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Interactive comment on "Characterising organic carbon sources in Anthropocene affected Arctic upland lake catchments, Disko Island, West Greenland" *by* Mark A. Stevenson et al.

Anonymous Referee #1

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This a solid contribution that documents the impact of recent warming on the productivity of âĂŤ and flux of carbon toâĂŤ arctic lakes. While I am not an organic geochemist and cannot comment on that aspect of the paper, the straightforward interpretation of the d13C, C/N, and pigment data clearly reveal an increase in the autochthonous input of organic matter to lacustrine sedimentary sequences after the end of the Little Ice Age.

I have a couple of questions regarding the limnologic response to the warming.

First, there appear to be a threshold response of C/N and d13C rather than a gradual response. WHat is the origin of this threshold response? Is it simply a build up of

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nutrients in the water column that reaches some critical level that drives a lakes trophic system to increase substantially? Are there watershed filters at work that delay the response of a lake as recorded in the Disko 1 core?

Second, the main lacustrine response appears to take place in the middle of the 20th century, well after the end of the LIA. Again, is this reflecting a threshold temperature response by arctic lakes of regional warming? Or, was warming much more pronounced in the middle 20th century than 100 years earlier, when the LIA ended? Or, are there issues with the age model that could explain this difference.

Thirdly, how much would the plots of total C change when plotted as flux (mg/cmˆ2/yr-1 rather than %)? THe inflection in the age model might have a small effect on the shape of the C flux curve.

Lastly, what is the source of nutrients to these lakes. Mention is made of soil derived nutrients, but what about eolian accumulation of N and P on glacier surfaces that then are liberated to lake upon ice retreat.

Finally, the 137Cs data points are NOT clear on Fig.6

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