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Interactive comment on "The role of coccoliths in protecting *Emiliania huxleyi* against stressful light and UV radiation" *by* Juntian Xu et al.

Anonymous Referee #2

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Coccolithophores are an ecologically important group of marine phytoplankton that characteristically produce calcium carbonate plates (liths) internally and then secrete them to the cell surface. Exactly why coccolithophores produce liths has been the subject of considerable debate, with a range of possibilities raised. The manuscript by Xu et al has set out to test the hypothesis that the calcite from which the liths are constructed will absorb enough UV radiation to protect the cells from damage.

The approach the authors have used is to compare the UV sensitivity (measured as growth, quantum yield of PSII and relative electron transport characteristics including non-photochemical quenching) in a calcified strain, a non-calcifying strain and the calcifying strain with the liths removed (which could be more clearly termed 'decalcified' in the text and figures/tables). The experimental approach is sound and the results are presented clearly and discussed thoroughly.

I really only have some minor points the authors might like to consider.

P 2 line 26: 'for' not 'since'

P 3 line 52: delete 'by'

P 4 lines 72/72: shading effects could include scattering of light which is certainly a feature of coccolithophore blooms

P 4 lines 73/74: a bit pedantic I know, but strictly speaking it is hard to see how liths could stimulate NPQ – presumably liths are affecting the light climate in some way that leads to up-regulation of NPQ

P 9 line 180 et seq.: I assume some of this loss of transmittance could be due to scattering by liths rather than absorbance? In Fig 1, the non calcifying strain has a lower transmittance in the UV than does the calcifying strain without liths - could this be because the non-calcifying strain employs another strategy (such as inducing UV-screening compounds) to ameliorate UVB?

P 10 lines 201-203: A significant decrease in rETRmax would, if alpha is unaffected, be expected to show a decrease in Ik (given the relationship Ik=rETRmax/alpha) so the lack of an effect on Ik seems odd. In fact there does seem to be a difference but it is statistically non-significant.

P 11 discussion lines 233- 234: While I don't disagree with the authors conclusions, you have to be a bit careful in making claims that the liths are causing the differences in growth rate between the naked and calcifying strain based on only one strain of each phenotype (certainly when grown indoors). Would all naked strains grow more slowly than all calcified strains? Remember also that calcification leads to internal generation of CO2 - although it has been shown elegantly by Bach et al 2013 that there is no obligatory coupling between calcification and photosynthesis. The differential impact of UVB on growth is though compelling!