

Interactive comment on “Reconstructing the mass balance of Brewster Glacier, New Zealand, using MODIS-derived glacier-wide albedo” by P. Sirguey et al.

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In “Reconstructing the mass balance of Brewster Glacier, New Zealand, using MODIS-derived glacier-wide albedo”, remotely-sensed annual minima of snow and ice albedo are found and correlated with in situ measurements of albedo and mass balance at a well observed glacier. This is a strong paper and I couldn’t find much wrong with it. I recommend the paper be published as is, or pending some minor corrections at the authors’ discretion.

I have one question. The presence of mixed pixels is not discussed at all. My understanding from a brief review of the authors’ previous work, is that the broadband albedo reported here is a whole pixel albedo. In Dumont et al. (2012), which this work

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is based on, it is conceded that mixed pixels are not adequately dealt with: “To address the problem of mixed pixels, it would be interesting to apply the albedo retrieval method only to the part of the pixel reflectance which is attributed to snow and ice by linear unmixing.” As far as I can tell, this suggestion was not followed here. In Dumont et al. (2012), mixed pixels of rock and snow were suggested to be one cause of higher errors around the glacier perimeter in the remotely-sensed albedos from MODIS. My worry with the albedo approach here to estimate mass balance is that an increasing fraction of some other endmember and a decreasing fraction of snowcover could be inferred as a change in snow/ice surface albedo, when in fact, it is the result of changing endmember fractions. This could result in an incorrect assessment of mass balance, especially over longer time periods. I suggest that authors at least acknowledge and discuss this source of error. Other comments are included as an annotated PDF. If the authors have any questions, please contact me nbair@eri.ucsb.edu.

Sincerely,
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Dumont, M., Gardelle, J., Sirguey, P., Guillot, A., Six, D., Rabatel, A. and Arnaud, Y., 2012. Linking glacier annual mass balance and glacier albedo retrieved from MODIS data. *The Cryosphere*, 6(6): 1527-1539.

Please also note the supplement to this comment:
<http://www.the-cryosphere-discuss.net/tc-2016-98/tc-2016-98-RC2-supplement.pdf>

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