

***Interactive comment on “Coccolithophore
response to climate and surface hydrography in
Santa Barbara Basin, California, AD 1917–2004”
by M. Grelaud et al.***

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I would just like to make a few quick comments to this very interesting data set.

- Most oceanographers use the "calcification" to describe a rate, that is a mass of CaCO_3 precipitated per unit of time. However, this paper reports data on the coccolith mass and size. It is important to note that mass and calcification may not be correlated as cells with a light coccoliths may exhibit a rate of calcification higher than cells with heavier coccoliths if the mass of CaCO_3 was precipitated over a shorter time interval. In other words, the generation time is required to convert coccolith weights into calcification rates. Therefore, the authors cannot claim that

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calcification (or biomineralization; see line 16 on page 4144) has increased in the past decades but, rather, that the mass of coccolith has increased.

- The paper reports on experiments carried out by Beaufort et al. (2007) who showed that "*during experimental acid attack the weight of cultured and fossil coccoliths did not change significantly in a range of pH going from 8.2 to 6.2*". I suggest that the pH scale should be mentioned. Also, does this mean that there was no dissolution at lower pH? If there is dissolution at low pH, why is it that the weight of coccoliths did not decrease? This is critical because those data are used to dismiss a possible dissolution in the earlier part of the record, hence suggesting increased mass as a function of time.
- Section 4.1 mentions that the concentration of nutrients is also an important parameter controlling the abundance (and, presumably, the morphometric characteristics and weight) of coccolithophores. Section 4.3 would benefit from a paragraph mentioning how changes in the nutrient concentrations would impact the weight and size of coccoliths. The goal being to try disentangling the respective impacts of environmental changes on coccolith mass.
- The two sentences in lines 16 to 19 of page 4144 are not very clear and should be reworded. Note that enhanced calcification generates CO₂.
- The paper may benefit from a discussion of data recently reported in another upwelling area off Portugal (Silva et al., 2008).

References

Silva, A., Palma, S. and Moita, M. T.: Coccolithophores in the upwelling waters of Portugal: Four years of weekly distribution in Lisbon bay, *Continental Shelf Research*, 28, 2601-2613, 2008.