Clim. Past Discuss.,
https://doi.org/10.5194/cp-2019-13-RC2, 2019

Climate of the Past Discussions
Open Access
EGU

Interactive comment on "Centennial-scale precipitation anomalies in the southern Altiplano (18° S) suggest an extra-tropical driver for the South American Summer Monsoon during the late Holocene" *by* Ignacio A. Jara et al.

Anonymous Referee #2

Received and published: 22 May 2019

This article presents an interesting pollen record from Lago Chungará and a current pollen distribution along an adjacent transect on the western Andes slope. The authors, based on the pollen record, reconstruct the precipitation variability at centennial scale during the Late Holocene. They compare their results with paleoclimate sites along Atacama Desert, the Altiplano and the Tropical Andes, and suggest an extra-tropical driver for the South American Summer Monsoon (SASM). The contribution is interesting and it deserves to be published. Nevertheless, I have some major comments related with the chronology of the record and with the discussion regarding El

Printer-friendly version

Discussion paper

Niño – Southern Oscillation (ENSO) and the Intertropical Convergence Zone (ITCZ).

Major comments:

1) I agree with the referee #1 regarding the chronology. The chronological model should be available in the article, and not hidden in two earlier articles. The article should illustrate, in a figure, the chronology for the Core 7 and its correlation with the Subunit 2b in cores 11 and 14. It also should present a more detailed information to assess the chronological uncertainties. Furthermore, a summary figure with the earlier data cited in the item 2.3 (Previous investigations in Lago Chungará) is missing, as well as a more complete discussion considering the available data (e.g. sedimentation rate, geochemical data, etc)

2) The discussion related to the extra-tropical driver for the SASM is not strong enough. If the chronology of the record is right, the discussion about ENSO decoupling is interesting, but it needs to be more extended (only two references are cited: Yan et al., 2011; Conroy et al., 2008). The discussion would be more robust if the authors consider multiple records that propose the enhanced ENSO during the Late Holocene, specifically the intensification trend of El Niño for the last millennia (Vargas et al., 2006; Zhang et al., 2014; Barr et al., 2019; Ortega et al., 2019). On the other hand, it seems that the discussion to discard the ITCZ influence of SASM during 2400 to 1000 cal yr BP is incomplete. The authors just indicate that "the record of metal concentration from Cariaco Basin off the Venezuela coast (10°N; Haug et al., 2001) does not show any noticeable trend between 2300-1100 cal yr BP" discarding the north-south shifts of the ITCZ in the centennial-scale variability of SASM. I suggest analyzing the ITCZ position by mean of the anomaly of the Titanium (%) from Haugh et al. (2001) as in Salvatecci et al. (2014) (Figure 3 in Salvatecci et al., 2014). Considering this analysis, the authors will note a different trend between the periods 2500-1500 cal yr BP and 1500-1000 cal yr BP, the influence of the ITCZ will be clearer and probably more difficult to remove it completely as a driver of the SASM. I also suggest adding Sach et al. (2018) to the discussion.

Minor comment:

Line 76-77. It is necessary to add updated references on the geological setting. Other authors (Barnes and Ehlers, 2009; Jordan et al., 2010) point out that slow steady-state uplift since 40 Ma is more consistent than enhanced short periods of uplift.

Line 216. "...is supported by multiple lines of evidence". This sentence is too imprecise. References are needed.

Line 355. What kind of geochemical data?. As it is mentioned above, a figure with the available data (such as Bao et al., 2015) is necessary.

Suggested references:

Barnes, J.B., Ehlers, T.A., 2009. End member models for Andean Plateau uplift. Earth-Sci. Rev. 97, 105–132. https://doi.org/10.1016/j.earscirev.2009.08.003

Barr C, Tibby J, Leng MJ, et al. Holocene El Niño-Southern Oscillation variability reflected in subtropical Australian precipitation. Sci Rep. 2019;9(1):1627. Published 2019 Feb 7. doi:10.1038/s41598-019-38626-3

Jordan, T. E., Nester, P.L., Blanco, N., Hoke, G.D.; Dávila, F., Tomlinson, A.J., 2010. Uplift of the AltiplanoâĂŘPuna plateau: A view from the west. Tectonics 29, TC5007, doi:10.1029/2010TC002661.

Ortega, C., Vargas, G., Rojas, M., Rutllant, Muñoz, P., Lange, C.B., Pantoja, S., Dezileau, L., Ortlieb, L., 2019. Extreme ENSO-driven torrential rainfalls at the southern edge of the Atacama Desert during the Late Holocene and their projection into the 21th. Century Global and Planetary Change 175, 226–237

Sachs, J. P., Blois, J. L., McGee, T., Wolhowe, M., Haberle, S., Clark, G., & Atahan,P.(2018).Southwardshiftofthe PaciïňĄc ITCZ during the Holocene. Paleoceanography and Paleoclimatology, 33, 1383–1395. https://doi.org/10.1029/2018PA003469

Salvatteci, R., Gutiérrez, D., Field, D., Sifeddine, A., Ortlieb, L., Bouloubassi, I., Bous-

safir, M., Boucher, H., and Cetin, F.: The response of the Peruvian Upwelling Ecosystem to centennial-scale global change during the last two millennia, Clim. Past, 10, 715-731, https://doi.org/10.5194/cp-10-715-2014, 2014.

Vargas, G., Rutllant, J., Ortlieb, L. 2006. ENSO tropical – extratropical climate teleconnections and mechanisms for Holocene debris flows along the hyperarid coast of western South America (17°–24°S). Earth Planet.Sci.Lett.249,467– 483

Zhang, Z., Leduc, G., Sachs, J. P. (2014) El Niño evolution during the Holocene revealed by a biomarker rain gauge in the Galápagos Islands. Earth and Planetary Science Letters, Elsevier, 404, pp.420-434. ff10.1016/j.epsl.2014.07.013ff. ffhal-0147212

Interactive comment on Clim. Past Discuss., https://doi.org/10.5194/cp-2019-13, 2019.