



Supplement of

Role of formation and decay of seston organic matter in the fate of methylmercury within the water column of a eutrophic lake

Laura Balzer et al.

Correspondence to: Laura Balzer (laura.balzer@tu-braunschweig.de)

The copyright of individual parts of the supplement might differ from the article licence.

This PDF file includes:

11 pages (S1-S11)

Figs. S1 to S8

Determination of methyl Hg in sediment samples

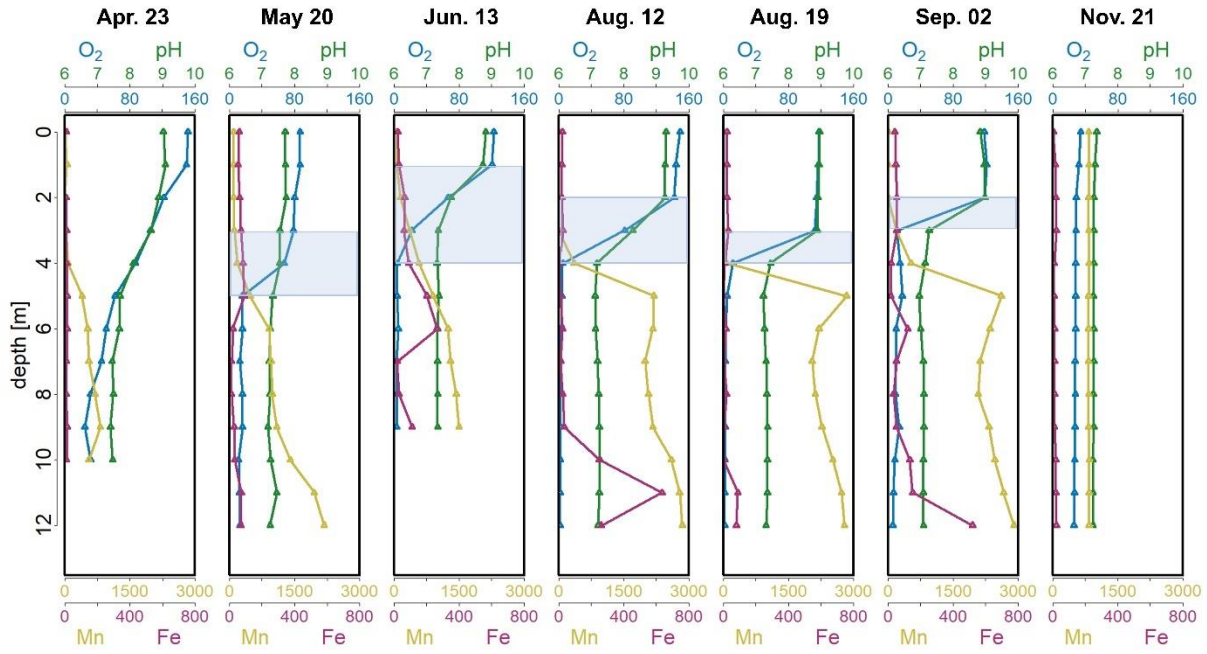


Fig. S1. Depth profiles of O₂ saturation (%), pH and concentrations of dissolved Mn [$\mu\text{g L}^{-1}$] and Fe [$\mu\text{g L}^{-1}$] in the lake Ölper water column from April to November 2019. The depth of the sharp decrease in O₂ concentration and start of Mn reduction (RTZ) are shown in each panel (shaded light blue).

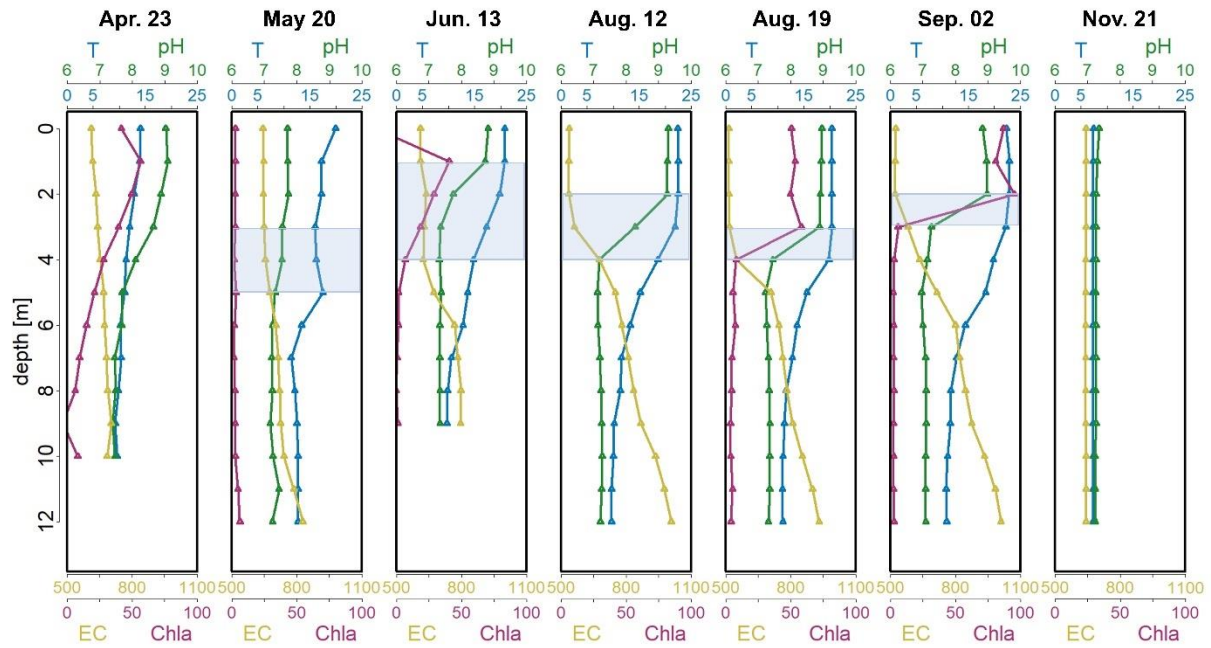


Fig. S2. Depth profiles of temperature (T) [C°], pH, conductivity (EC) [$\mu\text{S cm}^{-1}$], chlorophyll (Chla) [$\mu\text{g L}^{-1}$] concentrations in the lake Ölper water column from April to November 2019. The depth of the sharp decrease in O_2 concentration and start of Mn reduction (RTZ) are shown in each panel (shaded light blue).

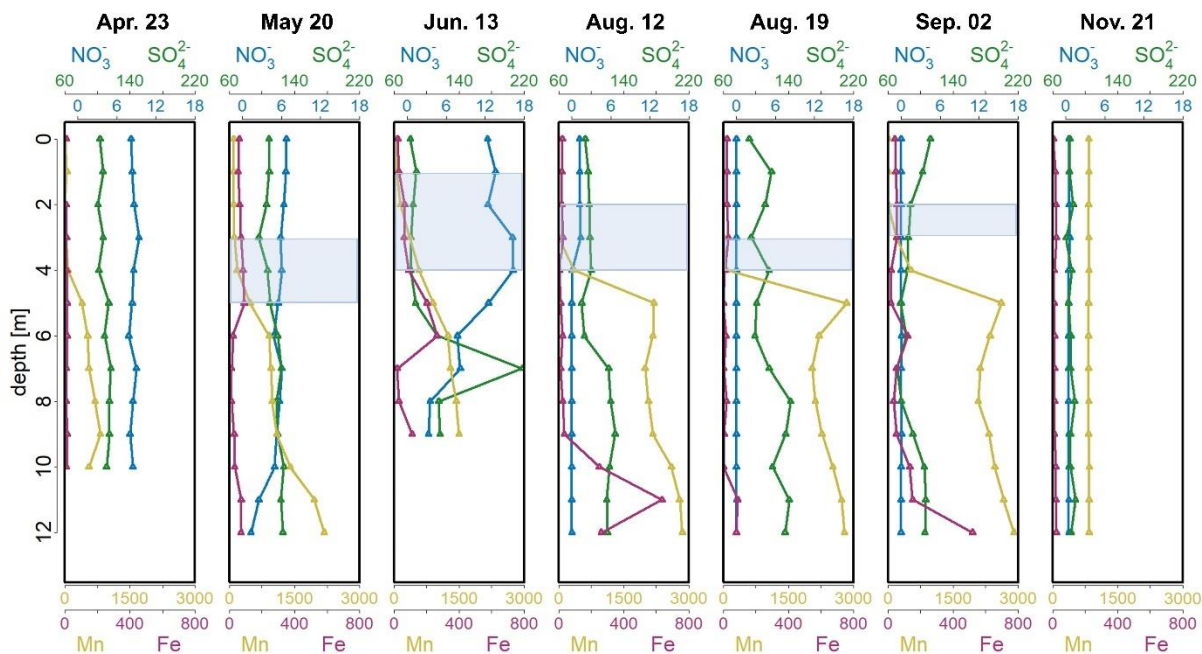


Fig. S3. Depth profiles of NO_3^- [mg L^{-1}], SO_4^{2-} [mg L^{-1}], dissolved Mn [$\mu\text{g L}^{-1}$], Fe [$\mu\text{g L}^{-1}$] concentrations in the lake Ölper water column from April to November 2019. The depth of the sharp decrease in O_2 concentration and start of Mn reduction (RTZ) are shown in each panel (shaded light blue).

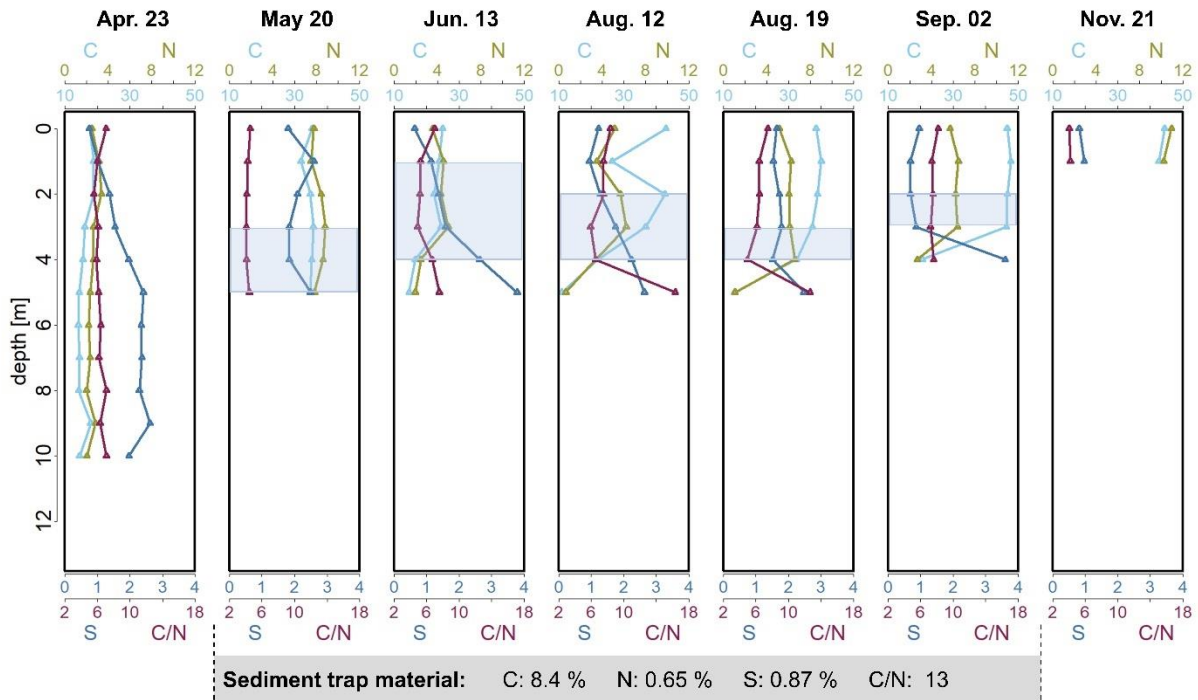


Fig. S4. Depth profiles of C [%], N [%], S [%] concentrations and calculated C/N ratio in the seston in lake Ölper from April to November 2019. The depth of the sharp decrease in O₂ concentration and start of Mn reduction (RTZ) are shown in each panel (shaded light blue). Concentrations of C [%], N [%], S [%] and the C/N ratio of the sediment trap material collected during the 141 days between May 6th and September 24th are given in the grey box below.

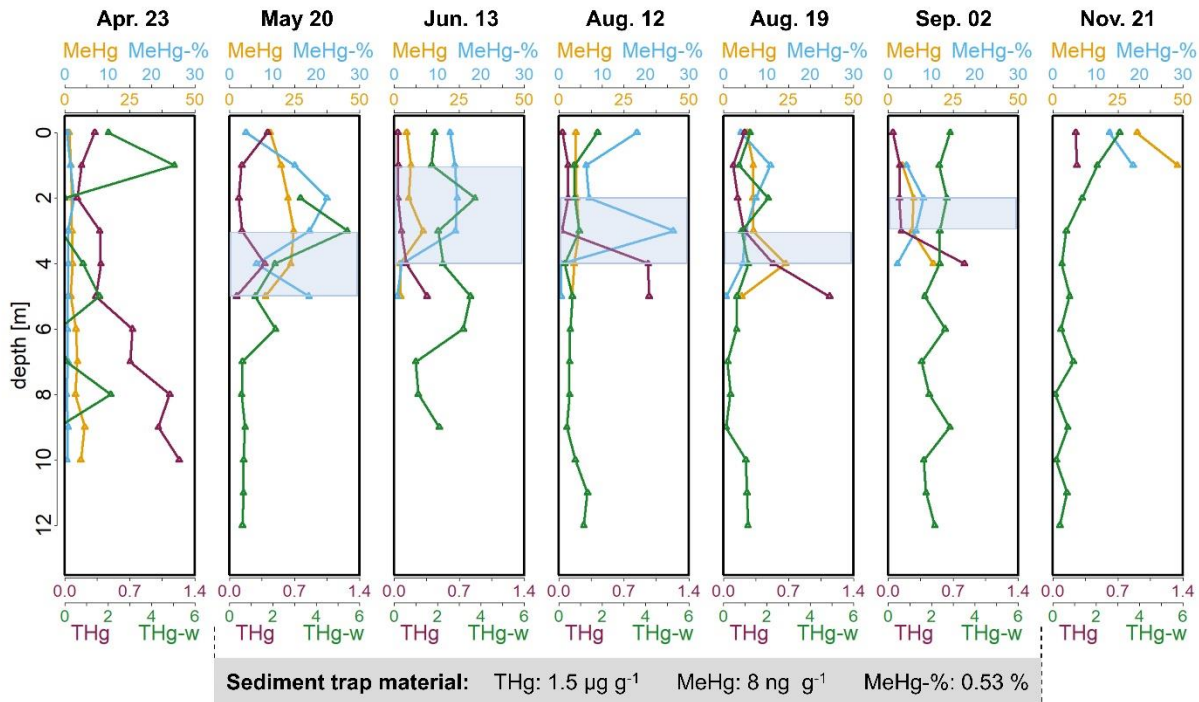


Fig. S5. Depth profiles of MeHg [ng g^{-1}] concentrations, percentage of MeHg [%] of THg (MeHg-%), THg concentrations in seston [$\mu\text{g g}^{-1}$] and dissolved THg [ng L^{-1}] in the water phase (THg-w) of lake Ölper from April to November 2019. The depth of the sharp decrease in O_2 concentration and start of Mn reduction (RTZ) are shown in each panel (shaded light blue). Concentrations of THg [$\mu\text{g g}^{-1}$], MeHg [ng g^{-1}], MeHg-% [%] of the sediment trap material collected over the 141 days between May 6th and September 24th are given in the grey box below.

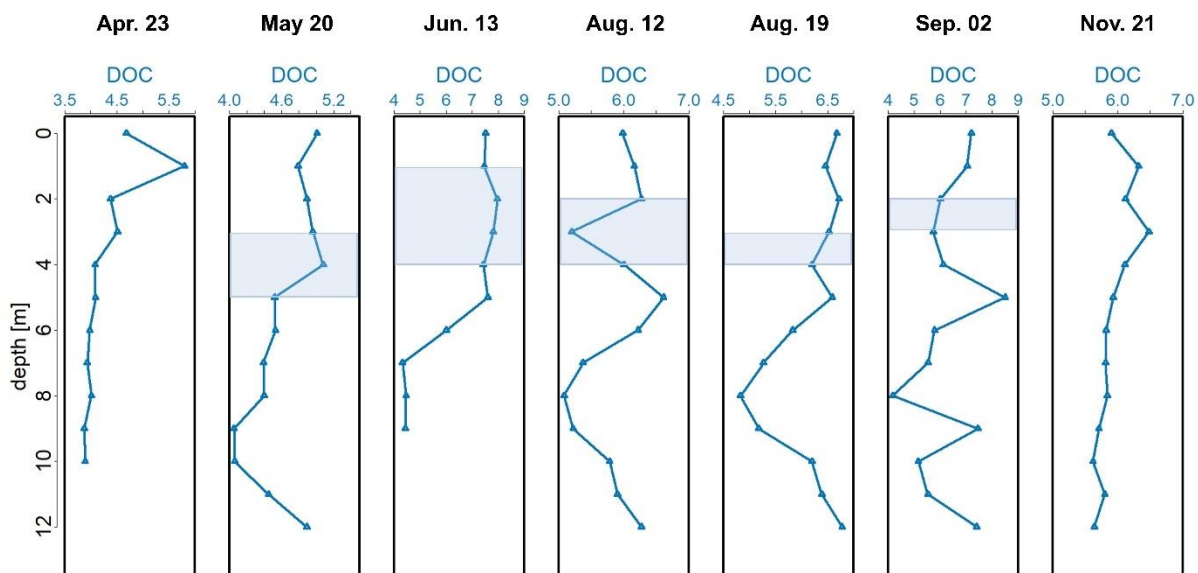


Fig. S6. Depth profile of DOC⁻ [mg L⁻¹] concentration in the lake Ölper water column from April to November 2019. The depth of the sharp decrease in O₂ concentration and start of Mn reduction (RTZ) are shown in each panel (shaded light blue). Note that each column has an individual scale to better illustrate changes with depth. Depth profiles with the same scale in all columns are shown in Fig. S7.

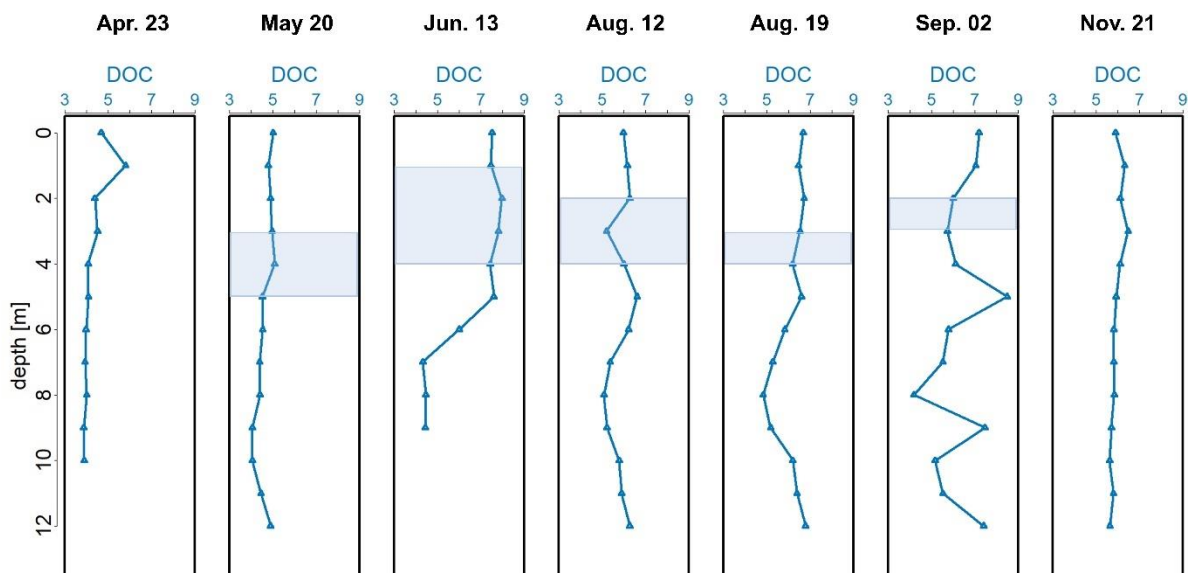
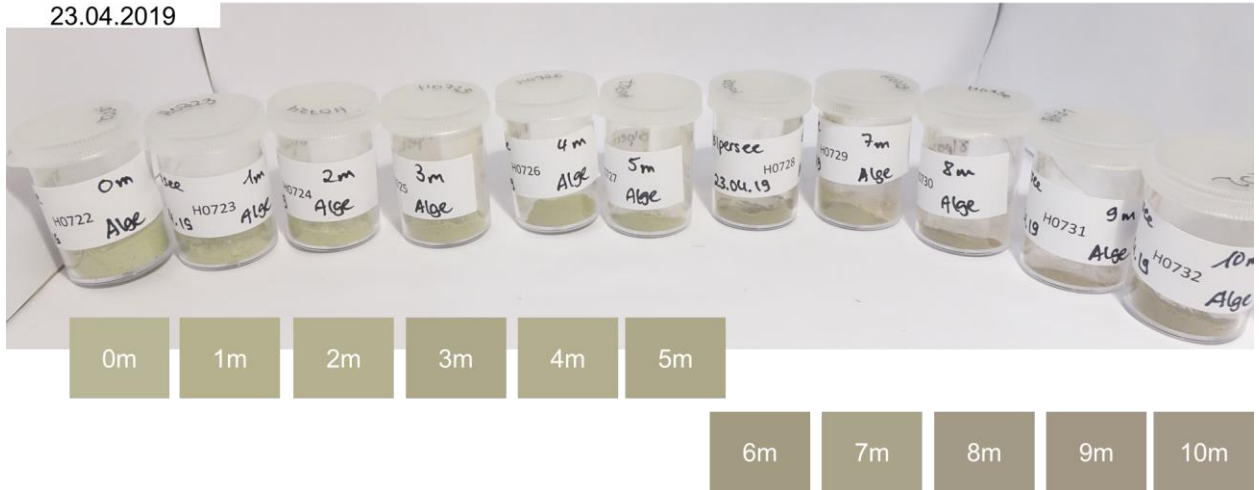
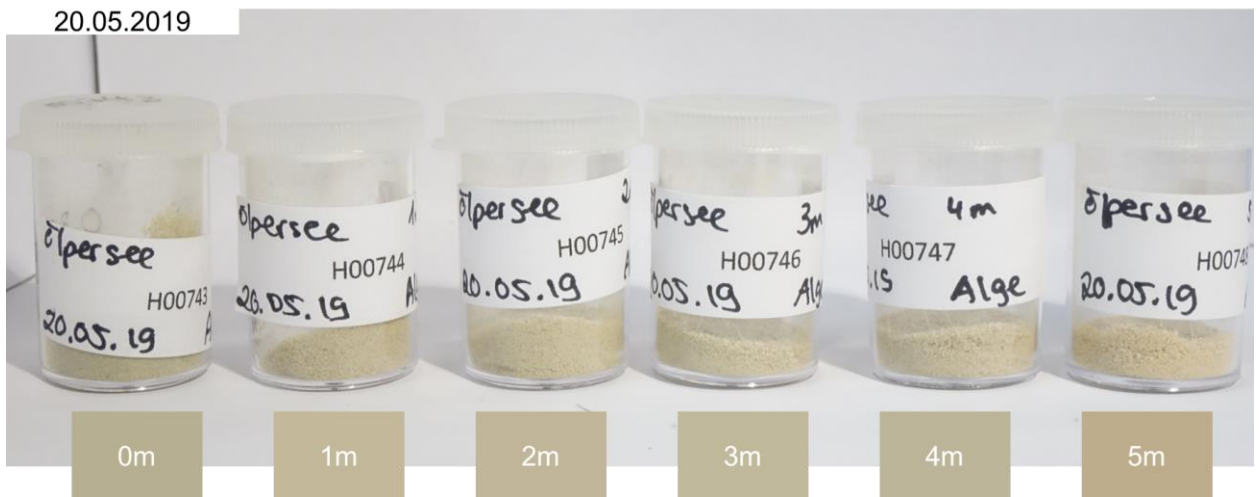


Fig. S7. Depth profile of DOC⁻ [mg L⁻¹] concentration in the lake Ölper water column from April to November 2019. The depth of the sharp decrease in O₂ concentration and start of Mn reduction (RTZ) are shown in each panel (shaded light blue).

23.04.2019



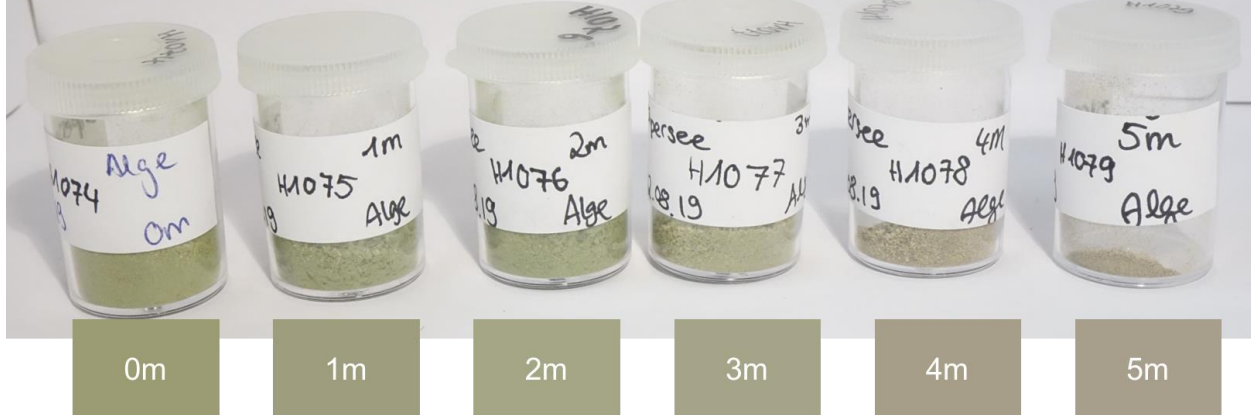
20.05.2019



13.06.2019



12.08.2019



19.08.2019



02.09.2019



21.11.2019



Fig. S8. Dry and homogenized seston from lake Ölper from April to November, 2019; shown with one row per sampling day. The average color of each sample (corresponding to one sampled depth in m) is illustrated in boxes below each sample. Indicating decomposition during sampling or dominance of zooplankton in May and November.

Determination of methyl Hg in sediment samples

In order to extract MeHg from the sediment samples, between ~0.5 – 1 g of material was measured into new 50 mL Falcon tubes and between 20 – 100 μL of an internal standard, an isotopically enriched Me^{200}Hg standard with concentration 1.1 ng^{-1} added and left to equilibrate for an hour. After equilibration, 10 mL KBr (1.4M), 2 mL CuSO_4 (2M) and 10 mL dichloromethane, DCM (CH_2Cl_2) were added to each tube, which was capped and left for 45 min. In order to extract MeHg, the samples were rotated at 85 RPM on a sample rotor for 45 min, then centrifuged for 5 min at 3000 RPM. Glass Pasteur pipettes were used to manually transfer the lower (clear) layer containing DCM and the extracted MeHg to a new 50 mL Falcon tube. After adding 10 mL of Milli-Q (MQ) water to the pipetted liquid, the DCM was purged in a warm water bath at 45°C , and the extraction is complete. MeHg was analyzed using a Tekran® Model 2700 Automated Methylmercury Analysis System connected to an Inductively Coupled Plasma Mass Spectrometer, Thermo–Fisher X- series 2 (ICPMS). Prior to analysis, half the extracted sample was ethylated using sodium tetraethyl-borate (NaTEB) at pH 4.9 (using 225 μL 2M acetate buffer). The resulting data was manually adjusted in Excel (Microsoft) to determine the MeHg peak area. The concentration of MeHg for each sample was subsequently calculated using mass-bias (MB) corrected signals derived through signal deconvolution. Three mass-bias vials, each containing 0.5 ppt ambient Hg ethylated in sodium tetraethyl-borate (NaTEB) at a pH of 4.9 (using 225 μL 2M acetate buffer), were analyzed and MeHg concentration for each sample adjusted by the calculated MB

correction factor. The mean (in ng MeHg/g sediment) and %RSD of the replicates was: $4.30 \pm 9.12\%$, $2.74 \pm 10.40\%$, and $1.20 \pm 10.74\%$. Five blanks, containing only reagents, were tested concurrently with the sampled material to ensure no contamination of MeHg occurred during the extraction process. Certified reference material (ERM-CC580, estuarine sediment) analyzed were on average 110 % of the certified value ($75 \pm 4 \text{ ng g}^{-1}$).