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Global warming prolongs the thermal stratification of dimictic lake Mondsee.

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The pre-alpine Lake Mondsee is situated at the northern margin of the European Alps (47° 49′N, 13° 24′E) in the Salzkammergut lake district of Upper Austria at a sea level of 481 m. The lake has a surface area of 14,21 km^2 and a maximum water depth of 68 m (volume is 500 Mio m^3 and theoretical water retention time is 1,8 years).

Sediment samples confirm oligotrophic conditions as historical reference status of the lake. From 1970 to 1985 the lake suffered from severe eutrophication leading to cyanobacterial blooms (Planctothrix rubescens). Reduction of nutrient load in the course of improved sewage treatment resulted in re-oligotrophication from 1985 to about 2000. Currently, lake Mondsee is assessed mesotrophic and the biological quality elements “phytoplankton” and “macrophytes” classify the lake in the "moderate ecological status". According to the Water Framework Directive, a key initiative throughout the EU, the aim is to improve water quality and reach the "good ecological status".

Temperature data of the Lake have been measured since the 30ies of the last century in varying intervals. In the present study (1991 – 2009) water temperature measured at the deepest point of the lake shows an increase in average surface temperature (0 - 5 m) of about 2 °C over the last two decades. The increase is less pronounced in deeper water layers and almost not visible below 15 m depth.

Due to global change and rising temperatures stratification is starting earlier in the season and is prolonged from formerly end of November to the middle or even end of December. Thus, between 1999 and 2011 in several years the stratification period was extended for 5 weeks.

During stratification oxygen depletion occurs in the depth of lakes and prolonged stratification results in increased areas of oxygen depletion. The oxygen concentration controls the phosphorus release of lake sediments. Therefore prolonged stratification results in increased internal phosphorus load of the lake. Global warming may thus enhance internal eutrophication and lead to problems reaching and sustaining the "good ecological status" of prealpine lakes.