

Interactive comment on “The effect of salinity on the biogeochemistry of the coccolithophores with implications for coccolith-based isotopic proxies” by Michaël Hermoso and Marceau Lecasble

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Dear Editor,

We are very grateful to the Reviewer 2 for the positive assessment of our paper. As detailed below in a point-by-point response to their comment, we will take into account all the remarks made during peer-review and modify the manuscript accordingly.

Sincerely,
Michael Hermoso

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Dear editor,

The work of Hermoso and Lecasble addresses the effect of seawater salinity on the oxygen isotope composition of coccoliths. This work was carried out on a variety of coccolithophores in laboratory controlled conditions (where temperature and $d^{18}O$ were constant). Physiological parameters and isotope composition were measured under a range of salinity. Hermoso and Lecasble have concluded that despite large physiological changes, salinity does not effect the oxygen isotope composition. This is an important observation as salinity may complicate the interpretation oxygen isotope composition in relation to sea surface temperatures.

Listed below are a few minor comments:

Line 29, Page 2 Can the authors clarify what they mean by 'synthetic salts'. Perhaps indicate the composition or recipe as this may change how an organism/cell responds to the salinity of its environment.

Authors's response: We now explicitly refer to the ESAW “recipe” with reference to Keller et al. (1997), so that the chemical composition of the medium can be found.

Line 11 and 26, Page 3 The use of the term 'bioassay' may be quite misleading. I would recommend using the term 'culture' or 'algal culture'

Authors's response: We changed “biossays” for “cultures”.

Line 28, Page 3 Include a reference for the method/protocol of semi-continuous

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batch culture/strategy. This wouldn't be apparent to someone who is unfamiliar with the methodology and is important if someone is thinking of repeating this experiment.

Authors's response: Reference to the chapter written by LaRoche et al. (2010) in the seminal book "Guide to best practices for ocean acidification research and data reporting" has been added.

Line 7, Page 5 What do you mean by 'statistically less well behaved' (this is repeated again in Line 15, Page 7). This is quite subjective. I would suggest that the authors consider rephrasing this.

Authors's response: Sentence modified for: "...with the exception of *G. ericsonii*, for which the measurements do not show a relation between μ and salinity."

Line 7, Page 8 Consider including the strain names of the coccolithophores used by the different authors. This may explain the difference in the observed physiological response.

Authors's response: This has been done.

Line 14-30, Page 8 I don't think the authors can exclude the role of osmosis in determining the cell size/volume. Nor can they make the conclusion that cell size is determined by the metabolism of the organism alone. As the authors mention, there is little known about the process of osmoregulation in coccolithophores. As such it is worth considering the following:

1) The presence of active transporters (or membrane pumps) that may vary in type, numbers and work at different rates. This will naturally affect the transport/diffusion of water across the membrane, thus influencing the size/volume of the

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*cell and leading to the observed difference between *G. oceanica*, *G. ericsonii* and *E. huxleyi*.*

*2) An organism may have different ways of maintaining water balance. For example, some organisms have the potential of varying their osmolytes (osmoadaptation/osmoregulation). As such, the cellular content of *G. oceanica*, *G. ericsonii* and *E. huxleyi* may vary based on said ability.*

Authors's response: We agree with the Reviewer and will simplify our text regarding these biological concepts and follow the Reviewer's first point.

Lines 21-30 on p8 have been deleted and replaced by the following statement, which mostly relies on the Reviewer writing: "The presence of active transporters (or membrane pumps) may vary in type, numbers and work at different rates in various coccolithophore species. As a consequence, these possible distinct strain-specific features will affect the transport/diffusion of water across the membrane, thus influencing the size of the cell and leading to the observed differences between *G. oceanica*, *G. ericsonii* and the two strains of *E. huxleyi*."

Line 6, Page 10 Awkward turn of phrase. Perhaps remove 'that' (which has been repeated)

Authors's response: This has been modified. Sentence now reads: "Photosynthesis favours ^{12}C at the expense of ^{13}C atoms, leaving the internal pool isotopically more positive with implications for the carbon pool that will be allocated to calcification."