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Supplement of

Photochemical mineralisation in a boreal brown water lake: considerable temporal variability and minor contribution to carbon dioxide production

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1 **Supplementary information**

2 **Figure legends**

3

4 **Figure S1.** Determination of the apparent quantum yield (AQY) spectrum. Position of the cut-
5 off filters with respect to the irradiance spectrum, and an exemplary AQY spectrum calculated
6 based on the photochemical DIC production and CDOM-absorbed photons for each cut-off
7 filter. Inset: Glass incubation vial with quartz top, sides covered with black insulation tape to
8 avoid irradiance to enter laterally.

9

10 **Figure S2.** Monthly determined spectra from Lake Erssjön during the open-water period of
11 2014 for (a) filtered UV-vis absorbance (April-November) and (b) apparent quantum yield
12 (AQY) (June-November). The blue dashed line in (b) gives the August AQY if the high dark
13 control values, which we excluded due to suspected contamination, were included (see Sect.
14 2.3). The black dashed line in (b) shows the pooled AQY spectrum, which was fitted through
15 all data points. The densities of the bootstrap distribution of parameter estimates, which was
16 used to obtain 95% confidence intervals for the parameter estimates (eq. 2, Sect. 2.3), are
17 shown for the fit parameters of the AQY spectrum m_1 (c) and m_2 (d).

18

19 **Figure S3.** a: Daily photochemical DIC production rate using the AQY spectrum with highest
20 productivity (November). b: Daily photochemical DIC production rate using the AQY
21 spectrum with lowest productivity (July). c: Daily photochemical DIC production rate using
22 the monthly measured AQY spectra for month-long time periods around the sampling date,
23 where the spectrum measured in June was also used for the open-water period prior to June,
24 and the spectra measured in November were used until the end of the open-water period in
25 December. The vertical lines indicate when the AQY spectra were measured and are colour-
26 coded as in Fig. 2. d: Daily irradiance integrated over the wavelength range 280-600 nm for
27 2014. The grey shaded areas mark the ice-covered period of the lake, during which we set DIC
28 photoproduction to zero assuming no irradiance transmission (Petrov et al., 2005).





