

## ***Interactive comment on “Southern hemisphere bog persists as a strong carbon sink during droughts” by Jordan P. Goodrich et al.***

### **Anonymous Referee #1**

Received and published: 3 May 2017

Review of Goodrich et al. BGD

#### General Comments

Goodrich et al. present results from an EC flux tower installed in a Empodisma robustum peatland over four years. Two of years have drought conditions for the summer period. The bog exhibited little sensitivity to the drought conditions and remained a C sink over the four years. Generally the paper is well written with a logical presentation. The work is very straight-forward as is the interpretation. I liked the paper and think it helps to fill in a whole in the literature for peatlands for regions outside the boreal. I found little fault with the study and anticipate it can be published with only minor revisions.

My main revision is to suggest a slight extension to the interpretation. I found the

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response of 2012 vs. 2015 quite interesting. While we have a nice record showing the climatic conditions of 2012 - 2015, we don't have any data showing pre-2012 conditions. Obviously that is pretty normal, however I wonder about using the nearby weather station from NIWA to help interpretation for 2012. Since there is likely 4 years of overlapping meteorological data for the study bog and the NIWA station, what about using that to give a look at how the previous years conditions could have impacted 2012? Yes, this would need to be couched in cautious language and it would need to be recognized that the two sites are not going to have identical conditions but I think it could add to the interpretation of the early part of the bog record. I think the added uncertainty of this extrapolation from the NIWA site is reasonable and could be presented in a manner that acknowledges the added uncertainty.

#### Specific Comments

Abstract does not have GWP defined.

p 2 | 3 - the Bousquet study is not peatlands specific but rather wetlands as a whole.

p 3 | 23 - Spaghnum and other mosses...sentence, please consider rewording, bit confusing as written.

p. 5 | 2 - While I don't expect a full discussion on neural networks, some better lead to up to 'four fuzzy datasets representing season' etc. would help your readers. ANN and similar techniques are becoming more common but it is helpful to give readers a bit more background on the technique.

Sec 2.4 while I understand the DOC export paper is in preparation, it would be good to have more numbers here. E.g. p 5 | 30 'strong relationship', how strong? The DOC work presented needs to be able to stand on its own in this paper, especially as the other paper is not submitted nor published.

p. 8 | 31 - I didn't follow this argument about shifting away from *E. robustum*, what is the basis of this argument? Is it meant that the actual vegetation distribution would shift

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due to ER demands?

p 11 | 16 - How deep is the peat?

Fig 7 - So each symbol represents one month right? That wasn't clear from the caption.

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