**Atmospheric
Measurement
Techniques
Discussions**

Interactive comment on "Improved identification of clouds and ice/snow covered surfaces in SCIAMACHY observations" *by* J. M. Krijger et al.

Anonymous Referee #2

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The paper describes an updated version of the SCIEMACHY PMD identification of clouds and ice/snow (SPICI) algorithm that is based on several spectral threshold tests for PMD measurements in visible and near infrared. In this updated version a normalized vegetation index is used to improve detection of clouds over snow covered forested surfaces. The authors also provide a PMD degradation correction to be used with the algorithm. The SPICI algorithm is validated against other methods of cloud detection developed for the instruments flying on board ENVISAT.

General comments:

The paper subject is appropriate to AMT. The paper contains some original material. The abstract provides a sufficiently complete summary of the paper. The paper is well organized and clearly presented. However, the paper being scientifically correct is not

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obviously a significant advance because it provides basically an incremental improve-ment to the existing algorithm. Moreover, the paper lacks independent validation of the capability of the algorithm to distinguish clouds and snow covered vegetated surfaces which is one of the algorithm improvements as it is stated in the abstract. In the val-idation section, the authors say that "as both MERIS and SCIEMACHY FRESCO are not well suited for cloud detection over snow/ice surfaces" and they employ ATSR to validate the SPICI algorithm. However, Section 6.3.2 says that "partial snow coverage like e.g. in the case of snowy forests has been avoided" in the ATSR validation dataset. That's why the capability of the algorithm to distinguish clouds and snow covered veg-etated surfaces remains invalidated with independent data.

Specific comments:

Introduction: The authors may want to add the following references to cloud algorithms developed for OMI and an application of one of the algorithms for detection of clouds over snow/ice:

1. Accarreta J.R., J.F. de Haan, and P. Stammes, Cloud pressure retrieval us-ing the O2-O2 absorption band at 477 nm, J. Geophys. Res., 109, D05204, doi: 10.1029/2003JD003915, 2004.

2. Joiner, J., and A. P. Vasilkov, First results from the OMI rotational Raman scattering cloud pressure algorithm, IEEE Trans. Geosci. Rem. Sens., 44, 1272-1282, 2006.

3. Vasilkov, A. P., Joiner, J., Haffner, D., Bhartia, P. K., and R. J. D. Spurr, What do satellite backscatter ultraviolet and visible spectrometers see over snow and ice? A study of clouds and ozone using the A-train, Atmos. Meas. Tech., 3, 619-629, doi:10.5194/amt-3-619-2010, 2010.

Introduction: P. 1115, line 24. Is it a typo in "It uses, a.o. the SCIAMACHY ..."?

Section 4. P. 1119, line 7. Please correct "85 nm"

Figure 3. It is hard to distinguish light color lines.

Figure 3 and 4. A font size of the labels should be increased.

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