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Interactive comment on “Short-term spatio-temporal spring grassland fire effects on soil colour, organic matter and water repellency in Lithuania” by P. Pereira et al.

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Received and published: 3 January 2014

This manuscript deals with the effects of a low intensity fire on a grassland soil for 9 months and falls within the scope of the SE journal. It is focused on the effects on colour, organic matter (OM) and water repellence (WR). The topic of the research is not novel, nor the methodology and conclusions obtained. In fact, there is not a thorough assessment of trying to explain WR dynamics, causes and factors controlling this property; the manuscript (MS) does not deepen in further analyses to provide new insights about these properties. It is a descriptive study about field effects of a fire during a short period of time. Nonetheless, data is interesting for boreal landscapes, not as

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studied as other environments, with special interest in the different persistence of WR in finer soil fractions. In fact, this is the most interesting report on this MS, the different behaviour of WR in terms of soil fractions. The scientific methods are valid although some clarifications must be made, and some assumptions in the Discussion should be checked. One important issue is the MS title. It reads “Short-term spatio-temporal”, but no result is shown dealing with spatial variations. Thus, title must be changed to only show temporal fire effects. The language is not always clear, and sometimes is too basic, with weird structures. Thus, language must be revised by a Proficient in English. I expose below the major comments (page/line): Abstract P2121/L17. Are you so sure that leaching is the cause for WP reduction? I do not see it so clear, and with the design you have developed in this study is impossible to conclude this. P2121/L18-19. Delete this sentence about spatial variability. You do not show any result about spatial variability. P2121/L23-24. You confirm here that repellent compounds were leached at different rates according to particle size. Firstly, I do not see clear evidence about leaching being the only factor involved in the decrease of WP, and secondly, you have not proved that leaching rate is different. You only know that WP disappears faster in coarse fractions. Thus, you must rewrite this sentence. Try to be more objective and focus on your findings. P2121/L24-25. You conclude that impacts of this fire are not a threat to this ecosystem, but you are so sure to conclude this only taking into account colour, OM and WP evolution? I do not think that with these three unique properties this assertion can be declared. Delete this sentence or rewrite it. In fact along the discussion you must give more arguments to justify this assertion, because I do not think you have enough information for that with your only data.

Introduction/Objectives P2124/L26-27. Give an initial hypothesis to enforce the need for you study. Explain the results you expected to find when designing the study and justify the need for that.

Statistical Analysis -It is strange that despite the high variability of data, normality was achieved after some transformations. Please check it. -I do not agree with the statis-

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tical analysis you have developed. I do not understand why you have considered that your samples are dependent to carry out a repeated measures ANOVA. In my opinion, samples are independent, since you are not sampling the same “individual”. I do not think that the factor “time” should be included as within-subject factor since samples assessed at each different sampling are different, they are not the same. Thus, if normality is assured, you should carry out a two-way or one-way ANOVA for independent variables. Material and Methods I suggest to avoid the reiterative use of “we...”. Try to be more impersonal.

Results -Along the entire MS you use the word “treatment”, and it is not clear what you mean with this word. I guess you mean burned/unburned soil. If so, explain in the Materials and Methods section that your treatment is a burned soil and an unburned soil, otherwise is difficult to understand. -Along the entire MS you use the terms “control” and “unburned” interchangeable. Please, use always the same term to make it clear to reader. -Replace “period” by “sampling date” along the entire manuscript. -You have developed a two-way ANOVA showing the results for the interaction “treatment” X time. However, later no discussion is carried out in terms of this. Please, try to analyze these interactions and extract some discussion or explanation, or delete the results for the two-way ANOVA since no useful information is provided in the way they are shown. I recommend you to interpret the results given by those interactions. -Section 3.3. Correlations. Make a partial correlation between SWR and soil colour with SOM as control variable, since maybe the correlation SWR with colour is indirectly affected by the correlation between SOM and colour. It could also be helpful for discussion.

Discussion Section 4.1. You speak about soil colour changes, but what you used to carry out the analyses is only the chroma. Revise. P2130/L1-13. Here you write that vegetation totally recovered in the burned area in two months. Please, provide a table with vegetation cover and plant species present in each soil sampling, since it is necessary so reader can understand results. Include the fact that vegetation cover was recovered after two months in the Materials and Methods section when explaining the

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sampling procedure. P2130/L12-13. You write here that the fire was not considered a threat to the ecosystem. You conclude this by the fact that the vegetation was rapidly recovered? Explain better and justify this assertion. I do not think you can conclude this only using the properties measured in this MS, as I exposed above. P2130/L22. You explain that OM decrease can be attributed to plant nutrient consumption and recovery. What do you mean with this sentence? For plants to consume nutrients, OM must be mineralized, so nutrients are released. So, decreases in OM with time can be due to fast mineralization owing to active microbial communities. Rewrite this sentence and explain better. Section 4.2. You only report leaching as a process responsible for WR decrease with time. However, could OM mineralization be responsible somehow for decreases in WR, in composite samples and also in the different fractions? Please discuss. P2133/L3-15. You should have weighed the different size fractions to conclude that fire has or not modified the proportion of each size class. Since you do not show these data, I recommend you to delete this entire paragraph since it is too hypothetic and does not provide consistent information. P2133/L28 – P2134/L2. How nutrients leaching (such as N, P, K, Ca, etc) leads to decreases in WR? Please explain.

Tables Tables 3 and 4. These two tables are complementary, so I suggest combining both tables in an only one. This will make data easier to understand. Use the format of Table 4, and include in each cell the mean (minimum-maximum). To show differences among fractions, you can use upper case for sampling date, lower case for fractions and a symbol like * to indicate differences between control and burned soil within each sampling date. Do no title the table as summary of ANOVA results since it is not. Title as, for example, Water drop penetration time (s) in terms of the different size fractions for control and burned soil in the different sampling dates.

Figures -Revise the captions of all figures since it is not corrected written. I guess you mean "...in the burned and unburned plots in the ...". -Add standard deviation in all figures instead of 95% confidence interval. -When no differences are found among the levels of one factor, there is no need to include the same letter.

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Minor comments are directly exposed in the attached pdf file.

Please also note the supplement to this comment:

<http://www.solid-earth-discuss.net/5/C828/2014/sed-5-C828-2014-supplement.pdf>

Interactive comment on Solid Earth Discuss., 5, 2119, 2013.

SED

5, C828–C832, 2014

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