Supplement of

**Organic carbon mass accumulation rate regulates the flux of reduced substances from the sediments of deep lakes**

Thomas Steinsberger et al.

*Correspondence to:* Beat Müller (beat.mueller@eawag.ch)

The copyright of individual parts of the supplement might differ from the CC BY 3.0 License.
Contents:

1. Table S1: TOC-MAR and OC gross sedimentation data from four lakes

2. Table S2: F_red and TOC MAR values of six selected lakes

3. Figure S1: Porewater profiles from Lake Zug

4. Figure S2: Seasonal development of O_2 concentration

5. Table S1: Average fluxes of TOC MAR, TOC gross sedimentation and the corresponding OC burial efficiency based on sediment trap data.

<table>
<thead>
<tr>
<th>Lake</th>
<th>OC burial efficiency %</th>
<th>TOC MAR at deepest point gC m(^{-2}) yr(^{-1})</th>
<th>Benthic gross sedimentation gC m(^{-2}) yr(^{-1})</th>
<th>Monitoring duration, month-year</th>
<th>Sampling interval</th>
<th>ref</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake Baldegg</td>
<td>49.83</td>
<td>45.62</td>
<td>91.56</td>
<td>4-2013 to 11-2014</td>
<td>2 weeks</td>
<td></td>
</tr>
<tr>
<td>Lake Aegeri</td>
<td>77.45</td>
<td>22.77</td>
<td>29.40</td>
<td>3-2014 to 12-2014</td>
<td>2 weeks</td>
<td></td>
</tr>
<tr>
<td>Lake Hallwil</td>
<td>41.59</td>
<td>22.51</td>
<td>54.12</td>
<td>1-2014 to 12-2014</td>
<td>monthly</td>
<td></td>
</tr>
<tr>
<td>Lake Sempach</td>
<td>45.96</td>
<td>28.00</td>
<td>60.92</td>
<td>1-1984 to 12-1992</td>
<td>varying</td>
<td>Rene Gächter</td>
</tr>
</tbody>
</table>

16. Table S2: Characteristics of three eutrophic, one mesotrophic, and two oligotrophic lakes. F_red data for Rotsee, Türlsee, Lake Sempach and Pfäffikersee are from Müller et al. (2012) and F_red was calculated for Lake Erie (Adams et al., 1982), Lake Superior (Richardson and Nealson, 1989; Remsen et al., 1989; Klump et al., 1989; Heinen and McManus, 2004; Li et al., 2012), and Lake Baikal (Och et al., 2012). TOC MAR was calculated for all lakes based on literature data: Lake Baikal (Och et al., 2012), Lake Sempach (Müller et al., 2012), Rotsee (RO) (Naehler et al., 2012), Pfäffikersee (unpublished data), Türlsee (Matzinger et al., 2008), Lake Erie (Smith and Matisoff, 2008; Matisoff et al., 1977) and Lake Superior (Klump et al., 1989; Li et al., 2012).
Figure S1: Porewater profiles of NH$_4^+$, CH$_4$, Mn(II) and Fe(II) from Lake Zug in the permanently oxic part of the lake at 62 m water depth.
**Figure S2**: Oxygen concentrations in 5 lakes at distinct water depths during one year. The orange line represents oxygen concentrations at the deepest point of the lake. In Lake Geneva (LG) oxygen concentrations remained high throughout the year, while in Lake Baldegg (BA) and in the deepest layer of Aegerisee (AE) $O_2$ rapidly declined during the stratified season. Lakes Sempach (SE) and Hallwil (HA), both recovering from eutrophication, showed higher $O_2$ concentrations than the still eutrophic Lake Baldegg. Data sources: CIPEL for Lake Geneva (year 2011); cantonal agency of Lucerne for Lake Baldegg (2014) and Lake Sempach (2011); cantonal agency of Zug for Lake Aegeri (2014); cantonal agency of Aargau for Lake Hallwil (2015).
References

Adams, D. D., Matisoff, G., and Snodgrass, W. J.: Flux of reduced chemical constituents \((\text{Fe}^{2+}, \text{Mn}^{2+}, \text{NH}_4^+\) and \(\text{CH}_4\)) and sediment oxygen demand in Lake Erie, Hydrobiologia, 91, 405-414, [http://dx.doi.org/10.1007/bf00940130](http://dx.doi.org/10.1007/bf00940130), 1982.


