Biogeosciences Discuss., 11, C2721–C2724, 2014
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Interactive Comment

Interactive comment on "Morphology of *Emiliania huxleyi* coccoliths on the North West European shelf – is there an influence of carbonate chemistry?" *by* J. R. Young et al.

J. R. Young et al.

jeremy.young@ucl.ac.uk

Received and published: 19 June 2014

Authors response We are grateful for the interest in the paper and the supportive comments. Two issues are raised

1. Methodology - measurement of relative tube width.

a. The referee suggests it would be useful to have additional images illustrating different values of relative tube width. We will do this by modifying our figure 2 to add a series of images, these will also illustrate the standard of the images used in this study (as opposed to the better quality SEM used to illustrate the measured parameters). A draft version of this figure is included with this reply.

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b. The referee asked how relative tube width relates to coccolith weight. The prime determinant of coccolith weight is coccolith size, if shape does not change with size then weight will be proportional to size cubed - or m = . ks . l^3 where m is mass, is the density of calcite, ks a factor dependent on the shape, and l a characteristic dimension for the shape, usually length (Young & Ziveri 2000). Coccoliths of a given relative tube width can vary greatly length and so in weight. Conversely, the shape factor will vary with relative tube width and we would predict that it would be roughly proportional to it, i.e. for coccoliths of a given length we would predict that coccolith weight was approximately proportional to relative tube width.

c. The referee also asked if we had measured ray width, since this is another aspect of coccolith shape which varies. The number of rays in E. huxleyi coccoliths is size dependent (in fact the number of rays is very close to 10 x the length of the coccolith in microns), as a resut the spacing of the rays is independent of coccolith size and variation in ray width does indicate variation in degree of calcification. We did investigate this, developing a routine to automatically measure average ray width. Ray width varied from 0.08 to 0.14μm and showed a moderate (r= 0.41, 1400 measurements) but significant (>0.99) correlation with relative tube thickness. However, these measurements were at the limit of the resolution of our images so had high errors and we preferred to concentrate on the more robust tube-width data.

2. Variation between neritic and oceanic samples The referee noted our statement that: "The neritic populations tend to be larger (Fig. 9a) and to show a decrease in calcification with size in contrast to the oceanic populations which tend to be smaller and show an increase in degree of calcification with size." They asked for more discussion of this. The most significant implication of this is that the largest coccoliths in each population are the most distinctive. This is represented in fig. 9c where means are calculated for the largest 25% of the population, and this plot shows the strongest separation of the samples of the different plots. Referee 2 also asked for clarification of this part of the ms., so we will reword the final text.

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Interactive comment on Biogeosciences Discuss., 11, 4531, 2014.

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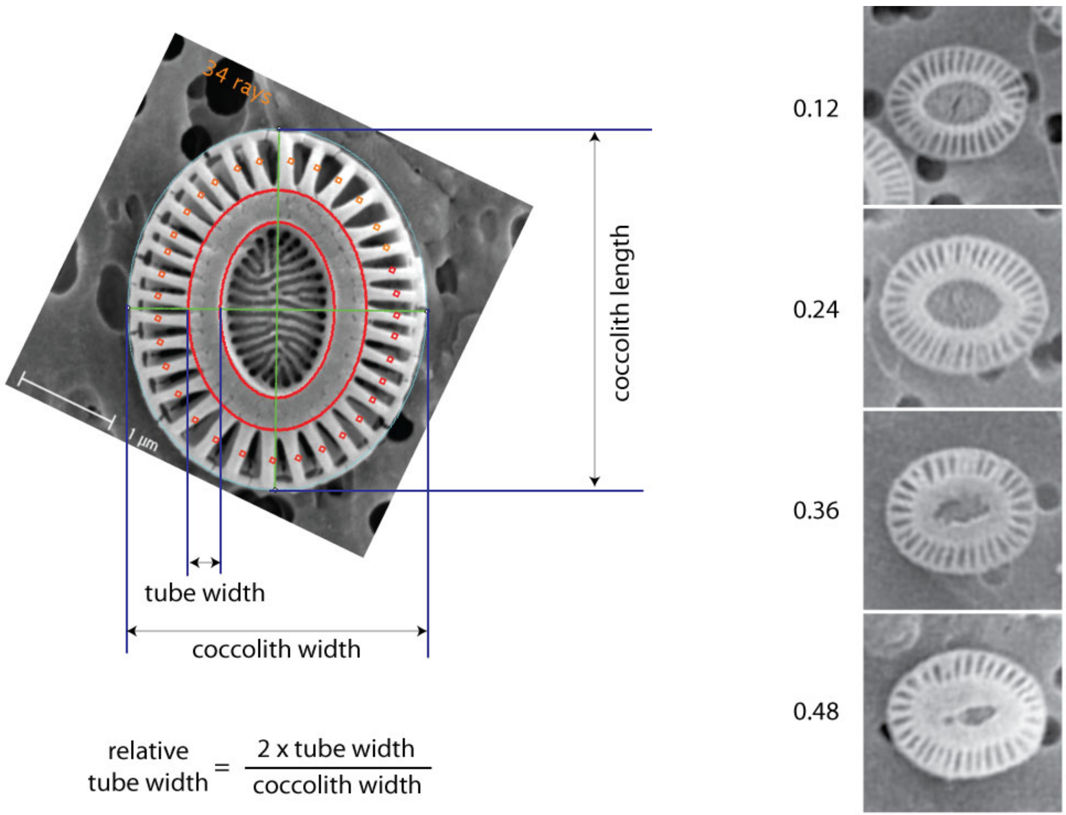

Fig. 1. modified version of fig 2

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