**Figure S1.** Illustration of the terms used to describe the stratification of meromictic and holomictic lakes. Meromictic lakes are stratified in a mixolimnion (layer mixed yearly by convective and wind-induced motion), and a monimolimnion (permanently isolated deeper layer). During the stratification period, the mixolomnia and holomictic lakes are further stratified in an epilimnion (mixed layer) and a hypolimnion (seasonally isolated layer), divided by a thin transition layer (thermocline).



**Figure S2**. The P-AHOD model used in this study was derived using data provided as Supplementary Information by Müller *et al*. (2019). We considered AHM (areal hypolimnetic mineralization rate) as equivalent to AHOD (areal hypolimnetic oxygen consumption) and we obtained P (volume-weighted annual mean total phosphorus concentration) from TPMIX (volume-weighted mean total phosphorus concentration after spring mixing) using P=0.9TPMIX (see Methods). A piecewise linear regression was fitted using the program SegReg ([www.waterlog.info](http://www.waterlog.info)). The fitted models (see Materials and methods) has a calculated *r2* of 0.81. Data from artificially aerated lakes were excluded.

