

Interactive comment on “The catastrophic thermokarst lake drainage events of 2018 in northwestern Alaska: Fast-forward into the future” by Ingmar Nitze et al.

Anonymous Referee #2

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This paper presents interesting and novel research on how quickly lake drainage can happen over a substantial area when extreme weather events occurs. The paper is overall good and easy to follow but there are a few comments that I would suggest that the authors consider before publication.

Major comments: - Why did you choose to do the comparison between 1999-2014 and 2017-2018 and leave out 2015 and 2016? Would be good if you could motivate this as I assume it has a scientific reason. - In the aim it is stated that this study should investigate weather and climate data as well as modelled lake ice conditions as potential drivers of the widespread lake drainage. The results from the modelled

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part are not well covered in the discussion. At present, section 4.2.2. and 4.3 can be deleted or the results should be better incorporated in the discussions. - Why did you choose to work on lakes larger than 1 ha? I assume you could have included smaller lakes as well with the resolution of your data set and given the possible importance of the smaller lakes for GHG emissions (See e.g. Kuhn et al., 2018. Emissions from thaw ponds largely offset the carbon sink of northern permafrost wetlands. Scientific reports), it would be great if you could please add a sentence about why you chose to only work on lakes with this size. - In the discussion the influencing factors are discussed, many sentences states that it is likely.... Would it not be possible to make a multiple regression with the climate parameters (that have already been analysed) to see if you have any statistically significant connections?

Minor comments: Line 34 – Brown et al., 1997 is missing from the ref list Line 39 – Nitze et al., 2018 should it be a or b? Line 40 – Pastick et al., 2015 is missing from the ref list Line 41 – Liljedahl et al., 2015 is missing from the ref list Line 53 – Jones and Arp, 2015 is missing from the ref list Line 65 – Lawrence and Slater, 2005 is missing from the ref list Line 70 – Nitze et al.. 2018 should it be a or b? Line 71 – Nitze et al.. 2018 should it be a or b? Line 109 – Hopkins et al., 1955 should be Hopkins, 1955? Line 188 – Nitze et al., 2018 should it be a or b? Line 204-205 – Lakes where the timing could not be detected manually, e.g. in case of very subtle drainage, were assigned no drainage year (25 of 270); what does the numbers in the parentheses mean? Line 212 – Perhaps a good idea to refer to Figure 1a after Kotzebue? Line 281 – I suggest to remove the heading 4.1.2 as then you will have the same style for both 2017-2018 comparison and the past comparison. Line 352 – refers to Table 5 which I could not find in the manuscript Line 435 - Walter Anthony et al., 2014 is not in the reference list Line 442 – Smith et al., 2003 is not in the reference list Line 443 – remove too in the beginning of this line Line 642 - Nitze and Grosse, 2016, is this reference referred to in the running text? Line 660 – Pastick et al., 2019, is this reference referred to in the running text? Line 713 – Figure 1. This figure is fairly “empty”. Consider to include the lakes from table 2 in the map. Maybe also include Nome that you mentions weather

data from in section 4.2.1? Line 727 – Figure 3. What does hillshade stand for? I cannot detect it in the figure Line 732 – Figure 4 – Suggest to move “remaining pools” to figure d where it is mentioned. Line 739 – Figure 5 – I think it is quite confusing with the greyscale on the dots, maybe you can have one colour per decade or something (with a legend outside of the box).

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2020-106>, 2020.

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