

The manuscript “**The contributions of various calcifying plankton to the South Atlantic calcium carbonate stock**” (<https://doi.org/10.5194/egusphere-2025-4234>) by Anne Kruijt and colleagues investigates how the three main calcifying plankton groups — coccolithophores, foraminifera, and planktonic gastropods (heteropods and pteropods) — contribute to particulate inorganic carbon (PIC) stocks and export in the South Atlantic Ocean. The authors present data from a sampling campaign, quantifying the depth-integrated PIC standing stock, production, and export for all three groups.

The research is original and addresses a critical question in the field of marine biogeochemistry, providing a more holistic understanding of how the major calcifying plankton groups contribute to carbon cycling and export in the South Atlantic. The study is conceptually strong, clearly written, and presents complex results in a way that is accessible to the reader.

However, certain sections, particularly the *Materials and Methods* section, require clarification and reorganization to improve readability and ensure that methods and assumptions are clearly linked to the presented data. While I understand that the authors use previously published values of turnover time, I see this as highly critical, as it does not take into account the fact that gastropods are, in fact, multicellular organisms that have a more complex life cycle than single-celled foraminifera and coccolithophores (e.g., seasonality, stagnant growth). Therefore, using the same equation for turnover time as for coccolithophores and foraminifera will lead to a drastic overestimation of pteropod contribution, which in fact is seen here (citing from abstract) — “implying that not only coccolithophores but also gastropods may be more important PIC producers than foraminifera.” That is the main shortcoming of the paper, in my opinion. I know this method has been used before, but the issue surrounding turnover time needs to be addressed here. Furthermore, the manuscript, while very well written, needs to be checked very carefully for consistency (in used terms, layout, etc.) and formatting of figures needs to be improved.

Despite these issues, the manuscript provides valuable insights for the community and is well-positioned to advance our understanding of PIC production and export across multiple plankton groups. I would recommend publication after the authors address the points raised in the review.

I wish the authors success with the revisions and remain available for further feedback.

Best wishes,

Nina Keul

Here is a detailed list of comments:

I. 38 “haptophyte”: I let the authors be the judge if it is reasonable to assume that the community of BGD all know that term.

- **I. 87**: The order in which the three groups are addressed should always be the same; here it is GFC, but in section 2.4 it is F (2.4.1), G (2.4.2), C (2.4.3).

- **Fig. 1:**
 - “Multinetting” — is this indeed a verb?
 - Formatting: in some boxes there is an extra space before the unit (e.g., for PIC), in some not (e.g., counts # for F).
- **I. 117:** How do you know that the Benguela Current was too remote to influence the study site? Consider rephrasing “remote”
- **I. 119:** “Samples from station 39 (further northwest; Figure 2) and stations 6 and 9 were used to reconstruct the PIC/POC ratio of *Limacina bulimoides* and *Heliconoides inflatus*, two abundant and cosmopolitan pteropod species.” This sentence should go to another section.
- **Fig. 2 caption:** The methodology (Copernicus data extraction) should also be described in the text, not just in the figure caption.
- **Fig. 2c:** Station 39 is not readable. What does “Station with number” mean (upper right corner)?
- **I. 135:** How were station 39 samples collected? Also via oblique multinet tows? Please add.
- **I. 140:** Was this splitting performed on the ship? If yes, how did you ensure a 50:50 split on a moving ship (as the splitter should be level when using)?
- **I. 142:** What about pteropods? How big is the bias here by using a 200 μm net? Do you have estimates? The smallest pteropods we find are usually 80 μm in diameter.
- **I. 175:** Stored in polyethylene (jars)? Krantz vials? Were they dried before storing? Were they washed (e.g., quick DI bath)?
- **I. 182:** Add a datatable (can be in supplement) to list the n of each category (full, empty, adult, juvenile).
- **I. 187:** I am a bit puzzled by this comment (in relation to unweighed pteropods). I have weighed individual pteropods before; in the case of *H. inflatus*, the shells of the smaller specimens were still 20+ μg , which could be weighed without problem on an ultramicrobalance.
- **General comment:** Please specify in which institute the analyses were performed (e.g., I. 201 — the automated microscope system).
- **I. 222:** “Unlike the shells containing living plankton” — rephrase.
- **Equation 4:** You mention that cups were split — was that taken into account in the calculations?
- **I. 289:** The same turnover times as Ziveri et al. are used (5–16 days), which I have a hard time with. While the calculations per se are correct, I feel this is far from reality, where stagnant growth is common, especially in temperate areas as in your study location. Since turnover time is a crucial parameter in flux calculations, using these low turnover times might overestimate pteropod fluxes. Furthermore, in the case of planktonic foraminifera, this is more reasonable; here, values are in agreement with lifespan, as there is no stagnant growth phase for forams.
- **Table 2:** Add references to all values, not just V.
- **I. 330:** I value that you try to assess turnover time differently, but again, we know from sediment trap studies that pteropod flux is not the same over the year, so we cannot make these calculations and extrapolate them into a full year, even in a medium-seasonality region such as yours. February, I would imagine, is post-bloom (after summer); I would assume differences in winter. See for instance Oakes et al. 2021, where they only found pteropods in 17/36

sediment trap samples (Oakes RL, Davis CV, and Sessa JA, 2021. Using the Stable Isotopic Composition of *Heliconoides inflatus* Pteropod Shells to Determine Calcification Depth in the Cariaco Basin. *Front. Mar. Sci.* 7:553104. doi: 10.3389/fmars.2020.55310).

- **Figure 3:** Should be prepared more carefully. For example, the X-axis line is barely visible, and the second Y-axis line is shown incorrectly.
- **I. 398 / 299:** Does this apply to F and P, or only P? How was full versus empty assessed in foraminifera (staining?)? In Materials and Methods, it gives the impression that only P were assessed in this regard (species or sometimes genus type, organic matter content (full or empty), and in the case of gastropods, life-stage (juvenile or adult)).
- **I. 402:** Add (SE) after “Standard error = 0.08.”
- **Fig. 5:** I am not sure whether this needs to be plotted or can be better represented in a datatable. If the authors decide to keep the figure, its visual appeal needs improvement (remove helper lines, format consistently, include corresponding p-values).
- **Section 3.3:** Species names in italics; *Syracosphaera* needs capitalization.
- **Fig. 6:** Remove grid lines; make lines and symbols the same size and thickness.
- **Table 3:** Explain acronyms (SS); check digits and only list significant amounts based on the error associated with the calculations/initial measurements. If in doubt, perform error propagation.
- **Tables (general):** Check for consistency, e.g., stdev vs Stdev; check the number of digits (see comment for Table 3); apply consistently across manuscript, tables, and figures.
- **Table 5:** Add explanation of export scenario 1 and 2 in the caption.
- **Figure 7:** Same comment as Figure 6. Chlorophyll-a and chlorophyll are used interchangeably; check consistency throughout manuscript.
- **Fig. 8:** Was, I assume, meant to have a Y-axis.
- **I. 507 / 508:** m^2 versus m^{-2} (consistency); check throughout manuscript, tables, and figures.
- **I. 507:** Capitalize March.
- **I. 514–516:** This shows that turnover time is vastly overestimated in the case of pteropods.
- **I. 667:** What is an ashed surface water sample?
- **Captions of tables in appendix (B2, B3):** Species names need italics.
- **I. 756:** $\text{pg } \mu\text{m}^{-2}$ instead of $/\mu\text{m}$.