**Atmospheric
Measurement
Techniques
Discussions**

Interactive comment on "The detection of cloud free snow covered areas using AATSR measurements" *by* L. G. Istomina et al.

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"In the first instance, some of the text describing the tests (e.g. pages 1108, 1110) could be clearer if presented in mathematical notation (as an inequality with a threshold)."

We do agree that in present form the spectral behavior tests are hard for understanding. In the final version of the paper they will be written in mathematical notation as a table.

"Page 1110 says 'Relative BT difference at 3.7, 10.8 and 12 μm channels should not be larger than 3%'; is this three separate tests on each pair of BTs (which is how we are interpreting it)? If so, the check using the 10.8 and 12 μm tests is similar to traditional cirrus cloud masks. Applying this test to some of the test scenes in the paper reveals

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that cirrus may be a frequent occurrence, which is interesting."

The problem with the difference between 10.8 and 12 μm is that channel 10.8 μm is sensitive to the grain size and liquid water content of snow. In some cases this causes the difference between the two channels even for cloud free conditions. To avoid misinterpretation of this difference (which may be caused by snow and not by cirrus), we do not apply the test for 10.8 and 12 μm directly. However, we do apply the tests for the pairs 3.7 and 12 μm, 3.7 and 10.8 μm, which contains indirect comparison of 10.8 and 12 μm. We would not recommend to rely on standard thin cirrus tests over snow surface as it might be misleading.

"We think Figure 15's caption is incorrect: the AATSR scene is from January (the next part of the caption with the MODIS image is correct)."

Indeed, both scenes are from January. This typo will be corrected in the final version of the paper.

"As well as detecting snow, we think the first test (870 and 1.6 μm difference) may also identify deep convective clouds with a very high cloud water content, as their spectral behaviour can be similar."

Indeed, a cloudy scene might pass some of the VIS and NIR tests, and the probability of this in case of optically thick warm clouds is high. However, we do not consider these clouds to be difficult for detection, as such clouds will be screened out during TIR tests due to their high reflectance in 3.7 μm.

"It would be an interesting addition to extend the figures by including the AATSR operational cloud mask (as a comparison with the MODIS cloud classification, which would additionally highlight some of the benefits of the scheme presented in the paper)."

According to our observation AATSR cloud mask is generally a bit less precise than that of MODIS. Therefore we have chosen MODIS cloud mask as a reference point. However, showing them together certainly makes sense. We will add AATSR cloud

mask panels for figures 8-15 in the final version of the paper.

The authors are grateful for the useful corrections and thank referees for the efforts.

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