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Interactive comment on “Distribution of planktonic biogenic carbonate organisms in the Southern Ocean south of Australia: a baseline for ocean acidification impact assessment” *by* Thomas W. Trull et al.

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GENERAL COMMENTS:

This is an interesting, well-written and comprehensive study of the concentration and distribution of bio-mineralised particles over latitudinal sections (40 to 65oS) south of Australia. I commend the authors on the dedication that construction of such a dataset has taken, with cruises from 2008 to 2015 using (mostly) standardised methodology. I have one significant recommendation and a few minor comments.

My recommendation is that the authors need to further elucidate in the manuscript the distinction between particulate material and ‘living biomass’. Most particulate pools (POC, PIC and BSi) contain variable contributions of both living biomass (i.e. organisms) and detrital material. In the case of PIC, detached coccoliths (e.g.) can be a significant fraction of the total pool and their small size conveys very slow sinking speeds. In the case of diatoms, empty or broken frustules may stay in suspension (or as part of the cell chain) after the organic material has been removed. Similar comments may be made about the larger biogenic organisms (foram fragments, juvenile shells, radiolarian tests). While the particulate concentrations of PIC and BSi represent well the (historical) production of biogenic material from coccolithophores and diatoms, as well as the other groups examined here, their relationship to ‘living biomass’ is not necessarily direct and may break down seasonally and spatially. Recognising that this may occur, for example in post-bloom conditions, is an important caveat that should be clear to the reader.

MINOR COMMENTS

Ln 107-108: The calcite content of these different strains of Emiliania huxleyi also differ significantly (see Poulton et al., 2011 for estimates or Muller et al., 2015 for measurements), which may have strong implications for PIC production in S Ocean coccolithophore blooms (e.g. Poulton et al., 2013).

Ln 263: Missing full stop between ‘cell’ and ‘Calibration’.

Ln 468-470: The POC:PIC ratio given is relatively low, especially for the S Ocean strain: Muller et al. (2015) reports values of $\sim$0.83 for over-calcified strains, $\sim$1.5 for normal A-type and greater than $\sim$2 for the B/C type reported in the S. Ocean. Maybe the authors could add in a statement on the sensitivity of their estimates to cell POC:PIC ratios – and also how detached coccoliths may actually counteract high cellular POC:PIC ratios.

Ln 518-519: Biometric measurements have confirmed the low PIC per coccolith for the different morphotypes/strains (see Poulton et al., 2011 and/or Charalampopoulou et al., 2016; see also Muller et al., 2015 (as cited)).

Ln 573: Please correct Emiliania Huxleyi to Emiliania huxleyi.

Ln 622: Light utilization may be another important factor as there are pigment differences between E. huxleyi strains (see Cook et al., 2011)

Ln 653-655: Charalampopoulou et al. (2016) concluded that temperature and light were strong drivers of coccolithophore distribution and calcification across a latitudinal transect in Drake Passage (whilst also acknowledging the role of iron). Have the authors considered the role of (seasonal) light availability?

References

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