Ocean Sci. Discuss.,
https://doi.org/10.5194/os-2017-91-RC1, 2018

Ocean Science
Discussions

Interactive comment on "Spatial variations in zooplankton community structure along the Japanese coastline in the Japan Sea: influence of the coastal current" *by* Taketoshi Kodama et al.

Anonymous Referee #1

Received and published: 2 January 2018

Spatial variations in zooplankton community structure along the Japanese coastline in the Japan Sea: influence of the coastal current

General comments:

This paper presents results from a time series on zooplankton community composition and for concomitant environmental data collected in the month of May from 1999-2013 along the Japanese coastline. Biological and physical data have been collected and analyzed with timely methods and hold the potential to increase the understanding of the factors controlling zooplankton community composition on the mesoscale and the physical/environmental factors affecting this composition in the decadal time frame.

However, the graphical presentation of results as well as the discussion of findings need to be revised. Especially, the evidence presented to support the effect of the coastal current is not convincing in its present form. I therefore suggest a major revision of the manuscript before possible publication.

Specific comments:

Introduction

Page 1, line 29/30: Effects of currents on zooplankton community composition are the core of this manuscript and the existing literature on this topic is extensive. The authors should review the publications from study areas with similar environmental conditions. Also, other factors that drive community composition on the regional scale should be addressed, e.g. seasonality or nutrient loading.

Material and Methods

Page 3, line 7: For a more complete assessment of zooplankton community structure, night time samples are preferably used, since they also take into account the migrating part of the mesozooplankton community. However, tows from 150m to the surface included the water column well below the mixed layer. I therefore think that the sampling was appropriate to evaluate mesozooplankton community composition.

Page 3, lines 28/29: Give the reference for equation (1)

Page 4, line 5: Although the discarding of rare zooplankton species for statistical reasons is a necessary step, this leads to a loss of ecological knowledge. Rare species are indicative of particular environmental conditions or events, e.g. the advection of water masses. One way of keeping this information in the analysis is the use of species richness (S) as a variable.

Page 4, line 13-20: It is not clear on which reasoning the choice of parameters is based. Parameters with VIF values between 3 and 10 are discarded, but mean temperature with a very high VIF value (25.9!) is kept in the analysis and reveals itself as a param-

eter with high explanatory power (e.g. page 7, line 9 “the variation in RD1 is largely controlled by mean temperature”). The authors should state more clearly their procedure in calculating VIF values before and after selection, and why mean temperature is preferred to temperature at 5m depth, for example.

Figure 1: Present a map where the position of the current is indicated.

Results

Page 4, line 34f and Figure 2: spatial trends mini T, SST, max S are not used further in the analysis and discussion. I suggest to present only panels a, b, c, h, i, and j in Figure 2.

Page 5, line 3: “monthly SSChla concentration was variable”; from Figure 2j is appears that monthly SSChla is in fact very low and stable in spatial and temporal terms.

Page 5, line14: “78 of the 388 samples were identified to species level and 25 groups to genus level”; From this sentence is it not clear whether 310 samples of the 15-year time series were not analyzed at all, and if yes, how were the 78 samples chosen? What do you mean by groups? I presume it is taxonomic groups. How were these groups used in the statistical analysis? Add this information to the Material and Methods section.

General comment on figures: The manuscript contains 9 Figures with numerous panels. Several figures present information that is redundant and some information is not used in the discussion. I suggest substantial revision of the figures and focus on the relevant information.

Figure 3: The surface temperature is presented, but the mean temperature is used for statistical analysis and for the discussion of results. I do not think this figure is necessary to be presented.

Figure 4: indicate the position of the coastal current in panel 4b

Figure 5: plot the current vectors in panel 5b to indicated direction of flow and current

speed

Figure 6: revise the x-axis in panels b) and d) so that the axis scaling and years are aligned

Figure 7: the information presented here is in part redundant with information presented in Figure 6c

Figure 9: make a separate figure for panel 9e or move to supplementary material

Discussion:

My major concern with this publication is the discussion. Overall, the discussion needs to be re-structered.

The information obtained from the zooplankton community analysis is not properly discussed in the light of ecological differences between the sampling sites. See the publication by Espinasse et al. 2014, Mar Ecol Prog Ser. Vol. 506: 31–46; doi: 10.3354/meps10803 as just one example.

From your data, it is clear that Toyama Bay has a very different zooplankton community structure compared to the stations along the coast. However, it is not clear whether this region is influenced by the coastal current or not (see page 8 line 19f and line 26ff). The possible role of nutrient input or bottom topography is only marginally addressed in this manuscript and needs to be elaborated.

The occurrence of key organisms such as Oithona atlantica needs to be discussed. Turbulent motion is possibly one of the factors that contribute to its spatial distribution. See for example the paper by Saiz et al. 2003 (Limnol Oceanogr Volume 48, Issue 3, Pages 1304–1311)

Also, the evidence presented for the role of the coastal current is not convincing. The most relevant parameter (mean temperature) has the highest VIF (25.9, before selection) and caution should be given when using it in the statistical analysis. However,

the spatial variation of RD1 and its explanatory power (84 %) rely on mean temperature. Mean temperature is of high biological relevance, since it affects all metabolic processes (feeding, growth, reproduction) in the zooplankton. To show an effect of oceanographic parameters (i.e. currents) the use of salinity and temperature at a certain depth is possibly more appropriate. I suggest to repeat the statistical analysis using S and T at 5 m depth and to compare the results with your findings when you use mean T.

Sea surface heat flux is discarded as a factor influencing spatial variations (i.e. the east-west trend), and, ultimately, the occurrence of warm water and cold water species (page 8, lines 4-11). In a recent publication, Smyth et al. 2014 (PLOS one, Volume 9 | Issue 6 | e98709) use sea surface heat flux as a forcing factor in the seasonal structure of the pelagic ecosystem. The authors should re-discuss their findings in the light of these observations.

Interactive comment on Ocean Sci. Discuss., https://doi.org/10.5194/os-2017-91, 2017.