

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

**C. E. Jonsson et al.**

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Authors reply to reviewers' comments

Reconstruction past atmospheric circulation changes using oxygen isotopes in lake sediments from Sweden. C.E. Jonsson, S. Andersson, G.C. Rosqvist and M.J. Leng

We are grateful to all the constructive comments and useful suggestions from the three referees. We have now carefully considered the comments and revised the paper accordingly.

Anonymous referee 1 Regarding the approach of the synthesis: We have chosen to use

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a broad approach in this synthesis and explore how the climate signals are reflected in different ways by lake hydrology and the issues that needs to be considered when interpreting oxygen isotopes records from lakes in Sweden. However a more explicit analysis can probably be used in a future synthesis of oxygen isotopes in this region.

The order of the curves in figure 4 and 5: We have changed the order and removed the IRD-data from figure 5.

Referee A. Henderson Regarding the discussions: We have added a discussion about why Lake Igelsjön shows an opposite variations during the early Holocene compared to Lake 850 and Lake Tibetanus. We have also added a comparison with more regional climate proxy records for a more regional interpretation.

1611, line 12: Changed

1613, line 23-27: Removed

1615, line 2-4: Changed to reference only Swedish studies

1615, line 23-25: We have added that the secondary isotope exchange leads to enrichment

1615, line 25-27: We agree that there might be a maturation process going on but that this process seems to have a minor impact on the isotopic records from these high altitude lakes.

1616, line 16: We have removed the part about vegetation succession.

1617, line 1: “that” removed

1618, line10: “as” removed

1619, line 7: Changed

1619, line 19: “the” removed

1619, line 20: Not all high altitude lakes with a short open water season have two

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productivity peaks. Some have only one peak in early summer whereas other peak in late summer.

1621, line 1: When the ice sheet decreases the oceans isotopic composition would be lower and also the precipitation  $\delta^{18}\text{O}$  would be lower but at the same time temperatures would increase, so changing ice sheet size and temperature would probably cancel each other out.

1624, line 1: The dominance of E/I over changes in  $\text{d}^{18}\text{O}_\text{p}$  could have changed over time

1643 Fig 4: We have separated the speleothem record from the lake isotope record

1643 Fig 5: We have removed the IRD data from the figure and added pollen reconstructed July temperature and annual precipitation records from Fennoscandia.

Referee J.Tyler Regarding the discussion of Holocene climate changes: We have added a comparison with more regional climate proxy records for a more regional interpretation.

1611, line 12: Changed

1613, line a: “annual” added

1614, lines 7-8: Changed

1615, line 15: We have added information about species related fractionation.

1615, line 24 We have added that the maturation process leads to enrichment. We also agree that there might be a maturation process going on in these high altitude lakes but that this process seems to have a minor impact on the isotopic records from these lakes.

1616, line 2: Changed

1616, line 3: We have added information about how to determine that the cellulose is

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aquatic.

1617, line 15: More information about snowmelt affecting lake water  $\delta^{18}\text{O}$  can be found in Jonsson et al., 2009, we have chosen not to discuss this in detail in this paper

1618, line 20: Changed

1621: line 19: Insolation curve added to figure 4.

1624, line 7: Changed

1624, line 16. Such figure is found in Rosqvist et al., 2004.

1624, line 18 and 27 Changed

1625 line 6: Changed

1625, line 7: We agree and have changed this in the text.

1625, line 23 and 29 and 1626, line 3: Changed

Figure 2 Changed to larger labels on the weather data

Figure 5. We have added more information about the different Lake Tibetanus and Vuolep Allakasjaure cores and removed the IRD data.

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

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