

## ***Interactive comment on “MERIS albedo climatology for FRESCO+ O<sub>2</sub> A-band cloud retrieval” by C. Popp et al.***

**Anonymous Referee #2**

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The paper describes the new global MERIS albedo climatology for oxygen A-band cloud retrievals. The authors demonstrate that the application of this new MERIS black-sky albedo (BSA) dataset to the FRESCO+ algorithm using SCIAMACHY data is able to improve the determination of effective cloud fractions compared to the currently applied GOME Lambert-equivalent reflectivity (LER) climatology. The GOME LER dataset introduces several artefacts, especially in regions with sharp spectral contrasts or over bright surface targets, due to the coarse spatial resolution of GOME ground scenes (320kmx40km). The topic meets the aim and scope of the journal. The paper is well structured and well written. It covers globally what is expected from a paper describing the compilation and quality of a new dataset. The title clearly reflects the contents of the paper and the abstract provides a compact and reasonable summary.

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mary. I suggest the paper being published after some minor changes/improvements are carried out.

Specific comments:

(a) Page 4605, line 26: Replace the word 'Monitoring' by 'Measurement'. The official terminology (esp. w.r.t. SCIAMACHY) is 'Polarisation Measurement Device' for PMD.

(b) Page 4606, line 6: Include reference for SCIAMACHY:

Bovensmann, et al., SCIAMACHY: Mission Objectives and Measurement Modes, J. Atmos. Sci., 56, 127–150, doi:10.1175/1520-0469(1999)056, 1999.

(c) Page 4606, line 7: Include reference for GOME:

Burrows et al., The Global Ozone Monitoring Experiment (GOME): Mission Concept and First Scientific Results, J. Atmos. Sci., 56, 1999.

and GOME-2:

Munro et al., GOME-2 on MetOp, in: Proc. of The 2006 EUMETSAT Meteorological Satellite Conference, Helsinki, Finland, 12–16 June 2006, EUMETSAT P.48, 2006.

(d) Page 4608, line 3: FRESCO+ uses an assumed cloud albedo of 0.8 for the radiative transfer calculations. How did you find this value of 0.8? What happens to your retrieval results, if you would increase or decrease this value? How large is the impact on the effective cloud fraction determination, for example? For large solar zenith angles the cloud reflectance is lower than for small solar zenith angles at certain azimuth angles (e.g., 90 deg). How do you deal with that in your retrieval w.r.t. a fixed cloud albedo of 0.8? Moreover, does this fixed cloud albedo mean, that FRESCO+ is not able to detect thin clouds (e.g. cirrus clouds)?

(e) Page 4608, line 4: In the RT calculations you use a mid-latitude summer atmosphere profile. Is this profile used for all the retrievals, i.e. globally? If so, then, how does this effect your retrieval results obtained for low and high latitudes?

(f) Page 4609, line 7: Include the following 2 references w.r.t. geometric cloud fractions, namely OCRA algorithm using SCIAMACHY PMD observations:

Loyola, D.: A new cloud recognition algorithm for optical sensors, IEEE International Geoscience and Remote Sensing Symposium, IGARSS, Seattle/WA, 6–10 July 1998, pp. 572–574, 1998.

and MICROS using the synergy between SCIAMACHY and MERIS measurements:

Schlundt et al., Synergetic cloud fraction determination for SCIAMACHY using MERIS, Atmos. Meas. Tech. Discuss., 3, 3601-3642, doi:10.5194/amtd-3-3601-2010, 2010.

(g) Page 4611, line 7: What is the reason for the absence of albedo values for deep ocean pixels in the Albedomap dataset and therefore, also in the MERIS BSA climatology.

(h) Page 4622, line 22: Replace the word 'Monitoring' by 'Measurement'.

(i) Page 4636, Figure 2: Please enlarge both figures.

(j) Scatter density plots (Fig.3, Fig.7, Fig.9): color bar and its labelling (font size) could be slightly larger. The same holds for the labelling of the x and y axes.

(k) Page 4638, Figure 4: Use a larger font size to label axes.

(l) Page 4639, Figure 5 and page 4640, Figure 6: All the figures (a-f) and thus, labels and also color bars, are definitely too small. For the cloud fraction maps I would suggest to use a bright color for drawing coastlines, which would make a comparison between the figures much easier.

(m) Page 4644, Figure 10: Use a larger font size to label axes. The color bar is too small. In general, I would suggest to be more consistent in presenting the plots w.r.t. plot and color bar sizes, font sizes, etc.

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Interactive comment on Atmos. Meas. Tech. Discuss., 3, 4603, 2010.

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