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Interactive comment on “Snow on the Ross Ice Shelf: comparison of reanalyses and observations from automatic weather stations” by L. Cohen and S. Dean

Anonymous Referee #2

Received and published: 17 May 2013

I do not need to see the final revision, but I am happy to review it if need be.

Referee Comments for “Snow on the Ross Ice Shelf: comparison of reanalyses and observations from automatic weather stations”

General comments:

Generally, I thought this paper was interesting, useful, and well written. This paper compares NCEP-NCAR and ERA-Interim reanalyses precipitation data to accumulation data from acoustic depth gauges that are on board nine automatic weather stations across the Ross Ice Shelf region of Antarctica. The end conclusions of the authors are that there are more precipitation events found concurrently with accumulation events

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in the ADGs, and as such: a) ERA-Interim precipitation more closely represents reality in the Antarctic (at least compared to NCEP), and b) it is possible that many of the accumulation events captured by the ADGs have associated precipitation.

I do think there are a few areas that need improvement in this manuscript. First, there is a general lack of discussion on many of the results in this paper, which leads the author wanting more. For example, why was ERA-Interim and NCEP-2 chosen as the two reanalyses to compare? While I can make an educated guess as to why (there are many studies published on the two) it would be good to see at least a brief discussion regarding why these two were chosen, as well as a discussion on the limitations and benefits of each. Second, one of the main conclusions in this paper is with respect to ERA-Interim being a better representative of precipitation data in the Antarctic, but there is very little, if any, discussion as to why (ie, why it performs better than NCEP-2). The Bromwich et al. 2011 paper referenced in this study could provide some insight. There are many other questions the authors leave unanswered – which I've tried to address in the specific comments.

One of the cautionary items of this study needs to be with regards to using precipitation output from reanalyses and comparing it to accumulation data from a UAV. The two are not one in the same, and the authors do note this occasionally throughout the text, most notably in the last paragraph of the results section. However, sometimes the reader can conveniently “forget” that they are actually looking at two very different types of datasets, and more references to this should be made in the text.

Specific comments:

1. In line 9 on page 1246 – this sentence says that the AWS measurements have been widely used in many studies. This is true for all but the ADG measurements. The ADG measurements are relatively new on the AWS, and have not been as widely used.
2. Line 2, page 1247 – in reference to Table 1. Most of these sites (particularly Nascent, Ferrell, Windless Bight, and Mary) have had operating ADGs on site for much longer

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than Table 1 implies (see Knuth et al. 2010, Table 3, as referenced in the paper). Knuth et al. lists some stations being available as early as 2005. Did the ADG instrument stop operating on the AWS between the Knuth et al. time period and this study? Or was the time period chosen to be shorter for this study? If so, why? Please make this clearer in the text. 3. It would be useful to show a figure where the model grid points and the locations of the AWS are overlaid so that we can visually see the proximity of the grid points to the AWS sites. It would also be useful for the authors to comment on the representativeness of the grid points and the AWS locations (especially given that they can be a large distance – 100 km – away). For example, if the grid point used to compare to the Ferrell site is actually located over the Ross Sea, is this really an appropriate comparison? 4. Figures 2 and 4 are too small. I could hardly read them on the page (especially Figure 4). It might be better to split each of these to display on two pages instead. 5. Line 20, page 1251 – I don't understand the meaning of the sentence: "Accumulation events can be seen as stepped increases in height while decreases in height (in the ADG records only) indicate the effects of ablation, compaction, or sublimation". . . Why wouldn't decreases in height in the reanalyses also be due to ablation, compaction, or sublimation? Please clarify. 6. Figure 3 – which gray box corresponds to which dataset? 7. There is another coincident event early on in the Ferrell record – it would be useful to see a comparison between the two (Ferrell's coincident event and Margaret's outlined in Figure 3). 8. How are coincident events being defined? Is there a duration over which the three datasets must coincide within some sort of snow threshold? 9. Why are reanalysis events longer than ADG events? This was mentioned briefly on page 1252, but was never discussed further or expanded upon. 10. The authors should watch their use of the word "significant". Sometimes it's used appropriately (such as when they discuss the significance on page 1254 within a 90% level), but sometimes it's not quantified, and it's not clear if their discussion is actually statistically significant. This word is used many times throughout the paper.

Technical corrections:

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1. Line 22, page 1248: “accumulations” should be “accumulation”

Interactive comment on The Cryosphere Discuss., 7, 1243, 2013.

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7, C592–C595, 2013

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