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Climate of the Past Discussions

Interactive comment on "Modelled glacier equilibrium line altitudes during the mid-Holocene in the southern mid-latitudes" *by* C. Bravo et al.

Anonymous Referee #2

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The paper aims to answer a clearly expressed and highly interesting question: "To what degree was orbital forcing responsible for the larger MH glacier extents apparent from moraine records in Patagonia and the Southern Alps of New Zealand?" (page 607, lines 2 – 4). Yet, in its present form I am unable to quantify the value of the paper for a series of major reasons:

(1) By approaching the task, the authors make clear on several occasions that, given the limited knowledge about Mid Holocene conditions, only differences between a reference (PI) and the target period (MH) can be addressed. It remains, thus, unclear why the major proportion of the paper (including 6 of the 10 Figures) deals with absolute values of temperature, precipitation, and ELA. Among many other expendable portions, e.g. the discussion about biases in the absolute values is not needed. (2) It

remains obscure (probably because of the dominating discussion on absolute values) how recently observed conditions can hold to validate the PI as a reference period. (3) The key for explaining any climate forcing is the dating of the targeted proxies (glacier extends in this case). It seems that the problems associated with dating are large for glacier extends during the Mid Holocene in the southern mid latitudes. The authors must examine and clarify if this enables them to retrieve conclusions from their exercise. (4) The use of ELA as the crucial variable requires a much clearer definition of the ELA the authors use. (5) A much clearer discussion is needed on how ELA changes are related to glacier extends under different landscape geometries in order to compare modeled ELA differences with reconstructed glacier extends. (6) It remains unclear how PMIP output enters the mass balance model (any downscaling procedure applied?) as well as on how reference levels are defined to which the vertical gradients of temperature and precipitation are applied. (7) What is the final significance of the differences in ELA (Figure 10)? What is the uncertainty of the obtained ELA differences?

The paper needs, by addressing the above mentioned and some more issues, a major re-organization, a re-structuring, and a re-writing before a proper review is possible.

Interactive comment on Clim. Past Discuss., 11, 603, 2015.