

## ***Interactive comment on “Inelastic scattering in ocean water and its impact on trace gas retrievals from satellite data” by M. Vountas et al.***

### **Anonymous Referee #1**

Received and published: 10 July 2003

The paper contains significant original material proving that neglecting the ocean Raman scattering effect leads to large errors in trace gas retrievals from hyperspectral satellite measurements over clear ocean waters. This paper is well written and represents an important contribution in the field of remote sensing. The assumptions are clearly identified but the methodology leaves open a few questions that need to be addressed before publishing the paper. Overall ranking of the paper is good.

### General comments

1. Authors' ocean Raman scattering model takes into account the energy transferred to a given emission wavelength from shorter wavelengths only. The model neglects the energy transferred from the given emission wavelengths to longer wavelengths. The authors do not touch this issue.

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2. The ocean Raman scattering band is much wider than the GOME bandpass, so integration over exciting wavelengths within the band is needed. Alternatively, neglecting the integration should be justified.

3. Chlorophyll concentrations selected for the case study scenarios are too low as compared with the typical chlorophyll concentration of  $0.1 \text{ mg/m}^3$  for clear ocean waters. An estimate of the ocean Raman scattering impact on trace gas retrievals should be done for more realistic chlorophyll concentrations.

#### Specific comments

1. Entire paper. The main problem in modeling of ocean Raman scattering in the UV is not a selection of ocean reflectance models either being simple (Satyendranath and Plat, 1998 and many others) or sophisticated as e.g. Hydrolight (Mobley, 1994). Any reflectance model has inputs of inherent optical properties (IOP) of seawater. Parameterization of the seawater IOPs in the UV is still evolving mostly because of the lack of reliable empirical data. In comparison with the visible region, uncertainties in the parameterization of the seawater IOPs are significantly larger. Of course, those uncertainties translate to errors in any estimate of the impact of ocean Raman scattering on retrievals. Minimization of those uncertainties is the major problem in modeling of ocean Raman scattering in the UV. Highlighting of this issue is strongly desirable in the paper.

2. Introduction, 6th paragraph. Please reference the statement "We have performed several DOAS investigations in different wavelength regions " or take it out.

3. Section 5. As usual fresh waters are quite different from open ocean waters where the seawater optical properties model is valid. Optical properties of the water used in the swimming pool experiment were not measured. This raises a question of how the authors calculated the VRS compensation spectrum they compared with measurements.

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Technical correction

1. Correct spelling of the name of S. Sathyendranath throughout the paper.

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Interactive comment on Atmos. Chem. Phys. Discuss., 3, 2931, 2003.

**ACPD**

3, S1009–S1011, 2003

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