The Cryosphere Discussions

The Cryosphere Discuss., referee comment RC1
https://doi.org/10.5194/tc-2020-351-RC1, 2021

Comment on tc-2020-351

Jan Nitzbon (Referee)

Referee comment on "New insights into the drainage of inundated ice-wedge polygons using fundamental hydrologic principles" by Dylan R. Harp et al., The Cryosphere Discuss., https://doi.org/10.5194/tc-2020-351-RC1, 2021

In the present paper the authors investigate a novel analytical model which conceptualizes the hydrological drainage dynamics of inundated ice-wedge polygon centers in Arctic lowlands. I have already reviewed an earlier submission of this manuscript with TC (https://tc.copernicus.org/preprints/tc-2020-100/tc-2020-100-RC1.pdf). One of my major concerns with the previous submission was, that the article by Zlotnik et al. (2020) which introduces the analytical model had not undergone peer-review at the time of the initial submission. This point is now obsolete, as the model description and validation article has been published in a peer-reviewed journal (http://www.mdpi.com/2073-4441/12/12/3376).

The present article is well-written, well-presented, and certainly of interest to the readers of TC as the topic is important and timely. In particular, I have seen that the authors addressed almost all major and minor points which I raised when reviewing the first submission of this article. Hence, I support publication of this article in TC after addressing some minor, mostly technical, points which I noticed during reading.

Specific comments

- The introduction of the article is quite long and should be shortened and streamlined. For instance, I would suggest to shorten on detailed descriptions and justifications which should rather be presented in the Methods or Discussions sections, respectively (e.g. lines 84-87, lines 107-110, lines 112f).

- In the abstract (l. 7) the authors state to investigate ``inter-annual increases'' in active layer thickness. While I understand that this is only done indirectly via the variation of aspect ratios, it would be nice to provide a discussion of the effect of active-layer deepening, similar to what is done for the seasonal thaw-depth increase in lines 323ff.

Technical corrections

- l. 2: I think ``transitions from methane to carbon dioxide dominated emissions'' would describe the implication of polygon drainage better.

- l. 68:``ice-wedge surface hydrology'' might be a confusing terminology. Maybe rephrase this to ``(ice-wedge) polygon surface hydrology'' or ``polygonal tundra surface hydrology''.

- l. 319: Do you mean ``affecting''?

- l. 345: Do you mean Abolt et al. (2020) (JGR: Earth Surface), which I suggested to discuss in the first review? To my understanding Abolt et al. (2018) do not discuss the effect of trough geometry.

- l. 385: should be ``that'' instead of ``this''

- The references Atchley et al. (2015) and Harp et al. (2015) are for the Discussion papers, but not for the final revised articles. You probably want to change this.

- Fig. 5 and 8: Consider leaving away the decimal points (.000) at the contour line labels.