

Interactive comment on “Aerogeophysical characterization of an active subglacial lake system in the David Glacier catchment, Antarctica” by Laura E. Lindzey et al.

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Summary

This manuscript describes a new aerogeophysical survey of the area upstream of the David Glacier terminus near the South Korean base there. It describes in detail the scientific motivations, instruments and platform used, surveys, data and implications. A key result is not necessarily a new one – that subglacial lakes appear quite different in altimetry vs. radar sounding. However, the lake system considered includes two good-

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size, candidate lakes, the survey is high-resolution, and the conclusions are perhaps stronger than is possible from previous comparable studies.

As a whole, this manuscript is quite impressive. It is not easy to relatively concisely convey as much meaningful information as done in this manuscript. From a bird's eye view, the manuscript summarizes an entire, substantial aerogeophysical survey of an area that has heretofore received less attention, carefully informs the reader and outlines a sincere attempt at reconciling the mismatch between altimetry radar sounding over active subglacial lakes. Overall, it represents a substantial contribution and is appropriate to The Cryosphere. In the details, the manuscript rarely misses a beat. I have only a few concerns listed below and cannot consider any of them more than minor.

Comments

2/5: Explain more clearly here why Siegfried and Fricker (2018) didn't consider these to be “true” lake features. This is reconsidered later on but is awkward as left hanging here.

6/10-16: Given that a new antenna system is introduced, a slightly more detailed diagram illustrating the antenna configuration might be appropriate. In particular, I'm wondering whether the forward-pointing boom is empty?

8/9: Is this the “2-D focusing” described in the earlier Peters et al. studies? Avoid sending the reader all the way to the reference describing this key point of the processing sequence.

9/11: Why not use ordinary kriging? The data appear extensive enough.

Section 3.3.3 Reflection Coefficients: A thoughtful discussion of attenuation issues and in particular the roll-over shown in Figure 8. I find the sub-division of this power-thickness relation plausible. A minor concern is that the uncertainty on the best-fit attenuation rate is not reported, which could be used to further evaluate the significance

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of the spatial variation in bed reflectivity. It's probably not a significant effect upon the spatial variation, but it should still be reported.

20/23: This completely fair statement then begs the question as to why that calibration wasn't done. As I recall, there is often open water within helicopter range of the basing during the Antarctic summertime. Please clarify.

14/5: Compare to regional value reported by Matsuoka et al. (2012). I respect the later argument that the Matsuoka et al. (2012) grid is coarse compared to this survey's grid, but a nominal comparison should still be possible.

15/7: Because a graticule is consistently used in the figures (which I like), revise the phrasing "grid north" to (probably) "south". A north arrow in the figures could ameliorate the situation.

Discussion is excellent.

Figures

Figures 1a/6/7: Add scale bar. Figure 6/7: Label lakes as D1/2.

Figure 3: The radargram contrast is quite poor on paper and in print. Color range as mean +/- two standard deviations usually works well. Is the very top of the radargram indeed the surface, following elevation correction?

Figure 8: Narrow vertical scale (remove lower 20 dB).

Figure 9: Narrow the color scale used significantly. It's ok to saturate if less than / greater than symbols are used at the edge of the range. Otherwise, I'm not getting much out this reflectivity map.

Grammar, etc.

1/7: While understandable if perhaps unintentional, it isn't necessary to be quite so dismissive of one's own (significant) efforts in an abstract. I suggest changing the

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sentence that starts with "While..." to more positively reflect the effects undertaken and drop the "not the first" statement.

Introduction as a whole is perhaps a quarter too long and more appropriate to a dissertation chapter than a journal article. Review to simplify further.

Throughout: CryoSat-2 not CryoSat.

2/7 to 3/4: Merge these two paragraphs.

9/3: "policy" is an awkward choice of terms here. Perhaps clarify what first-return picking means relative to other options?

11/15-17: In the phrasing used here, "X%" makes more sense to describe the fraction of overburden pressure that earlier studies considered.

12/10: Cite Matsuoka et al. (2012)

12/14: "Some studies attempt..." (some of these papers include some of the same authors even though they used different methods)

12/17: "David Glacier region"

Figure 8 caption: "we assume" not "we think"

13/11-10 and 13/15: Description of graphical elements in figures (as opposed to what the displayed data mean for interpretation) should be reserved exclusively to figure captions.

17/17: "a single snapshot seven years"

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