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Comment

## ***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.**

Y. Huot et al.

Received and published: 10 March 2008

**We thank Reviewer 1 for his/her thoughtful review, his/her point about the discussion of the backscattering ratio was particularly helpful in revising the paper.**

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

**We agree with the reviewer that the points below may stimulate discussion, generally, however, we avoided providing a more in depth discussion when we think the paper does not provide enough new arguments to further**

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these questions: but it does bring these long standing question back into the limelight. More specifically:

1. *The results obtained from the Hydrosicat 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.*

**We would also like to know. However, given that there are differences in the instrument calibration methods, geometries, and protocols used (which often cannot be reconciled after the experiment), it is very hard to provide a clear answer to this question. We find that the differences vary significantly with wavelengths and hence some of the discrepancies may originate from variability in the band calibration. However, our study was clearly not designed to answer this question and we thus cannot be much more definitive.**

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.*

**We find this result intriguing and definitely worth further investigation, but we feel that rehashing old arguments about the potential scatterers would be fruitless. The general agreement of Mie calculation with measurement of**

**BGD**

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phytoplankton scattering and backscattering properties has been previously shown (discussed in the text introduction). Thus, while our study provides a somewhat provocative result, we feel we cannot rely on Occam's Razor to provide a clear cut answer on this question. Our contribution allows a better parameterization of models for bbp but, unfortunately, does not further the question of its origin. We have added a paragraph to that effect in the discussion

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?*

**Yes, we agree with the reviewer and have greatly reduced the discussion on this topic and removed Figure 8.**

*Details.*

it p4574 line 4. delete question mark after lambda;

**Corrected**

*p4586 line 3: 8217;The results of these computations (see Fig. 8) differ depending on the instrument used..8217; but the legend for Figure 8 does not indicate which results are illustrated.*

**We have now dropped Figure 8.**

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