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Interactive comment on "Variability in copepod trophic levels and in feeding selectivity based on stable isotope analysis in Gwangyang Bay off the southern coast of Korea" *by* Mianrun Chen et al.

Anonymous Referee #1

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General Comments:

The authors used stable isotope analysis to solve copepod trophism (i.e. food resources and trophic level), which is important to understand the biogeochemistry in estuarine system. The findings on copepod trophism in the manuscript (MS) will contribute for understanding pelagic food webs in the system. These are valuable and positive points in the MS.

Nevertheless, I found many doubtful points throughout the MS. The authors simplified the dynamics of copepod community by considering the most dominant copepod species only, and then applied this simplified copepod assemblage to the stable iso-

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tope analysis. As a result, trophism of some copepod group, especially carnivorous copepods are still questionable.

The current method (e.g. Boyesian mixing model) and the assumption (e.g. the body mass of different genera among calanoids are the same) applied to stable isotope analysis may have some limitation to evaluate the real trophism of the copepods in the field, even though most results of copepod trophism in the MS were similar to previous reports.

Therefore, I would like to recommend the authors to include an additional explanation on a potential limitation which may occur when you apply the current method and assumption to copepod community, in the revised MS.

Specific Comments:

P6, line 20-22: The author's assumption is questionable. Calanoids consist of many genera or species with various sizes. Even though some large calanoids are not dominant in the sample in terms of abundance, some large calanoids (e.g. Calanus) can have important role in terms of biomass or volume. So, the author's assumption may not apply to a mixed copepod community with existence of both small and large copepods.

In relation to this issue, how did the authors treat copepodite stages of the copepods occurred in this study to calculate their abundance or body mass? There is no explanation in the materials and methods.

P8, line 13-19 and Table 1: There is no criterion for dominant species in Table 1. The authors listed only the most abundant copepod species by station and season. I think more than one copepod species would have contributed to copepod community in the field. Please specify a criterion and also show other copepod species if possible (in fact, the information on copepod species composition is poor and not informative in this study).

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P10 line 31-33: More detailed explanation may be needed, like in the case of delta 15N in Fig. 6A and 6B.

P10 line18: There are no results for Centropages in Fig. 4, Fig. 5 and Table 1. However, the authors showed the dietary compositions of Centropages as a major omnivorous copepod genera in Fig. 10D. Why?

P11 line 29-32: The authors did not consider either cyclopoids or brackish water calanoids because those are not co-occurred with Labidocera, a surface water species. However, I believe that Labidocera has a chance to contact other preys beside Acartia and Paracalanus, such as cyclopoids and brackish water calanoids. If the authors check the copepod community in summer, not only dominant species but other subdominant species (not shown in Table 1), there are many adult and copepodite copepod species that can be a potential prey for Labidocera. So, please add potential prey in Fig. 11.

P11 line 32- P12 line 1-2: For Sinicalanus, potential prey including brackish water calanoid such as Pseudodiaptomus should be tested in Fig. 11. Also, I failed to understand that why Acartia was considered as prey for Sinocalanus in Fig. 11, considering Acartia was not dominant species in autumn in Table 1.

P14 Line23-25: I understand that calanoids (both marine and brackish water types) and cyclopoids had different delta 15N values according to Fig. 6B. However, the authors mentioned the mean value of the group was the same. Please check again.

P15 line 3: There is no result of the brackish water species, Pseudodiaptomus in Fig. 4, but in Fig. 5. Why?

P15 line 20-24: Corycaeus affinis was evaluated as omnivorous in this study, but as carnivorous in previous reports. What is a possible explanation for this difference?

P15 line 27-31: I believe decapod issue is not necessary for this study. Why did the authors include decapod results?

P15 line 31-33: There is no result of Euterpina as a genus of benthic harpacticoids in the results section, but only as harpacticoids. However, the authors mentioned Euterpina was detrivores in discussion and conclusion. In case of cyclopoids, the trophic level of cyclopoids and Corycaeus was presented separately in Fig. 4. Why?

P16 line 13-16: Even though Acartia dominated the marine calanoids in winter and summer, it is questionable to say that the bulk copepod assemblage with various species prefers large particles (microplankton; Fig. 7A and 7B). Likewise, Paracalanus also dominated the marine calanoid community in the more saline region in winter (Table 1), and Paracalanus prefers small particles (nanoplankton; Fig. 10). Paracalanus and other marine calanoids other than Acartia also may have contributed to the feeding selectivity of the bulk copepod assemblage differently.

P16 line 31: Corycaeus affinis dominated copepod community in spring and autumn, except for the river mouth. This result is inconsistent with previous reports in the same region; Corycaeus affinis was not a dominant species in spring and autumn (Kwon et al. 2001, Jang et al. 2004). I am very curious about the difference. My speculation is that horizontal net towing (0.5-1m depth) in the deeper region in this study may be responsible for potential bias of copepod composition.

(Kwon KY, Lee PG, Park C, Moon CH, Park MO. 2001. Biomass and species composition of phytoplankton and zooplankton along the salinity gradients in the Seomjin River estuary. The Sea, J Korean Soc Oceanogr, 6: 9-102 Jang MC, Jang PG, Shin K, Park DW, Chang M. 2004. Seasonal variation of zooplankton community in Gwangyang Bay. Korean J Environ Biol, 22: 11-29)

P16 line 32: The authors concluded that Pseudodiaptomus was a detrivore, feeding on small phytoplankton cells. However, recent paper (Kayfetz and Kimmerer 2017) showed that P. forbesi in San Francisco Bay is rather omnivores feeding on various kinds of preys including centric diatom, pennate diatom, diatom (7-15μm), flagellates, flagellate (7-15μm), dinoflagellate and ciliate in the laboratory.

(Kayfetz K, Kimmerer W. 2017. Abiotic and biotic controls on the copepod Pseudodiaptomus forbesi in the upper San Francisco Estuary. Mar Ecol Prog Ser, 581: 85-101)

P17 line 5-6: The authors mentioned that harpacticoids contributed to total copepod diet, preferring microplankton in winter (Fig. 7A), because harpacticoid preferred microplankton (Fig. 9D). However, harpacticoids are not a dominant group in winter (see Table 1).

P17 line 9-13: The authors used the Bayesian mixing model to estimate the relative contribution of copepods to the carnivore diets, and the prey copepods which were not occurred with predatory copepods according to Table 1 were not considered in the model processing. However, this assumption or process may brings bias when evaluate the prey copepod contribution to predators in reality. The authors did not consider some copepod prey for Labidocera and Sinocalanus, but not Tortanus in Fig. 11. I guess that Labidocera who living on surface also may contact copepods other than Acartia and Paracalanus (for example, according to Table 1, in summer Labidocera rotunda co-occurred with Tortanus as well as Acartia spp.). Therefore, the brackish calanoids and cyclopoid also need to be included in potential prey for Labiocera. The same logic can be applied to Sinocalanus. Although Sinocalanus tellenus dominated in autumn with Paracalanus and Corycaeus, only Acartia was considered as prey for Sinocalanus, but not brackish water calanoid such as Pseudodiaptomus. Please consider all potential prey for Labidocera and Sinocalanus like in the case of Tortanus in Fig. 11A.

Also, it is not clear whether the dietary composition of the carnivorous genera in Fig. 10 was for a season or for the four seasons. Please specify appropriate season for each carnivorous copepods (e.g. all season or particular season) so that we can guess the potential prey for the carnivorous copepods.

P28 Fig.4: Please indicate which genera are the brackish calanoids or marine calanoids in Fig. 5(B) and/or Fig. 5. Also, please specify whether the result of de-

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capods or harpacticoids is for spring and/or winter samples.

P33 Fig.9: Please indicate appropriate season for each copepod group and decapods.

Technical Corrections:

P15 line 11: ‘brackish stations in autumn and saline stations in winter’ instead of ‘brackish stations in winter and saline stations in autumn’

P 15 line 24: ‘Turner, 1984’ instead of ‘Turner, 1986’

P16 line 20: ‘Fig. 10B’ instead of ‘Fig. 9B’ for Paracalanus

P17 line13: ‘Sinocalanus preferred Paracalanus to Acartia and/or cyclopoids.’ instead of ‘Sinocalanus preferred cyclopoids to Acartia.’

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