

The Cryosphere Discuss., referee comment RC3
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Comment on tc-2022-80

Edward Bair (Referee)

Referee comment on "Automated avalanche mapping from SPOT 6/7 satellite imagery with deep learning: results, evaluation, potential and limitations" by Elisabeth D. Hafner et al., The Cryosphere Discuss., <https://doi.org/10.5194/tc-2022-80-RC3>, 2022

In "Automated avalanche mapping from SPOT 6/7 satellite imagery: results, evaluation, potential and limitations" avalanches are detected using a machine learning approach on high-resolution satellite imagery. Manually classified avalanches are used as training data, and manual classification consistency is compared across 5 experts.

I enjoyed reading this manuscript and suggest that it be published subject to a few minor revisions. Attached is an annotated PDF with line-by-line points. My major critiques are as follows.

1) The authors need to acknowledge the limitations of optical imagery for avalanche classification; that is that the weather has to be clear. Most avalanches occur while it is snowing and their evidence may be erased before the next clear weather period, let alone a coincident clear sky satellite overpass.

2) The authors need to state what it is the experts and the DeepLabV3+ algorithm are looking for: crowns, stauchwalls, debris, all of the above? Perhaps this is described in some of cited literature but it should be re-stated for the reader.

3) Why was a support vector machine used instead of solar geometry to create a shade mask? Given that the authors have a DEM and the time of acquisition, it would be easy to calculate the local solar zenith angles.

4) It's not surprising that the inclusion of the near-infrared band in these heavily shadowed scenes did not improve the error statistics in DeepLabV3+. In the shadows, snow reflectance in the near IR will be zero, as only diffuse illumination in the shorter wavelengths will be present.

NB 6/8/22

Please also note the supplement to this comment:

<https://tc.copernicus.org/preprints/tc-2022-80/tc-2022-80-RC3-supplement.pdf>