

Interactive comment on “Union Glacier: a new exploration gateway for the West Antarctic Ice Sheet” by A. Rivera et al.

A. Rivera et al.

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Received and published: 21 May 2014

Dear reviewers,

Thanks a lot for all your very useful comments and suggestions. We have addressed all of them and we think the manuscript improved a lot.

Answers to Ted Scambos

General comments:

We have modified the title of the manuscript, focusing on the main topic of the research. “Recent ice dynamic and surface mass balance of Union Glacier in the West Antarctic Ice Sheet”

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We have shortened the text, excluding some details, and accepted the suggestions by the referee.

We have avoided over interpretation of our results and have analysed in more detail the possible impacts of migration of the local grounding line.

Detailed comments:

In general all the English corrections were accepted.

Abstract was re-written as suggested.

We stated more clearly that the deeper subglacial topography detected by our work is in comparison to BEDMAP2.

Page 1229, line 14: Yes. We are talking about sea ice conditions. Changed as suggested.

Page 1229, line 14: OK, we left “sea ice in this area. . .”

Page 1232, subchapter 3.3: OK, we estimated the number of measured stakes versus the total possible measurements at the gate (near 82% were measured).

Page 1232, line 14: We were always measuring snow densities using the same tube (Mte Rose), and if there is any bias, this will be constant. Therefore, we added an estimated random error (12%) as calculated by Conger and McClung, 2009, who compared different snow density measurements methods, including our system.

Page 1234, subchapter 3.6. We shortened this subchapter and quoted our recent paper (Uribe et al, 2014), in which the radars used here are described in detail.

Page 1236, subchapter 4.2: yes, we are only talking about the surface mass balance. Changed accordingly all along the text.

Page 1237, lines 24-26: We changed the text to “The overall ice motion at the gate is nearly parallel with the main wind direction (Fig. 2) observed at the BIA.” This will be

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clearly visible in the new Figure 2, where the wind diagram was added as suggested by the referee.

Page 1239: The text was shortened as suggested.

Table 1: We added the suggested reference and the related discussion about seasonal variability of BIA extents.

Figure 2: we changed the figure as suggested, adding the wind diagram that was rotated to be in agreement with the map orientation.

Figure 7: We added the grounding line to the figure.

Figure 8: We double checked the distances, and we agree that the positions of the letters in the profile were confusing. Now, we added a red point in order to be more precise about the position of the radar profile. We also improved the brightness of the radargram.

Answers to Neil Ross

General comments:

We agree that the original title of the manuscript was not the best to describe the main focus of the paper. This comment was also pointed out by the first reviewer, so we changed the title, avoiding the role of a logistic hub, and focusing on the main aim of our research; the recent ice dynamic and surface mass balance of Union Glacier.

The reviewer is right. We did not clearly state the role of this ridge with shallow ice (only -190 m asl). We modified the text accordingly.

We accepted all English, typewritten and format suggestions.

Detailed comments:

P1228, line 15: Right, when we talked about deeper than previously estimated, we are refereeing to BEDMAP2. Our previous measurement results are similar in order of

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magnitude to the new survey data.

P1228, line 21: We changed the reference as suggested.

P1230, lines 1-3. OK, we changed the title and the emphasis of the paper, reducing the importance of Union Glacier as a logistic hub.

P1230, Study area: OK. We changed the order of the text as suggested and eliminated the non critical descriptions.

P1234, lines 24-28. Migration was applied before mapping the subglacial returns. This is stated in the following paragraph.

P1242, Conclusions: OK, you are right. We have changed the abstract and the conclusions in order to clearly state that the potential changes are modulated by this subglacial ridge.

Figures: We improved the brightness of the radagrams of Figures 7 and 8.

Regards, Andres Rivera.

PS. The new version of the manuscript was uploaded as supplement file.

Please also note the supplement to this comment:

<http://www.the-cryosphere-discuss.net/8/C689/2014/tcd-8-C689-2014-supplement.pdf>

Interactive comment on The Cryosphere Discuss., 8, 1227, 2014.

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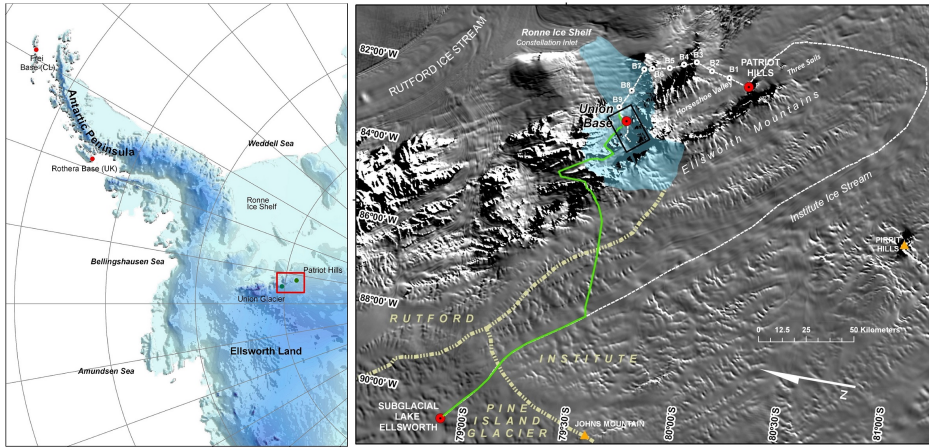


Fig. 1.

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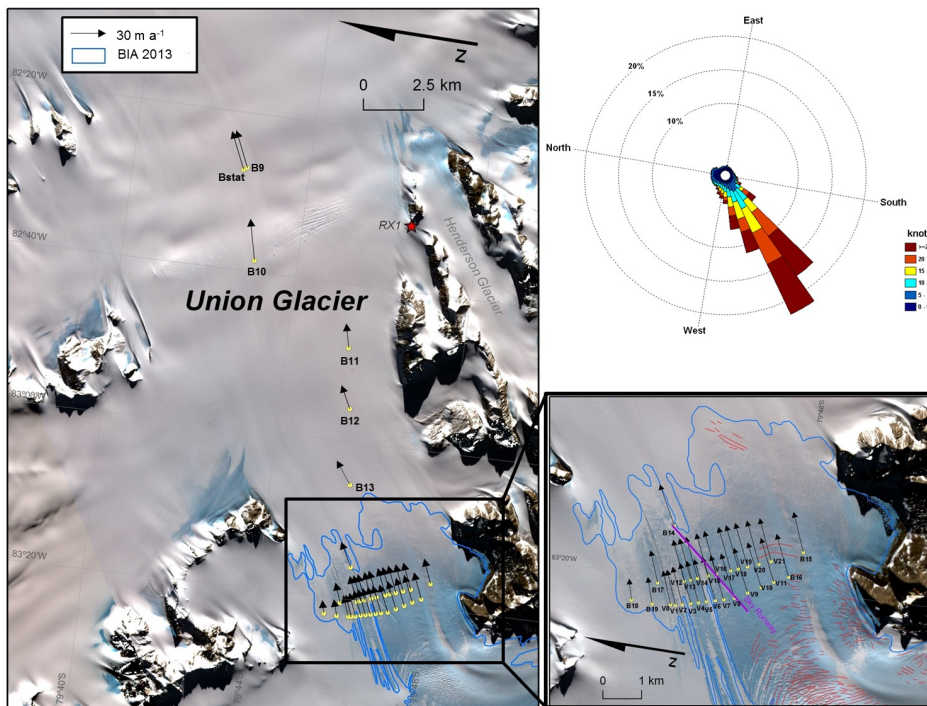


Fig. 2.

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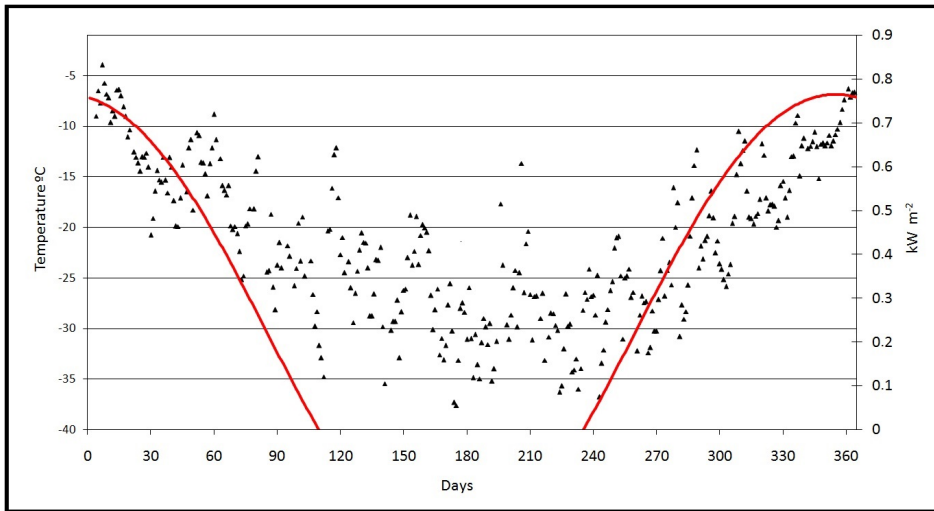


Fig. 3.

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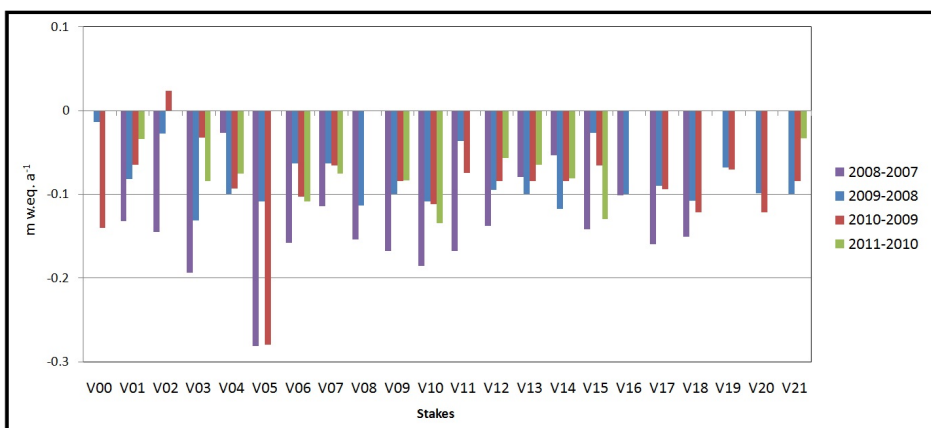


Fig. 4.

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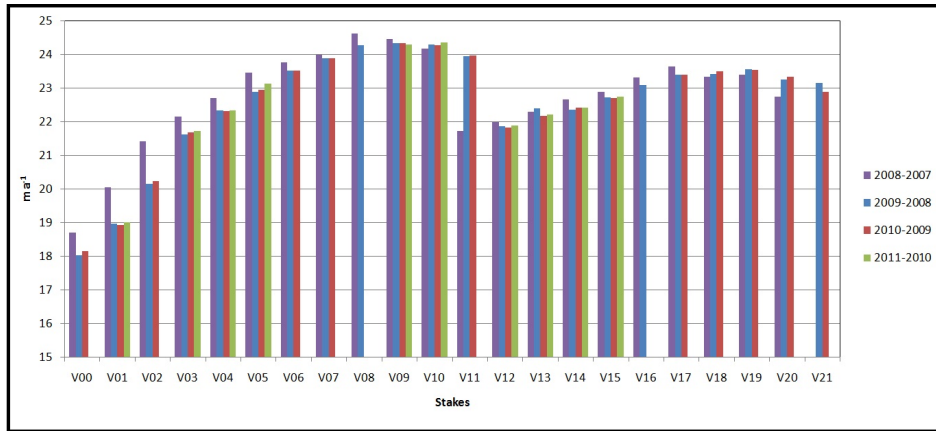


Fig. 5.

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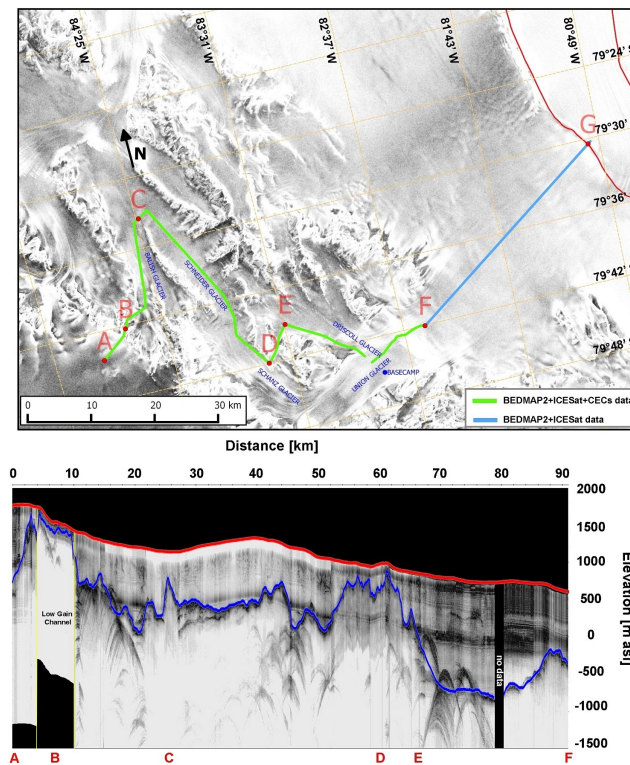


Fig. 6.

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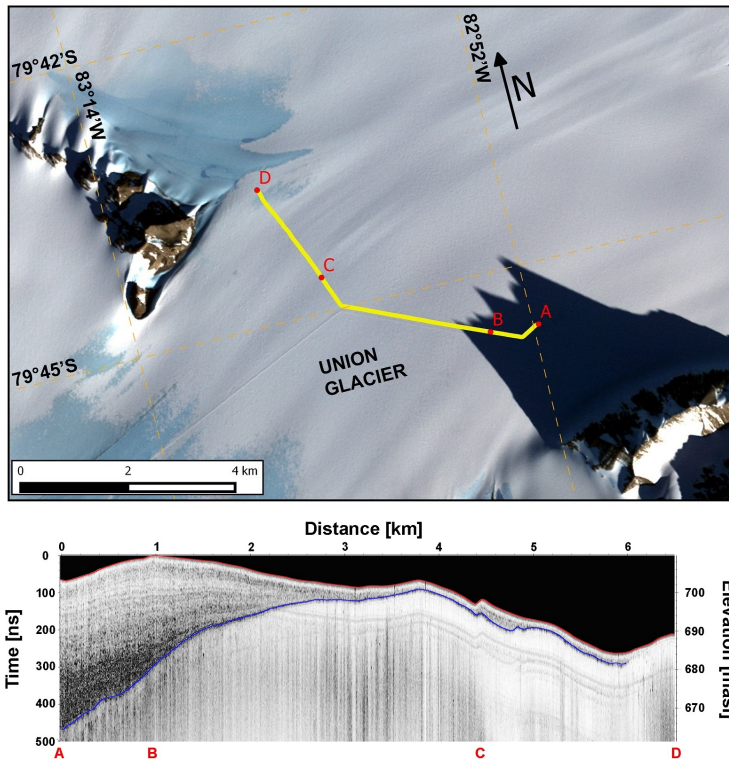


Fig. 7.

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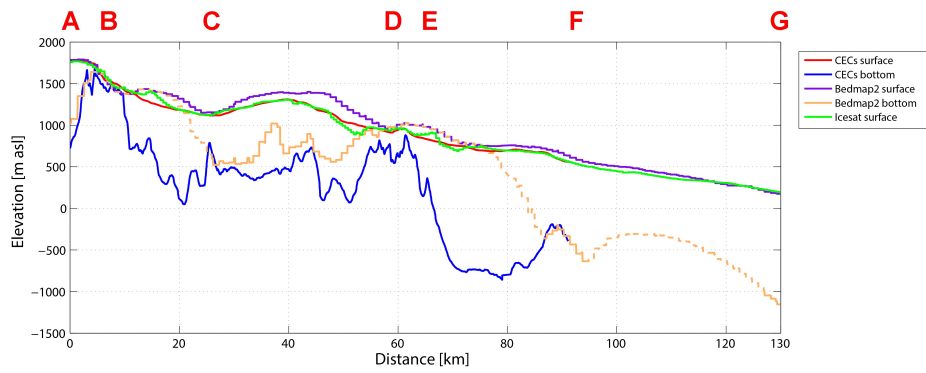


Fig. 8.

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