

January 20, 2016

Dear Dr. De Michele – after considerable thought, and reading of recent literature, I will agree to change my recommendation and recommend that your manuscript be accepted with minor changes. A few points to clarify my position. Please note that even though each reviewer suggested publication (either minor or major changes), all of these reviewers clearly outlined that the major limitation was the very small number of validation points. This is a major limitation of the paper, and is why I made my original recommendations. This is still my general position, but believe I should now recommend publication due to the following.

1. There is an excellent article by (Nolan et al., 2015. The Cryosphere) who have used aerial photos and structure-from-motion to demonstrate the applicability of this methodology to map snow depths. I understand that they used a small manned aircraft and high resolution cameras and GPS, but they did not use ground control points. This paper has clearly shown that this method can be very accurate and they provide a very large number of ground snow depth points (over 6000 points) to verify the methodology. This is the “gold standard” and which other papers should follow. My initial expectation is that this is an example of what is needed to properly validate new airborne methodology for measuring snow depth, and was the reason I initially rejected your paper. You need to reference this paper and clearly outline that they have demonstrated the use of this type of methodology.
2. It has come to my attention that there is another recently published paper (Vander Jagt et al., 2015. Geosciences) using drones to estimate snow depth. Unfortunately, they do not have a large number of sample points either – only 31 validation points. But this paper does present initial evidence that this methodology may provide snow maps, and again, you should reference this paper.
3. In addition, another article is currently in The Cryosphere Discussion (Buhler et al, 2015. The Cryosphere Discussion). This paper uses a few hundred data points to validate the methodology.
4. Given a small, but growing, number of papers outlining the use of drones for mapping snow depth, with each system using various drones/cameras/GPS and each also having a relatively small number of validation points, I now believe that your paper can contribute to advancing this small, but growing, body of evidence that drone systems may provide reasonable accuracy in mapping snow depth. Although improved validation with more data points is urgently needed, in the mean time the small number of papers, including yours, are beginning to outline the possibilities of using this methodology.

With the above, I will recommend that your paper is accepted and ask that you:

- reference and review the papers above, and carry out a detailed literature review to find any other papers on this topic,
- address the changes suggested by the last round of three reviewers. This will likely include shortening your paper.

I believe that you should be able to make these changes relatively quickly.

Thanks for your patience,

Phil

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