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Carbon burial in and CO_2 evasion from Europe's lakes and reservoirs: first results and outlook

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The importance of lakes and reservoirs for the global carbon cycle is still largely uncertain. Burial within their sediments sequesters atmospheric carbon for a long period. Previous estimates suggest that in particular reservoir sediments store notable amounts of carbon, due to their high accumulation rates. At the same time, most lakes and reservoirs are CO2 oversaturated with respect to the atmosphere and therefore release carbon through the air/water interface. Thus, lakes and reservoirs seem to play an ambivalent role as carbon sources and sinks.

We have estimated the order of magnitude for carbon burial in Europe's lakes and artificial reservoirs including parts of the CIS. Coarse mean accumulation rates from Dean and Gorham (1998) were applied to the lake and reservoir surface areas from the Global Lakes and Wetlands Database (Lehner and Döll, 2003) and the World Register of Dams (ICOLD, 2003). First results suggest that organic carbon burial is about 9.7×10^6 t/a in the lakes larger than 1 km^2 surface area, and 19×10^6 t/a in large reservoirs (dam height over 15m). The proportion of OC burial in lakes is similar for the European Union and non-member states. Europe's reservoirs are dominated by large dams within the European part of Russia. Because of limited data for reservoirs, the used value for surface area is a very strong underestimate. Also very small lakes are not yet included. These figures suggest that lakes and reservoirs are important for Europe's carbon budget.

For a more reliable calculation of carbon burial in and CO_2 evasion from European lakes and reservoirs, we will consider regional variations of the major control parameters. We will test available carbon accumulation rates and CO_2 concentrations for their controlling factors by statistical methods. Based on these analyses we will de-

velop an extrapolation algorithm for calculating the lake and reservoir carbon fluxes for Europe. Improved lake and reservoir area data will be used.