**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 #1

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This paper describes an improved version of the SPICI algorithm to distinguish between clouds and snow/ice using PMD measurements from SCIAMACHY. The main improvements are a PMD degradation correction and the usage of normalized vegetation index to distinguish snow over forest areas. The paper is well organized and the algorithm contribution is suited to AMT. Nevertheless as this is the second paper on SPICI, a more systematic validation must be performed before publication.

Major Issue:

The SPICI validation is restricted to relative few random orbits. A more systematic validation is required showing comparisons for a complete year (or at least full representative months) of SPICI data with e.g. MICROS, FRESCO, or AATSR data.

Minor Issues:

The use of PMD 5/4 or PMD 4/5 should be homogenized. Table 2 and Fig. 3 use PMD 4/5 while Fig. 4, Eq. (3) and (4) use PMD 5/4.

Section 1, page 1115, lines 10 and 16: Other O2 A band algorithms like ROCINN (Loyola et al, 2007, 2010) are missing:

- Loyola D., W. Thomas, R. Spurr, B. Mayer, "Global patterns in daytime cloud properties derived from GOME backscatter UV-VIS measurements", International Journal of Remote Sensing, vol. 31, no. 16, pp. 4295-4318, 2010.

- Loyola D., Thomas W., Livschitz Y., Ruppert T., Albert P., Hollmann. R., "Cloud properties derived from GOME/ERS-2 backscatter data for trace gas retrieval", IEEE Transactions on Geoscience and Remote Sensing, vol. 45, no. 9, pp. 2747-2758, 2007.

Section 3, page 1118, Eq. (1): In case that T <0.35 & S5/S4=0.16 the measurement will be classified as both "Ice/Snow clear" and "Cloud"

Section 5, page 1121, line 6: Add a reference to the statement about the GOME PMDs degradation. What is the relationship between the GOME PMD degradation and the SCIAMACHY PMD degradation?

Table 1: The meaning of the sentence "containing 80% of the signal" is not clear

Fig. 3: A curve for the "Desert" case in the PMD2/PMD3 plot is missing

Fig. 5: There are no top and bottom images as indicated in the figure caption.

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