

Dear associate editor,

Thank you for considering our manuscript for publication in Biogeosciences after minor revisions.

In the corrected manuscript we have addressed all points raised by the reviewers and made the necessary changes as described in detail in the two responses published on the website.

The main concern, that we might overestimate gastropod PIC production by underestimating turnover time, has been dealt with in the following way:

- In section 2.5.1 we added: *The gastropod turnover times adopted in Ziveri et al. (2023) are on the high end of values reported in literature, with several studies reporting turnover times of several months to up to two years (Oakes et al., 2020; Bednaršek et al., 2012; Fabry, 1989). We therefore include an additional calculation of gastropod PIC production, using a longer maximum and minimum turnover time in the Monte Carlo simulation.*
- In Table 2 we added an extra column containing the lower and upper bound (TTmin and TTmax) of the long gastropod turnover scenario, including references. These lower and upper bounds are 183 days and 365 days.
- We rephrased part of section 2.5.3: *We acknowledge that the steady state assumption might not be valid. Pteropods and heteropods are still relatively understudied calcifying plankton groups and especially little is known about their life histories and population dynamics (Bednaršek et al. 2016; Manno et al. 2017; Wall-Palmer et al., 2016), but studies have reported seasonal variation in pteropod and heteropod fluxes in sediment traps (e.g. Oakes et al., 2021, Gardner et al., 2023). However, in the absence of a detailed timeseries of plankton standing stock at our study site we make the simplest assumption at hand.*
- We added the new production results to section 3.4 and Table 5 and 6 (former Table 4 and 5): *Using turnover times of between 0.5 - 1-year results in ~27 times lower gastropod PIC production and a relative contribution of coccolithophores, gastropods and foraminifera of 99, 0.3 and 0.6% respectively.*
- We discuss these new results in section 4.1 and 4.2:
 - o Lines 558-559: *However, if we adopt a longer gastropod turnover time of 0.5-1 year, the contribution of this group to the PIC production decreases to only 0.3% and coccolithophores dominate production even more, producing 99% of all the PIC.*
 - o Lines 575-580: *Gastropod production and export balance when using the short turnover times to calculate production. When we assume turnover times to lie between 0.5-1 year, export is 30 times higher than production.*

This suggests that at our study site gastropod turnover is faster than 0.5-1 year, or that gastropod export concentration or sinking speeds are overestimated. A recent review paper by Ziveri et al. (2025) also finds generally higher gastropod export fluxes than production estimates and suggest that adopting lower gastropod turnover times, on the order of a few weeks instead of 1 year, could bring these values closer together.

- A small adjustment has been made to the last lines of the abstract:
Coccolithophores contributed 92% - 99% of the produced PIC, depending on planktonic gastropod turnover time, and from 52 to 99% of the exported PIC, depending on their mode of sinking. Both the standing stock and export of planktonic gastropods was significantly larger than that of foraminifera. Similarity between our results and those from different ocean basins suggests that these patterns are global in nature, implying that not only coccolithophores but also gastropods may be a more important contributor to the oceans PIC inventory than foraminifera, challenging a longstanding paradigm.

Additionally, we have made the following corrections:

- We have replaced Figure 5 by a table (Table 3). This means that the table and figure numbering has changed from there on. Figure 5 has instead been added to the Appendix as figure B1.
- For brevity and readability, we have changed ‘planktonic gastropod’ to ‘gastropod’ throughout the entire manuscript, except for the Abstract and Introduction. In the Introduction, we introduce the planktonic gastropods and mention that from thereon, they will be referred to as ‘gastropods’.
- We have changed the word ‘multinet’ to ‘MultiNet’ throughout the manuscript.
- We clarified the use of station 39 samples in section 2.2.1, ‘Measuring PIC/POC ratio of selected gastropod species’: *We strove to use measured rather than calculated PIC mass where possible. The pteropod species Limacina bulimoides and Heliconoides inflatus, occurring in high abundances in the surface nets, were processed separately from the bulk gastropod samples to obtain species-specific PIC/POC ratios. For this purpose, we used individuals collected in net 5 at stations 6 and 9, as well as specimens from net 5 at station 39, located further north. The inclusion of the station 39 material enlarges the sample size on which we base our species-specific PIC/POC ratio estimate. This approach requires the assumption that the more northerly position of station 39 does not introduce a systematic latitudinal bias in PIC/POC ratios for these species. We will compare our species-specific PIC/POC ratios to those reported by Bednaršek et al. (2012). We additionally calculate average PIC ind^{-1} and POC ind^{-1} based on stations 6 and 9 only and use those in our own study to reconstruct the PIC mass of L. bulimoides and H. inflatus in the unweighted nets, to stay as close as possible to our site-specific measurements.*

- We corrected equation 4. The equation represents the calculation of gastropod PIC concentration in the productive zone, and should be, as the text correctly describes, ‘total PIC mass in the upper 300 m divided by the total amount of water filtered by the three nets’. However, in the previous version, the division by volume was missing in the equation. We have corrected this, and the full equation now reads:

$$C_{bpz-0} = (MassPIC_{net3} + MassPIC_{net4} + MassPIC_{net5}) / (V_{net3} + V_{net4} + V_{net5})$$

The calculations in the R-script already used the correct version of the equation, so no changes were necessary there.

- In our reply to Dr. Keul, we wrote that we would add a short line to the methods section to clarify that reconstructed weights and concentrations were corrected for the splitting of the samples. We decided not to add more information to the main text but clarify this in Appendix A, line 675: *To obtain the total CaCO₃ weight of each sample, the original counted number of full and empty shells was first multiplied by 2, to correct for the splitting of the sample, and then multiplied by this average shell CaCO₃ weight (W_{shell})*.
- In Table 5 (former Table 4) we changed the row ‘Production using minimum TT’ to ‘Production using minimum coccolithophore TT’ and presented only the production value based on the coccospHERE standing stocks. We changed this because the gastropod and foraminifera values calculated using only the minimum turnover estimate are not discussed anywhere in the manuscript and thus are not relevant here.
- We added some text to line 781, in which we explicitly state that all raw data and calculations related to the PIC/POC ratios of selected gastropods from station 6, 9 and 39 can be found on GitHub and Zenodo. An additional data file has been added to GitHub and a new release of Zenodo has been made. The reference to the Zenodo release has been updated in the bibliography. The additional data file does not contain new data, but provides the calculations that led from raw counts and mass measurements to the PIC/POC ratio of each of the selected gastropod groups at stations 6, 9 and 39.

We hope to have adequately addressed all issues and look forward to hearing your reply.

Yours sincerely,

Anne Kruijt, on behalf of all authors.