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Biogeosciences Discussions
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Interactive comment on "The relative importance of photodegradation and biodegradation of terrestrially derived dissolved organic carbon across four lakes of differing trophic status" *by* Christopher M. Dempsey et al.

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Thank you for the suggestions and feedback. Our future work with DIC will be sure to acidify immediately and remove the headspace issue. We still think the DIC results are relevant as samples were mixed prior to analysis. It does seem likely that some of the CO2 partitioned into the headspace. The results we present here represent minima for DIC production due to photodegradation. I re-ran the calculations (assuming 1:1 molar ratio) using the oxygen data. Those results are presented in the attached figure. While there was 2 mL of headspace in the oxygen exetainer vials, the Winkler

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method was carried out inside those vials and they were mixed multiple times throughout the process. Using the oxygen data, we are still likely underestimating the carbon pool processed by sunlight. Allesson et al (2016) suggest an average RQ value for photodegration of 3.5.

We did not attempt to develop an overall carbon balance as we did not measure POC. I did make a mistake in regards to calculating the amount of carbon photomineralized. Thank you for finding my error.

We did not collect iron data as a part of this experiment. Other researchers at the lake collected samples from the three Pocono lakes and from wetlands surrounding each lake in 2018 and 2019. The concentrations they reported were low (unpublished data). Giles Surface water: 0.025 mg/L, Lacawac Surface water: 0.122 mg/L, and Waynewood Surface water: 0.13 mg/L. Giles wetland: 0.22 mg/L, Lacawac wetland: 4.7 mg/L, and Waynewood wetland: 0 mg/L.

Below we have responded to specific comments not addressed above:

Line 179: This information is in the Moeller et al 1995 paper we cited. We could pull more of that information into the manuscript.

Line 199: All filters were pre-combusted.

Line 218: Yes. Labco Exetainer vials 138W.

Line 218: Yes. 2mL of headspace. The samples (i.e water and headspace) in each vial were mixed for 30 seconds. A syringe was used to carefully extract 5 mL of sample. Samples were then acidified using 200 uL of 0.1N H2SO4. 5 mL of nitrogen gas was then added to the syringe and the syringe was then mixed prior to affixing to the GC.

Line 233: The data are not corrected for difference in volumes.

Line 248: We have in situ lake temperature for Lacawac, but we did not install temperature sensors inside of aluminum foil wrapped tubes. We do have radiometer data

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available that could be added.

Line 266: We use a 50ppm TOC standard from Aqua Solutions and create dilutions to calibrate the TOC analyzer.

Line 366: These will be double checked.

Line 490: No. The red precipitate only occurs in the samples exposed to sunlight.

Line 491: The sentence will be re-worded to be more clear. We were suggesting a potential reason as to why DOC concentrations increased in Giles and Waynewood. The intent was to refer to the DOC being released back into the water as the iron precipitated out.

References: Allesson, L., L. Ström, and M. Berggren(2016), Impact of photochemical processing of DOC on the bacterioplankton respiratory quotient in aquatic ecosystems, Geophys. Res. Lett., 43, 7538–7545, doi:10.1002/2016GL069621.

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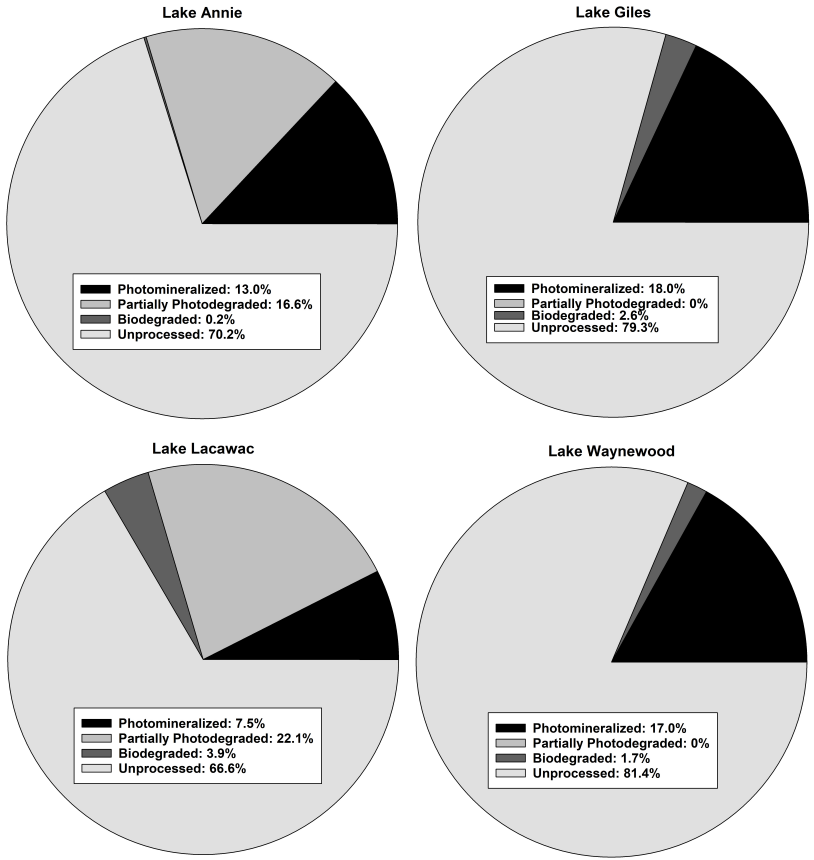

Fig. 1. Figure 2 based off of oxygen data