The Cryosphere

Discussions

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Interactive comment on "Seasonal and Interannual Variability of Melt-Season Albedo at Haig Glacier, Canadian Rocky Mountains" *by* Shawn J. Marshall and Kristina Miller

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The paper uses a long-term observation dataset of surface albedo in the Haig Glacier during the period 2002-2017 to depict the seasonal and Interannual Variability of Melt-Season Albedo at Haig Glacier, Canadian Rocky Mountains. It is important to present this valuable dataset for developing any energy or mass balance model to project the evolution of the glacier. The tuning of the MB model is also a nice try. The paper is promising to be finally accepted by the Cryosphere from my point of view. However,

before its formal acceptance, I want to address a few concerns here.

Specific comments: 1. The first paragraph of the Introduction part seems to describe the target of the work, which is more proper to be moved to the end of this part. 2. Line 3-4. The sentence, "Variations in surface albedo, therefore, exert a strong control on the surface energy balance and available melt energy", needs a reference. Here is one by Ming et al. (2015) for your information. - Ming, J., et al. (2015). Widespread albedo decreasing and induced melting of Himalayan snow and ice in the early 21st century. PLoS One. 10: e0126235. 3. Line 4. "manuscript" -> "work" or "study". 4. Line 44-51. This paragraph reads to be wordy and not well organized and needs to be rephrased. 5. Line 44. The word "this" is not clear. Please clarify it. 6. Line 45-51. These two sentences are too long to read. Please rephrase them to several shorter sentences. 7. Line 97. Figure 1 had better incorporate a smaller map of the study area from a global perspective so that the readers could know where the study area is in the first sight. It is also beneficial to include the conditions of climatology for this area in the figure. 8. Line 97. "Albeta" -> "the Albeta province" or "the Albeta state" or "the Albeta city"? 9. Line 101-102. "Snow surveys conducted on the glacier each May indicate a mean winter snowpack of 1.35 m water equivalent (w.e.) on the glacier from 2002-2017, with a standard deviation (σ) of 0.24 m w.e. (Table 1)." Is this original from this study or cited from other studies? If it is in the latter case, it needs a reference. I suggest using a simpler expression of 1.35 ± 0.24 m w.e. to replace the long one in the previous form. 10. Line 105. Could you also add a standard error of the mean of the temperature after the number 5.3 âĎČ? 11. Line 111-115. This paragraph could be incorporated into the measurement section, and the next as well, because two paragraphs are more like introducing the measurement and data collection. 12. Line 116. "The forefield AWS" -> "The AWS in the forefield"? This phrase appears a few times throughout the text. 13. Line 123. Please clarify what "the set of available in situ data" is. 14. Line 133-134. Here needs a more detailed description of how to do manual quality control and remove the questionable data, although the authors claimed that the data control had been introduced in Marshall (2014). The current explanation

is too simple to understand the method. 15. Line 135. "concentrates" -> "focuses" or "zooms in"? The usage of "concentrate" here seems to be strange. 16. Line 135-136. The intent of the sentence is unclear, and please rephrase it. 17. Line 136. "pragmatic" -> "virtual"? 18. Line 137. "evolution" -> "variation"? 19. Line 142. "than" -> "from" or put "other" before it. 20. Line 150. Please clarify how you calculated out 7%. 21. Line 157. The last sentence "modelling of potential reflected radiation from valleys walls indicates that this is negligible at our AWS site". Could you please present evidence of your claim? 22. Line 159. "paper" -> "work". "repeat" -> "repetitive" or "repeated". 23. Line 161. "Haig Glacier albedo" -> "The albedo of the Haig Glacier". 24. Line 162. "points" (geometric concept) -> "sites" (geographic concept). Check that throughout the context. 25. Line 166. Was the sensor held manually? If so, how did you avoid the shadow of the body when measuring? Please clarify. 26. Line 167. Please give the detail of presuming a 10% uncertainty. 27. Line 169. "for melting and major ion and organic carbon analyses" -> "for the analysis of major ions and organic carbon". Please provide the source or references of the impurities used in this work. 28. Line 176. "data" -> "temperature" and "precipitation"? Please specify them. 29. Line 177. Please check the use of articles throughout the context. "forefield AWS data" -> "the data from the AWS in the forefield". 30. Line 191. What do you mean "the net energy goes to melting"? Please rephrase it. 31. Line 195. Give out the exact value of Lf (334 J g−1). 32. Line 240. Please clarify the definitions of a and b, respectively. 33. Line 430. The first sentence needs to be rephrased. Do you mean "the impact of fresh snow on albedo"? 34. Line 450. "forced" –> "driven". 35. Table 1. Please clarify the definitions of summer and winter for this study in the caption or context. 36. Figure 2. Why didn't the authors use the lines of means with shaded area indicating the error? 37. Figure 7. The blue points denoting the snowpits are blur. 38. Figure 8. What about the significances between the observed and modelled? 39. Figure 9. The same issue as that in Figure 8. Significance? 40. The language of the context needs a thorough check for grammar and misused words, such as articles, the function word "of", ambiguous statements, etc.

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