

Interactive comment on “Reconstructing past atmospheric circulation changes using oxygen isotopes in lake sediments from Sweden” by C. E. Jonsson et al.

Anonymous Referee #1

Received and published: 10 July 2009

The many controls on d18O in lake waters are reviewed in this paper. Some of these variables are common to a most if not all lakes for example the residence time and temperature, whereas the limited amount of evaporation in Northern Sweden make these sites especially valuable as recorders of change in precipitation. Since 50% of precipitation falls as snow, the dominant control on contemporary lake waters is snowmelt. Continentality also has a role in some regions. The long term (Holocene) changes in d18O seem to be a result of changes in source effects since Atlantic and Polar air brings precipitation of very different isotopic composition. This is especially marked in the northern lakes whereas lakes from central Sweden are more modified by evaporation. This highly simplified picture is then viewed through the filter of the isotope

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host. Studies have used diatom silica, carbonate and cellulose which all introduce complexity in the extent to which they reflect d18O of lake water.

The paper is effectively a study of lake coherency exploring how the climate signals are reflected in different ways by lake hydrology. I would like the approach to be made more explicit as it would deepen the level of analysis. The results show how much the local characteristics can modify the signal. A downward trend in d18O is shown in lake Tibetanus, lake 850 and a Norwegian speleothem, whereas the record from Lake Igelsjon is less clear with an opposite trend in the early Holocene. More variation in d18O is seen in the late Holocene series presented in figure 5 where some coherent changes are found. Links are also apparent with IRD, implying regional significance.

This paper is a reasonable synthesis of the issues that need to be considered when interpreting oxygen isotope records from lakes. The different hosts and the local hydrological characteristics are clearly dominant in some places, although good agreement is shown between diatom and carbonate based records. Despite the complexity some trends are still discernable. These could also be made more explicit in the conclusion. The order of the curves in figure 4 and 5 needs to be reconsidered so that non-lake data (IRD and speleothem) are differentiated.

Interactive comment on Clim. Past Discuss., 5, 1609, 2009.

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