



## ***Interactive comment on “Tree-ring width wavelet and spectral analysis of solar variability and climatic effects on a Chilean cypress during the last two and a halfmillennia” by N. R. Rigozo et al.***

### **Anonymous Referee #1**

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In this paper, wavelet and spectral analyses are applied on a 2500 yr long tree-ring series from Chile, in relation with ENSO and solar activity. Some conclusions are proposed on the effect of solar activity and ENSO on Chilean climate. The paper is short and sometimes difficult to follow as some information is missing. Discussion and conclusion are not sufficiently deepened, especially from the climatic point of view. Too many references are not given in the bibliography although they are cited. I consider that this paper is not finished and does not bring enough novel results for the paleoclimatological community.

Specific comments 1) End of Introduction. What is this new methodology developed by the authors in their previous papers. Has it something to see with the methodology used here? If not, there is no reason to cite abundantly this literature. If yes, a few

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sentences should be added to show the innovation (which does not appears to me).

2) Methodology. We need to know more on quantitative statistics for the relationship cupressus-climate, it is necessary to be able to identify through which climatic variable, the external forcings studied influence tree-growth. Is the analysis done on individual series, one tree or a mean of several trees (has it been repeated on several tree-ring series?). The point that ring width analysis has a lot of advantages on isotopes is out of subject, as isotopes give access to different information. They are complementary.

3) Spectral analysis methods: More details should be given on the methods: which taper is used in MTM ; why Morlet wavelet is better than any other ones in geophysical signals ? A reference where it is demonstrated is necessary. How are calculated the confidence levels of the peaks ?

4) results

4.1. First part is a repetition of first part of methodology (but with more details).

4.2. Sentence “ The presence of peaks at both lower and high frequencies suggests that this species, growing at high altitudes sites, is very responsive to longer and shorter periods and to climatic factors influencing growth patterns ” is either a triviality either not clear : longer and shorter than what ? Why is it necessarily climate ?

4.3. Sentence “ The wavelet analysis was performed after removing from the original series the long term tendency function obtained by exponential function fit (Fig. 1a) ” I suppose that it is already done for MTM, thus it is not necessary to be repeated. Please clarify respective methodologies.

4.4. Figure 4 is not readable

4.5. Sentence “ Periodicities between 3-6 yr clearly appear in the EI-Ni&#771;no domain but only after the growth decrease at 120 AD which was probably associated to permanent more severe environmental conditions and consequent greater sensitivity

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to external factors such as those induced by El-Niño. ” : Maybe yes, maybe no ; more development should be necessary, because it could simply be due to the fact that raw data have precisely their variance and mean decreased at that period and then it can be an artefact due to stationarisation.

5) Discussion The authors find in their data a fingerprint of the solar activity and review some papers where same frequencies have been found. The minimum control of that should be to check if same frequencies are found on the instrumental climatic series. If not, how to explain that trees register a signal no present in the forcing factors? The 11 yr cycle (periods of 13.2, 10.9 & 9.8 yr) is certainly not the most powerful in the spectrum, but most of discussion is done on it. There is no phase study: we do not know if growth is larger when solar activity is higher, and/or if there is a lag. The analysis of the results is too superficial.

6) Conclusion Sentence “ More studies of regional tree ring data, as this, become necessary to determine the relative importance of the solar influences in the Sun-Earth system, in the past, since tree rings are seemingly becoming an excellent proxy data base for solar variability ”. This kind of conclusion is not acceptable for me. Indeed there is no utility to done spectral analysis on all the existing tree-ring series (when we apply extensively methods to large sets of data, we finish by finding what we want to find). It is necessary (1) to understand to which climatic signal, trees respond, (2) to check if the instrumental series have some of cycles, (3) if yes, to check if the same cycles are found in the tree-ring series.

Missing references : Stuiver & Quay 1980, Beer et al., 1988 Lara et al. 2000 percival and walden 2000 Parks et al 1987 and not Parks 1987

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