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The Cryosphere Discussions

Interactive comment on "Rock and snow differentiation from colour (RGB) images" *by* Alex Burton-Johnson and Nina Sofia Wyniawskyj

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Manuscript Title: "Rock and snow differentiation from colour (RGB) images"

General comments: This study presents a new Polynomial Thresholding (PT) for differentiation of rock and snow using high resolution coloured images of the Polar region. Overall, the work lacks reasonably in scientific content and several fundamental errors. PT is the sole contribution of the current work, however, since the method is empirical it needs rigorous evaluation in terms of its scientific viability. The writing style followed in the manuscript is casual with basic references of certain well-established methods simply missing (For example Linear mixture modelling (LMM) or Fuzzy Membership as called here: Settle and Drake (1993)). The scientific quality of the work needs to be upgraded considerably in line with the comments.

Specific and Technical comments: 1. The Introduction section fails to properly justify

the need of the current work.

2. The results from the proposed PT method are compared with other supervised (MLC) and unsupervised (FM and RB-NDSI) methods. However, this is not a justified comparison except for MLC which performs at-par with the proposed method. Classic NDSI is modified to RB-NDSI as per the availability of the bands and the results of FM are degraded for the sake of comparison. Reframing the NDSI in itself meant that it would not perform well or at par because the spectral difference which is its basis is lacking in its new version (RB-NDSI). Incase of FM or linear mixture modelling neither the method has been properly explained nor correctly implemented. The LMM can be applied in both supervised as well as unsupervised modes and since it is a sub-pixel or soft classifier it results in fraction images equal to the number of target classes (Bastin, 1997). This is usually applied when data has sizable mixed pixels (i.e., in case of moderate to coarse resolution data). Its actual potential is revealed while classifying the low-resolution data and it constitutes an advanced classification method. In this work the output from the LMM has been degraded by thresholding which convert the 'soft' output to a 'hard' one. In light of this the comparisons made with RB-NDSI and FM are not fair and justified.

3. Besides, the authors should have compared their method with the Object based image analysis (OBIA) instead of the methods they have currently chosen. This is because, similar to PT, the OBIA work well in case of high-resolution datasets. It would be interesting to see this comparison.

4. The accuracy assessment portion needs better clarifications and description. Proper explanation and justification in support of the usage of the chosen accuracy metrics (i.e., CAtot and CArock) should be given. Also, for comparison of any set of algorithms the processing speed/time makes a very important parameter which must be considered and which is lacking here.

5. The number of figures can be reduced.

References J. J. SETTLE & N. A. DRAKE (1993) Linear mixing and the estimation of ground cover proportions, International Journal of Remote Sensing, 14:6, 1159-1177, DOI: 10.1080/01431169308904402 L. BASTIN (1997) Comparison of fuzzy c-means classification, linear mixture modelling and MLC probabilities as tools for unmixing coarse pixels, International Journal of Remote Sensing, 18:17, 3629-3648, DOI: 10.1080/014311697216847

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