

## ***Interactive comment on “Little ice age advance and retreat of Glaciar Jorge Montt, Chilean Patagonia, recorded in maps, air photographs and dendrochronology” by A. Rivera et al.***

**M. H. Masiokas (Editor)**

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Dear Dr. Rivera and co-authors,

Thank you for the revised version of the manuscript in response to the comments and suggestions of Reviewer #1.

Please note that Reviewer #2 has also recently posted detailed comments about your manuscript. In agreement with the first reviewer, this second reviewer also considers this manuscript as a valuable contribution and recommends accepting the paper for publication with only minor changes. To a large extent this new set of comments and suggestions is intended to improve the English and the overall readability of the

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manuscript, but there are also a few other issues that I suggest you address in detail when preparing the revised version of the paper.

I also have some comments regarding a few issues that in my opinion could be elaborated further (please see below).

Best wishes,

Mariano Masiokas IANIGLA-CONICET Mendoza, Argentina

#### Editor's comments

The first point refers to the use and interpretation of radiocarbon dates in the manuscript. I agree with Reviewer #2 that the reporting of these data should be consistent (probably use calibrated dates in the abstract and discussion). However, I think it is also important to show the uncertainties associated with these calibrated ages (which as the authors point out in the revised version are rather large in this time frame). The age ranges ( $\pm 1SD$  or  $\pm 2SD$ ) obtained from the calibration curve should be reported together with the most probable date in the abstract and the text. If possible, please also indicate if the samples for radiocarbon dating were collected from the inner portion or the outer portion of the reworked stumps. This information is relevant to know if the dates are closer to the establishment or the death of the specimens found in the glacier forefield. Another important point that needs to be clear is that these samples were collected from reworked material which unfortunately increases the uncertainty of the dating of the glacier advance as it is not known if the trees were in fact killed by the advancing ice or they remained dead for several decades/centuries before being overridden by the glacier.

I think it would also be interesting to elaborate a fit further on the rather impressive behaviour of the glacier over the past 400-500 yrs, and I mean not only the record retreat but also the massive advance of the glacier front between ca. 1650 ( $250 \pm 40$  14C yr BP) and 1898 (Reviewer #1 points out this issue as well). The fact that the

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calving front of the glacier advanced almost 20 km into a fjord over this period is a very interesting finding and could be compared in more detail with advances and conditions at other neighboring glaciers. The authors mention similar behaviour for Glaciär Upsala but over a much shorter period – 1999-2001. I think the advances recorded at Glaciär Pío XI during the early and late 20th century are more similar to the situation observed at Jorge Montt and should be mentioned in the text. The extensive advance observed at Jorge Montt also suggests that conditions were likely quite favourable for glacier growth over an extended period of time, providing strong additional evidence for better defining the main “phases” and the end of the LIA in this region. The existence of SPI calving glaciers currently in advancing, stable and retreating states could also be elaborated further to build on the very interesting discussion presented by Post et al. (2011) but using specific examples from southern South America.

In relation to the point mentioned above, I also think that the evidence available allows a more detailed discussion of the existence and timing of LIA glacier advances in this region. The radiocarbon dating of the stumps indicates the glacier overrode this material between ca.  $440 \pm 40$  and  $250 \pm 40$  14C yr BP (the burying of this material could have been even more recent as it is difficult to determine if the trees were effectively killed by the ice or had been dead for some time prior to the advance). In any case, the end of this advancing state (and therefore the dating of the most extensive LIA advance at this site) is indicated as 1898 based on the existence of a subaquatic terminal moraine. This peak advance thus occurred significantly later than the peak LIA advances (ca. AD 1650 and 1750) recorded at other neighbouring sites and mentioned in the introduction. The differences in timing for the main LIA advances could be discussed further as this may contribute to define more appropriately the timing of this period in this region.

The page numbers of the reference (Mann 2002) used by the authors to define the key term “Little Ice Age” refer to an article about the MCA. Please check pages as there is another chapter of the same author about the LIA in pages 504-509 of the same

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book. I would also like to recommend another reference which provides a very good discussion of this term (Matthews, J.A. and Briffa, K.R., 2005: The 'Little Ice Age': re-evaluation of an evolving concept. *Geografiska Annaler* 87 A (1): 17–36).

I wonder if the sections 4. Discussion and 5. Conclusions could be merged together? It seems both sections are similar in the sense that they discuss results and provide an interpretation and further comparison with other data and sites. Maybe a single “Discussion and Conclusions” section may help to avoid some repetition of ideas and to conclude the manuscript in a solid and well organized manner.

Please remember to insert line numbers in the new revised version of the manuscript to facilitate the editing and commenting of the text.

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Interactive comment on *Clim. Past Discuss.*, 7, 3131, 2011.

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