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Interactive comment on “Stability and biodegradability of humic substances from Arctic soils of Western Siberia: insights from ¹³C-NMR spectroscopy and elemental analysis” by E. Ejarque and E. Abakumov

Anonymous Referee #3

Received and published: 27 November 2015

The paper by Ejarque and Abakumov focuses on a topic of great interest for Solid Earth readership, i.e. the possible influence of climate changes on organic matter (SOM) stability and evolution in soils from Western Siberia. Both bulk organic matter and the corresponding humic acid fraction were considered in this study. The paper is generally well written, although several paragraphs need to be revised (as not clear or containing typing mistakes). The paper is not always well organized; in detail, part of the Introduction should be moved to the Materials and Methods, the discussion of the results

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improved, and major findings of this paper compared with what is already present in literature. Finally, I would suggest to avoid reporting references also in the Conclusion paragraph. In few words, I do not consider this work as relevant/original enough or of added value that deserves publication in this journal, at least in the present status. Several papers have been published on the same topic, even though in other areas of Arctic region; unlikely, the Authors did not underline sufficiently the (innovative) contribution that this article provides with respect to what is already present in literature. As a consequence, major revisions are needed before publication.

Further, more detailed comments: p 3021, title. Replace “humic substances” with “humic acids”, as the fulvic and humin fraction were not considered. p. 3023, lines 1-10. I would suggest to consider that warmer temperatures at high latitudes are already resulting in unprecedented permafrost thaw, leaving large organic C pools exposed to fires (and especially smouldering) for the first time in millennia (Geochim. Cosmochim. Acta, 137, 2014, 134–146; G. Rein, Smouldering fires and natural fuels, Chapter 2, 2013). p. 3024, line 17. Replace “humification” with “mineralization”. p. 3027, line 24. It is not clear to me why soils were 1-mm sieved. Normally, the fine earth fraction is defined as <2mm! p. 3028, line 5. Replace “690 nm” with “665 nm” p. 3031, paragraph 3.2. Did you calculate the extraction yield of HA? p. 3031, lines 20-30. Is there a correlation between H/C and E4/E6? Both are possible indices of humification.. p. 3032, lines 7-9. Please consider that the C/N ratio is affected also by the origin (e.g., botanical composition) of the soil organic matter. p. 3036, line 12. I would avoid using the word “profile”, as, in most of the cases, the Authors studied only the first 5-to-10 cm of depth. p. 3036, lines 18-24. I would suggest to compare your findings with other studies, even though they were conducted in different environments. For example, in a previous study carried out in a peatland located in Northwest Territories, Canada (Org. Geochem., 42, 2011, 399-408), the low degree of humification of the organic material was also reported, as well as the influence of permafrost on the low content of HA in this peat. Table 1. I would suggest to reduce the number of decimal places. Table 2. I would suggest using only one decimal place. What about S? Figure 3. I would suggest

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to try plotting together also the H/C and the O/C ratios. References. I would suggest to consider also Bockheim, 2015. The soils in Antarctica.

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