Ocean Science

Discussions

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Interactive comment on "Modelling of underwater light fields in turbid and eutrophic waters: application and validation with experimental data" *by* B. Sundarabalan and P. Shanmugam

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Response for the Anonymous Referee #2

1. The treatment of homogeneous and inhomogeneous water column conditions is a complex problem which is not addressed simultaneously in the previous work. To simplify the situation, the authors consider the average of these two terms (both may not be equal) to compute the light field at a given depth. I think this solution is convincing

for turbid and eutrophic waters, but this section lacks some recent references.

Recent references are included in the revised manuscript.

2. It is not clear what are the depth and surface resolutions of the model. Can the model solve the underwater light field at any arbitrary depth? I recommend giving a brief description how the simulations were done; for example, bottom type and sea surface slope etc.

This model has a depth resolution of 0.25 m and surface resolution of 0.1m, which are adequate to capture the variability. The model has to be run for the entire depth at uniform intervals for simulation of the underwater light fields. The PM spectrum is used to treat the surface boundary condition, where the surface transmittance is calculated from the Fresnel function using the modified transmitted angle. Then the light interacts with the IOPs, and hence the transmittance along the depth is calculated as a function IOPs. As the light reaches the bottom, the upward direction of light entirely depends on the bottom boundary condition, and hence the reflectance along the depth is calculated based on the IOPs as well as bottom boundary conditions. The inclusion of these parameters is seen to increase the accuracy of this model.

3. Concerning in-water optical models, more details on how these models were developed and what were the ranges of in-situ data used for deriving the model parameters. Some parameters require a reference.

A detailed description is presented to explain the types/ranges of in-situ data and derivation of the models. Appropriate references are also included

4. Addition information with regard to the error calculation is required.

The performance of the underwater light field parameters was examined through the mean relative error MRE ([model –in-situ] / in-situ). 5. Check the consistency of some symbols and notations used in the manuscript. Symbols and notations were checked.

6. The authors may consider providing information on the computational time of the

present model.

The model is implemented in MATLAB 2007 with the computer having 4 gigabyte RAM. The run time for this model is 8 milliseconds for the entire wavelength at one depth. In fact, this can be reduced if the model is implemented in FORTRAN with the high performance computer (Included in the manuscript).

7. A brief discussion about existing RT models should be incorporated.

Existing RT models are discussed in the introduction section

The authors wish to thank the reviewer for insightful efforts and positive contribution to the outcome of this paper.

Kindly see the revised version for further information

Please also note the supplement to this comment:
http://www.ocean-sci-discuss.net/11/C1022/2014/osd-11-C1022-2014-supplement.pdf

Interactive comment on Ocean Sci. Discuss., 11, 2119, 2014.