Clim. Past Discuss.,
https://doi.org/10.5194/cp-2018-130-RC1, 2018

Climate of the Past Discussions

Interactive comment on "The onset of Neoglaciation in Iceland and the 4.2 ka event" *by* Áslaug Geirsdóttir et al.

Anonymous Referee #1

Received and published: 19 November 2018

The overall quality of the discussion paper ("general comments") The paper summarizes six normalized series of sediment proxies (BSi, TOC, δ13C, C/N, MS, δ15N) from seven lakes with high accumulation rate in Iceland. This way the authors demonstrated the general trends in summer temperature changes and glacier fluctuations in the region. They also discussed potential drivers of these variations, including the orbital forcing, explaining the long-term trend of the holocene summer temperature changes, superimposed with higher frequency perturbations such as local volcanic eruptions and sea ice variability. I really liked the approach: the multi-proxy and multi-lake together make it possible to minimize the individual specificity of each of the lakes and allow the identification of the regional patterns. This has already been done for two lakes earlier, but now the aggregated data is from seven lakes of different origin, located in different

landscape zones and with different types of sediment accumulation. It is important that the signal coincides in many ways and allows to make all lakes-composite. Obviously, all the lake sediment series are well dated and the 14C dates are cross-referenced with tephras, so there should be no questions about the chronology of events. The interpretation of the onset of the Neoglaciation in Iceland and explanations from the point of view of forcing also sound rather convincing to me. The goal of the paper is clear and well defined. The paper is well designed and written, illustrated by informative figures and tables. The methodology is valid and correct. Overall, the paper is of value for a large scientific audience. I think that after very minor corrections the paper is ready for publication.

Individual scientific questions/issues ("specific comments") It seemed to me that it was not completely obvious why these six proxies were chosen. Can you please specify the processes of the selection of proxies. Three of them (BSi, d13C, d15N) reflect bioproductivity and summer temperature, and other three (TOC, MS, C / N) - erosion activity during the cold period. It is curious that TOC refers to the cold period. The authors argue that the TOC increases due to soil erosion occurring during the cold, dry and windy seasons (Geirsdóttir et al., 2009b). However, the logic might be different: more organic material is transported in the lakes due to more intensive precipitation and snow melt. I would suggest to expand a little this part and explain the mechanisms.

A few interesting questions remained outside the scope of the paper, although they might be interesting for the reader.

It would be helpful to compare the reconstruction provided in this paper with those based on pollen analyses. Are they coherent? The dates of moraines are not mentioned. Do they agree with the sediment records? The modern warming is not manifested in the records (see fig. 5c). What is going on nowadays in this region? I think a few words on the current climate trends (including seasonality)in the region are necessary. The Medieval Climatic Anomaly is not mentioned and discussed here. What is your opinion on this? All lake records indicate a strong decline in temperature $\sim$1.5 ka.

Can you suggest an explanation for the absence of the MCA in this region unlike some other areas in the North Atlantic? I am not sure why the authors limit themselves by the Neoglacial time having the complete Holocene records? I would suggest to reconsider the title. They state that the 4.2 ka event is undistinguishable in the period 4.0 - 4.5 ka, so why it should be the focus and mentioned even in the title? Technical corrections Đă 10 line 4 The current ELA pattern reflects reflect the patterns and temperature and precipitation across Iceland – please edit

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