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Comment

Interactive comment on “The role of ocean acidification in *Emiliana huxleyi* coccolith thinning in the Mediterranean Sea” by K. J. S. Meier et al.

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The methodological concerns of Johnson & Bollmann regarding the weight estimates are not justified. They are based on the attempt of Bollmann (2013) to use circular polarisation in combination with a theoretical calibration, as opposed to the linear polarisation and empirical calibration used here. The attempt by Bollmann (2013) has received many critical comments and failed to provide a comparison of the two methods.

In fact, the two methods, if applied correctly, come to very similar results. In a recent paper Beaufort et al. (2014, Nature Protocols) show that circular polarisation in

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combination with a theoretical calibration can be used for determining calcite particle weights. Furthermore, there is unpublished data on *E. huxleyi* coccolith weights from water and sediment samples off Marseille, which was obtained by the circular polarizer/theoretical calibration method following Beaufort et al. (2014). This data shows similar weight values as reported here.

Length measurements are less accurate than weight measurements, but still they are far from being “noise/random”, as can be seen in the seasonal variation. Also, they are very much in line with the Biosope data (Beaufort et al. 2008). The length of the coccoliths displayed in Figure 5 of Beaufort et al. (2008) is between 2.8 and 3.6 μm and not 1.9 μm as stated above (please check your information). There are many different morphotypes with different degrees of calcification that make up for the differences in average weight. Even within one morphotype, there is considerable weight variation of coccoliths of the same length, due to different degrees in calcification. This variability is not accounted for in the ks factors, where each morphotype has only one ks factor.

Bollmann, J.: Technical Note: Weight approximation of single coccoliths inferred from retardation estimates using a light microscope equipped with a circular polariser – (the CPR Method), *Biogeosciences Discuss.*, 10, 11155–11179, doi:10.5194/bgd-10-11155-2013, 2013.

Beaufort, L., Barbarin, N., and Gally, Y.: Optical measurements to determine the thickness of calcite crystals and the mass of thin carbonate particles such as coccoliths, *Nature Protocols*, 9, 633–642, doi:10.1038/nprot.2014.028, 2014

Beaufort, L., Couapel, M., Buchet, N., Claustre, H. and Goyet, C.: Calcite production by coccolithophores in the south east Pacific Ocean, *Biogeosciences*, 5(4), 1101–1117, 2008.

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