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Climate of the Past Discussions

Interactive comment on "AMO-like variations of holocene sea surface temperatures in the North Atlantic Ocean" *by* S. Feng et al.

F. Charpentier Ljungqvist

fredrik.c.l@historia.su.se

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General comments

The paper addresses a very important subject, namely if the Atlantic Multidecadal Oscillation (AMO) found in the instrumental record (since c. AD 1850), with its 60–80 year cycle, also can be found in the proxy data extending through the whole Holocene. The authors especially address two climate events: the cold 8.2 ka event and the Medieval Warm Period (c. AD 800–1300). They can show, as have most previous studies, that the 8.2 ka event was cold over (most if not all of) the North Atlantic whereas the Medieval Warm Period was warm over (most if not all of) the North Atlantic. The results are important since they both stress the occurrence of major long-term variability and point to possible explanations for this variability in the climate system. I would therefore

strongly suggest that the authors in a further article assess also the Northern Pacific region to investigate whether similar patterns during the Holocene can be found there, in order to gain a better understanding of the coherency of the decadal to centennial climate variability in the Northern hemisphere.

Specific comments

It falls outside my competence to discuss the technical aspects of the Feng et al. paper, but I do have some comments on their choice of terrestrial palaeotemperature proxy data and the presentation of that data in Table S1 and Table S2 (in the Supplement). Feng et al. compare the sea surface temperature (SST) during the 8.2 ka event and the Medieval Warm Period with the terrestrial palaeotemperature proxy data from the circum-North Atlantic region. However, much of the presently available data are not used. I consider this a shortcoming since more data would make their conclusions more solid, especially for the medieval period. Below, I will list some additional records that I suggest that Feng et al. incorporate in the final version of the paper.

For the Medieval Warm Period the following additional records, referred to by the original article they appeared in, should be included in Figure 5b and Table S2:

Axford, Y., Geirsdóttir, A., Miller, G.H., and Langdon, P.G., 2009: Climate of the Little Ice Age and the past 2000 years in northeast Iceland inferred from chironomids and other lake sediment proxies. Journal of Paleolimnology, 41: 7–24.

Bjune, Anne, Birks, H.J.B., and Seppä, H., 2004: Holocene vegetation and climate history on a continental-oceanic transect in northern Fennoscandia based on pollen and plant macrofossils. Boreas, 33: 211–223.

Büntgen, U., Frank, D.C., Nievergelt, D. and Esper, J., 2006: Summer temperature variations in the European Alps, A.D. 755–2004. Journal of Climate, 19: 5606–5623.

Cook, T.L., Bradley, R.S., Stoner, J.S., and Francus, P., 2009: Five thousand years of sediment transfer in a high arctic watershed recorded in annually laminated sediments

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from Lower Murray Lake, Ellesmere Island, Nunavut, Canada. Journal of Paleolimnology, 41: 77–94.

Geirsdóttir, Á., Miller, G.H., Thordarson, T. and Ólafsdóttir, K.B., 2009: A 2000 year record of climate variations reconstructed from Haukadalsvatn, West Iceland. Journal of Paleolimnology, 41: 95–115.

Linderholm, H.W. and Gunnarson, B.E., 2005: Summer temperature variability in central Scandinavia during the last 3600 years. Geografiska Annaler, 87A: 231–241.

Martínez-Cortizas, A., Pontevedra-Pombal, X., García-Rodeja, E., Novóa-Muñoz, J.C., and Shotyk, W., 1999: Mercury in a Spanish peat bog: Archive of climate change and atmospheric metal deposition. Science, 284: 93–942.

Rosén, P., Segerström, U., Eriksson, L., and Renberg I., 2003: Do diatom, chironomid, and pollen records consistently infer Holocene July air temperatures? A comparison using sediment cores from four alpine lakes in Northern Sweden. Arctic, Antarctic and Alpine Research, 35: 279–290.

Sicre, M.-A., Jacob, J., Ezat, U., Rousse, S., Kissel, C., Yiou, P., Eiríksson, J., Knudsen, K.L., Jansen, E. and Turon, J.-L., 2008: Decadal variability of sea surface temperatures off North Iceland over the last 2000 years. Earth and Planetary Science Letters, 268: 137–142.

Sundqvist, H.S., Holmgren, K., Moberg, A., Spötl, C. and Mangini, A., 2010: Stable isotopes in a stalagmite from NW Sweden document environmental changes over the past 4000 years. Boreas, X: in press.

Zabenskiea, S., and Gajewski, K., 2007: Post-Glacial climatic change on Boothia Peninsula, Nunavut, Canada. Quaternary Research, 68: 261–270.

Vinther, B.M., Clausen, H.B., Fisher, D.A., Koerner, R.M., Johnsen, S.J., Andersen, K.K., Dahl-Jensen, D., Rasmussen, S.O., Steffensen, J.P., and Svensson, A.M., 2008: Synchronizing ice cores from the Renland and Agassiz ice caps to the Greenland Ice

Core Chronology. Journal of Geophysical Research, 113: D08115.

The Dye-3 borehole data from Dahl-Jensen et al. (1998) should also be including in addition to the GRIP borehole data from that paper that Feng et al. now use.

For the Torneträsk tree-ring chronology Feng et al. referred to Briffa and Osborn (1999) in Table S2, line 34. That is a very old version of the Torneträsk chronology. A much improved chronology, with significantly higher (April to August) temperature correlation, has been published in Grudd (2008), which is the proper work to refer to now:

Grudd, H., 2008: Torneträsk tree-ring width and density AD 500–2004: a test of climatic sensitivity and a new 1500-year reconstruction of north Fennoscandian summers. Climate Dynamics, 31: 843–857.

For the 8.2 ka event the following additional records, refer to by the original article they appeared in, should be included in Figure 5a and Table S1:

Antonsson, K., Brooks, S.J., Seppä, H., Telford, R.J., and Birks, H.J.B., 2006: Quantitative palaeotemperature records inferred from fossil chironomid and pollen assemblages from Lake Gilltjärnen, northern central Sweden. Journal of Quaternary Science, 21: 831–841.

Antonsson, K., and Seppä, H., 2007: Holocene temperatures in Bohuslän, Southwestern Sweden: a quantitative reconstruction from fossil pollen data. Boreas, 36: 400–410.

Ortega-Rosas, C.I., Guiot, J., Peñalba, M.C. and Ortiz-Acosta, M.E., 2008: Biomization and quantitative climate reconstruction techniques in northwestern Mexico Âň– With an application to four Holocene pollen sequences. Global and Planetary Change, 61: 242–266.

Peñalba, M.C., Arnold, M., Guiot, J., Duplessy, J.C., Beaulieu, J.L., 1997: Termination of the last glaciation in the Iberian Peninsula inferred from the pollen sequence of Quintanar de la Sierra. Quaternary Research, 48: 205–214.

Additional records, some not included in Feng et al., for the Arctic region of the North Atlantic are reviewed and referred to in: http://www.clim-past-discuss.net/5/1819/2009/cpd-5-1819-2009.pdf

In Table S1 and Table S2 Feng et al. refer to temperature changes in °C in a few isolated cases, but have not given any explanation why. In most cases, even when the temperature reconstruction in the original article they refer to are presented in °C, they just describe it as either “Warm” or “Cold”. I would strongly suggest that Feng et al. only use qualitative descriptions as “Warm” or “Cold”, and not quantitative statements in °C in order to give their presentation a greater uniformity.

In the discussion about the “Bond cycles”, I would like to see a reference to Wanner et al. (2008), where this topic is discussed in-deep:

Wanner, H., Beer, J., Bütikofer, J. Crowley, T., Cubasch, U., Flückiger, J., Goosse, H., Grosjean, M., Joos, F., Kaplan, J.O., Küttel, M., Müller, S., Pentice, C. Solomina, O., Stocker, T., Tarasov, P., Wagner, M. and Widmann, M., 2008: Mid to late Holocene climate change – an overview. Quaternary Science Reviews, 27: 1791–1828.

Figure 5a–b should be allowed to be much larger in size, approximately the double size, so that the reader is able to easier see the details of the maps. The maps are far too small now to be convenient.

Minor remarks

In the text to Table S1 the authors should be clearer with what they consider to be “new” proxy records.

S1, line 22: Seppa should be spelled Seppä with “ä”.

S1, line 27: Geraga et al. (2008) are no longer “in press”. It was published in Journal of Marine Systems, Volume 74, Issues 1–2, November 2008, Pages 623–638.

S2, line 22: Soylegrotta should be spelled Søylegrotta with “ø”.

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S2, line 35: Tornetraska should be spelled Torneträsk.

S2, line 31: Hardangerjokulen should be spelled Hardangerjøkulen with “ø”.

Interactive comment on Clim. Past Discuss., 5, 2465, 2009.