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Interactive comment on "Paleoclimate forcing by the solar De Vries/Suess cycle" *by* H.-J. Lüdecke et al.

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Lüdecke et al process some annual-resolution proxy-climate data to search for a 200-year periodicity that they relate to the de Vries solar cycle. There are several problems with this paper which should preclude its publication in its present form.

Lüdecke et al filter their proxy data with an OLS filter. Lüdecke et al argue that this filter allows them to focus on the rate of temperature rise rather than temperature per se. However, the effect is to use a (poorly performing) band-pass filter. Low frequencies are supressed. High frequencies are also supressed but not monotonically. Frequencies near the 1/200 year cycle the paper seeks to detect are preserved and consequently dominate the filtered record.

The rationale for using this filter does not seem greatly persuasive, especially since the authors explain that the filtered record is just a phase shift from the original with the advantage that frequencies they do not wish to consider supressed. Even if the authors processed white noise, they would find apparent de Vries cycles fairly often with this filter.

Having introduced this curious filter, the authors proceed not to use it for several sections of the paper. This is probably a good thing given the characteristics of the filter, but is apt to confuse the reader.

With the raw data, Lüdecke et al find near 200-year cycles in all three temperature proxy records. However, the significance thresholds they use are pointwise. By testing multiple frequencies, there is a multiple testing problem, which will increase the risk of a Type I error.

Lüdecke et al assume that the 200-year cycles must be solar driven. Over the last millennium there has been a roughly 200-year cycle in volcanic activity which could also influence the proxies.

Lüdecke et al go on to show that the filtered records resemble sine waves. This is not really surprising as once the filter has removed frequencies longer and shorter than those the authors are interested in, all that will be left should resemble a sine wave. The authors run a Monte Carlo procedure to test if the resemblance between the filtered records and the fitted sine wave is better than by chance. Unfortunately this test is severely biased. Surrogate proxy records are first generated and filtered. Then the correlation between this filtered surrogate and the sine waves fitted to the filtered proxies is estimated and this null distribution compared with the correlation between the filtered proxies and the sine wave. This is inappropriate as the sine waves are optimised for the proxy – one would therefore expect them to have higher correlation. A fair test would be to compare the correlation between each filtered surrogate and a sine wave fitted to it with the observed correlation.

The running correlations are difficult to interpret without showing the null distribution expected from such heavily filtered records.

The predictions for future climate are dubious. The 200-year cycle the authors have extracted from the proxy data represents a very small component of the variance in the proxies. It only appears large in this paper because of the filter used. Even if this cycle could be predicted, which is doubtful as at least some of its power is due to volcanic forcing, the contribution of other frequencies would make any prediction useless before we even consider the role of anthropogenic forcings. The predictions would be more credible if the methods could be shown to have some predictive power. This could be done by splitting the data into two parts, fitting the sine waves to one part and comparing the predictions with the remainder of the data.

Rather than making dubious predictions about future climate, it would be much more valuable if the authors explored the physical relationship between solar variability and the proxy records. How is it possible that, for example, the proxies are not in phase with each other and the TSI if they are governed by the de Vries cycle?

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