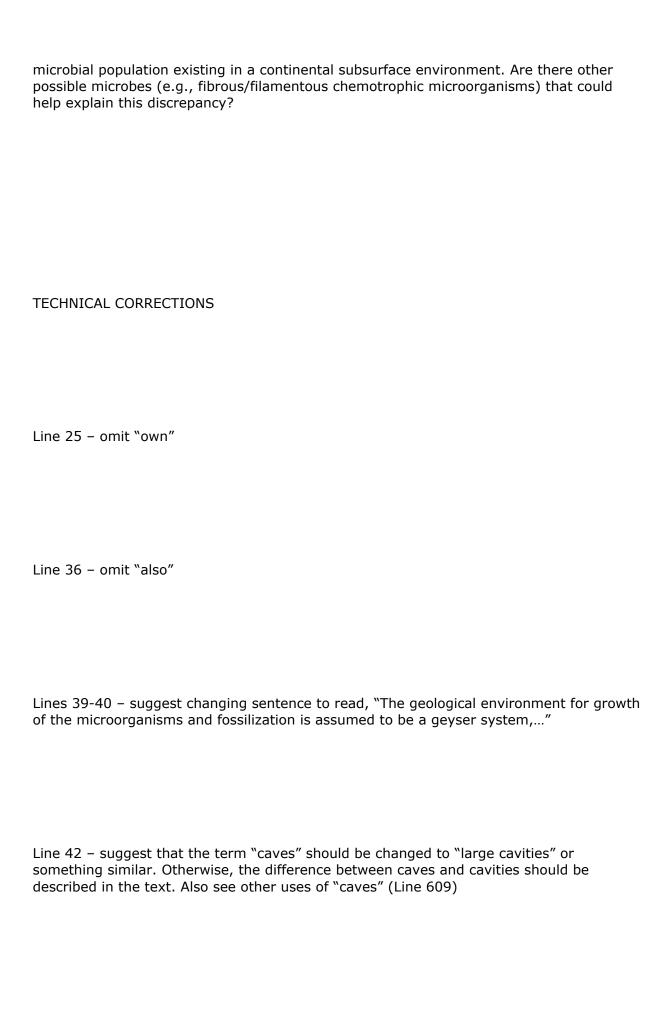
it free from other minerals to be collected by itself? Or did it need to be extracted from the host rock? In other words, were the minerals/crystals collected with OM present (as is the

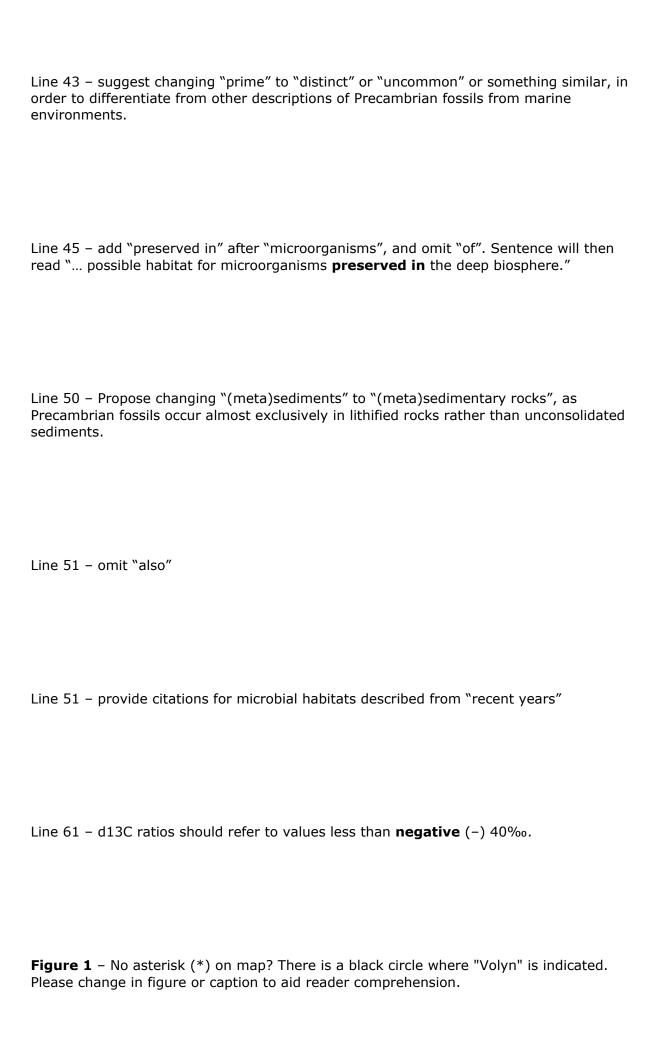
case for beryl in the next sentence, Line 109)? (see comment for Line 122 below).

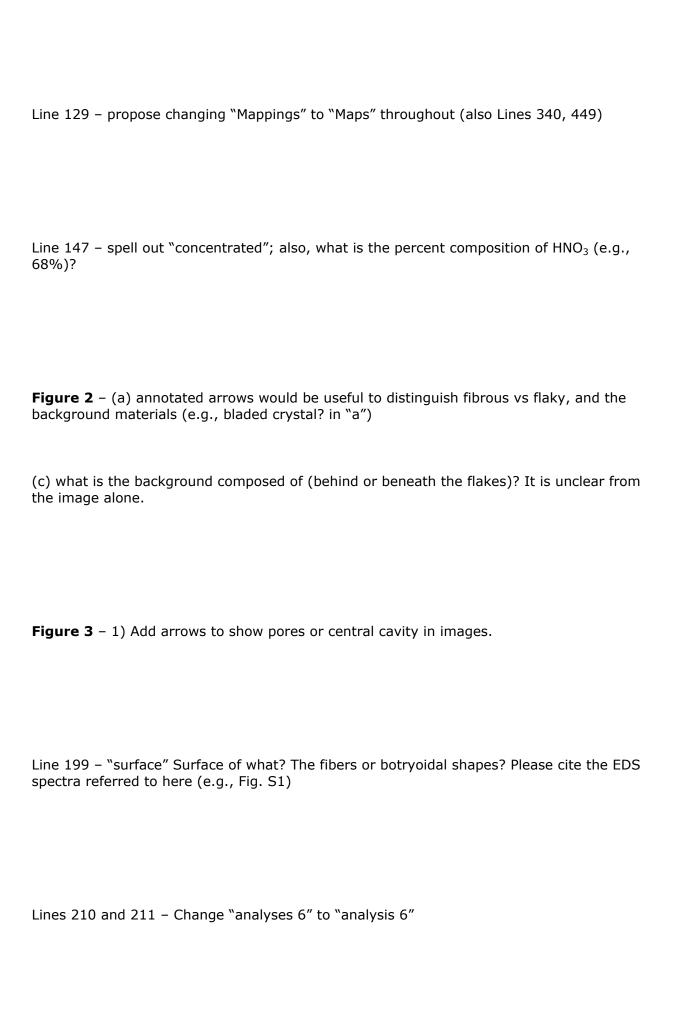


preparation? Line 122 describes a lack of physical cleaning or preparation please clarify.
Line 208 – To my knowledge, "core-mantel" is not a common terminology for microfossil descriptions. Could this be considered a filamentous "sheath" as observed in some cyanobacteria (as mentioned in Line 446 and 479)? Consider rewording (also "mantle" is apparently mispelled here as "mantel").
Line 274 – "anaerobic oxidation" – Citation(s) for this interpretation? Does this imply biomineralization played a role in preservation or degradation? Please expand.
Figure 9 – The elemental distributions of O, S, and N for the botryoidal texture seem to be inverse to other figures (e.g., O and S occur together – possibly indicative of sulfate or other oxidized sulfur?). Please expand.
Line 338 – "thermal overprint" – How is this known to be a thermal overprint? Are there additional indicators for thermal alteration? If so, please explain, or cite relevant literature to help support this interpretation. (See comment for Lines 359 and 360 below.)
Lines 359 and 360 – "These are typical pyrolysis breakdown products of already matured
OM." – Please cite other examples of "typical pyrolysis breakdown products" of mature OM, or explain further how this is known.









("analyses 2 & 5; analyses 3 & 4")
Which analyses does this refer to? Something in the Supplementary Info? Not sure which analyses are being discussed.
Lines 212 and 213– "count rate for O decreases systematically from outer rim to center" Where is this shown? Please refer to figure.
Figure 5 – Line 221 – "central channel" Sometimes this is referred to as the central "cavity". Suggest choosing one description (channel or cavity) to use throughout, in order to avoid reader confusion.
Line 225 – "Fiber" It appears there are multiple fibers? Arrows might be useful here.
"numbers" Numbers are very hard to see in this image. Please enlarge.
Line 241 – "mineral" – which mineral(s)?
Figure 7 – A statement about the white line in this figure may be useful here. Such as, "the white line indicates the outermost rim of the fiber" (similar to dashed line in Fig. 9).

