

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.

Anonymous Referee #2

Received and published: 3 March 2015

Hyperspectral image acquisition of ocean colour holds great potential as the present article describes. Obviously, it is possible to extract the spectral signature of inelastic radiative processes associated with Raman scattering by water molecules from satellite data and from this draw conclusions on the photosynthetically available radiation in the ocean. A comparison of the diffuse attenuation coefficient from the GlobColour dataset and from the vibrational Raman scattering signal retrieved values show consistent results.

In my opinion, the article is a valuable contribution for the exploitation of hyperspectral satellite data and should be accepted after minor revisions.

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Comments:

- 1) The processing and obvious usability of the proposed scheme refers to case 1 waters. The comparison with the GlobColour data excludes the first $1^\circ \times 1^\circ$ pixels nearest the coastline in order to avoid optically complex case 2 waters. Lee and Hu show that in fact wide sea areas are rather case 2 with strong seasonal variations (Z. Lee and C. Hu (2006): "Global distribution of Case-1 waters: An analysis from SeaWiFS measurements", Remote Sensing of Environment, 101.2, 270-276). Could this be another explanation for deviations and the “butterfly distribution”? What IOP ranges and ranges of water constituent concentration are necessary for the described method of VRS utilization? Can it be applied to optically complex waters?
- 2) How sensitive is the method on uncertainties due to the spectral shape of absorption and scattering of different phytoplankton types and associated fluorescence?
- 3) It is not clear to me how the sun zenith angle correction is applied. Is the correction related to 3-D effects of the Earth's curvature that are important at low sun altitudes?
- 4) There is a recent paper by Li et al. describing Raman effects on the light field within the ocean (L. Li, D. Stramski, and R. A. Reynolds (2014): "Characterization of the solar light field within the ocean mesopelagic zone based on radiative transfer simulations", Deep Sea Research Part I: Oceanographic Research Papers 87, 53-69). They used the radiative transfer software Hydrolight (an often used reference). Could you discuss possible deviations to their findings? From the perspective of your coupled atmosphere-ocean RT model what Raman-related assumptions are possibly oversimplified?
- 5) With respect to Figures 12 and 13, how important is the consideration of VRS in terms of remote sensing? Maybe it is interesting to look at spatial differences on global maps without Raman?

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Specific comments:

- Equation 25 is unclear. Please explain all variables and unitise all labels in the figures including units.
- Figure 9 refers to different phytoplankton types, that are not further defined or discussed.
- Figure 12 and 13: Some regions are marked without reference to the text, does it mean something?

Interactive comment on Ocean Sci. Discuss., 12, 31, 2015.