

# ***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 #1**

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This paper presents an hypothesis for investigation of late-Holocene variations in hydroclimate and stable isotope composition of precipitation in South American peatlands. It integrates 25 years of instrumental records for mean monthly surface air temperature, precipitation as well as  $\delta D$  and  $\delta^{18}O$  in precipitation for two distinct geographic regions from Chile (Punta Arenas) and Argentina (Ushu). Instrumental data come from two stations from the Global Network for Isotopes in Precipitations (GNIP) where both show a decrease in  $\delta D$  and  $\delta^{18}O$  which the authors tried to link to recent atmospheric and meteorological changes. In the Punta Arenas station (Chile),

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the 1988-2010 meteorological series shows a slight decrease in precipitation and an increase in temperature while at Ushuaia (Argentina), the 1980-2004 meteorological series indicate an increase in annual mean precipitation but no change in temperatures. From the authors, these two distinct geographic locations are influenced by recent changes in the zonal intensity increase of the southern westerly wind belt that might explain these regional differences.

The paper is very well written and well structured. In the introduction, the overall climate context for southern South America is very well documented and supported by up-to-date literature. However, interpretation of peat reconstruction should be slightly moderated using for example data from Blaauw (2012) as peatbog archives **are** good proxy climate indicators but one must also take into account their autogenic dynamics when interpreting changes.

The other sections related to climate and  $\delta D$  are also very clear. The question that remains unsolved in this paper is how can  $\delta O18$  data be interpreted adequately in proxy records when they show contemporaneous similar response from two distinct regions with different atmospheric seasonal patterns? How can the data then be reliable when interpreting Holocene paleoclimate conditions in one or several regions? The authors have not been yet convincing that further  $\delta 18O$  proxy will strengthen the interpretation of the climate signal as contemporaneous surface data respond similarly to opposite changing conditions. It rather confirms the complexity of the precipitation isotope signal in the region but it does not provide yet from my opinion “ *the foundation for improved interpretation of the hydroclimatic and paleoisotope records from the Tierra del Fuego peatlands* ”. Modern measured data provide clear regional signal differences but show also recent trends in climate changes that might be uncertain to use as proxy indicators.

This paper needs to be published to present the documented complexity when using modern analogs for paleo reconstruction of climate. It might raise more questions than answers but is surely strengthen the need of further integrated multiproxies research.

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## Specific comments :

Abstract : lines 1-8 : True although it is not yet clearly demonstrated in the text.

lines 15-17 : here, this is well presented in the text although hard to constrain in paleoreconstructions

lines 20-22 : not sure that the paleoclimate data are consistent with the pattern in recent modern observations. This is not a straightforward one

lines 22-25 : this synchronicity is very interesting

Introduction : p. 597; lines 8-9 : with socio-economic importance : not relevant here  
p. 598; lines 17-20 : true

p. 599; lines 8-12 : also autogenous processes that cannot be left apart, at least add a mention

p. 600; line 20 : relatively hydrologically *resilient Sphagnum*

line 25 : paleoclimatic studies instead of hydroclimatic

p. 601; lines 16-19 : true but little different than what is presented in the precedent sections

p. 602; lines 1-2 : true, so how should the data presented in this paper be interpreted. Complexity should be raised here

Section 2 : very well presented

Section 3 : from page 604 ...  $\delta^{18}\text{O}$  precipitationation

page 605-606; from line 23... very interesting but how these recent changes over 20 years can be a valid proxy. There should be a justification in the text

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page 607 ; lines 1-3 : logic contemporaneous explanation  
lines 17-18 : disagree. Should be presented with the limits  
page 608; first paragraph : not convincing yet. Rephrase

Section 4 : very interesting these synchronic changes from AND-1 and northern England

although they are not so obvious on figure 3

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8, C333–C336, 2012

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