

Interactive comment on “Seasonal thaw settlement at drained thermokarst lake basins, Arctic Alaska” by L. Liu et al.

L. Liu et al.

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We thank the reviewer for his/her constructive comments. We have addressed all of them and made the suggested changes in the new version of our manuscript. Our point-by-point replies (in black) to their critical comments (in blue) are listed below.

This linked pdf file is our revised manuscript with all changes highlighted in yellow
<http://www.the-cryosphere-discuss.net/7/C3360/2014/tcd-7-C3360-2014-supplement.pdf>

Please note that the page/line numbers are different in the original discussion paper and our revised paper. And we refer to the corresponding numbers in our revised paper in our replies.

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- around page 5796, line 11. You mention the potential impact on geomorphology and hydrology, but without details. A bit more details are scattered over the paper at several places, but it would be good to have one clear paragraph dedicated to the relevance of the study in the intro.

AUTHORS: As suggested, we grouped the relevant text into a paragraph on the importance of DTLB dynamics in the introduction section. Now it reads “Here we investigate the dynamic states of DTLBs, which are important for landscape stability at regional scales. In addition to this geomorphic impacts, surface deformation changes surface hydrologic conditions, vegetation, and thermal conditions. Moreover, surface deformation at DTLBs can potentially affect carbon exchange and stability of the permafrost carbon pool. Lastly, DTLBs in our study area are undergoing large seasonal changes, which will be presented in this study.” (pages 2–3, lines 52–57)

- page 5804, line 8. How and how well do you actually know the start and end of the active layer thaw season?

AUTHORS: Generally, we use air/soil temperature records to determine the start and the end of thaw seasons. In the context of this paragraph describing a specific interferogram, our point is that the two SAR images were taken approximately at the start and end of the 2007 thaw season. We have clarified this sentence as: “The interferogram in Fig. 3 was formed using SAR images taken on 13 June 2007 and 13 September 2007, approximately at the start and end of the 2007 thaw season, respectively, ...” (page 8, lines 247–248).

- I might have missed: You could discuss (more) about the spatial differences in results over the different drained lakes. What could it tell that the thaw settlement varies? Water content?

AUTHORS: We chose not to further discuss the spatial differences in thaw settlement

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at different basins and only to point out the difficulty in assigning an exact mechanism(s) for such spatial differences due to lack of ground-based measurements in the discussion section:

“We expect that remote-sensed surface deformation maps will show spatial variations at different DTLBs similar to what this study presents. Such spatial variations reflect the active layer water content, which depends on various physical properties such as active layer thickness, saturation fraction, soil porosity, and ground ice content. Investigating the mechanism(s) of such spatial variations requires detailed ground-based measurements. InSAR maps will be useful to provide guidance to plan and conduct field measurements.” (page 11, lines 366–371)

- Fig 1b. Try to modify the color scale/figure so that one can also recognize the topography within the drained lake. Would be interesting to see if the spatial variations in thaw settlement are in parts related to topography. Unless the area is REALLY flat. In the latter case give some numbers in the text.

AUTHORS: See figure below as a reference for the elevation map with a much narrower color range as to show the elevation changes inside the basin. We don't use this color scale in the paper. Instead, we quantify the flatness as “The basin is flat with only a peak-to-peak variation of 0.6 m within the perimeter (Fig. 1b).” (page 3, lines 83–84)

Interactive comment on The Cryosphere Discuss., 7, 5793, 2013.

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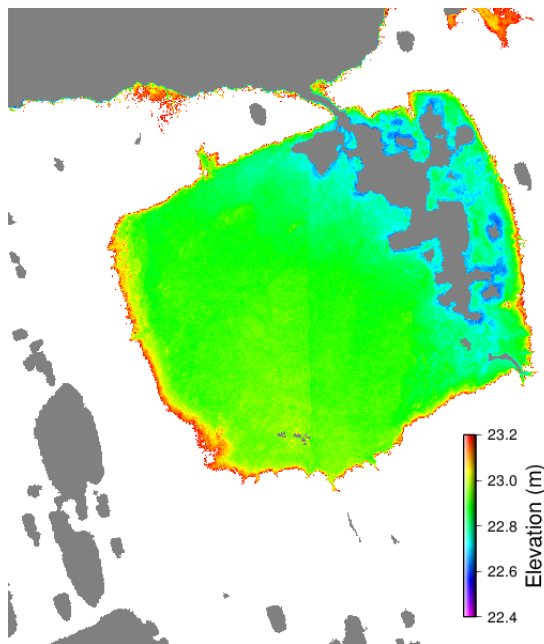


Fig. 1.

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