Atmos. Chem. Phys. Discuss., 7, S7341–S7343, 2007
www.atmos-chem-phys-discuss.net/7/S7341/2007/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Oceanic phytoplankton, atmospheric aerosol and Raman scattering impacts on space-based ultraviolet radiance measurements" *by* R.-M. Hu and R. S. Sokhi

o. torres

torres@qhearts.gsfc.nasa.gov

Received and published: 28 November 2007

This manuscript addresses a very important issue. However, as currently written the paper lacks many important details. This deficiency makes the interpretation of the reported results very difficult.

The reflectivity of the ocean as seen by a satellite sensor such as TOMS is made up of the water leaving radiance that depends on the water inherent optical properties, and the Fresnel reflection of the incoming radiation (both direct and diffuse) that is a function of wavelength and surface roughness (surface wind speed). These components are a strong function of satellite viewing geometry.

The paper starts with a description of the data used for the parameterization of the water inherent properties for the calculation of the water leaving radiance. Figure 1 shows calculation of ‘water reflectivity’ at 331 and 360 nm, without specifying if it is just the water leaving radiance component, or if it also includes the Fresnel reflection component. Another crucial information missing to fully understand the results in Figure 1 are the angles for which the calculations were performed: solar zenith angle, satellite zenith angle, and relative azimuth (or phi) angle. If the calculations shown in Figure 1 include the Fresnel reflection it is very important that the geometry be such so that the strong specular reflection of the ocean or sunglint be avoided. For sunglint viewing geometry conditions the Fresnel reflection is significantly larger that the water leaving radiance. The same comment applies to the results in Figure 2 that integrate the effects of Raman Scattering, also a function of observing geometry. Figures 1 and 2 use the term reflectance in the y-axis, but refer to it as reflectivity in the captions, which is it? It makes a big difference in terms of the angular dependence.

The upper panel of figure 3 shows what is supposed to be the surface reflectivity at 360 nm from Herman et al [1997] The Herman et al analysis applies only to 380 nm. More explanation is needed on the TOMS observations shown here, is it a monthly average? What month is it? If it is an annual average, what years were used? Is the quantity shown on figure 3 calculated in the same way as the results shown in Figure 2?

The authors need to explain how the calculations shown in the bottom panel of Figure 3 were carried out. How was the viewing geometry associated with the observations in the top panel accounted for in the generation of the bottom map?

With regard to the Aerosol Index maps shown in Figure 5, the authors need to explain how is the chlorophyll effect accounted for in the calculation of the Aerosol Index.

The calculation of the Aerosol Index maps for January 2001 and July 2000, should be described. Instead of showing Aerosol index differences, the maps should show the actual Aerosol Index for the two cases. It should also show the actual AI observations

ACPD

7, S7341–S7343, 2007

by the TOMS sensor.

Details of the SSA retrieval are lacking. In addition to the AOD constrain using MODIS data, and aerosol vertical distribution using model calculations, the SSA retrieval must account for the satellite viewing geometry. Does the retrieval make use of the TOMS level 2 data that reports the viewing geometry, or uses the level 3 gridded AI data? The reference by Hu et al [2007] on the inversion procedure does not address this issue.

In summary, the paper has left out very important information necessary to understand and judge the validity of the reported results.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 14351, 2007.