

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

### **Anonymous Referee #2**

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Lüdecke et al. investigate published high-resolution paleoclimate records with focus on the solar 207 yr cycle. They conclude that the cyclicity found in the data allows an approximate prediction of near future climate.

I think this paper is generally well written but I am wondering about value of this study in general. The authors look at cyclicities in solar forcing and climate records with a method that, in my opinion, amplifies/extracts cyclicities on centennial time scales. They extract the most prominent cycle from this filtered/modified record and then project this cyclicity into the future. This analysis (i) removes information about the amplitude (e.g. how much temperature change is really caused by solar forcing), (ii) in the projections it neglects that there is not a continuous fit with the extracted cyclicity and (iii) it provides no new insight into possible mechanisms behind the sun climate

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link.

In the following I added some more detailed comments that I have regarding this study.

It appears that the analysis is designed to amplify the centennial signal. It certainly acts as a low-pass filter i.e. enhancing longer-term variability. It will also remove very long-term trends (as those will add a constant to the delta function). Therefore, it appears that the transformation calculates some kind of derivative of the original function with, however, some filtering that depends on the window size used for the calculation. Therefore, it remains unclear to me how important the discussed signal really is in the real (untransformed) time series.

In general the methods section is not easy to follow. Abbreviations are used (e.g. MC) without proper explanation. Methods are used that are not explained (e.g. detrended fluctuation analysis). It could at least be written what these analyses do. Due to this it is very difficult to assess the reliability of the analysis (e.g. the confidence analysis).

I do not agree that Delta T and Delta P can “reasonably” be represented a sine function (maybe this depends on the definition of “reasonably”). It appears that the Delta functions maximises the variability in the 200 yr band. Therefore “reasonable” agreement between the Delta functions and the sine wave is not unexpected. Nevertheless, there are significant differences visible in figure 6. The authors compare the results in figure 6 and 7 to the wavelet analysis and say that there is agreement. Therefore, I am wondering why the authors feel that they need to do this transformation at all.

The authors conclude that the delta T etc. . . series show comparable signals in the 20th century showing “the warming rate during the 20th century lies within the natural rates of change”. This is all based on the proxy data used for the study. As visible on figure 2 there is no exceptional trend in these records for the last 100 years. Therefore, I am left with the question if these records are suitable to identify the recent warming trend i.e. allowing the authors to draw the conclusion they draw.

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I think the prediction aspect is very speculative. The authors conclude that the cycle agrees partly with the data and then they continue to predict the climate with this cycle. It neglects that there is no perfect fit in the past and it neglects other forcing mechanisms.

The radionuclide data has on average a cyclicity of about 220 yrs (average in table 3). This appears to contradict the identification of the 207 yr cycle in the data.

Figure 3. The spectral peaks do not agree in the different records i.e. questioning that these really represent the same cycle/cause.

It appears that the significance levels in figure 5 are severely misrepresented (right part of the figure). This can arise from the artificially increased resolution by interpolating data (especially when comparisons to Stei/Beer are made). As it is now the figure seems to suggest strong & significant covariability in radionuclide and climate records for the last 2000 years basically in all frequency bands with periodicities longer than 100 years.

In figure 6 all information about the amplitude of change is lost. How can it then be argued that the data shows a significant part of the signal. The authors should go back to the original data and explain how much the signal contributes to temperature variations (in °C).

Details: The introduction reads like a list of publications that support the conclusions of this analysis. A more balanced introduction would be useful as there are many other papers that would not agree with this clear cyclicity on climate records (i.e. allowing prediction).

Page 283: -7404 BP => 7404 BC

Why do 25000 zeros provide optimum interpolation of the DFT spectra?

MC simulation => write Monte-Carlo simulation

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What are Hurst exponents? Please add explanation and/or reference

Why is there a need for abbreviations such as AM

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Interactive comment on Clim. Past Discuss., 11, 279, 2015.

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