Hydrol. Earth Syst. Sci. Discuss., 9, C6584–C6587, 2013
www.hydrol-earth-syst-sci-discuss.net/9/C6584/2013/

Hydrology and Earth System Sciences Discussions

Interactive comment on "Temporal variation in depth to water table and hydrochemistry in three raised bogs and their laggs in coastal British Columbia, Canada" *by* S. A. Howie and H. J. van Meerveld

Anonymous Referee #2

Received and published: 2 February 2013

I reviewed this paper without reading the comments posted by the reviewer #1. Then, before writing down my comments, I had a look to what he/she had to say. I think I could have written this review myself! I almost have the same comments to express. I also took the time to read the answer of the author to the first reviewer comments. The following review is therefore considering all this commenting and replying iteration.

This article is evidently aiming to better understand the hydrology of laggs. However, I also think that the methodology used is inappropriate, especially because of the

piezometer/water table issue. Right from the start, I noticed a major problem, since the third sentence of the abstract rang to me as an alarm bell: "Depth to water table measurements in 25 piezometer. . .". The whole text should consider that the height of water measured in the tubes in this study were precisely water levels, and nothing more. The precisions added by the author in her reply are very important but it brings even more variations and uncertainties. Technically, a part of them acted as piezometers all the time, another part acted as piezometer during high water table events (i.e.: water table higher than the slots) and as wells during low WT events (i.e.: WT fluctuating within the slots), and finally, a part might even have acted all the time as wells. My experience using both wells and piezometer in peatland sites for many years, using Leveloggers for automatic water level monitoring, showed me that differences can sometimes be very little, but that most of the time piezometer can show anything but the real WT. Piezometers can show very different range of water level fluctuations, affecting both maximum and minimum values. I consider the additional figures provided in the reply usefull, but insufficient to put a blind confidence in the WL data provided. If the author want to go further with these data, it should explicitely consider that measured WL are sometimes heads and sometimes WT. This will affect both water level fluctuation and chemistry analysis. Major revisions will be needed.

I also believe the introduction is not putting in evidence that the issue here is to better understand the lagg. The 14071:22 to 14072:7 section should appear at the first lines of the introduction. Part of it could be shorten or better linked to the lag issue. The second objectives comes from nowhere for the reader. The 14071:7-12 should come earlier, and be supported by references. I also think that the logging watering up should be stated as an "official" objective.

14072 second paragraph: I believe that the table 1 is never linked in the text. . .

14073:15-25: This would be much easier to understand if put in the form of a table.

14074:1-5: Lagg1 and lagg2 are not defined here while used in table2.

14074:18: The author will have to add here complete and complex explanation of the distance of the slots to the surface of the peat. And try to find a way to make the measured water levels understandable, comparable and valuable.

14076:18 a maximum value should be a unique value, not a range.

14077:4-15: The comparison of the watering up should be illustrated with relative change to the other WL values of the same transect, not the other lag sites. This is mostly because of the sampling procedure. WL measured on a transect were done on the same day, therefore they are more reliably linked.

14077:11 The Salal explanations seems to be a weak explanation for such a difference in reaction to watering up. Further examination of the data should be done here.

14077:20 and 14078:5: If I understand well these sentences, this is the main evidence on which you prove that the second objective is reached for pH and EC. To me, it is a relevant impression at most. Demonstrating that a single value is enough to show a whole season hydrochemistry is a much more complicated hypothesis than it seems! It would have been necessary to have hundreds of samples, collected in wells (!) and a very solid statistical analysis to show its validity. There is not even here a graph showing the residual difference of monthly fluctuations compared to the long term average to enable the reader to see that what you suggest is true. Therefore, I believe that the second objective should be omitted from the study since the methodology used is incomplete to properly prove the hypothesis. I would recommend keeping the information in the result and discussion section in order to show that the tendency you observed is worth knowing.

14080:19 A significant ANOVA value tells you that at least one of the class variable you used was different from the others. To know which one, you have to do a multiple comparison test. This was omitted here but it should definitely appear.

14081:17-19: This statement is false. Your data, taken very sporadically, with weeks

intervals, are surely far from having caught the real minimal and maximal values of the water levels. Relying on so few values to describe sites is to me an oversimplification of the hydrological behaviour of peatlands. Years of continuous hourly water table monitoring tells me that water table moves a lot and quickly in peatland, especially following intense precipitations. I understand that environmental legislators want to describe simply the hydrology of peatland, but as a researcher, I cannot accept to go this far, without enough solid proven facts.

14082:7-8: This sentence just proves exactly what I think of the chemical data that was gathered: It is difficult to explain because it is buffered, with different intensity relative to the depth of the piezometer.

14082:17-18: These rapid impact explanations seem odd since the water in the piezometers should be buffered. . .

14084:14-30 and more: The DOC section should appear in the introduction and in the result section!

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 14065, 2012.