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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Regional and local patterns in depth to water table, hydrochemistry, and peat properties of bogs and their laggs in coastal British Columbia" *by* S. A. Howie and H. J. van Meerveld

Anonymous Referee #1

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Review of - hessd-10-3143-2013: "Regional and local patterns in depth to water table, hydrochemistry, and peat properties of bogs and their laggs in coastal British Columbia" by Howie and van Meerveld.

General Comments:

This paper attempts to show how hydrological and hydrochemical gradients can be used to classify the transitions that occur at the margins of bogs – the transition from peat to mineral soil and specifically the role of the lagg zone. The goal is to use these

classifications to guide restoration efforts. This study concentrated on coastal and near coastal wetlands that have, by their location, some inherent differences - e.g. effect of sea spray on precipitation chemical composition, latitudinal effects on rainfall and temperature. Using a battery of measurements – depth to water table, pH, electrical conductivity, calcium content, and other parameters that are commonly determined in wetland studies; the authors describe local gradients across the transition zone and show some regional differences.

Despite a good merging of points and impressions derived from literature and the corroboration of those impressions by the results presented for this set of coastal bogs, I don't see much contribution to new understanding beyond that corroboration and a specific demonstration of it for these British Columbia bogs – except for a clear demonstration of the ash content gradients (Fig 4) in all regions studied, a parameter which is not often reported but could prove useful. The authors conclude that the properties of local analogues should be the primary source of information to guide restoration efforts. Regional differences in the character of bogs and their laggs can be so great that the characteristics of a bog/lagg system in one British Columbia region cannot be used as a template for restoring a system in another. These are useful conclusions but hardly unanticipated.

The authors organized the paper well with appropriate grouping of their observations. They were reasonably successful in combining results and discussion which kept the manuscript size down and avoided the often tedious trip through tables and figures in succession; but I encourage them to review the manuscript again and look for areas where tighter control of the writing would be beneficial.

I have some specific comments below regarding some of the data in and presentation of the tables that I consider important to resolve and an uncertainty about the added value that the statistical treatments provide to the conclusions.

Specific Comments:

Water Table Gradients: There is a problem with values in Table 2 which lists depth to water table for all sampling positions and water table gradients between the R1 to LG positions at all sites. The measured "depth to water table" is assumed to be positive cm down from the bog surface, so smaller values indicate "higher" or "shallower" water table elevation and larger values indicate "lower" or "deeper". Negative values are above the bog surface according to the caption. The caption also assists in explaining the meaning of positive and negative water table gradients – a term that seems more appropriate as used here than "hydraulic gradient".

Some of the values for water table gradient are positive and some are negative, but not all have the correct sign in Table 2. I cannot judge the actual values of the water table gradient since the distances between the R1 and LG are not given, but I have checked the signs of the gradients based on the "depth to water table" values given. Six of the sites have the correct sign (Tow Hill, Butze, Shorepine W & E, Burns SW and Blaney UP) and ten have the incorrect sign (Mayer, Drizzle, Diana, Oliver, Pt. McNeill, Campbell, Burns CW, Surry, and Langley). Five of these sites are depicted in Figure 2 and of those five, three show the correct gradient sign in Fig 2 and Tab 2. One shows a correct gradient sign in Fig 2 but not Tab 2, and another is incorrect for both.

The description of the distribution of water table gradients from p3154 line 27 through p3155 line 1 suggests that all water table gradients are positive which is at odds with the values shown in Table 2 AND the correct signs which I observed from a re-examination of Table 2.

Finally the water table elevation for the Oliver Lake is shown as positive in Table 2, when it should be negative which means that the statement in lines 2-6 on p 3155 needs to be revisited. Fortunately these R1-LG water table gradients don't appear to be used in any other parts of the manuscript (maybe they should be deleted!), but the more general water table gradient from BG to MN is discussed several times.

In Table 3 what does the "position on the transect" mean - BG=1 . . . MN=5? Is this

table used for any of the conclusions? There are hardly any values on this table.

The caption in Table 4 states that the top half of the table shows Pearson and the bottom half shows Spearman correlation coefficients. It would be more clear to state which parameters are for each either by superscript or a more detailed explanation, or maybe part a and b of the table. Does top half mean Lat., WR, PD, P, pH and EC are Pearson – and that means that $\frac{1}{4}$ of the table is Pearson? It's not clear to me how to interpret the correlation values, e.g. is Lat vs Acid 0.844 (Pearson) or -0.953 (Spearman)? What about Mg vs Na 0.697 or 0.827 (both Spearman?)? There is a paragraph in the Methods section on page 3153 that attempts to explain this but it also is pretty confusing.

Statistics — The questionable nature of Tables 3 and 4, as well as the paucity of clear references to these statistics in the text makes me wonder if they are needed at all. Yet there are several places where "significant differences" are claimed but they don't seem to be on these tables (see Technical Comments). The first part of the conclusions is somewhat evident just by looking at Figs 6, 7, 8 – the statistics don't help.

Technical Comments:

P3153 L23-25 – The T-Test is mentioned but not given in any Tables. Is this the "significant differences referred to at: P3158 L8-9;

P 3154, L 27 – Change hydraulic gradient to water table gradient

P3156, L2-6 – Cannot find the "significant" results on Table 3 or 4, but it is generally visible in Fig 3.

P3158, L14-15 – Significant correlation not shown on tables.

P3160, L6-14 – The authors chose to show the "few" significant correlations in Table 3 but not the grouped data that were significant for all regions.

P3161 – There is a sudden "clustering" of data which requires more explanation and

doesn't appear on any table or figures.

P3162, L19-21 – It's not clear in the methods section whether "acidity" was a separate measure - like a Gran Titration, or just a separate measure of pH for collected water. If the former then no problem, if the latter then the "correlation" mentioned in this sentence is an "auto correlation".

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