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The Cryosphere Discussions

Interactive comment on "Evaluation of single-band snow patch mapping using high resolution microwave remote sensing: an application to the Maritime Antarctic" *by* C. Mora et al.

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This is a very interesting and useful manuscript that highlights the potential of very high resolution, X-band SAR imagery for large cartographic scale, snow cover mapping. Notwithstanding, I find the manuscript's structure somewhat ineffective, particu- larly with regard to method description. Relatedly, the methodology used to evaluate the performance of the classifiers is not well explained and seems inadequate (does not translate actual performance). I hope that the following comments come across to the authors as constructive in intention; some of the issues I highlight below are issues that I deal with in my own research and have particular interest on.

Section 3.3 is titled "Production and validation of snow cover maps" but does not ex-

plain how the validation was done. I think it would be beneficial to separate classification algorithms ("Production of snow cover maps") from validation. Only after the results (section 4), in section 5, is it explained that the ground truth data was divided into classification and validation sets. I would additionally suggest explaining how the separation between classification and validation sets was performed (e.g., random?) as well as adding considerations on the representativeness of the samples (different configurations will significantly affect computed performance). Considering the small size of the reference dataset, for a minimum-bias assessment, the performance of the preferred classifier should be trained and evaluated using multiple training and validation sets (from multiple, different partitions). As is, it would be useful to have the classification and validation polygons discriminated in one or all of the results' maps; or, maybe, just remove the patches used for classifier development from those maps.

The study area is quite small (< 1.5 sq. km?), yet the reference data is significantly spatially restricted; although it could be difficult to analyze snow properties for all snow patches, it is clear that wet-snow conditions are widespread – why only some patches were mapped in the field? Additionally, since the presented method for snow mapping involves classifying non-snow land covers, having more extensively field-mapped the non-snow classes would have enabled a more reliable performance assessment independently of the snow cover mapping. My concern is that the presented values of Kappa, etc., though encouraging, do not properly convey the performance of the classifications. For example, in Fig. 15, in two instances, the snow ground-truth polygons (the northernmost and southernmost polygons) are much smaller than the SAR-image derived snow patches they overlap. Do those (red) polygons represent the actual extent of the snow patches? If so, it means that the overmapping for the snow class is much more significant than the performance measures suggest, and thus actual performance is lower than the computed performance; i.e., the geometry and distribution of the ground-truth areas would have been a strong determinant of measured performance. If not, what was the rationale for mapping only a portion of the snow patch?

It would be more effective to describe the used statistics (evaluation of the different polarizations for land cover class discrimination; comparison of the classification algorithms; automated classification evaluation) under methodology. Currently, they are essentially referred for the first time in or after the results section.

In line with a comment from reviewer #1, section 3.2 deals with data and data (pre)processing, not with image classification as suggested by the respective title; ideally, there would be a correspondence between the 3 items highlighted in the text right after section 3 header (Methodology), and section 3 level-2 headers.

Section 5 is composed of results and thus should be under the results section (section 4). The method descriptions under section 5 would move to the methodology section.

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