



Interactive comment on “Glacier mass balance reconstruction by sublimation induced enrichment of chemical species on Cerro Tapado (Chilean Andes)” by P. Ginot et al.

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Ginot et al. paper review:

General Comments:

The Ginot et al. paper is a very valuable new contribution to a growing body of South American ice core research. The paper is clearly written and offers multiple approaches to solving the basic theme in the paper - impact of post-depositional alteration on environmental interpretations developed from ice cores. The Cerro Tapado (CT) record is notable because it was recovered from an arid region and the temperature profile through the 36 m core ranges from -8.6C to a frozen base on bedrock at -12.4C.

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Lack of glaciers in nearby regions as noted by the authors may be indicative of significant climate change making the immediacy of this record important. A prominent discontinuity in the CT record suggests dramatic climate change in the recent past.

Suggestions made by the authors related to post-depositional alteration have been considered in the interpretation of polar to sub polar ice cores. However, this work represents a substantive step forward in the identification of issues related to the interpretation of mid - low latitude ice cores since post-depositional alteration is certainly expected and observed in middle to low latitude ice cores.

More Specific Comments:

The abstract should be slightly reworded to tone down the implication that this record could offer reconstruction of past climate over northern Chile. The record is very valuable but it is short and discontinuous despite association with regional scale circulation such as the SOI.

p. 172, line 10 - The authors assume that the association between sublimation and concentration of certain chemical species is directly proportional. This certainly offers initial guidance for the resultant SOI association and as such is a valuable contribution. However, the authors should either substantiate this association more rigorously or note that this is largely an assumption and that with more work the linear association may prove to be more complex as might be expected in the natural world.

p. 175 line 12 - Calculation of the mean concentration of chloride in fresh snow as presented in the paper invokes a histogram examination of the concentration frequency of all 1901 samples. This is a novel idea but it is unlikely to provide a definitive answer. The authors do provide several overlapping techniques for cross-examination, notably a novel 210Pb correction technique. They are to be congratulated for this creative reconstruction and it is highly unlikely that their record is the only record from mid-low latitudes that is missing segments due to post-depositional effects. This said it would be worthwhile for the authors to suggest other ways of testing the results, notably through

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automated aerosol sampling allowing more precise calculation of fresh snow values.

Figure 4 - Correlation between the CT core and the SOI is not entirely obvious in this figure. A more complete figure caption, more text in the paper, and some basic statistics would be helpful.

Figure 5 - Why were 25 bins chosen?

In conclusion - This paper should be of considerable interest to a large scientific audience because it offers a unique record and the authors are to be congratulated for dealing with the major issue of post-depositional alteration in mid-low latitude ice cores. The authors even go beyond this issue by demonstrating that dramatically impacted (post-depositional) ice core records may still maintain extremely worthwhile climate records that are valuable in assessing regional influences of the SOI. The paper should be published following minor additions.

Interactive comment on Climate of the Past Discussions, 1, 169, 2005.

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