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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 #3

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This manuscript of Krijger et al. presents an improved method for the detection of clouds from the PMD observations of SCIAMACHY. The main emphasize of the manuscript is on separation of clouds and ice covered surface and of the correction of the PMD channels for degradation effects. In addition the manuscript presents a comparisons to co-location cloud and snow observations from MERIS and AATSR as well as to the FRESCO cloud product.

Cloud detection is an important issue for instruments like SCIAMACHY which aims at accurate trace gas retrievals. This manuscript tackles a common problem for cloud detection, namely that ice-covered surfaces appear white in the visible and thus they can be misclassified as cloudy and here an effort is made to extent the separation of ice and snow to snow covered forest surfaces.

The manuscript presents a topic that will be of interest to the readership of Atmospheric Measurement Techniques. However, the manuscript is very technical and brief and appears to be tailored towards a technical report rather than a scientific journal. Specifically the abstract and the conclusion will need to be re-worked.

The manuscript presents primarily an update to a (rather simple) cloud detection method, I would have wished that they put more effort into a comprehensive validation. However, the comparisons of the results of the SPICI method to three other cloud/ice detection methods is very brief, clearly lacks details and is mostly based on a small subset of the data. Two of the three comparisons deal with cloud-fraction and not with detection of cloud-free scenes over snow and thus I assume that the main focus here is to test the degradation correction. I would suggest making this point clear. Since the degradation is varying with time, I would recommend to study if the comparisons changes with time. Also, it would be interesting to see if the differences between the products have a typical spatial distribution. Overall, the comparisons are very simplistic and only a few global values are generated. To test the detection of snow, a comparison to AATSR is carried out. Again, this is done for a small subset and more critically it excluded snowy forests which is the primary update of the method presented in this manuscript. Overall, the manuscript provides only a single number for the comparisons and I would suggest to include a more detailed analysis, e.g. how many false negative true negative, false positive, and true positive do you find. Also, the main figure here (figure 5) is hard to read and I would suggest showing the data with a correlation plot. Finally, I am not sure if the comparisons of the SPICI retrieval to the other cloud/snow retrievals can be called a validation. This would require that these products themselves are validated and that their errors are well know. Otherwise you should call it a comparison.

Minor comments:

Abstract: This abstract is much too brief and it is unsuitable for a reader unfamiliar with SCIAMACHY.

p.1114: clouds effectively screen -> clouds effectively shield

p.1114: ... and providing exciting scientific results. -> This is a very subjective statement and I would recommend rewording it and added a few references.

p.1115 ...SCIAMACHY or GOME, its predecessor, like ICFA -> SCIAMACHY or GOME, the predecessor of ACIAMACHY, like ICFA

p.1115: In principle, cloud-detection methods using the O2 A band, like FRESCO and SACURA, can determine the pressure and thus discriminate white clouds from a white surface, but this is not part of the current versions of these algorithms.

I don't understand what is meant here. Why does it matter for an O2 Aband retrieval if the surface is snow covered or not. Are snow covered surfaces explicitly excluded from FRESCO?

p.1115 a.o. -> what does this mean?

p.1119: 85 nm and 1600nm -> 485 nm?

p.1120: define WLS and ESM

p.1122: Originally SPICI was validated on specific co-located scenes observed very close in

time by both SCIAMACHY and MODIS

è This updates SPICE algorithm has used MODIS to infer the thresholds so a validation against MODIS would not be a good idea.

p.1123: to determine an accurate geometric cloud fraction for SCIAMACHY ground scenes at nadir using MERIS spectral observations. to determine a geometric cloud fraction for SCIAMACHY ground scenes at nadir using MERIS spectral observations with an accuracy higher than from PMD algorithms.

p.1128: M-factors -> M-factors are used with capital and lower case in the manuscript.

Conclusion: A conclusion with 1 sentence is not very useful. I would recommend to remove the conclusion or to expand more on the relevance of this work.

Interactive comment on Atmos. Meas. Tech. Discuss., 4, 1113, 2011.