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Interactive comment on “Size-fractionated dissolved primary production and carbohydrate composition of the coccolithophore *Emiliana huxleyi*” by C. Borchard and A. Engel

Anonymous Referee #3

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General Comments: Extracellular release of primary products by phytoplankton plays a major role in aquatic carbon cycle. However, several questions remain regarding the nature of the release process as well as the exact biochemical composition of the released products. *Emiliana huxleyi* is a bloom-forming, calcium carbonate-secreting primary producer of global significance. This study examines the question of extracellular release of dissolved organic carbon in steady state P-limited cultures of *E. huxleyi* to sort out the active versus passive release aspects of release mechanism and to characterize the size carbohydrate composition in the different size-fractions. The authors present results showing evidence for low and steady release of DOC consisting of a greater proportion of acidic sugars and a low proportion of glucose in the HMW DOC

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fraction (and vice versa for the LMW fraction) suggesting distinctly different ecological fates for the HMW and LMW components of the extracellular release. As far as experimental works go, it seems to be a well-performed and rigorous study that has clear objectives and manages to provide data that advance our understanding of the complex phenomenon of the release of photosynthates from actively photosynthesizing cells and provides clues to their biogeochemical role in the sea. Advancing the discussion of the passive versus active release findings and the meaning of the compositional differences in the freshly produced LMW DOM and HMW DOM fractions to their reactivities in the environment would enrich this study. Details: Title: Fine. But reveals nothing of the findings. Abstract: Complete. Introduction: Please expand PP upon first mention in p. 1592, line 23. I especially like the last 3 paragraphs setting up the context for the study, detailing the approach and stating the objectives. Methods: Pl. expand fully TA upon first mention in p. 15295, line 8. Nice detail is provided of the different methods employed. Results: Results are well presented, and many aspects agree well with earlier studies on the amount and composition of size-fractionated phytoplankton release products. Figure 3 is a bit busy – but I have no suggestions on how to improve it. Discussion: Nice discussion points. However, some additional attention could be given to the resolution of the active versus passive release question that is raised in the Abstract as well as the Introduction – but goes unaddressed in the Discussion in the current form. Discussions of the reactivity of size-fractionated DOM could also be advanced further – leading from experimental results to their environmental role. Refs: Well cited.

Interactive comment on Biogeosciences Discuss., 11, 15289, 2014.

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