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The Cryosphere
Discussions

Interactive comment on "A new glacier inventory for 2009 reveals spatial and temporal variability in glacier response to atmospheric warming in the Northern Antarctic Peninsula, 1988–2009" *by* B. J. Davies et al.

Anonymous Referee #1

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The paper provides a detailed mapping of the Trinity Peninsula, Vega Island and James Ross Island glaciated regions, with a breakdown of several glaciological parameters (area, length, hypsometry, slope, aspect, and ELA).

I found the paper to be overloaded with detail and short on analysis of what the details might mean. Components of the paper that are rea lly just hashes of data to be given to the glacier inventories should be culled, keeping those aspects that provide some insight into cha nge and causes of change. For example, I don't think there any merit to telling the TC audience that ELA estimates based solely on altitu de ratios of 50 versus

60 percent correlate highly. Nor do I think that near-zero correlations of the many parameters that don't do so ar e worth the space or the effort to understand them. If you propose a hypothesis (or a few hypotheses) of what leads to glacier changes in the region, you can examine the data you have in an organized fashion, and eliminate parts that don't have much to say.

I recommend that the paper be significantly reduced, and extensively rewritten, presenting the valuable map of Figure 1 in as high a reso lution as is reasonable; accompanied by a well-organized summary table of the glacier parameters. Table 5 should be shortened to the mean ingful relationships; Table 6 and 7 are fine, but should replace parts of Fig 4 (cut Fig 4); Tables 8, 9 are of value; Figures 2, 3, 4CDE FG, 6, and 7 mean very little, except to show that lots of things don't matter.

Abstract 3452 L14-16 - this sentence essentially repeats the preceding one. L18-19 - this JRI retreat rate is very small, the sentence is a bit awkwardly put. You are saying that losses have essentially stopped on JRI glaciers. L19-20 - These are retreats; non-steady behavior. The orographic temp and precip differences have always been there. You need to re-think this statement. (The strength of the differences may be changing – you need to explore that as an explanation) L20-11 - suggest change to: 'Large variations in rates of retreat of adjacent tidewater glaciers in the area may result from ...' L22-23 - High snowfall: you can't make this statement in this paper without a lot more work. -Increased- snowfall -may- be stabilizing th e western-side glaciers. Yes, that is likely to be true. But you don't know without a look through time at past extents, calving, ocean t emperature and circulation, past accumulation rates. etc. L23-25 Similar comment here - you need qualifiers, you have not begun to introduce the possible causes of retreat or the current slowdown in retreat rate. It may be due to retreat into the fjords, to cooler (or flat) climate, cooler (or flat) ocean temps at depth...

Intro 3453 L18-19 - this reference is not appropriate here - use a Grace-based result such as Ivins and others 2010. Hock et al. have no validation data in the southern hemisphere, the number is very tenuous, and it is not clear if they considered Trinity or other areas of the main An t ice cap.

Page 3455 L10-15 - rewrite, this is just too approximate to be useful. Bellingshausen - not 'warm', it has more to do with the absence of sea ice (you say this later); and the western Ant Peninsula climate is dominated by orographic uplift of polar marine air masses, not just Bell Se a. West Ap is warmer than East AP at the same latitude by 7deg.

5 Glacier change results: condense this to the important, well-mapped, and scientifically pertinent data you extracted. Let the tables do the work they were designed to do: restrict the text discussion to the interesting cases.

6.4 Changes in ELA - If the only data is altitude, then I think you should remove most of the discussion of ELA from the paper. You have no data on the real ELA. The Hess method does not seem to work for this region. You don't have sufficient imagery to accurately assess EL A from satellite. -If- you wanted to do this, you could use MODIS data to get a reasonable ELA from the 12 years of available data, altho ugh the resolution would be low (it would be more accurate than averaging the elevaiton from top to bottomw, though).

6.5 Ocean T - You don't measure anything related to ocean temperature. If you were to attempt to relate any of the retreat rates to geogr aphical parameters potentially related to ocean T at depth or on the surface (west coast, east coast, AAR, ice front width) than you migh t have room to discuss this. As it is, Section 6.5 is just a discussion of literature and not really a part of your study.

7Conclusions - some of these are not conclusions of the paper. e.g., opening lines - but overall this is a reasonable summary of the pape r's important results.

Table 1: Landsat 4 TM - TM does not have a Pan band. Bands 1234 are 28.5 m resolution.

Table 3: Of the methods listed, I think you should elimninate ELA-median; is is a com-

plete guess. I don't understand ELA-thar.

Table 5: Why are you bothering with the several pairs that have essentially no correlation? these could be listed in the text. teh ELA co rrelations - unless something other than hypsometry is involved the high correlation is meaningless. so the first ELA correlation of 0.95 is of no use?

Figure 1: useful and informative, if accurate. I see there are some questions about Vega Island.

Figure 2: some of the length lines don't appear to begin at the highest contour, e.g. GIJR124, GIJR115, GIJR97?

Figure 3: for the scatterplots, include R2 value either in the graph or the caption. Side note, it is not science to compare numbers and examine meaningless relationships. I would cull the graphs here based on those that provide insight into glacier stability.

Figure 5: Caption: A 2 C warming could result in a an average ELA rise of 345 m.(don't mention 2040, it is irrelevant)

Figure 6: check caption, 'and-terminating glaciers'.

Interactive comment on The Cryosphere Discuss., 5, 3541, 2011.