

Interactive comment on “Impacts of topographic shading on direct solar radiation for valley glaciers in complex topography” by Matthew H. Olson and Summer B. Rupper

Anonymous Referee #2

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I agree with the review comments that have already been made. This isn't a new insight but it is helpful to be reminded of its potential significance. The modelling section needs to be clarified - equations (3) - (6) are not easy to understand as they are, and would certainly benefit from diagrams to show how things are defined. (And as a minor comment, the lower limits for the integrals in these expressions have to be zero, not 1, surely?) The use of the secant approximation for the air mass (eq. 1) is discussed, and the fact that it will introduce bias into the results is correctly identified, but I was left wondering why the authors didn't simply fix the problem with a better approximation. As the previous reviewer, I feel that the lack of explicit consideration of diffuse radiation is also a significant omission.

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The discussion of the impact of DEM resolution in section 4.1 is certainly relevant, but needs to acknowledge the fact that, while the sampling interval of GDEM is 30 m, its actual spatial resolution is coarser than that. There is relevant literature on this, e.g. Hengl & Reuter 2011 in general, Rees 2012 for polar environments, no doubt others, showing that the actual spatial resolution is more like 100 m so that some at least of the trend noted in fig 9 can be attributed to the characteristics of the DEM not the terrain.

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2018-64>, 2018.

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