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Comment

## ***Interactive comment on “Temporal variations of zooplankton biomass in the Ligurian Sea inferred from long time series of ADCP data” by R. Bozzano et al.***

### **Anonymous Referee #1**

Received and published: 28 September 2013

The paper “Temporal variations of zooplankton biomass in the Ligurian Sea inferred from long time series of ADCP data” by R. Bozzano et al. presents an attempt to investigate the variability of the zooplankton biomass and the Diel Vertical Migrations (DVM) in the upper thermocline, through the analysis of ADCP data collected in the central Ligurian Sea during a three year period. It is a very interesting work that I enjoyed reading and should be published providing some minor changes listed below are done to the manuscript.

GENERAL COMMENTS The paper is very well written and although there are some mistakes on these have already been corrected by the editorial service.

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One issue that I think needs to be addressed by the authors is the lack of ground truth or validation. Although they mention at the introduction that the method offers more qualitative rather than quantitative information, still it would be helpful if the authors as experts on the field can provide some discussion on this issue. Considering that zooplankton sampling is usually done during the day in the euphotic zone, there might be a significant error on the stock estimation in field studies. Thus the authors have the opportunity to upgrade the paper by providing a discussion on the advantages and limitations of the method.

Furthermore I would like to see the following issues being discussed; can the method be applied in other areas? can the method be coupled with field measurements in order to get a more complete picture?

With their experience what is the ideal experimental setup in order to catch the phenomenon? For example two ADCP sensors at 100m one looking upwards and one downwards?

Looking at the environmental conditions (Section 2.2) it seems that none of the three periods is representative of the climatology of the area and thus it would be very interesting to see the following years. Was the ADCP removed after 2006?

Section 3.5 (Vertical velocities and changes in the zooplankton population) fails to do what it is written in the title. The authors give a detailed description of the ADCP measurements but they don't link them enough with the changes in the zooplankton population.

**SPECIFIC COMMENTS** Section 2.1 Main features of the investigated area: I think that a figure with the area would help. Particularly in Page 1371, Lines 11 – 20 where the authors refer to seasonal and spatial variations observed in the composition of zooplankton population, it would be very informative if this information were shown in a figure.

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Page 1371, Lines 28 – 29, Page 1372, Lines 1 - 5: I think this is a generality which could be omitted or moved to the beginning of the section.

Page 1372, Lines 13 – 17: The sentence needs re writing. I can understand that stratification prevents oxygenation from deeper layers but it prevents oxygenation also from the atmosphere?

Page 1372, Line 28: Which characteristics?

Page 1373, Lines 15 – 21: It would be very interesting to see the situation after 2006 and if the system returned in the “normal state”.

Page 1374, Line 1: What do you mean by “according to the specific experimental design the configuration of both mooring line and ADCP changed”? What is the reason for not keeping a constant ADCP depth between deployments?

Page 1374, Line 14: Since the deployment period was from September 2003 until February 2006 and only 0.1% of the data was rejected why the authors use data only between October – February?

Page 1375, Line 16: Delete repeated word “formula”

Page 1377, Line 21: It will be very helpful if in Fig. 3 the months for each deployment are aligned so one can see possible trends.

Page 1378, Lines 8 - 13: It is not very easy to see the consistency of NPP and backscattering strength. I suggest plotting them together in Fig. 4

Page 1378, Lines 14 – 18: Since “hard validation” is missing, the paper must get as much support of field data as possible. Thus adding CPR data in a figure 4 may help towards this.

Page 1379, Lines 20 – 25: I think that it would be interesting to see what is happening at the deeper layers below the ADCP. Should one expect during the day the deeper layers to have higher values compared to the surface?

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Page 1379, Lines 26 – 29: I think that the authors should expand a little more on this important issue.

Page 1380, Lines 1 – 11: What the authors say here is that although each group has a clear pattern of migration, overall they produce a mixed picture. Furthermore, reading Section 3.4 (Spectral analysis) an obvious question is since the authors in Section 2.1 (Main features of the investigated area) provide the phenomenology in terms of zooplankton groups is it possible to use this information and get an idea of what is causing the backscatter? Some discussion is done in the Conclusions section but I think that it is most appropriate to discuss this in Section 3.4

Page 1380, Line 15: For an easier comparison please use the same scale on y-axis in Fig. 8

Page 1380, Lines 16 – 25: So in the 1st Deployment only between Oct-Dec 2003 there is a diurnal migration while in the 2nd and 3rd Deployments there is diurnal migration below 40m. Any suggestion to what happened during the rest of 2003?

Page 1381, Lines 1 – 28: Can the significant 12h migration pattern shown in the 3rd deployment be due to the 30min temporal resolution sampling? Please discuss.

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