

Morphometry and average temperature affect lake stratification responses to climate change. (2015)

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Abstract

Climate change is affecting lake stratification with consequences for water quality and the benefits that lakes provide to society. Here we use long-term temperature data (1970–2010) from 26 lakes around the world to show that climate change has altered lake stratification globally and that the magnitudes of lake stratification changes are primarily controlled by lake morphometry (mean depth, surface area, and volume) and mean lake temperature. Deep lakes and lakes with high average temperatures have experienced the largest changes in lake stratification even though their surface temperatures tend to be warming more slowly. These results confirm that the nonlinear relationship between water density and water temperature and the strong dependence of lake stratification on lake morphometry makes lake temperature trends relatively poor predictors of lake stratification trends.

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