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Climate of the Past Discussions

Interactive comment on "Multi-century tree-ring based reconstruction of the Neuquén River streamflow, northern Patagonia, Argentina" *by* I. A. Mundo et al.

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This paper takes advantage of the excellent network of moisture-sensitive tree-ring chronologies in Chile and Argentina. A number of the authors of this paper have built on and greatly expanded the work of earlier dendrochronologists to develop a set of chronologies from long-lived trees that are being used to extend records of past climate and hydrology back in time. This paper features the latest in a series of reconstructed streamflow records which are providing potentially useful insight for water resource management in the region. The focus of this paper is the reconstruction of the Neuquén River, a major waterway in Argentina with headwaters in the Andes. This reconstruction

is the longest flow record for South America, to date, extending to AD 1346.

The authors make use of a suite of statistical methods to decompose the large set of tree-ring chronologies, enhance the common climate signal, and extend the reconstruction back in time as far as possible, give the signal strength of the trees. The reconstruction is then analyzed to investigate drought, spectral characteristics, and relationships of flow to large scale circulation.

The paper is well written and methods are clearly documented. Results are reported in a straightforward way, supported with tables and graphics. The disappointing part of this paper is the very minimal discussion of results, beyond the description of the reconstruction, and periods of drought. How are the ranking 20th century droughts and pluvial related to atmospheric/oceanic circulation (only 1998 is mentioned)? What is the significance of the 6-7 yr and 17.6-yr periodicities; to what might they be related? How do the SAM, AAO, and ENSO interact in this region to influence water supply? How is this manifested in this and other reconstructions? How does this understanding provide information useful for water resource management?

Specific comments

P. 3547, lines 20-21. While using the common interval, 1800-1950, to extract tree-ring chronology PCs does utilized the period of highest replication, it also assumes that grouping of chronologies over this time period is representative of the full record.

P. 3458, line 7. Define the ARSTAN chronology

P. 3553, line 3. It is not clear why the beta weights are given just for Model 2. Why not the others? It would be interesting to see if the weights changed between the different models (at least among the shared chronologies).

P. 3553, Frequency, intensity, and duration of events: this analysis only uses n-year running means, which only addresses the intensity component of drought. With the relatively low explained variance, the most robust information is duration and frequency.

This section needs more analysis to characterize these features of drought.

P. 3555, lines 3-4. The similarity is arguable, but if the patterns are described more generally in terms of zonal patterns, this might be OK.

P. 3556, line 5. I think you mean 43.1 to 48.2% (the range for the three reconstruction models)?

P. 3556. The lowest reconstructed flow year is 1968, but it is the lowest value in the gage record. What is the rank of 1968 in the gage record?

P. 3556, line 23-24 (also on P 3558), what is the relationship between the Antarctic Oscillation mentioned here and the SAM?

P. 3558, line 8. It is not clear why QBO is mentioned here, as the periodicity is not apparent in the reconstruction.

P. 3558, line 14. No analyses were shown that indicate that droughts lasted 25 years (a running average does not establish duration).

Figure 3c: The uncertainty based on RMSE in the early part of the record looks narrower than from 1700-1900, but the variance explained in the earlier period is less. Is this correct?

Figure 4a: Is this needed?

Figure 7a: Please add a legend or indicate which series is black and which is red.

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