Clim. Past Discuss., 8, C1870–C1873, 2012
www.clim-past-discuss.net/8/C1870/2012/

Climate of the Past Discussions

Interactive comment on "Multi-periodic climate dynamics: spectral analysis of long-term instrumental and proxy temperature records" *by* H.-J. Lüdecke et al.

M. Mudelsee

mudelsee@mudelsee.com

Received and published: 10 October 2012

Suboptimal spectrum estimation methods—and the ignorance of responding authors

Manfred Mudelsee

Climate Risk Analysis
30167 Hannover
Germany

www.climate-risk-analysis.com
www.manfredmudelsee.com

Alfred Wegener Institute for Polar and Marine Research
27570 Bremerhaven
Germany
www.awi.de

The major scientific problem with the manuscript remains after the authors' response: the spectral analysis has been performed poorly. The reported periods of spectral peaks are meaningless. The basis for interpretation of results is not given.

The major "meta-scientific" problem with the manuscript remains after the authors' response: the data are unavailable (e.g., for download in form of a zipped archive on the CP site) and the methods are insufficiently described. It is impossible for peers to reproduce the results.

I recommend the Editor to approach the authors to address in a revised manuscript version and the final author reply seriously, in a constructive manner—and in a professional, non-offensive tone—both major problems.

Here I go through scientific points 1, 2, 3, 5 and 6; scientific point 4 seems to have been settled.

Spectrum estimation 1. Trend removal.
The authors still ignore my original question: "Why does the manuscript ignore trends?" The authors instead write: "We stress again that it is until now not possible with any

method—including the Lennartz-method—to extract an external trend from a persistent time series."

This last statement by the authors is wrong. An ARFIMA process is a stationary (i.e., no "external trend") long-memory process. It may serve as a noise model. Mudelsee (2010: Chapter 4, Section 4.1.6 therein) presented Monte Carlo evidence, where an external trend (linear) was superimposed with ARFIMA noise—and it was indeed possible to quantify the trend parameters (slope, intercept) and to obtain accurate confidence intervals using subsampling. It is unfortunate that authors cite my book's chapter but ignore to consult that section. It is furthermore unfortunate—and this applies to the manuscript in full—that authors are still inclined to ignore the other statistical literature given in my first comment.

Spectrum estimation 2. DFT.
Mudelsee (2010: Chapter 5 therein; see also references cited in that chapter) describes better methods (for even spacing: Thomson's multitapers, for uneven spacing: Lomb–Scargle periodogram combined with Welch's Overlapped Segment Averaging procedure) than the DFT. The DFT-estimated power spectra (Figure 3) have approximately 100% relative error, on the frequency borders 200%: no basis for interpretation.

Spectrum estimation 3. Interpretation of low-frequency peaks.
The authors' response fails to address my sentence "In case of the 254-year M6 series, one cannot say anything meaningful about periods longer than about 127 years; referring to other, longer series from somewhere else does not help."

Spectrum estimation 5. AR(1) alternative.
The authors' response ignores my request to show both noise alternatives (AR(1) and long memory).

Spectrum estimation 6. Long-memory alternative.
The authors' reponse completely fails to address this point.

Reference

Mudelsee M (2010) Climate Time Series Analysis: Classical Statistical and Bootstrap Methods. Springer, Dordrecht, 474 pp. [http://www.manfredmudelsee.com/book]