**Electronic Supplementary Material Figures S1-S10 and Table S1**

Spatial and temporal variations of dissolved CO2, CH4 and N2O in Lakes Edward and George (East Africa).

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**Supplemental Figure S1:** Air temperature (°C), relative humidity (%), precipitation (mm), wind speed (m s-1) in Mweya (-0.1904°N 29.8991°E) from January 2016 to late March 2019. Vertical lines indicate the periods of the sampling cruises.



**Supplemental Figure S2:** Water temperature (°C), specific (Sp.) conductivity (µS cm-1) and oxygen saturation levels (%O2) in Lake Edward reported in 1935 by Damas (1937), 1931 by Beadle (1932), 1964 by Beadle (1966), 2018 (this study).



**Supplemental Figure S3:** Vertical profiles of specific (Sp.) conductivity (µS cm-1) in Lake Edward (32 m bottom depth) in October 2016 (25/10/2016 at 13:10 local time (LT)), March 2017 (25/03/2017 at 09:20 LT), January 2018 (19/01/2018 at 11:55 LT), March 2019 (30/03/2019 at 10:00 LT).



**Supplemental Figure S4:** Wind speed (m s-1) and air temperature (°C), in Mweya (-0.1904°N 29.8991°E) from March 25 to April 1 2017. Vertical dotted lines indicate the sampled profiles shown in figure 11. Arrow indicates a storm on March 30.



**Supplemental Figure S5:** Vertical profiles of specific (Sp.) conductivity (µS cm-1) in Lake Edward (32 m bottom depth) in 26/03/2017 (11:00 local time (LT)), 27/03/2017 (09:35 LT), 30/03/2017 (12:55 LT) and 31/03/2017 (14:40 LT).



**Supplemental Figure S6:** CH4 concentration (nmol L-1) versus carbon stable isotopic composition of CH4 (δ13C-CH4, ‰) in surface waters of Lake Edward in March 2017. Vertical dotted line indicates the lowest δ13C-CH4 measured in bottom waters during this sampling cruise. Arrow indicates a particularly elevated CH4 concentration measured at a station with a bottom depth of 22 m on March 30.



**Supplemental Figure S7:** Wind speed (m s-1) and air temperature (°C), in Mweya (-0.1904°N 29.8991°E) from October 21 to November 4, 2016. Vertical dotted lines indicate the sampled profiles shown in Figure 13. Horizontal double arrow indicates 3 consecutive days of windy conditions, and vertical arrow indicates a cooling prior to sampling on November 4.



**Supplemental Figure S8:** N2O concentration as a function of specific (Sp.) conductivity (µS cm-1) in Lake Edward in surface waters (station with bottom depth of 22 m) on November 4 (after a storm event) and before the storm event in bottom waters (20 m and 30m) at two stations sampled on October 22 (station with bottom depth of 22 m) and on 25 October (station with bottom depth of 32 m)



**Supplemental Figure S9:** Vertical water temperature variations at a station (-0.2459°N 29.8635°E) in Lake Edward (bottom depth of 10 m) from 21/03/2019 (13:00 local time (LT)) to 23/03/2019 (13:50 LT).



**Supplemental Figure S10:** O2 saturation level (%O2, %) in bottom waters (sampled at 20 m depth) versus potential energy anomaly (PEA, J m-3) in Lake Edward, at a station with bottom depth of 22m, from January 2017 to December 2019.



**Supplemental Table S1:** Date and time (local time (LT)) of sampling at the monitoring station (22 m depth) in Lake Edward (Fig. 14).

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| --- |
| **DD-MM-YYYY hh:mm (LT)** |
| 30-12-2016 12:04 |
| 23-01-2017 11:40 |
| 19-02-2017 10:38 |
| 12-03-2017 16:40 |
| 26-03-2017 11:00 |
| 25-04-2017 14:35 |
| 16-05-2017 17:44 |
| 05-06-2017 16:41 |
| 21-06-2017 15:57 |
| 10-07-2017 13:49 |
| 31-07-2017 13:56 |
| 22-08-2017 10:26 |
| 16-09-2017 09:43 |
| 04-10-2017 11:39 |
| 24-10-2017 11:31 |
| 13-11-2017 10:01 |
| 06-12-2017 10:53 |
| 28-12-2017 10:51 |
| 21-01-2018 11:30 |
| 25-02-2018 11:03 |
| 21-03-2018 12:55 |
| 17-04-2018 09:27 |
| 05-01-2018 13:09 |
| 24-05-2018 13:29 |
| 27-06-2018 13:36 |
| 30-07-2018 11:18 |
| 30-08-2018 09:55 |
| 30-09-2018 10:17 |
| 11-04-2018 10:10 |
| 30-11-2018 09:16 |
| 23-12-2018 08:37 |
| 30-01-2019 09:12 |
| 27-02-2019 07:39 |
| 23-03-2019 11:50 |
| 01-05-2019 13:29 |
| 28-05-2019 13:04 |
| 03-07-2019 09:16 |
| 29-07-2019 11:37 |
| 30-08-2019 09:32 |
| 21-09-2019 11:01 |
| 30-10-2019 09:13 |
| 29-11-2019 09:13 |