

Interactive comment on “Recent acceleration of ice loss in the Northern Patagonia Icefield based on an updated decennial evolution” by P. López and G. Casassa

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The study by Lopez and Casassa updates geodetic mass balance estimates from DEMs of different acquisition time until 2005 for the Northern Patagonian Icefield (NPI). Furthermore, it provides new data on length changes and areal changes of various glaciers of the NPI. In principal, the paper is an important contribution to our understanding of the current status of the NPI. Therefore, it definitely merits publication in TC.

Nonetheless, there are shortcomings as already lined out in the reviews of Christopher Nuth and the comments provided by Mauri Pelto and Etienne Berthier. In addition,

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I would find it necessary that you provide an estimate of uncertainty for the various numbers regarding length and area changers.

I am convinced that after some, possibly major revisions, the paper may become acceptable for publication in TC.

Adding to the reviews and comments that are already published I provide some details following hereafter:

P3324f (Abstract): I recommend to shorten the abstract by leaving out details of individual glaciers.

P3325, L11: You state that shrinking of glaciers will produce GLOFs. This is not a straightforward result from your data. What you can say is that proglacial lakes are expanding. Whether or not this may lead to an enhanced risk of GLOFs is well beyond the scope of your study. I would be more cautious regarding this statement.

P3325, L23f: Why should NPI and SPI be a more “unique natural laboratory” than any other large glacier around the world? How can a glacier have a “rich biodiversity”. To my understanding glacier surfaces are always places of extremely limited biodiversity compared to other geo-systems. Both sentences, I find rather misleading or without specific regional importance. Either you provide evidence to support the statements or - even better- skip them.

P3328, L7ff: The numbers resulting from Rignot et al. 2003 and the numbers from Rivera et al. 2007 are very different. There may be good reasons for this and you should make an effort to better explain where these differences may origin from.

P3329, L12: Delete “According to”. However, I understand that you will have to redo this section according to previously posted comments.

P3329, L17ff: Change: “With the purpose TO support scientific research focused . . .”

P3329, L23: “pairs of images” instead of “pair of images”

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P3330, L3: After “20%”, insert slope angle or similar expression to indicate what the 20% refer to.

P3331, L4: “infrared”, one single word

P3331, L17: Delete “From a general point of view”; since this is a meaningless expression in this context.

P3333, L14: DY and DY should also be defined in the text, not only in the figure.

P3335, L7: Strange wording in the beginning of the sentence (“The shifted process ...”)

P3336, L1f: It is not clear to me to which investigation you are referring to (Rignot, Rivera or the current one?).

P3336, L11: “In this paper”; again it is not quite clear to which study you are referring to.

P3336, L12ff: You say that according to Table 8 the results of all three studies are similar. The differences in numbers between Rignot’s study on the one side and the Rivera study and yours on the other side, for some of the glaciers, are large. How can you say that there are no significant differences? I believe you have to discuss the differences in more detail or refer to that discussion in the paper of Rivera, in case that has been elaborated in his paper in some detail.

P3336, L17ff: This information has been provided earlier in your paper, so you are repeating yourselves. You can shorten this.

P3336, L22ff & Figure 7: You classify the results in rather broad bands. The class boundaries in the text are different from the ones in Figure 7. This is confusing. Also, why do you use such broad bands at all. The data should allow for a much more detailed color bar – more classes – e.g. using a class with of 0.25 m/yr.

P3336, L26ff: Do the numbers provided in the text relate to the numbers provided in

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Table 8? Please insert a note on that in the text.

P3337, L7ff: I recommend that you analyze your data regarding thinning by separating into east and into west facing slopes or glaciers. Regarding the regional climate with its strong divide regarding precipitation this may reveal systematic differences that are worthy to look at.

P3337, L15ff: It would be helpful if you could provide in addition length changes relative to absolute glacier length. Relative changes are more comparable than absolute values especially when glacier sizes vary a lot.

P3337, L16: “Glacier lengths fluctuations” not “Glacier lengths fluctuations!”

P3338, L15ff: In this section you use values for area change that refer to distinct periods and sometimes you use annual values. I would always state the period but give values as annual values since by this means numbers can be compared easily even across different periods with varying length.

P3338, L20: It is not “opposite”. Opposite would be if Soler and other glaciers would be growing. However, they are retreating at a lesser speed, which is different but not opposite.

P3340, L2f: “. . . are analysed in more detail in the FOLLOWING SUBsections.”

P3340, L19: Skip the word “reported”.

P3341, L12ff: You should state that this is most probably related to lake bathymetry and not a consequence of direct climate forcing.

P3341, L20ff: This remains unclear. Why should the discharge into Río Huemueles increase just because the lake area increases due to glacier retreat? I believe you have to explain this in more detail. The discharge may increase because of enhanced melting/calving but this is not directly related to lake area. What are specifically the circumstances that alarm people living downstream?

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P3343, L5ff: It appears that the retreat of Gualas Glacier is more controlled by the bathymetry of the proglacial lake/fjord rather than direct climate forcing. Can you say a sentence regarding this?

P3342, L. 25, L 27: Replace "on" with "by".

P3343, L18: "is" not "is" (second word in the line!)

P3344, L1ff & P3378: Can you indicate/name the two fronts in Fig. 17?

P3344, L23ff: The statement in this sentence ("geometry of fjords play an important role") to me appears rather important in the context of your study. You should discuss this in more detail and with regional examples that illustrate the very individual circumstances.

P3345, L8: Delete "From a global point of view,"

P3345, L9: "lose" not "loss".

P3345, L19f: Why should it be more significant if thinning occurs over the accumulation area as well compared to thinning that occurs only in the ablation area. I cannot understand the physical reasoning behind this argument.

P3346, L7: "lost" not "loss".

P3346, L10ff: Please see my comment to P3341, L20ff. I still do not understand the direct physical link that supports this argument.

P3346, L16: What you detect are glacier change trends, not climate trends. Obviously, the glacier change trends are related to climate trends. However, as we can see from the retreat of those glaciers that are controlled by proglacial lake or fjord geometry this is not straightforward in all cases. Therefore, I would be cautious in stating that you have detected past climate trends.

P3356, L17: Replace "continuous" with "continue".

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P3359, Table 8: Are the numbers annual or absolute numbers for the varying periods?

P3360 & P3361: I believe you can make one table by fusing table 9 and table 10.

P3363, Fig. 2: Can you overlay the glacier drainage basin outlines and possibly also glacier names? This would make it much easier to pick up details, especially when you relate to specific glaciers in the text.

P3368, Fig. 7: Please see my comment to P3336, L22ff. I would use much finer classes. Additionally, you name three periods in the figure captions but you only show two panels. You should in this case also include a figure for 1975-2005 or otherwise change the figure caption.

P3370, Fig. 9: Again, why do you use only three classes, and why are the class boundaries in the way they are? This seems too coarse and class boundaries are arbitrary.

P3371, Fig. 10: Can you indicate which of the glaciers are east-facing and which are west-facing? Can you analyze this in more detail and give some interpretation?

P3376, Fig. 15 & P3377, Fig. 16: Can you indicate the frame of the Fig. 15 in Fig. 16 or vice versa?

P3378, Fig. 17 & P3379, Fig. 18: Can you locate Fig. 18 within Fig. 17?

P3380, Fig. 19 & P3381, Fig. 20: Can you locate outlines of Fig. 20 within Fig. 19?

Interactive comment on The Cryosphere Discuss., 5, 3323, 2011.

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