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Climate of the Past Discussions

Interactive comment on "Temperature variability at Dürres Maar, Germany during the migration period and at high medieval times, inferred from stable carbon isotopes of *Sphagnum* cellulose" *by* R. Moschen et al.

Anonymous Referee #1

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This paper presents new isotope derived temperature data obtained on sphagnum cellulose for the last two millennia in the Dürres Maar. Authors find a nice agreement between their local record and the global one that derives from tree-rings studies. The scientific question is important, the paper is well-organized and well-written, it should be published.

I have no major concern, only some moderate comments.

I really appreciated authors used the "introduction" and "background" parts as it should

be to give them a stand-alone value. Nevertheless I would have appreciated to find the same critical thinking they have for their own results, for the calibration coefficients they used. Indeed by going back to Menot and Burns 2001 and to Skrzypek et al. 2007, it is clear that the -0.20‰ and -0.41‰ coefficients were obtained on a pretty large dispersion of points. They are thus associated to uncertainties that are reflected in temperature reconstructions. Please mention the uncertainty associated to these coefficient or at least the order of magnitude. Please propagate it on your own temperature reconstructions.

I really appreciated authors accounted for Suess effect on d13C of atmospheric CO2 to deconvolute d13Ccellulose signal. They unfortunately don't explain how they do. Do they remove 1.7‰ out of the whole extent record, even out of the youngest part of the section that clearly knew industrial era and that was already under the fossil fuel emission impact? I would better apply a subtraction that accounts for real data of CO2 d13C (e.g. Levin et al.). By removing less than 1.7‰ this wouldn't impact ΔT between two consecutive years but should explain discrepancies for the 1990's between global signal (that accounts for real data) and your set of data.

Likewise, I would recommend the subtraction of impact of atmospheric CO2 increase (also associated to Suess effect) out of the isotopic record (Keeling et al. provides the required data). You can find adequate coefficient tying d13Ccellulose and [CO2] in literature. For modern times, you might have an increase of 1ppm per year, integrating on 4.5 years, this might result in 0.1‰ d13Ccellulose shift and thus 0.25°C.

Some details

- what is affiliation "4"?

- first author is now in Köln but his email address refers to Jülich. Is it normal?

- page 541, lines 17-20: can micro-topography effect be associated to a "canopy effect" that would keep enclosed the peat degradation CO2 within the atmosphere and would

lead a mixed CO2 (atmospheric and degraded) for photosynthesis?

- page 543, lines 25-26: I do not agree (see above) : mixed CO2 is very likely and would contribute for an artificial ageing of sphagnum. Nevertheless the global record chronology seems to lead your 14C based chronology, this is a good proof of reliability for the 14C dating.

- page 544, line 18: why do you boil your sample at 85°C? it seems to me a too high temperature to keep samples in good shape...

- page 544, line 22: on how many samples did you check that 355-630μm fraction is the right fraction? were tested samples very different from each other?

- pages 545-546, "isotopic measurements" many thanks for a such rigorous protocol (two standards, replication, ...)!

- page 546, "ash content": on which fraction did you measure the ash content? bulk or 355-630μm fraction?

- page 552, lines 20-24: opposition between local and global does not explain decadal shift whereas 14C versus counting does.

- page 553, lines 9-16: can you clarify your mind?

- page 554, lines 12-24: this weakens the chronology of the oldest part too. Indeed accumulation rate is about of the same order of magnitude and the time elapsed between two consecutive 14C dating is about the same than the distance between the 14C and the palynology derived time markers of the youngest part of the record.

- page 554 and following: can we see the instrumental record?

- Figure 3: add a stratigraphical column that refers to species succession as mentioned in page 547

- Figure 4: colors are not obvious in B&W printing. Can you use different symbols?

- Figure 6: difference between bold and fine lines is not obvious. Can you use bolder line?

Interactive comment on Clim. Past Discuss., 7, 535, 2011.