

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.

J. Yackel (Referee)

yackel@ucalgary.ca

Received and published: 4 November 2016

Overall comments:

This paper utilized very high resolution TerraSAR-X imagery for maritime snow patch mapping in the Maritime Antarctic. The manuscript is clearly written, organized and detail-oriented. Several SAR classification techniques have been tested to identify snow patch in summer. SAR imagery from winter and field measurement were used as ground truth. Authors mentioned different accuracy from tested techniques to identify wet snow patches. However, there are concerns regarding terrain and incidence angle corrections. To utilize this method for operational monitoring these concerns should be resolved. Moreover, the authors mention about misclassification of wet soil with wet

C1

snow patch. Proposed method has the potential for more accurate classification by adding classes such as wet soil, bare soil etc in classification. It would be nice to see a confusion matrix with all these categories for improved classification accuracy.

Specific comments:

What is meant by wet snow? What is the moisture content by volume? This is important in terms of microwave signature that varies with moisture content in snow. Is this method meant to identify snow patch regardless of wetness (e.g. saturated, 5% moisture etc.)?

Page 2, line 1-2 ‘In mountain terrain. ...’ Reference is needed to support the statement. And, why it is difficult? What are the constrains?

Page 4, section 3.1 When and how the grain size was measured? Considering the high temperature fluctuation from Fig 7, grain size will be different as well depending on the time of measurement. I think, Fig 10 would have better agreement if those measurements were coinciding.

Page 5, section 3.2 How this technique will be same/different for descending passes?

Page 6, line 27 The timing of snow temperature measurement was shown in GMT. To have a better idea about all of these dataset, all time should be mentioned in a single unit (UTC/GMT/local time: choose any and be consistence).

Page 7, line 6-7 Due to diurnal effect, backscatter from HH polarization will be varied in ascending and descending pass. How this effect was considered? Incidence angle has a significant effect on microwave backscatter. Images from Jan 12 has very large incidence angle in comparison to other two images. How us incidence angle dependency on backscatter addressed?

Page 7, Line 8 ‘The summer HH polarization scene showed best separability ...’ Why HH worked better than VV?

C2

Page 8, section 5.1 How these thresholds will change with different passes/polarizations/incidence angles?

Page 10, Line 10 Overall accuracy for the classification is promising. However, looking at Fig 15, it seems ground truth polygons are not perfectly overlapped with extent from SAR images in most cases, that questions the actual performance of the approach.

Page 10, line 15 and page 11, line 19-21 'The only issue arise in classification. ...' How can this issue be resolved?

Page 17, Table 1 Acquisition time for SAR images in local time (instead of UTC) would help to correlate the temperature during acquisition from Fig 7. As water content in snow is one of the major determinant of microwave backscatter (both HH and VV), therefore local temperature should be considered while calculating any threshold for wet snow.

Page 11, line 24 'Radar'.. should be radar

Page 21, Figure 3: 'aquisitions'... should be 'acquisitions'. 'analysys'... should be 'analysis'

Interactive comment on The Cryosphere Discuss., doi:10.5194/tc-2016-190, 2016.