

Interactive comment on “On the influence of wind and waves on the underwater light field” by M. Hieronymi and A. Macke

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Thank you for the review of our work! Your comments will be considered for the revised manuscript.

1. The present paper could be significantly shortened by making better use of cross-referencing to background material that already appears in the earlier one.

This point probably applies for the description of the applied methods (Section 2). The aim was to introduce the model without making it necessary to read the earlier paper. However, we will shorten the section.

2. The abstracts of the two papers are very similar, suggesting a much greater overlap in subject matter than is apparent on reading the full text. In order to differentiate the

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two papers, it would be useful if the material in Section 4 (the summary) appeared in the abstract.

We will reshape the abstract with this regard.

3. The title is somewhat misleading, since the paper considers only a very restricted sub-set of the possible influences of wind and waves on the underwater light field. Enhanced reflection at low solar angles, the effect of white caps and bubble clouds, and wavelengths other than 490 nm are all excluded.

We propose a new title for the article: “On the influence of wind and waves on underwater irradiance fluctuations”. We try to keep it simple. With the new title it should be clear that polarization or reflectance are not subject of the paper. The exact specification will follow in the abstract.

4. The results presented are for the sun at zenith, 10% diffuse sky illumination, and very clear oceanic waters. There is a need for some kind of sensitivity analysis to indicate to what extent the conclusions drawn from the simulations carried out under these highly idealised conditions can be applied under more realistic conditions.

The conditions are chosen in order to maximize the potential lensing effect of waves. But these conditions are not unrealistic; we showed for example corresponding measurements in our previous work (Hieronymi et al. 2012) (only the sun zenith angles were differently – with minor influence on the light field and its fluctuations). However, the aim of the article is to investigate the purely geometrical influence of water surfaces, which is done for more than 100 different cases. It is certainly interesting to look at the influence of different sun positions, different illumination conditions, and more turbid waters. It is known that each of these points decreases the lensing efficiency (e.g. Stramski, 1986; Walker, 1994; Gernez and Antoine, 2009). We will add an appropriate paragraph to the end of the discussion of the simulation results (Section 3.3.2) in order to follow the referee’s suggestion. But this must be rather in a form of revealing perspectives for future research works.

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5. The authors raise the question of whether wave-induced underwater flashes have any significance for phytoplankton photosynthesis, but do not appear to draw any firm conclusions on the issue. Perhaps the question could either be addressed properly, or simply dropped from the paper?

We propose that we insert another outlook point (behind Section 3.3.2), where the issue is addressed. Some works investigate possible effects of light variability on different photo-relevant processes, and our work can give a hint on the manner in which irradiance is delivered.

Interactive comment on Ocean Sci. Discuss., 9, 1231, 2012.