

Review of Howat et al., TC, November 2014

In their paper, Howat et al. used imagery and multiple elevation dataset to describe the formation of a 70-m depression in the upper ablation zone of the west Greenland Ice Sheet (GIS), in just a few days in early July 2011. They interpret this rapid collapse of the ice sheet surface as the expression of the drainage of a subglacial lake that stored surface melt-water in a lake located 1000 m under the ice. To the author's knowledge (and also mine), this is the first time that drainage of a subglacial lake is describe under the GIS. The brief communication is well-written, the topic relevant to the journal audience and thus I recommend prompt publication. The general and specific comments below are mainly here to propose some clarifications and improvements to the study.

General comments.

Did the authors thought about giving a name to this lake for future reference in the literature?

A location map is really missing. What about an inset in Figure 1?

Why did not the authors use the ASTER data (imagery and DEMs) also available over their study site? ASTER DEM are less accurate than the elevation data they used but, once vertically adjusted, may provide some additional insight into the timing of the pre- and post- drainage surface elevation changes. I checked the archive of ASTER images and found a dozen of cloud free images and some of them (acquired 2002-07-21, 2012-07-16 & 2012-08-17 among others) seem to lead to very useful DEMs. I know it means some additional work but I think it is worth exploring all the available data.

A depression of similar depth (~70 m) but over a much larger area (about 5 km²), has recently been detected at the surface of the East Antarctic Ice Sheet, initially by (Smith et al., 2009) and studied in depth with similar remote sensing data as in the present study later (Flament et al., 2014; McMillan et al., 2013). It is probably worth referring to those studies in the present article given the similarity of the maximum surface lowering.

I am very curious to learn how this depression was first detected. On imagery? or on DEM? By chance? I guess others readers will be curious too. Can you provide this in a short sentence for example in the "author contribution" section if you do not think it is relevant for the main text.

Specific comments.

P5363 L18. I think the section "observations" should start about here.

P5363 L27. What is the size (km²) of the depression?

P5363 L29. Size (km²) of the area covered by water. Given that water is found in the depression, your depression volume is a lower bound, right? To mention

P5364 L8. space missing

P5364 L12. can use WV1 here (acronym defined already)

P5364 L23. "at the location" rather than "in the location" (???)

P5364 L26. "of" missing between "margin" and "what" I think.

P5365 L19. What about "the surface depression is located at the vertical of a reversed...".?

P5365 L24. Like in the previous comment, maybe good to clarify that the depression described here is at the surface (and not the bedrock one)

P5366 L1. A reference (a review by R. Bell?) for this general statement about Antarctic subglacial lakes would be welcome.

P5366 L23. I suggest adding "of this lake to the ice sheet margin"

P5368 L9. "it's" -> "its"

P5368 L15. "Finally, the depression refills quickly after the collapse". Seems somewhat in contradiction with "Thus, failure of the lake to refill" (P5367, L21). Reconcile.

P5368 L25. The SPOT5 data are not described here.

Figure 1. What about adding annotations on the Landsat images to help the reader visualize what is described in the text (not so easy...)

Figure 3D. Could change the vertical axis so that the two curves do not intersect. Could use two different colours for the curves (to better distinguish them) and the same colours for the two corresponding vertical axes. Legend: DEM's --> DEMs.

References cited in my review

Flament, T., Berthier, E. and Rémy, F.: Cascading water underneath Wilkes Land, East Antarctic ice sheet, observed using altimetry and digital elevation models, *The Cryosphere*, 8(2), 673–687, doi:10.5194/tc-8-673-2014, 2014.

McMillan, M., Corr, H., Shepherd, A., Ridout, A., Laxon, S. and Cullen, R.: Three-dimensional mapping by CryoSat-2 of subglacial lake volume changes, *Geophys. Res. Lett.*, 40(16), 4321–4327, doi:10.1002/grl.50689, 2013.

Smith, B. E., Fricker, H. A., Joughin, I. R. and Tulaczyk, S.: An inventory of active subglacial lakes in Antarctica detected by ICESat (2003-2008), *Journal of Glaciology*, 55(192), 573–595, 2009.