

Interactive comment on "Effects of floating (solar PV) platforms on hydrodynamics and primary production in a coastal sea" *by* Thodoris Karpouzoglou et al.

Anonymous Referee #3

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1 Summary

The question addressed in the paper is practical and applied, rather than of a fundamental scientific nature, but appears to lie well within the journal scope. The paper itself is exceptionally well written, structured and easy to follow. Methodology is well explained and, importantly, the limitations of 1D water column approach modelling (compared to a 3D modelling) are clearly noted and explained. Despite the constraints of a 1D approach, useful guidelines, albeit of a preliminary nature, are obtained concerning the proportion of surface area covered before significant effects on primary productivity might be expected. The application to the three sites is also very useful in giving

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an idea about how generic these results might be. I have a technical concern about the formulation surface friction effect that is discussed below. Apart from this, there are only a few minor suggestions for manuscript improvement. Overall, the paper is a very clearly written description of a well-motivated and executed study and deserves publication with minor modifications.

2 Shear stress formulation

If I've understood correctly, the definition of the structure surface shear stress appears to explicitly depend on layer thickness of the 1st grid cell (h in equation 4). Clearly the structure drag is a real physical quantity that cannot depend on how a particular model is set up. For example, if the user decided to refine the mesh near the sea surface then as $h \rightarrow 0$ the stress coefficient given by eqn. 4 is unbounded. It seems a real physical length scale needs to be included in the formulation - the depth of the structure below the surface would be an obvious candidate (but note, a straight substitutes of h with structure depth wouldn't work). It probably doesn't make a difference to the results obtained here as the authors show these are rather insensitive to the details of the formulation (fig. 8), but a grid independent estimate of the structure drag seems to be desirable.

3 Suggested text amendments

Authors could mention the study is also relevant to other proposed offshore developments e.g. large-scale aquaculture/seaweed farming.

p line 5 16. Phaeocystis is omitted from model then suggested as explanation for peaks in chlorophyll not captured by model (p 8 line 6). Although I understand that if phaeocystis is linked to nutrient peaks from rivers it is quite legitimate to exclude it in a 1d model, nevertheless, on 1st reading of p8 line 6, it seems slightly odd to blame the mismatch on something deliberately excluded from the model. A rewording here, or on p 5 line 6, might Just help the reader understand this more quickly.

p 6. line 8-9. How was the light extinction coefficient calibrated from observations? If I understand correctly, then the SPM at the OG causes greater light attenuation for a given concentration that at the other sites. A brief mention in the discussion might interesting; is the difference just an artifice of calibration and not real, or is there some reason for the SPM at OG being different to the other sites.

p 6. detritus. Is this seabed or water column detritus? Brief explanation on what detritus is and why it is necessary to adjust its value.

4 Minor format issues

fig 2 Suggest put quantity name (chlorophyll, nitrate, silicate) at top of each of the 3 column of plots so reader immediately knows what is being shown rather than having to read caption.

fig 5,6 Very minor, but I think is easier to read having the letter label before the text instead of after, e.g. "(a) irradiance at 3 meters depth", instead of "irradiance at 3 meters depth (a)"

p 15 line 2. The regime 2 text misses out on a general conclusion that the other regimes get. Suggest text be amended to something like "..... a substantial spread occurred between sites. Thus, no general, site-independent, conclusions can be drawn. In regime 3......."

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