

Dear Editor,

We finished the revision of the manuscript according to the questions and advices of the reviewer. The following are the details of our responses (in blue color) to questions and advices of the reviewer.

The work of reviewers help improve the quality of the manuscript. We thank the thoughtful advice of the reviewer and hope the revision successfully answered the questions.

Best wishes

Wuchang Zhang

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Public justification (visible to the public if the article is accepted and published):

Dear authors,

Your manuscript can now be accepted for publication in Ocean Science. Please take into account the final technical comments.

Additional private note (visible to authors and reviewers only):

Please make to final modifications before sending your final version to the production department. I am using the numbers that you use in your author's response:

1. Your number 5: The slope line that you changed to is better. However, I think the concept of slope or slope line is not clear to the reader. Please insert in the introduction the text that you give in the response: “(tendency for evaluating the decreasing trend from small to large size spectrum)”

Response: **We revised this part accordingly in lines 114–115 in revised manuscript.**

Lines 114–115: **In addition, the slope or slope line means tendency for evaluating the decreasing trend from small to large size spectrum.**

2. Your number 9 (lines 31-33): “generalised” seems to be the wrong term here. I think it would be better served with “taken as a guideline” or similar: “... ciliate trait structure among five temperature zones and can be taken as a guideline for assessing the potential effects of climate change on pelagic ciliates in future marine realm.”

Response: **We accepted suggestions and revised accordingly in lines 31–33 in revised manuscript.**

Lines 31–33: **In conclusion, these results underscore the unprecedented divergences in ciliate trait structure among five temperature zones and can be taken as a guideline for assessing the potential effects of climate change on pelagic ciliates in future marine realm.**

3. Your number 11: I think Singh et al. is still not the correct reference for “Over recent decades, anthropogenic CO2 emissions have led to increased atmospheric concentrations and greater global radiative forcing” The safe reference here is the

IPCC.

Response: We revised into “IPCC 2023” accordingly in lines 47–48 in revised manuscript.

Lines 47–48: Over recent decades, anthropogenic CO₂ emissions have led to increased atmospheric concentrations and greater global radiative forcing (IPCC 2023), triggering diverse ecological feedbacks worldwide...

4. Your number 18: It is unusual that the precision of measurements is unknown. I urge you to give some kind of precision, because without a precision/accuracy one cannot know the reliability of the data. The fact that you use a Seabird CTD may give you a solution at hand, as the Seabird will give in the specifications the possible precision that can be reached. Please use that in the manuscript.

Response: We added the precision of measurements of a Seabird CTD for environmental factors (depth, temperature, salinity and Chl *a*) during each cruise accordingly in lines 115–122 in revised manuscript.

Lines 115–122: Simultaneously, environmental factors of sampling depth (a quartz pressure sensor to detect hydrostatic pressure, converted to depth via the formula: $\text{Depth} = \text{Pressure} / [\rho \times g]$, where ρ is water density and g is gravitational acceleration) (van Haren et al., 2021), temperature (a thermistor, SBE-3 Plus, resolution is 0.0001°C), salinity (derived from measured electrical conductivity [SBE-4C sensor] and temperature data, computed using the Practical Salinity Scale algorithm) and chlorophyll *a* in vivo fluorescence (Chl *a*, a fluorometer [SeaPoint] excites chlorophyll pigments with blue light and measures emitted red light intensity as a proxy for Chl *a* concentration) were recorded by a multi-sensor profiler (CTD–SeaBird SBE 911, <https://www.seabird.com/product.detail-cms.block.jsa?id=60761421595>) during each cruise.

5. Your number 40: Your write in lines 333-335: “Furthermore, the Chl *a* functionally serves as the food resource in marine food webs ...” Chl *a* is of course not a food resource, not even functionally. Phytoplankton may be the food, but not chl *a* as such. This has to be changed.

Response: We revised this sentence accordingly in lines 339–341 in revised manuscript.

Lines 339–341: Furthermore, the Chl *a* is roughly represent of phytoplankton at specific sampling layer, which further influencing marine ecosystem stability through both quantitative (abundance) and qualitative (nutrient composition) pathways via the fundamental prey-predator interplay (Šolić et al. 2010; Våge and Thingstad 2015; Holm et al. 2022).