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Atmospheric Measurement Techniques Discussions

Interactive comment on "What do satellite backscatter ultraviolet and visible spectrometers see over snow and ice? A study of clouds and ozone using the A-train" *by* A. P. Vasilkov et al.

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The paper describes the impact of clouds over bright surfaces (mainly ice/snow) on the UV backscatter satellite retrieval of total ozone, here in particular for the OMI retrieval. This is an important paper since many satellites that currently retrieve total ozone operate currently in the UV (SBUV, GOME/GOME2, SCIAMACHY, and OMI).

The first part describes the OMI cloud (scene) pressure algorithm based on RRS scattering. Using synthetic spectra the effects from clouds over bright surfaces is investigated. A classification scheme for non-shielding (mainly thin clouds) and shielding clouds (thick clouds) is applied to OMI data and compared to CLOUDSAT data. Finally,

the error in the current operational OMI retrieval which neglects clouds over bright surface is assessed for two specific scenes above Antarctica. The paper is generally well written and can be published with some minor modifications as detailed in the following.

p. 239, l. 5-7. In a recent paper by Lotz et al. (2009) an algorithm for classification of clouds and surface from SCIAMACHY data is described that allows cloud detection above ice, see Figure 4 in Lotz et al., Cloud and surface classification using SCIAMACHY polarization measurement devices, Atmos. Chem. Phys., 9, 1279-1288, 2009. This should be included and briefly described here

p. 240, l. 20: Current UV backscatter satellites are listed here and should be extended by adding GOME1 (Burrows et al., 1999), which is still in operation but with a limited geographical coverage.

p. 241, l. 3-5: The authors mention that the current operational OMI retrieval (OMTO3) does not account for clouds above snow and ice. It is important here to mention that the various DOAS algorithms applied to GOMEs and SCIAMACHY use cloud information from the O2A bands. FRESCO/SACURA (see the papers by Koelemeijer and Kokhanovsky et al.) provide effective scene heights above snow/ice and this is used in the DOAS retrievals, see for instance Coldewey-Egbers et al., ACP, 2005, van Roozendael et al. JGR, 2006. The major difference is that effective scene height is here calculated from the O2A band (visible/nir) and not from the UV as in this work.

p. 248, l. 3. Please state briefly how the tropopause pressures were derived (method, data source).

p. 251, l. 4-6, Using the discrete wavelengths from TOMS, is it feasible to retrieve scene pressures from the TOMS data? This would be important to make the new version of OMTO3 with scene pressure retrievals applicable to historic TOMS data. What about SBUV retrieval, which uses a different algorithm? It is clear here that OMI with the continuous wavelength range coverage allows an optimisation of the used wavelengths to minimise impact from RRS. But this is not possible for SBUV and TOMS. Please

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discuss the implications here.

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