Atmos. Meas. Tech. Discuss., 3, C1773–C1775, 2010
www.atmos-meas-tech-discuss.net/3/C1773/2010/

Atmospheric Measurement Techniques Discussions

AMTD

3, C1773–C1775, 2010

Interactive Comment

Interactive comment on "Synergetic cloud fraction determination for SCIAMACHY using MERIS" *by* C. Schlundt et al.

C. Schlundt et al.

cornelia@iup.physik.uni-bremen.de

Received and published: 20 October 2010

(1) & (2): The GTOPO30 model is a digital elevation model from which we obtain the information about the height above mean sea level in meters. That means, for a MERIS pixel above water, DEM gives 0.0m and in combination with the empirical found threshold values for MERIS near infrared channels 13 (865nm) and 12 (778nm), MICROS is able to identify water pixels. For example, for the discrimination of an inland water pixel above (below) mean sea level, MICROS uses the combination of DEM greater than 0.1m (less than 0.0m) and the water threshold values for MERIS NIR bands. In the same way, MICROS checks for land pixels above and below the mean sea level in conjunction with the empirical found land threshold values.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

(3): The RMIN=0.2 threshold value has been determined by Kokhanovsky (2001) using radiative transfer simulations. The spectral contrast threshold values (1.04 and 1.20) were found empirically analyzing case studies until they were valid globally.

(4): The reason for the double check of SC is related to the position of the sun at nadir observation. That means, the top-of-atmosphere (TOA) reflectance is decreasing with increasing solar zenith angles. SC<1.20 works very well for low- and mid-latitudes, but not for high latitudinal regions, where SC<1.20 leads to wrong MERIS pixel classifications. So we carried out a lot of case studies in order to find out, which threshold works for high latitudes. We found that 1.04 works very well at the polar regions. However, SC<1.04 does not catch clouds at mid and low latitudes. Therefore, this double check is needed, in order to avoid wrong pixel classifications.

(5): 2 adjacent non-cloudy MERIS pixels are flagged as cloudy. That means, for an optically thick cloudy MERIS pixel, MICROS checks the adjacent pixels within a 2km radius (i.e. 2 MERIS pixels) and re-flags only the non-cloudy pixels to IDX=7.0 (optically thin cloudy pixel). Pixels having an index of 7.0 or 8.0 are not touched. The fraction of re-flagged MERIS pixels in a SCIAMACHY grid cell is very low, since the SCIAMACHY ground scene is rather large and only pixels at cloud borders are re-flagged.

(6): For creating the MERIS RGB Images, the first 8 channels are used. We will add this information in the paper.

(7): We will exchange all histograms in Fig. 8, 9 and 10 by difference histograms: x-axis: MICROS - other cloud fraction; y-axis: Frequency Density [%], in order to support the scatter correlation plots.

(8): The digital elevation model GTOPO30 is incorporated in MICROS as described in section 3.

(9): We think that Figure 3 is worth to keep since MICROS is a complex algorithm. In conjunction with Section 3, the scheme helps to understand how a MERIS pixel passes through each step of the algorithm. Due to the complexity of MICROS it is not possible to further simplify the scheme. Presentation experiences also showed that this scheme was very helpful to understand the structure of MICROS.

(10): We created also contour plots but since there are a lot of data gaps, we decided to use scatter plots presenting the results. We will exchange the histograms by difference histogram plots.

(11): We will exchange all plots in Figure 8,9 and 10, since MICROS has been processed for the whole data set available at IUP. The new processed MICROS cloud fractions do not exhibit the artificial behavior at 0.17, 0.32 and 0.5 anymore. There was a bug in the GTOPO30 subroutine, which was most probably responsible for that behavior.

References:

Kokhanovsky, A. A.: Reflection and transmission of polarized light by optically thick weakly absorbing random media, J. Opt. Soc. Am., 18, 883–887, 2001.

Interactive comment on Atmos. Meas. Tech. Discuss., 3, 3601, 2010.