

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

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Comment from A. M. Sayer & C. A. Poulsen

This is useful paper; it is known that accurate cloud masking over snow is non-trivial. We think that the approach based on radiative transfer is a good one to take. As well as identification of cloud-free scenes for aerosol retrieval, another application of such techniques is in improving cloud masking for cloud retrieval purposes. We have found in validation of our (A)ATSR cloud retrieval datasets that biases and artefacts can occur when existing cloud tests are used in polar regions.

We do have a small number of suggestions which we feel would improve the paper. In the first instance, some of the text describing the tests (e.g. pages 1108, 1110) cloud

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be clearer if presented in mathematical notation (as an inequality with a threshold).

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

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).

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. This is something we have observed in our own efforts to identify misflagged cloud in polar regions: resulting retrievals show anomalously high water content. As a result this test may provide some false positives when applied to non-polar regions containing deep convective clouds (although presumably these will be correctly identified by some of the other tests you present).

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).

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