

Interactive comment on “Pleistocene sediment offloading and the global sulfur cycle” by S. Markovic et al.

Anonymous Referee #2

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The manuscript by Marcovich et al. describes how quaternary sea level fluctuations have affected the oceanic sulfur budget through massive movement of sediment off the shelf. They use sulfur isotopic records from two IODP drill cores from the Eastern Equatorial Pacific. The study is very well written and relatively easy to understand, even for someone who is not completely familiar with this research area. It is a valuable addition to our understanding of the sulfur cycle. There are a few minor points that I would like to see discussed in a bit more detail or changed to improve clarity. 1) Page 1214, line 5ff: Sediment offloading will also introduce pyrite and OM into the abyssal box, but it will not be counted, because it is already accounted for in the shelf box. While I agree that you should not count things twice, I wonder how much of the pyrite that is moved from the shelf into the abyss will be oxidized because oxygen penetration depths in abyssal sediments are usually much greater.

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2) Page 1216, line 11: Please check spelling of "environments" 3) Page 1221, line 9: What do you mean by "moderately sensitive"? This is a phrase that can mean almost anything. 4) Page 1223, line 3ff: If there is a connection between build up of oceanic DIC from pyrite oxidation and jumps in atmospheric CO₂, would it be possible to show them? This is an interesting aspect and your arguments are compelling, but I would like to see something like a "smoking gun". Can you prepare a graph that shows this relationship? 5) Graphs A1 to A4: The graphs are nice, but in order to make a direct comparison between the different model runs I would rather like to see them as a single panel with 4 sub-graphs instead of 4 separate figures. Plotting them all into one graph will not work as they are too similar.

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