

Review for Hydrology and Earth System Sciences

**Title: Assessing glacier melt contribution to river runoff at Universidad glacier, central Andes of Chile**

Authors: Bravo, Loriaux, Rivera, Brock

**PAPER SUMMARY AND RECOMMENDATION**

As already reported, I find this article relevant for HESS and interesting, as it provides new information about the glacier contribution to runoff in a region where glaciological studies are relatively scarce.

I think that the authors have properly answered to the last comments of the reviewers regarding the discussion and conclusions. The discussion section has improved with a better description of the uncertainties in the methods. I have two minor points that the authors might want to clarify/include in the text. In my opinion, there are still several problems with the style. I have again provided some suggestions to improve that part.

Finally, I would like to encourage the authors to develop new studies in that region covering longer time periods and/or use more physically-based models able to reproduce glacier ablation and retreat in greater detail.

**MINOR COMMENTS**

You say that AWS2 is located in the accumulation area. Probably you were sure about this at the installation time, but you found that the snow disappeared completely at the site during that summer. I wonder if you should change this for “the upper area”. Or maybe mention that that was the accumulation area for the previous years.

9/32: What exactly indicates “an efficiently channelized drainage system flow”? The 6 hours between minimum and maximum? Would you please provide more comments about this? Any reference to support that statement?

**TECHNICAL CORRECTIONS**

1/11: Maybe add “in this region”

1/12: Replace “large” by a number or say “one of the largest in the region”

1/14: I would suggest to move “Total modelled glacier melt...” after the next sentence (“The temperature-index model was calibrated...”)

1/17: Maybe replace “is characterized”. As you only model one ablation season, it might be an excess to say that the glacier is characterized by the conditions valid then.

1/20: Probably you should mention before that 2009-10 was a dry year with little winter precipitation.

1/29: If you write “in recent years”, then I would replace “are increasing” by “have increased”

1/31: Those are independent clauses. Replace “;” by “;” or formulate it differently

1/34: add “,” after (Mernild et al. 2016)

2/2: I would replace “, which” by “and”

2/6: I would remove “However”

2/9: Please consider to replace “the high basin of the Maipo River” by “the upper Maipo River basin”

2/14: glacier -> glaciers

2/15: Consider to shorten this sentence by starting a new sentence with “Pellicciotti et al. (2008) investigated...”

2/21: improving understanding -> improving the understanding

2/26: “between the humid temperature south and arid north of the country”. Please briefly describe the climatic spatial patterns of Chile before in the Introduction. Otherwise this sentence will not be clear for a reader not familiar with the Chilean climate.

2/28: Perhaps be explicit about the two type of models: “using degree-day and energy balance models”.

2/37: Cortez -> Cortés. Here and elsewhere.

2/37: “with a runoff peak”

3/1: Add comma before which

3/3: end-of-summer snowline

3/4: Fig. 1c

3/7: I would be more specific and say that proglacial lakes are related to “glacier termini” or “glacier snout” instead of only “glacier”

3/10: Decide for “penitents” or “penitentes”

3/12: Do you have some numbers for the spectacular recession?

3/15: “and identified an increase in surface velocities between 1967 and 1987” An increase respect to what? The analysis starts on 1967.

3/18: The -> This

3/19: Delete: “We focused on...”

3/20: Explain what do “Dirección General de Aguas” and “Dirección Meteorológica de Chile” mean in English for the non-Spanish speakers.

3/9: “using snow density measured at stakes” I guess at stake 1 for the SR50 lowering

3/29: Please mention if the temperature sensor was aspirated.

4/20: Perhaps replace “differentiation” by “recognition” or “identification”.

4/21-23: Check the structure of this sentence. It is not very clear. I suggest:  
“The MOD10A1 product gives the fractional snow cover for each pixel in the range 1-100. To assure a correct snowline altitude, we assume the presence.... However, ...”

4/28: To estimate a FDH for snow, ....

4/37: “in the review article of Hock (2003)”

5/1: “by 24, which resulted in FDH values of 0.29”

5/7: Consider: “we compared melt calculations from a standard degree-day model with those from the DHM”

5/10: at -> with

5/15-17: I am not sure if the structure of this sentence is correct. Please check it.

5/19: Instead of distribute the model, I would say “to extend the model to a distributed scale”

5/21: “considering that melt occurs mostly during the day” Please explain why that is important.

5/25: “during daytime”

5/34: Keep using the same tense: “We restricted...”

6/5: “The turbulent sensible heat...”

7/17: meters -> m

7/18: “,which is ...”

8/17: As they describe the same figure, I would merge these 2 paragraphs.

9/1: It is also because the surface albedo is very low

9/6: What do you mean exactly by “small sublimation reflects a melt regime”

9/6: “Snow disappeared...”

9/15: I would say “to estimate glacier melt at the glacier tongue” instead of “total glacier melt” or what do the authors mean exactly?

9/21: As is expected -> As expected?

9/22: on the tongue

9/36-10/2: Please check the grammar/style of these sentences. It sounds a bit strange to me (particularly the use of whereas).

10/9: Maybe change those numbers by “the remaining part”

11/36: “tends to underestimate melt”

12/15: Maybe I was not clear in the previous version. Why reporting a non-significant trend?

12/18: add “likely” before increased.

12/18: In my opinion, the authors are not being precise enough with the terms in these sentences. They say that “the contributing melt area” has increased and then you say “Such increases in glacier melt”, but an increase in contributing melt area does not warranty an increase in glacier melt. Most probably yes, but such statements make the article more difficult to read.

12/21: Cortés

12/23: “uncertain” is not the right term here. From your analysis, it is not only uncertain, but also impossible to assess if the “peak water” has been reached.

12/33: in the dry season -> during the dry season

12/35: Please start a new sentence: “On the other hand, to the south of ~37...”

12/36: Replace “which” by “that”

12/36: Not sure if “enhances” is the right verb here. Maybe “allows”?

12/37: Add comma after melting

12/37-38: Local factors, such as ..., also contribute...

13/2: context -> reference

13/11: found -> showed

13/34: add comma after Chile

14/2: “are well suited” -> are appropriate for, support the application

15/4: Add volume and issue

16/26: Remove underline in Mernild

23/4: turbulent latent and sensible heat fluxes.

24/3: from Universidad Glacier

25/8: with the distributed degree-hour model

25/8: Delete comma