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Ocean Science Discussions

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

Anonymous Referee #2

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The present paper gives an interesting contribution to the field of ocean color research, with special respect to global chlorophyll interpretation in oceanic ecosystems.

This is written from a researchers point of view, who is familiar with water constituents interpretation from medium resoluted spectral measurements (SeaWifs, Modis, Meris), but has no detailed experience with spectrally high resolved measurement interpretation (i.e. Sciamachi and DOAS method). Therefore the DOAS approach gives a very useful complement to the "classical" chlorophyll determination approach, which consists of atmospheric correction, and application of more or less sophisticated color ratios, not mentioned here the state-of-the-art multivariate stastical Neural-Network like approaches. The new aspect (as it is known to me) is the introduction and use of Raman Scattering in this field and its relative simple computional realisation. The role of this can be possibly compared to the use of chlorophyll flourescence effects, what also cannot be classically included into radiative transfere theories and codes.

The description of the used method and models is compact and well understandable. The expected results are an useful enrichement to chlorophyll and biomass interpretation on a global scale. This is due to a number of reasons also mentioned by the author. The spatial ground resolution of Sciamache or GOME sensors are relativly poor, several kilometers, which does not allow to investigate coastal zones without mixed land-water pixels. Another point is the sensitivity of the retrieved Raman and chlorophyll absorbtion weighting coefficients Sv and Sa regarding concentrations above 1 mg/m^3. In coastal and other very productive zones there are typically found much higher values. Very promising sounds the remark in the conclusion that the method probably can be used for the distinction of different chlorophyll or algae compositions. This would be a very useful contribution to ocean color interpretation, as one can expect as a result from high spectral measurment use.

Finally some minor technical remarks from a readers point of view who is not familiar with the details of the DOAS approach. The definition of the measured optical depth tau = Log[I/I0]: May be it is worth to discuss that here are also included surface reflectance terms (albedos), which are for water in the order of 5% of incident radiance. Probably this is accounted for in the polynomial term.

Equation (1) includes the basic approach for the DOAS method for all of the following comprehension. Therefore slightly more description would be preferable. It is not clearly stated at this point regarding which internal parameters the functional is minimized, and what are the primary model input parameters. Also the kind of the norm is not indicated. Probably it is an integral over one of the below mentioned wavelength regions. (Why not to include both at one time?). In the summations there are twice used the parameter S with virtual summation indices i - trace gases j - pseudo absorber (later mentioned Ring spectra?) The trace gas factor Sk is probably a misspelling and should be Si, but must be clearly distinguished from the Sj-absorber coeffients, since the summation indices are so called mute ones. The remark about the problem of spectral correlation of reference spectra (page 464 line 21 ff) is not well understandable. It is

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clear that rising correlations will increase inversion problems, since the equation tends to an ill posed problem. But at least the polynomials in (1) are highly correlated, especially for the below mentioned relatively narrow spectral ranges. I mention all this because this part of the article is very important for the further understanding of the method.

Finally assessed the article is very interesting and worth to be published.

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