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The Cryosphere Discussions

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

The abstract will be reduced.

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.

The statement will be modified.

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 ïňĄnd rather misleading or without speciïňĄc regional importance. Either you provide evidence to support the statements or -even better-skip them.

The sentences will be deleted.

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.

The explanation will be extended.

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

The sentence will be modified.

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

The sentence will be changed.

P3329, L23: “pairs of images” instead of “pair of images” P3331, L4: “infrared”, one single word

The sentence will be modified.

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

The sentence will be deleted.

P3333, L14: DY and DY should also be deïňĄned in the text, not only in the ïňĄgure.

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DY and DX will be defined also in the text.

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

The sentence will be modified

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

The sentence will be revised.

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

The sentence will be revised.

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 signiïňĄcant 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.

The statements will be revised.

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

The statement will be modified.

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.

The purpose of this classification was to detect similarities over the NPI. Different num-

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bers of classes were analyzed and we found that the selected boundaries were the best choice. Nevertheless, a comparison will be done using 0.25 m/yr.

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

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.

A separation between east and west slopes will be included for the analysis.

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.

Changes of glacier length will be showed relative to the total length estimated for 2001 year.

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

The sentence “Glacier lengths ïňĆuctuations” will be replaced by “Glacier length ïňĆuctuations”.

P3338, L15ff: In this section you use values for area change that refer to distinct peÂňriods 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.

The observation will be considered.

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.

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The redaction of this paragraph will be also revised.

P3340, L2f: "... are analyseD in more detail in the FOLLOWING SUBsections."

The sentence will be modified.

P3340, L19: Skip the word "reported".

The word "reported" will be deleted.

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

The statement corresponds to an interpretation of the satellite images analyzed. It is not the purpose of this section to expose the reason of the frontal disintegration of Steffen glacier.

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 speciïňĄcally the circumstances that alarm people living downstream?

The discharge increase because the enhanced melting. However, we believe that due to enhanced melting the area of the lake is increasing as well.

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?

This idea will be analyzed.

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

The sentence will be modified.

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

The sentence will be modified.

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

Figure 17 does not appeared in the text that you mentioned.

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 disÂň-cuss this in more detail and with regional examples that illustrate the very individual circumstances.

This statement published by Lliboutry (as mentioned in the article) has been included in order to mention some possible explanations for the rapid retreat observed for Reichert Glacier. As you may know, in general, very few data exist for the glaciers of Patagonia. The relation between glacier retreat and geometry in the NPI and SPI (from a regional point of view) is not the focus of this paper.

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

The sentence will be deleted.

P3345, L9: "lose" not loss".

The modification will be done.

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

This statement was oriented to the fact that it is believe that the glaciers of the NPI are retreating at accelerated rates due to a decreased of accumulation due to a diminution of snowfall.

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

The modification will be done.

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.

The observation will be considered.

P3356, L17: Replace “continuous” with “continue”. The modification will be done.

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

Both tables will be merged.

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 speciïňĄc glaciers in the text.

Glacier drainage basin and names will be included in Fig. 2.

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

The observation will be considered.

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

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west-facing? Can you analyze this in more detail and give some interpretation?

East-facing and west-facing glaciers will be indicated.

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?

The modifications will be done.

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