

Interactive comment on “Retrieving the availability of light in the ocean utilising spectral signatures of Vibrational Raman Scattering in hyper-spectral satellite measurements” by T. Dinter et al.

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General comments

A significant part of the upwelling radiance in the oceans can be the result of vibrational Raman scattering (VRS) at water molecules. Since the VRS signal depends on the number of scattering events, it can be used to determine parameters influencing the light path length in water. T. Dinter et al. use it to estimate the available light in terms of the depth integrated scalar irradiance E_0 and apply their algorithm to SCIAMACHI data.

The well-written article introduces a new parameter that can be retrieved from spec-
C5

trally highly resolved satellite data. I recommend to accept it with minor revisions considering the specific comments.

Specific comments

The density of radiation energy, defined by eq. (1), is a parameter irrelevant for the study. I recommend to omit it and to reduce accordingly the number of equations on page 36.

The extraterrestrial solar irradiance H_0 has been measured since long time from ground and satellite for a wide spectral range, and measurement inconsistencies could be reduced using solar models that predict the spectral emission of the sun. Thus H_0 is generally considered well-known, and it is common practice to use H_0 from literature for radiative transfer modeling and remote sensing (though there is still significant uncertainty in some spectral regions). In this study, H_0 measured by the SCIAMACHY instrument was used (see page 43) instead of literature values. Please motivate briefly the usage of SCIAMACHY measurements rather than literature data, and illustrate the difference by adding a literature spectrum (e.g. Kurucz et al. 2005, Fontenla et al. 2011) to Figure 1.

As described on page 43, a cloud and aerosol free Rayleigh atmosphere is assumed. While clouds can, in principle, be excluded during image processing, the atmosphere is never free of aerosols. Please justify this approximation and discuss the implications.

When introducing z_{90} , I recommend to start with the definition “the attenuation depth z_{90} is defined as...” (first sentence on page 46). The last sentence on page 45 and eq. (22) are then trivial and can be omitted.

Explain why 0.1 mg m^{-3} is used as reference concentration for chlorophyll-a (page 47).

The VRS weighting function depends on different parameters, most importantly on chl a. Illustrate its variability by adding to Figure 5 a second weighting function for an other typical chl a concentration.

All components of the model are described in much detail and illustrated using clear plots, except the weighting function function $W_{Oc}(\Lambda)$ introduced on page 48. I recommend to add a plot of $W_{Oc}(\Lambda)$.

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