

## ***Interactive comment on “A 1500 yr warm-season temperature record from varved Lago Plomo, Northern Patagonia (47° S) and implications for the Pacific Decadal Oscillation (PDO)” by J. Elbert et al.***

### **Anonymous Referee #4**

Received and published: 31 May 2013

This manuscript presents a 1500-yr warm season temperature reconstruction from lake sediments in Lago Plomo, located in Northern Patagonia. The temperature reconstruction is compared to an earlier winter precipitation reconstruction derived from the same core. The derivation of these two reconstructions from a single lake core is novel and potentially very useful. For instance, the authors argue that the running correlation between the winter precipitation and warm season temperature are indicative of PDO variations.

The largest shortcomings of the paper are technical. I break these into several areas

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below that the authors need to address. Based on these shortcomings, their paper needs major revisions before it can be considered for publication. It also should be reviewed carefully for language problems. There are multiple mistakes and typos that can make the manuscript difficult to follow.

1. There are several serious issues with the chronology construction. The first involves the homogenization of the piston and gravity cores. The final chronology construction uses the former from 1900-1939 and the latter from 1940-2009, which is then calibrated using target temperature data. Although the procedure is a bit hard to follow, the authors leave the impression that they have simply calibrated from 1900-2009 and only report the in-sample calibration statistics for the reconstruction (see last several lines on pg. 1780). The calibration statistics are therefore a combination of the contributions from the gravity and piston core and it is very difficult to interpret how these statistics should be interpreted in the context of the actual reconstruction, which only represents the piston core. Moreover, the authors do not report any cross-validation statistics for the reconstruction. Lack of any out-of-sample statistics weakens the reader's ability to assess the real skill of the reconstruction. The authors should perform cross validation tests to further demonstrate the robustness of their calibrated reconstruction. This is standard practice in many areas of paleoclimatology.

The slump in the piston core is also a serious issue with the chronology. Several features of the core change across the slump period, not the least of which is the sedimentation rate, and therefore make the association between the pre and post-slump period very hard to interpret. Calibration statistics, even in lieu of the issues raised above, are impossible to interpret for the two different sections of the core. The single C14 dating point also poorly constrains the earlier time period of the core. One wonders why the authors did not simply provide a reconstruction back to the slump, without trying to include the floating earlier section.

2. The reasoning and subsequent treatment of the chronology for its appropriate temporal resolution is not well described or justified. It is also confusing how resolution

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issues were incorporated into the homogenization, calibration and sliding correlation steps. All of these steps should be done consistently at the same resolution if the authors are serious about the frequency window their proxy is thought to sample.

3. No attempt is made to quantify the significance of the running correlations. Significance levels should be quantified for a 20-yr moving window that account for autocorrelation. Most of correlations are likely not significant for the running correlations and weaken the authors claims. On a larger note, the authors should better quantify the relationships between their running correlations and the two PDO reconstructions that are used for comparison. There appears to be very little correspondence between the three results and the authors do little to explain the differences.

4. The cluster analysis is not well discussed or motivated. The authors should spend more time describing what they have done so that their technical approach can be better understood.

5. No uncertainty estimates are provided for the derived reconstructions. These must be included based on calibration/validation interval statistics.

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Interactive comment on Clim. Past Discuss., 9, 1771, 2013.