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The geo-referenced and timestamped data-set consists of 7 files:

- “db\_cruise\_CTD” contains the CTD profiles obtained during the cruises
- “db\_cruise\_GHGs” contains CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O dissolved concentrations, chlorophyll-a concentrations, inorganic nutrients (NO<sub>3</sub><sup>-</sup>, N<sub>2</sub>O<sup>-</sup>, NH<sub>4</sub><sup>+</sup>, PO<sub>4</sub><sup>3-</sup>) and d<sup>13</sup>C-CH<sub>4</sub> from the 4 cruises
- “db\_monitoring” contains CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O dissolved concentrations, chlorophyll-a concentrations, and POC from the monitoring at two stations (January 2017 to December 2019)
- “db\_uw” contains the continuous of CO<sub>2</sub> and CH<sub>4</sub> (plus EXO-II data) on 19/03/2019
- “meteo\_Mweya” contains the meteorological data acquired from June 2016 to March 2019
- “db\_monitoring\_CTD” contains the CTD profiles from the deep station of the monitoring.
- “mooring” contains the temperature data from a mooring at a station 10 m deep (March 2019)

Data were acquired in Lake Edward, Kazinga Channel and Lake George on four occasions (20/10-07/11/2016, 23/03-08/04/2017, 18/01-02/02/2018, 21/03-30/03/2019). From January 2017 to December 2019, a shallow station (3 m bottom depth) and a deeper station (22 m bottom depth) were regularly sampled, every 21 d in 2017 and 2018, and every 30 d in 2019. A mooring was deployed at a station at 10m bottom depth in Lake Edward (-0.2459°N 29.8635°E) equipped with RBR Solo temperature sensors at 6 depths from surface to 1m above the sediment (0.2, 1.0, 2.0, 5.0, 7.5 and 9.0 m depth) from 21/03/2019 (13:00 local time (LT)) to 23/03/2019 (13:50 LT).

Solar radiation, ultraviolet radiation, wind speed (cup anemometer), wind direction (wind vane), rain (mechanical rain collector), air temperature, barometric pressure data were acquired with a Davis Instruments weather station (Vantage Pro2 fitted with standard manufacturer sensors) in Mweya on top of a building of the Uganda Wildlife Authority, 4m above ground (-0.190384°N 29.899103°E) . Data were measured every 5 seconds, averaged and logged every 10 minutes.

During the March 2019 cruise, continuous measurements (1 min interval) of partial pressure of CO<sub>2</sub> (pCO<sub>2</sub>) and of partial pressure of CH<sub>4</sub> (pCH<sub>4</sub>) were made with an equilibrator designed for turbid waters consisting of a tube filled with glass marbles (Frankignoulle et al. 2001) coupled to a Los Gatos Research off-axis integrated cavity output spectroscopy analyzer (Ultraportable Greenhouse Gas Analyzer with extended range for CH<sub>4</sub>). In parallel water temperature, specific conductivity, pH, dissolved oxygen saturation level (%O<sub>2</sub>), turbidity, chlorophyll-*a* (Chl-*a*), and fluorescent dissolved organic matter (FDOM) were measured with an YSI EXO-II multi-parameter probe, position with a Garmin geographical position system (Map 60S) portable probe, and depth with a Humminbird Helix 5 echosounder. Surface water was pumped to the equilibrator and the multi-parameter probe (on deck) with a 12V-powered water pump (LVM105) attached to the side of the boat at a fixed depth of about 0.5 m depth.

Discrete sampling was done from the side of the boat with a 5.0 L Niskin bottle (General Oceanics). During the first cruise, vertical profiles of water temperature, specific conductivity, pH, %O<sub>2</sub> and Chl-*a* were measured with a Hydrolab DS5 multi-parameter probe, while during the other three cruises and also during the monitoring, turbidity and FDOM were measured additionally with a YSI EXO-II multi-parameter probe. Both multi-parameter probes were calibrated according to manufacturer's specifications, in air for %O<sub>2</sub> and with standard solutions for other variables: commercial pH buffers (4.00, 7.00, 10.00), a 1000 μS cm<sup>-1</sup> standard for conductivity. pCO<sub>2</sub> was measured directly after water sampling with a Li-Cor Li-840 infra-red gas analyser (IRGA) based on the headspace technique with 4 polypropylene 60 ml syringes (Borges et al. 2015). The Li-Cor 840 IRGA was calibrated before and after each cruise with ultrapure N<sub>2</sub> and a suite of gas standards (Air Liquide Belgium) with CO<sub>2</sub> mixing ratios of 388, 813, 3788 and 8300 ppm. The overall precision of pCO<sub>2</sub> measurements was ±2.0%.

Samples for CH<sub>4</sub> and N<sub>2</sub>O were collected from the Niskin bottle with a silicone tube in 60 ml borosilicate serum bottles (Wheaton), poisoned with 200 µL of a saturated solution of HgCl<sub>2</sub> and sealed with a butyl stopper and crimped with an aluminium cap. Measurements were made with the headspace technique (Weiss 1981) and a gas chromatograph (GC) (SRI 8610C) with a flame ionisation detector for CH<sub>4</sub> and electron capture detector for N<sub>2</sub>O calibrated with CO<sub>2</sub>:CH<sub>4</sub>:N<sub>2</sub>O:N<sub>2</sub> gas mixtures (Air Liquide Belgium) with mixing ratios of 1, 10 and 30 ppm for CH<sub>4</sub>, 404, 1018, 3961 ppm for CO<sub>2</sub>, and 0.2, 2.0 and 6.0 ppm for N<sub>2</sub>O. The precision of measurement based on duplicate samples was ±3.9% for CH<sub>4</sub> and ±3.2% for N<sub>2</sub>O.

Samples for the stable isotope composition of CH<sub>4</sub> ( $\delta^{13}\text{C-CH}_4$ ) were collected and preserved as described above for the CH<sub>4</sub> concentration. The  $\delta^{13}\text{C-CH}_4$  was determined with a custom developed interface, whereby a 20 ml He headspace was first created, and CH<sub>4</sub> was flushed out through a double-hole needle, non-CH<sub>4</sub> volatile organic compounds were trapped in liquid N<sub>2</sub>, CO<sub>2</sub> was removed with a soda lime trap, H<sub>2</sub>O was removed with a magnesium perchlorate trap, and the CH<sub>4</sub> was quantitatively oxidized to CO<sub>2</sub> in an online combustion column similar to that of an elemental analyzer. The resulting CO<sub>2</sub> was subsequently pre-concentrated by immersion of a stainless steel loop in liquid N<sub>2</sub>, passed through a micropacked GC column (Restek HayeSep Q, 2m length, 0.75mm internal diameter), and finally measured on a Thermo DeltaV Advantage isotope ratio mass spectrometer (IRMS). Calibration was performed with CO<sub>2</sub> generated from certified reference standards (IAEA-CO-1 or NBS-19, and LSVEC) and injected in the line after the CO<sub>2</sub> trap. Reproducibility of measurement based on duplicate injections of samples was typically better than ±0.5 %.

Water was filtered on Whatman glass fibre filters (GF/F grade, 0.7 µm porosity) for particulate organic carbon (POC) and Chl-*a* (47 mm diameter). Filters for POC were stored dry and filters for Chl-*a* were stored frozen at -20°C. Filters for POC analysis were decarbonated with HCl fumes for 4h and dried before encapsulation into silver cups; POC concentration was analysed on an EA-IRMS (Thermo FlashHT with DeltaV Advantage), with a reproducibility better than ±5%. Data were calibrated with certified (IAEA-600: caffeine) and in-house standards (leucine and muscle tissue of Pacific tuna) that were previously calibrated versus certified standards. The Chl-*a* samples were analysed by HPLC according to Descy et al. (2005), with a reproducibility of ±0.5% and a detection limit of 0.01 µg L<sup>-1</sup>.

The water filtered through GF/F Whatman glass fibre filters was collected and further filtered through polyethersulfone syringe encapsulated filters (0.2  $\mu\text{m}$  porosity) for nitrate ( $\text{NO}_3^-$ ), nitrite ( $\text{NO}_2^-$ ) and ammonium ( $\text{NH}_4^+$ ) and were stored frozen ( $-20^\circ\text{C}$ ) in 50 mL polypropylene vials.  $\text{NO}_3^-$  and  $\text{NO}_2^-$  were determined with the sulfanilamide colorimetric with the vanadium reduction method (APHA, 1998), and  $\text{NH}_4^+$  with the dichloroisocyanurate-salicylate-nitroprussiate colorimetric method (SCA, 1981). Detection limits were 0.3, 0.01, and 0.15  $\mu\text{mol L}^{-1}$  for  $\text{NH}_4^+$ ,  $\text{NO}_2^-$  and  $\text{NO}_3^-$ , respectively. Precisions were  $\pm 0.02 \mu\text{mol L}^{-1}$ ,  $\pm 0.02 \mu\text{mol L}^{-1}$ , and  $\pm 0.1 \mu\text{mol L}^{-1}$  for  $\text{NH}_4^+$ ,  $\text{NO}_2^-$  and  $\text{NO}_3^-$ , respectively.

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