Climate
of the Past

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Discussions

Interactive comment on "Similarity estimators for irregular and age uncertain time series" *by* K. Rehfeld and J. Kurths

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Numerous palaeoclimate papers claim to find correlations between proxy records, usually without any attempt to quantify the strength or significance of the relationship. Many of these purported correlations are dubious, amounting to little more than a few wiggles in common (if the age-depth model is shifted). Unfortunately, the twin problems of uneven sampling and chronological uncertainty preclude easy quantification of the correlation, so I am excited to read Rehfeld and Kurths's paper, which offers a solution to both these problems.

Rehfeld and Kurths calculate the strength of the relationship between proxies, using methods that tolerate uneven spacing, across an ensemble of possible age-depth models. This results in a probability distribution of correlations, which can be compared with

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a null distribution of the correlations from simulations of a process with the same autocorrelation properties as the original data. This process seems reasonable to me, indeed I have done part of this in my own work. The performance of the methods is investigated using some simulated data.

The main challenge will be to popularise the method Rehfeld and Kurths present so that it becomes a standard palaeoclimate method. The paper is well written, but overlong and heavy going with all the mathematical notation. It reads as if it is written for an audience of mathematicians rather than palaeoclimatologists. For example, few palaeoclimatologists will need a definition for an irregular time series, but several will need tuple defining.

The authors make their methods available in a toolbox for MATLAB/OCTAVE. This will present an impediment to those users not familiar with MATLAB. Depending on how computer intensive the process is, would it be possible to develop a web interface akin to OxCal where users could upload their data for processing? An R port would also be very welcome by the part of the community that uses R.

Detailed comments are below. Line numbers refer to the version of the paper uploaded on 22 November.

The text at ∼line 185 that the observation time in an irregular time series may carry some information may be true in some archives, but it is of little relevance to this paper.

Figure 2 and the associated text should be well known. Is it necessary here?

Line 485: do you have to describe making an age-depth model from first principles?

Line 626: an uncertainty of 0.1-0.5% is very optimistic for many archives, 1% would be good in many.

Line 648: if you need to summarise the simulation procedure, at least use plain English. Better still, make the text simpler to read and delete this summary.

Fig 6: Is there a more intuitive way to show the irregular part folding the bar backwards? e.g. arrows

Line 930: Is it not obvious that there is uncertainty whatever age-model is used?

Line 939: Please define a.u. (I presume it is not astronomical unit)