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Climate of the Past Discussions

Interactive comment on "Precipitation changes in the South American Altiplano since 1300 AD reconstructed by tree-rings" *by* M. S. Morales et al.

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Reviewer 2- Malcom Cleaveland

Reviewer: Why is the paleoclimatic information cut off at 1300 when the authors indicate they had 75 more years of data? They indicate they are using an EPS of 0.85 as justification for the cutoff. Even if the period before 1300 has a lower EPS, they are still discarding valuable paleoclimatic information. The 0.85 EPS "standard" is completely arbitrary and discarding data because the EPS is lower than 0.85 is completely unjustified logically. They could analyze this period separately in a paragraph and extend Fig. 4.

Authors: We totally agree with the Reviewer comment indicating that an EPS of 0.85

is somewhat arbitrary. However, the tree-ring indices in the regional chronology before A.D. 1300 are highly variable with values frequently overpassing the maximum and minimum indices recorded since 1300 to present. We do not trust on the values previous to A.D. 1300. Taking a conservative approach, we discard the early part of the chronology in the precipitation reconstruction process. The year A.D. 1300 is also consistent with a replication of at least 10 tree ring series in the regional chronology, and additional justification to start the reconstruction at this date.

R: The paper indicates correlations with climate in year t with growth in years t+1, t+2 and t+3. It is logical that soil moisture will influence growth in future years, but why not in year t? This is the only instance that I can remember where present tree growth is not influenced by present climate. Are the authors sure about the phenology of these trees? Could the Schulman shift create this illogical relationship?

A: Five previous dendrochronological papers have already been published describing the particular growth response of P. tarapacana to climate for more than 15 tree-ring chronologies across the Altiplano in Bolivia (Argollo et al. 2004, Soliz et al. 2009), Chile (Christie et al. 2009, Moya et al. 2011) and Argentina (Morales et al. 2004). All of these studies record a similar respond of P. tarapacana growth to climate as the one describe in our contribution: precipitation during the prior growing season is the main factor controlling P. tarapacana radial growth. Temperature during the previous growing season is negatively correlated with growth. In the Altiplano, warm summers are mostly dry. High temperatures increase evapotranspiration, reduce water availability and enhance the positive relationship between precipitation and radial growth. It is also important to mention that the pattern of "present tree growth dominated by previous growing season climate" has also been recorded in other species in South America including Fitzroya cupressoides (Villalba 1990, Lara and Villalba 1993), Araucaria araucana (Veblen et al., 1995) and Pilgerodendron uviferum (Roig and Boninsegna 1992, Veblen et al., 1995) among others.

Roig, F, and Boninsegna, J. 1992. Tree rings and Environment. LundQua Report,

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Lund.

Veblen, T.T., B.R. Burns, T.T. Kitzberger, A. Lara, R. Villalba. 1995. The Ecology of the conifers of Southern South America. In: N. Enright and R. Hill (eds.) Ecology of the Southern Conifers. Melbourne University Press, Australia. p. 87-126.

Villalba, R. 1990. Climatic fluctuations in Northern Patagonian during the last 1000 years as infered from tree ring records. Quaternary Research, 34(3): 346 360.

Lara, A., Villalba,R. 1993. A 3,620-year temperature reconstruction from Fitzroya cupressoides tree rings in southern South America. Science, 260: 1104-1106.

R: Why not in year t?

A: There are not specific eco-physiological studies intended to elucidate the P. tarapacana respond to climate. However, it is possible that temperature plays an important role determining the beggining of the growing season in October-November when precipitation is still very scarce (most rainfall occurred during the January-February). The water storage in the soil during the previous growing season could be the major source of water for tree growth.

R: This is the only instance that I can remember where present tree growth is not influenced by present climate.

A: P. tarapacana is not the only species that show this climate-growth respond pattern. For example, the radial growth of Prosopis ferox from high-altitude, dry-subtropical valleys in northwestern Argentina, is significantly related to precipitation during the previous growing season and weakly to rainfall during the current growing season (Morales and Villalba, 2011). It is also important to mention that the pattern of “present tree growth dominated by previous growing season climate” has also been recorded in other species in southern South America including Fitzroya cupressoides (Villalba 1990, Lara and Villalba 1993), Araucaria araucana (Veblen et al. 1995) and Pilgerodendron uviferum (Roig and Boninsegna 1992, Veblen et al. 1995) among others.

Morales, M.S., Villalba, R. 2011. Influence of precipitation pulses on long-term Prosopis ferox dynamics in the Argentinean intermontane subtropics. Oecologia, DOI 10.1007/s00442-011-2087-9.

Roig, F, and Boninsegna, J. 1992. Tree rings and Environment. LundQua Report, Lund

Veblen, T.T., B.R. Burns, T.T. Kitzberger, A. Lara, R. Villalba. 1995. The Ecology of the conifers of Southern South America. In: N. Enright and R. Hill (eds.) Ecology of the Southern Conifers. Melbourne University Press, Australia. p. 87-126.

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R: Could the Schulman shift create this illogical relationship?

A: Traditionally, Schulman's convention is applied in the SH for tree-ring dating purposes. We assign to each tree ring the date of the year in which the radial growth starts; the annual band formed during the growing season 2000-2001 was assigned to the year 2000. Since precipitation records were processed similarly (we assign to year 2000 the annual precipitation from November 2000 to October 2001), this pattern in radial growth response to climate should not be due to the application of the Schulman's convention for the Southern Hemisphere.

R: Although the paper is well-written, it needs considerable editorial revision to standardize the English as folows:

R: Everywhere - "rainfalls" S/B "rainfall" - it is never plural

A: Corrected.

R: Abstract, l.18 - eliminate "up"

A: Corrected.

R: p.3, l.12 - "yields" S/B "yield"; l.24 - no need to captialize, italicize or use quote marks for "llamas"

A: Corrected, we change “yields” by “yield” and “Llamas” by llamas.

R: l.26 - "resource" S/B "resources"

A: Corrected.

R: p.4, l.1 - "represent" S/B "represents"; l.11 - "rapidly" S/B "rapid"

A: Corrected

R: p.5, l.8 - delete "contribute to"; l.22 - insert comma after "America"; l.24 - "features" S/B "feature"

A: Corrected. We changed “contribute to” by “help to” and “fatures” by “feature” Comma inserted

R: p.6, l.1 - "occur" S/B "occurs"

A: Corrected

R: p.8, l.8 - "1968" S/B "1996"; The reference S/B: Stokes, M. A. and Smiley, T. L.: An introduction to tree-ring dating, University of Arizona Press, Tucson, 1996. (Originally published by the University of Chicago Press, Chicago, 1968.)

A: We not changed because we do not have the new edition.

R: p.9, l.24 - "1976" S/B ""2001"; The reference S/B: Fritts, H. C.: Tree rings and climate. Blackburn Press, Caldwell, New Jersey, 2001. (Originally published by Academic Press, London, 1976.)

A: We not changed because we do not have the new edition.

R: Note: Only the first word in the Stokes and Smiley reference was capitalized, but all

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words in the Fritts reference were capitalized, an inconsistency. There are many other relatively minor editorial changes needed, which I would be happy to furnish directly to the authors if they desire.

A: We appreciate reviewer consideration; however the new version of the paper was proof-read by a native English speaker. Grammatical and English language errors in the original manuscript were corrected.

Interactive comment on Clim. Past Discuss., 7, 4297, 2011.