Responses to Reviewer #1's comments

Paper summary:
Al Farid Abraham present new sea-surface temperature (SST) and organic redox proxy data for water column anoxia and water column and photic zone euxinia for the Cretaceous. Data come from Demerara Rise, a site that was situated in the central Atlantic, and more specifically from Ocean Drilling Programme Leg 207, site 1258. The data cover 3.8 Myrs, mostly preceding but also covering and slight exceeding OAE 2. The authors show that SSTs and TOC increase before OAE 2 and that water-column anoxia and euxinia spread at the studied location before OAE 2. Photic zone euxinia only occurred during OAE 2. SST kept increasing in the aftermath of OAE 2. The authors conclude that warming played a critical role in the spread of anoxia in the central Atlantic before, and during OAE 2.

AC- The authors are grateful to the reviewer #1 for taking time to provide constructive comments for this manuscript. All the comments have been taken into consideration in the revised manuscript.

General comment:
The manuscript is concise and clear and overall, very well constructed, and pleasant to read. New data are not really unexpected nor ground-breaking (since they overlap in part with van Bentum et al., 2009 and O'Brien et al., 2017), but they are interesting and new. Above all, I really appreciated the way the authors used previous work: the reader easily follows what data were generated in this study, what data come from previous work, and the authors compare their new data with previous work in a clever and accurate way. I write this review more rapidly than usual because I am asked to send it by May 1st, and I am currently at EGU, but that's fine with me since I have only minor comments and suggest prompt publication after minor revisions anyway (Please note that I'm no geochemist and am not able to evaluate the robustness of the geochemical analyses).

Minor comments:

1. Impact of the orbital configuration: The authors very rapidly approach the question of astronomical forcing (line 294). I think they could tell a bit more about that, notably in the light of key modelling (Sarr et al., 2019) and data (Laurin et al., 2016; Li et al., 2017) studies. I think that invoking the orbit:
• is important in the introduction.
• might help explaining the onset and/or termination of OAE 2 against a background of increasing SSTs.

AC – We thank the reviewer for this comment. The manuscript primarily explores the long-term relationship between temperature and anoxia, but the variability in the record does prompt consideration of orbital impacts on oceanic anoxia during the Cretaceous period (Baternburg, 2016). We are reluctant to include this in the introduction, because that will somewhat misrepresent the data to come. We are also reluctant to overinterpret our data due to its resolution. However, we have added the suggested modelling references to the discussion to put our results into a wider context.

2. Please check the figures:
• I think Fig. 1 is not called in the main text, but should be kept in the MS;

• I think Fig. 2 is not called and am not sure it's really useful;
• Fig. 3 is very nice but laterally very compressed, so that all temporal trends are difficult to read (e.g., the large SST increase, which looks like a flat line; or similarly: "TOC contents in excess of 5%" on 187: this is typically very difficult to see on the figure). Would that be possible to solve that problem? It would at least be helpful to draw vertical lines for key values (i.e., a figure 'grid'). Also, on line 141, the authors refer to some depth interval, but depth is not shown in Fig. 3. Please add it or convert depth to age in the text.

AC- The authors agreed that the figures need some revision based on the comments. The figures are updated on the revised manuscript, incorporating all of these suggestions.

3. Lines 146–147: "SSTs are lower than those of Foster et al (2007)". By how much? Again, this is difficult to estimate based on Fig. 3.

AC- The SSTs are about 2.6 °C lower and that has been included in the revised manuscript.

4. Lines 182–183: "from the Albian to the Cenomanian". Albian not shown?

AC – We have corrected this mistake.

5. Lines 226–227: Regarding sulfurization of OM during OAE 2, please consider the very nice quantification by (Hülse et al., 2019).

AC – We have incorporated Hulse et al. into the discussion.

Technical comments:
• Line 44: 'key biogeochemical cycles'
• Line 76 and throughout (e.g., lines 140, 142, 157): Fig. 3.1 should be Fig. 3 I think.
• Line 226: I guess "OC" stands for organic carbon, please define upon first use or remove the acronym (which I think is used here only).

AC- All of these suggestions have been incorporated in the revised manuscript.

References cited:

- Hülse, D., Arndt, S., Ridgwell, A., 2019. Mitigation of Extreme Ocean Anoxic Event Conditions by Organic Matter Sulfurization. Paleoceanography and Paleoclimatology 34, 476–489. https://doi.org/10.1029/2018PA003470
- Laurin, J., Meyers, S.R., Galeotti, S., Lanci, L., 2016. Frequency modulation reveals the phasing of orbital eccentricity during Cretaceous Oceanic Anoxic Event II and the Eocene hyperthermals. Earth and Planetary Science Letters 442, 143–156. https://doi.org/10.1016/j.epsl.2016.02.047
- Li, Y.-X., Montañez, I.P., Liu, Z., Ma, L., 2017. Astronomical constraints on global carbon-cycle perturbation during Oceanic Anoxic Event 2 (OAE2). Earth and Planetary Science Letters 462, 35–46. https://doi.org/10.1016/j.epsl.2017.01.007
- Sarr, A.C., Sepulchre, P., Husson, L., 2019. Impact of the Sunda Shelf on the Climate of the Maritime Continent. Journal of Geophysical Research: Atmospheres 124, 2574–2588. https://doi.org/10.1029/2018JD029971