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Climate of the Past Discussions

Interactive comment on "Extracting a common high frequency signal from northern Quebec black spruce tree-rings with a Bayesian hierarchical model" *by* J.-J. Boreux et al.

Anonymous Referee #2

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In this paper the authors provide a new method to extract some hidden information about past climate from tree-rings growth patterns. The method is based on a Bayesian hierarchical model with the common signal as a latent variable. Extracting climate information from ring-trees is a difficult issue, mainly because the ring-width series depend on the tree ages and environmental conditions. A non parametric transformation is performed in order to make the series stationary but this leads to remove the low frequency part of the common signal. Hence only the high frequency part of the signal is described by the model. The authors do not indicate how relevant is this information for climate study.

Specific comments

As emphasized by the authors, only the high frequency part of the common signal is described by the model. Hence it is not surprising that the autoregressive coefficients are found negative and I wonder what is the interpretation that can be given on the signal. This is not pointed out.

There is a significant discrepancy between the classical tree-growth index and the common signal given by the BHM, this should be analyzed further, coming back to the data. Just telling that the classical method shows its limitations by not providing confidence intervals is somewhat simplistic.

I do not agree when the authors expect the relationships between the observed Y_{ts} and $\widehat{Y_{ts}}$ to be linear. If the fit is perfect, the scatterplot is on the diagonal, and that kind of graph shows how well the model fits the data. But the relationship that is expected to be linear is the relationship between Y_{ts} and Z_t and this one would have been shown.

Technical corrections

page 802 l 23: this issue

page 804 l 11: $\varepsilon_{-s} = (\varepsilon_{s1}, \varepsilon_{s2}, \ldots, \varepsilon_{s(T-1)})'$

page 804 l 18: $Z_{-s} = (Z_1, Z_2, \ldots, Z_{(T-1)})'$

Figure 4: Say what is the dashed line in the caption.

This paper brings a new method to address a difficult issue. BHM provides a common signal from the ring-width series that can be compared with classical indices and give tools to a better understanding of the process. I recommend the publication, if an effort is done on the interpretation of the high frequency part of the common signal, and how it can bring relevant information on climate.

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