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Climate of the Past Discussions

Interactive comment on "Investigating late Holocene variations in hydroclimate and the stable isotope composition of precipitation using southern South American peatlands: a hypothesis" *by* T. J. Daley et al.

Anonymous Referee #2

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The manuscript is introduced by an overview on peatlands of Tierra del Fuego (TdF), the significance of peat bog derived proxies in S American palaeoclimatology and their potential in future studies. This is a well-written part of the paper. The second section is dedicated to the importance of precipitation isotopes in climatology. The section with itemized general isotope hydrological statements sounds like a second introduction. Section 3 discusses the modern variation in the isotopic composition of precipitation and meteorological parameters. Authors use two GNIP stations to illustrate the regional isotope hydrological setting and recent changes. This section could be the most

interesting part of the manuscript however the discussion needs deep revision due to the unusual positive values in the Punta Arenas record and the erroneously determined d-excess values. (see my 2nd major comment and the comment on Fig.1.) Section 4 introduces the existing peatland records from TdF and closes with a tentative comparison with an arbitrary chosen peat record from the NH. However Authors admit “The temporal resolution of the data from AND-1 and Harberton bog is sufficiently different to preclude a direct assessment...”

Although the topic is interesting and the potential to use proxy (e.g. peat cellulose) derived isotope record to track back hydroclimatic changes is worth emphasis I feel that presently the work hardly constitutes a self-contained contribution in its field. Unless substantial and detailed discussion material would be added, I recommend to produce a concise "Brief Communication" omitting the vague tentative comparison with the Walton Moss record.

Major comments

p601 lines 11-14 “Recent advances in the use of continuous flow isotope ratio mass-spectrometry have made it possible to generate a value for dD and d18O simultaneously via online equilibration (Filot et al., 2006; Loader et al., 2007) on samples that are 0.3–0.35mg in dry weight.” This part needs revision. 1: d18O measurement does not need equilibration, 2: simultaneous measurement of water isotopes, as far as I know, is still a methodological challenge. There is theoretical opportunity to do the simultaneous measurements however it’s not resolved yet in any lab. 3: Loader et al. 2007 is not a relevant citation for water isotopes. The study deals only with carbon isotopes.

p605 lines 9-10: “It should also be noted that the deuterium excess (the value for the intercept of the y-axis; d)” This is a false approach. d-excess can be inferred as the intercept of the waterline only if the slope is 8. As shown above this is not the case here! Please calculate the d-excess according to Dansgaard’s equation: d=dD-8*d18O. I expect that in the light of the real d-excess values the discussion will need

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extensive revision, as well. I'd like to call your attention that amount-weighted d-excess values should also be calculated. This could be even more different.

Instrumental climate history for Punta Arenas and Ushuaia should not be restricted to the IAEA record. Instrumental climate data are available for these stations as early as from the late 19th century. A wider time window could better demonstrate a potential hydrological change linked to the observed variations in the southern westerlies' belt in the last ∼20-30 yrs.

I miss Neukom et al. 2010 and Vimeux et al. 2008 from the references. The Neukom paper might help the Readers (and the Authors) to place the present-day hydroclimatic changes observed for Punta Arenas and Ushuaia into a long-term context. While the d-excess shifts documented in the San Valentin firn core might strengthen the hypothesis about recent changes in isotopic composition of S American precipitation.

Neukom, R., J. Luterbacher, R. Villalba, M. Küttel, D. Frank, P. D. Jones, M. Grosjean, J. Esper, L. Lopez, and H. Wanner (2010), Multi-centennial summer and winter precipitation variability in southern South America, Geophys. Res. Lett., 37, L14708, doi:10.1029/2010GL043680.

Vimeux, F., M. de Angelis, P. Ginot, O. Magand, G. Casassa, B. Pouyaud, S. Falourd, and S. Johnsen (2008), A promising location in Patagonia for paleoclimate and paleoenvironmental reconstructions revealed by a shallow firn core from Monte San Valentín (Northern Patagonia Icefield, Chile), J. Geophys. Res., 113, D16118, doi:10.1029/2007JD009502.

Specific comments:

p601 l 28: "Hpa" should be "hPa" p608 l 14: McDermott et al. 2011 discuss a speleothem transect across Europe why it is cited for "a spatial array of peat bog sites"? p616 l 9: "be-Ouchi" should be "Obe-Ouchi" p617 l 19: "FIGGE"should be "Figge"

Fig.1: First of all, North direction and scale bar are needed for the background map.

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However Authors might consider adding Lat-Lon grade on the frame to help Readers' orientation. The inset plots of Punta Arenas water isotopes show some weirdly positive d18O values. d18O composition goes above +5 (while dD is negative). The lower plots show that these unusual values are not linked to extreme warm or drought. I feel that these are unrealistic values. (I suspect sign error in the database, or isotopic enrichment due to inappropriate sample storage). Authors might test other GNIP records (Lago Roce, Coyhaique) whether they verify these unusually positive d18O (or the sign changed?) values. My personal experience with GNIP database is that erroneous records appear frequently. If there are no available stations to verify the unusually positive d18O values then Authors should test the robustness of the waterlines after these outliers are trimmed from the dataset.

Fig.2.: I recommend to use common reference period e.g. 1990-2002. It might alleviate the comparison of the interannual fluctuations. (or a 30 yrs long normal period if Authors accept my previous recommendation and use 100yrs-window, for instance, to demonstrate the instrumental climate history)

Interactive comment on Clim. Past Discuss., 8, 595, 2012.