

Interactive comment on “Spectral studies of ocean water using DOAS” by M. Vountas et al.

Anonymous Referee #1

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Comments on Vountas et al., “Spectral studies of ocean water using DOAS”

The paper applies an “optical absorption” analysis technique to satellite radiance measurements made by SCIAMACHY. This gives interesting results. However, the paper needs to explain why the standard techniques of water colour analysis, as used for SeaWiFS, MODIS and MERIS, are not applied. In view of the extensive literature on the standard techniques, most readers will be expecting these. Clearly, they could be applied, but SCIAMACHY may be lacking in calibration accuracy. I note that much of the background literature on the standard techniques is referenced on page 467 to compute effects of VRS.

Equation 1 shows that the analysis assumes that absorption features are spectrally narrow compared to the smooth continuum, which is fitted by a polynomial. Is this condition really met for chlorophyll? This needs a comment. I believe that the explanation

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would be clearer for many readers if the contrasts with the standard technique were explained.

A better title would use the word SCIAMACHY instead of DOAS. The present title does not even tell the reader that this is a satellite observation. “Differential” refers to switching between a sample and a reference. This is not the technique used here. I recommend “Estimates of ocean surface chlorophyll using SCIAMACHY.” “Spectral studies” seems unnecessarily vague.

The paper needs to end with a scatter plot comparing MODIS and SCIAMACHY chlorophylls.

Some estimate needs to be given for the errors in SCIAMACHY chlorophyll concentration in Fig 9. I have the impression from Fig 8 that this is large enough that you probably should not be citing MODIS errors as a significant problem at this stage, p476.

The text suggests that Fig 9 is derived from VRS only. This should be made clear.

In Figure 8, I have a strong feeling that the shape of the right panel has to do with Figure 3. This needs a comment

The Figures need improving, see below.

There are several examples of bad English grammar, and places where the language is repetitive and unclear.

Why is a resolution of 1 km necessary? (page 462). It is provided by other sensors, but this value is neither necessary nor optimal.

I strongly feel the need to include a Figure illustrating the effect of VRS on a typical ocean radiance spectrum. (p 465)

Surely the fit factor can be defined to be positive, p469? Negative values are an unneeded complication. The name also seems to shift from “fit factor” to “slant factor” (Fig 8 caption and axes). Language must be kept as simple and consistent as possible.

Were there 999 orbits in July 2005 (p 471)? I would expect about half that, 31x14. Perhaps you mean half-orbits, but then half these will be at night.

Figure 1 could be made clearer if lines were made more distinct and labeled individually. The VRS spectrum needs additional explanation, as noted above. “Call” presumably refers to ionized Calcium, but as written it looks like an English word.

In Figure 2, the left panel needs more explanation of SCIAMACHY’s properties. Why is the swath intermittent? What is the swath width? Where is the instrument’s instantaneous field of view? The right hand panels need to have the same vertical scale. I guess DOD to mean differential optical depth. This needs to be spelled out. In what sense is it differential? “Readout 2 of state 5” and “readout 253 of state 5” need to be explained.

Figure 5, as for Figure 2.

Something is very odd about Figure 9. In my version, the range 0.85 to 1.25 appears to be coloured the same as the “no data” area south of 40S. I assume from Figs 4 and 6 that you have almost complete global coverage from 50S to 80N. This figure needs to use the same colour palette as all the others.

Interactive comment on Ocean Sci. Discuss., 4, 459, 2007.

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