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Comment on bg-2021-23

Anonymous Referee #2

Referee comment on "Microbial labilization and diversification of pyrogenic dissolved organic matter" by Aleksandar I. Goranov et al., Biogeosciences Discuss.,
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In the study, the authors used art-of-the-state technologies to understand the transformation of pyrogenic dissolved organic matter by soil microbes. The authors reveal that the alternation of pyDOM was uniform and that a large portion of the bio-produced compounds is peptide-like. The results of this study can definitely improve the current understanding of the biogeochemical cycle of pyDOM.

1 Method. FT-MS. Positive or negative ESI? These two modes are suitable for acidic and basic compounds, respectively. If only one mode was used, only partial results could be obtained.

2 Results 3.1 The pyDOM produced at a higher temperature is more recalcitrant than that produced at a lower temperature. The photo-irradiated pyDOM should be more labile than the fresh one. However, it was not the case in this study (as shown in Figure 1). Why? How about the results using TOC loss and CO₂ respiration?

3 Result. As stated by the authors, the photo-degradation of pyDOM is also very interesting; why not to compare the structure change before and after photo-irradiation in the supplement.

4 Discussion. 4.1.1 It should be very careful to draw a conclusion on the biodegradability of pyDOM with various structures. Only polar compounds can be ionized by the ESI. Therefore, the results obtained by the ESI-FT-MS are biased. Some compounds are with high aromaticity index; they are still polar if the ESI can ionize them. If possible, more ionization modes can be tested using the same samples.