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Climate of the Past Discussions

Interactive comment on "Environmental and climatic changes in Central Chilean Patagonia since the Late Glacial (Mallín El Embudo, 44 S)" *by* M. E. de Porras et al.

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We are really grateful to Cathy Whitlock for her general comments but particularly those related to fire dynamics which encouraged us to better understand fire-climate-vegetation relationships from our study area and improved that issue in the manuscript.

We have done manuscript edition including grammatical, spelling and syntax errors so we hope the language is improved. However, none of us are English native speakers so there should be some mistakes we did not aware of. Taxa spelling was checked throughout the manuscript.

We correct fire terms so as to be concordant and correct throughout the manuscript.

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Interactive Discussion

Discussion Paper

We realized most of the problems with the fire record interpretations indicated by Cathy Whitlock were based (at some degree) on these mistakes in the terminology.

(...)Assertions are made about the influence of fire versus volcanism versus humans on the past vegetation that should be explained. . .no information is presented to link volcanic eruptions to vegetation change. There are tephra layers in the core, but what is the evidence that ashfalls influenced the course of vegetation development?...The human history is also a little unclear(...) Details of the effects of fire (now better and largely explained) and volcanism and on vegetation as well as a more detailed evidence of human occupations in the study area are described in the modern environmental setting section.

(...)What is "microscopic volcanic particle analysis" on p.8? (...) The complete analysis of tephra layers from Mallín El Embudo in currently being performed by Dr. Charles Stern at the University of Colorado. This analysis consist on:

1. washing the samples in water to remove organics and clay 2. examination under petrographic microscope to determine glass color and mineral content. 3. chemical analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS) techniques.

Given the large expertise of Dr. Stern in modern and Late Quaternaty tephra analysis, volcano sources and eruptions from the Southern Volcanic Zone, he determined El Embudo tephra layers based on the microscopic analysis and considering their stratigraphic position and the chronology of the record. Chemical analysis is being carried out during January 2014 to confirm the preliminary identification. Besides, similar tephra layers were found in Lago Saman cores (de Porras et al., 2012) in the upper Río Cisnes valley and also analyzed by Dr. Stern, so the preliminary identification was even easy.

(...)Finally, could the bamboo Chusquea be responsible for the high Poaceae (...) We understand what Cathy Withlock stated regarding the importance of Chusquea in forest fire dynamics as demonstrated in Whitlock et al. (2006). However, Chusquea is not

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present in the deciduous forest around Mallín EL Embudo or described in vegetation papers (eg. Luebert and Pliscoff, 2006; Gajardo, 1994, Heusser, 2003).

(...)A conceptual model of the fire-climate linkages would be helpful: If summers were wet and winters were dry, what would happen to vegetation (fuels), ignition frequency, and fire spread? If winters were wet and summers were dry, what would happen? (...) Major effort has been made regarding this point. We described fire-climate linkages (methodology section) based on dendrochronology papers from the rainforest at Central Chilean Patagonia (Holz and Veblen, 2009; Holz et al., 2013). We proposed how these linkages could interact in the deciduous forest that surrounds our study site and then, we interpreted Mallín El Embudo records in those terms. Finally, the sources of climatic variability at short temporal scales were discussed (discussion session) although records from CCP fail to record them given their millennial-scale resolution.

Interactive comment on Clim. Past Discuss., 9, 5747, 2013.