

Interactive comment on “Net accumulation rates derived from ice core stable isotope records of Pío XI glacier, Southern Patagonia Icefield” by M. Schwikowski et al.

Anonymous Referee #1

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The manuscript entitled “Net accumulation rates derived from ice core stable isotope record of Pio XI glacier, Southern Patagonia Icefield” by Schwikowski et al. describes investigations done from a shallow firn core extracted in the Patagonian Southern Icefield. After field experiment and ice core drilling presentation, the authors combined some stable isotopes with biological markers profiles in order to date the record and estimate the annual net accumulation. Only few ice core data are available from Patagonian icefields. Located in the westerlies belt, under extreme meteorological conditions, field works may be such difficult that all new data set is welcome and I would like to congratulate the field team for getting an ice core from Pio XI glacier. Concerning the well written manuscript, only few aspects need corrections or developed explanations.

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Specific comments:

Melting process occurs on the snow surface. Like the drilling was stopped because reaching water table at 50m depth, the assumption that percolation is reduced because some refreezing layers were observed is not validated. Refreezing layers may originate from surface melting/refreezing processes when the lower temperature follows. However, during the warmest period of the year, water percolation will flow through the whole firn down to deep permeable layer. This deep percolation is not crucial for the isotopic profile as long as the refreezing does not mix the layers, as you previously observed on Chimborazo (Ginot et al., 2010)

In the ice core analyses procedure, you say that major ions were analysed. However, in the manuscript, chemical profiles were not presented and discussed. Whether these chemical profiles are preserved or disturbed by water percolation, these results can support the isotopic profiles quality.

Concerning to the net accumulation amount deduced from the firn core, the value correspond to the accumulation on the drilling site (ice core top) and upward the flow line (deeper along the core). The snow accumulation measured from the stake network shows a high variability, from lower accumulation upwards to higher accumulation downwards, and measurement were only taken during the drilling campaign. The high values downward may results from deposition of drifted snow upwards, everything related to surface topography, wind and snow quality. In that case, the value is not “the lower limit”. I would not conclude to accumulation rate variation from this record, as the deposition processes may change from one year to another, but only use it as qualitative information on stable isotopes like layers from each seasons should be preserved at least.

Ginot, P., Schotterer, U., Stichler, W., Godoi, M. A., Francou, B., and Schwikowski, M.: Influence of the Tungurahua eruption on the ice core records of Chimborazo, Ecuador, *The Cryosphere*, 4, 561-568, 10.5194/tc-4-561-2010, 2010.

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