Biogeosciences Discuss., 4, S2359–S2361, 2008
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Biogeosciences Discussions

Interactive comment on "Particle optical backscattering along a chlorophyll gradient in the upper layer of the eastern South Pacific Ocean" *by* Y. Huot et al.

Anonymous Referee #1

Received and published: 10 January 2008

General comments.

This is a well written paper which pays a commendable degree of attention to detail. However the measurement of such low backscattering signals poses a considerable challenge to the instrumentation, and it is worth reading the companion paper (Twardowski et al 2007) to gain an insight into the steps that were taken to process the data. The main conclusion, that there is a linear relationship between the scattering and backscattering coefficients and chlorophyll concentration in the clear waters of the eastern South Pacific, is well supported by the evidence presented. The absence of a constant background scattering signal at very low chlorophyll concentrations is signifi-

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cant for light field modelling and remote sensing over large areas of the world oceans.

Specific comments.

There are three points raised in the paper that may stimulate further discussion:

1. The results obtained from the Hydroscat and BB3 backscattering sensors show systematic differences. Without getting into an argument about whether one set of results is better than the other, it would be interesting to know whether these discrepancies can be attributed to differences in measurement geometries or calibration procedures.

2. The fact that both the particulate scattering and the particulate backscattering coefficients are simple functions of chlorophyll concentration implies either that the concentrations of the particles responsible for scattering are closely linked to the phytoplankton populations, or that the scattering actually originates from the phytoplankton cells. Application of Occam's Razor suggests that the latter possibility should be seriously considered. This would imply that the phytoplankton cells in these waters are not acting as Mie scatterers, and the implications for the modelling and interpretation of inherent optical properties in clear oceanic waters are far from trivial.

3. The discussion (p4586) of possible spectral variation in the backscattering ratio at very low chlorophyll concentrations and its implication for the contribution of different size classes to scattering and backscattering seems to be unnecessarily speculative. Would it be better to accept that the uncertainties of the measurements prevent any firm conclusions on these matters, rather than rehearse old arguments?

Details.

p4574 line 4. delete question mark after lambda;

p4586 line 3: 'The results of these computations (see Fig. 8) differ depending on the instrument used..' but the legend for Figure 8 does not indicate which results are illustrated.

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Interactive comment on Biogeosciences Discuss., 4, 4571, 2007.

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