

## ***Interactive comment on “Photochemical mineralisation in a humic boreal lake: temporal variability and contribution to carbon dioxide production” by M. M. Groeneveld et al.***

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In this interesting study the authors quantify seasonal variation in photochemical production of CO<sub>2</sub> by dissolved organic matter (DOM) in humic lakes, by quantifying the apparent quantum yields (AQYs). The authors add to the literature on this topic by presenting their range and variability in AQYs in a humic lake, which is needed to constrain the CO<sub>2</sub> produced photochemically by DOM.

In several places in the manuscript, the authors compare results to our recent work (Cory et al. 2014, Vol. 345 no. 6199 pp. 925-928, DOI: 10.1126/science.1253119) and suggest that in our study of arctic lakes, a single AQY value was used to quantify

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photochemical mineralisation of DOM; this is incorrect and should be updated in the revised manuscript. We understand that it may have been difficult to determine the number of AQYs we measured for specific sites given that these details were in the online supporting information for our paper. However, in the main body of the paper we stated that we measured 97 AQYs for photo-mineralisation over three summer cycles (2011-2013); 20 of the 97 AQYs were from lakes with the remainder quantified from small ponds, streams and rivers. In addition to photo-mineralisation, other photochemical processes of DOM were quantified, with up to 124 AQYs of each photochemical process measured for streams, rivers, lakes and ponds. Figure S4 in Cory et al. 2014 is a box plot showing the average and range in AQYs used in this study. We used the average and range of AQYs measured over the three summer seasons to scale up to the open water period at our field site to quantify both daily and annual average photo-mineralisation (and other photochemical processes) in Cory et al. 2014. Thus we would appreciate it if the authors could clarify when comparing to our study that our results were based on a dataset of AQYs (not a single value), as is currently suggested in their manuscript at the following places in the text:

Page 17127, lines 22-25 Page 17138, lines 26-27 Page 17139, lines 1-8: Specifically, we quantified the AQY for Toolik Lake on 17 dates across three field seasons to produce a 95% CI, which was then used to estimate daily and annual amount of photo-mineralisation.

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