

Interactive comment on “Evidence for microbial dissolution of pyrite from the Lower Cambrian oolitic limestone, South China” by W. Liu and X.-L. Zhang

Anonymous Referee #1

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General comments:

The manuscript submitted by Liu & Zhang presents new essentially (micro) optical (SEM and thin section) evidence for intense corrosion of euhedral pyrite minerals found in oolitic limestones from the Lower Cambrian, south China. In addition a SEM EDX analysis is presented providing evidence for the finding of an iron- but not sulfur containing phase. In the discussion, these results are related to a microbial oxidation process based on an actualistic comparison with literature results from modern microbiological studies on pyrite corrosion. Although the optical results are impressive, the link to actually proven biotic mechanisms under pH-buffered conditions is weak and remains

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speculative. The authors argue that they provide a new concept to follow microbial pyrite oxidation in ancient sediments and rocks without providing us first with a clear evidence for this process in the investigated environment.

Specific comments:

-There is no clear research question formulated in the introducing part. -Looking on microbial iron oxidation would require first a brief discussion on the formation mechanism of euhedral pyrite in the dynamic carbonate dominated, ooid-forming sedimentary environment -Afterwards a biogeochemical discussion should focus not only on a comparison with laboratory culture studies that were carried out under completely different pH conditions. It should include the question of biogeochemical processes, including, e.g. oxidants, the composition of interstitial waters and the question of what happened to the precipitated iron (oxyhydr)oxides in the buffered solutions. One sample found away from any corroded pyrite of unknown mineralogical composition is not a clear evidence for the presence of a pyrite oxidation product (the occurrence of Cr in the SEM analysis is unusual). -Following the research question on microbial iron oxidation and the related biogeochemistry in a carbonate environment would require the inclusion of geochemical analyses of trace metal (and isotope?) contents of the intergrowing carbonate matrix (to deduce the composition of reacting interstitial fluids) as well as the application of microanalytical techniques on the direct surroundings of the pyrite crystals. -Without this, the discussion of the really interesting dissolution pits remains essentially speculative.

Technical comments:

The whole manuscript requires heavy editing of language and style.

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