Response to review comments to 'Impact of tidal dynamics on diel vertical migration of zooplankton in Hudson Bay' from Anonymous Referee # 2

We highly appreciate helpful comments and suggestions from Anonymous Referee #2. In the following, *the comments by the reviewer are in italics* and our responses to the comments are in normal characters. The revised manuscript text is underlined. **The line numbering (in bold)** is referenced to the marked-up manuscript version.

Review comments to 'Impact of tidal dynamics on diel vertical migration of zooplankton in Hudson Bay' by Petrusevich et al. Anonymous Referee # 2

The paper is very well written and with a clear and concise message. I have a few comments / questions:

1) line 55, objective 3: Why is not solar light mentioned here?
It was our omission, thank you for pointing it out. We have added solar light as well **(line 70)**.

2) How do you separate actively migrating from passively sinking (dead) organisms?

Passively sinking organisms will produce just a background VBS. While migrating organism will have a periodic pattern that is clearly seen in VBS, especially in VBS actograms. Also taking into account life span of the zooplankton species in Hudson Bay, there is very unlike that mortality rate will be comparable to the number of the individuals actively participating in daily DVM cycle.

3) Line 125. Ice thickness measured by ADCP - does there exist any groundtruthing data for this method? There are no references provided, except one that does not seem to be relevant? This needs to be updated / clarified

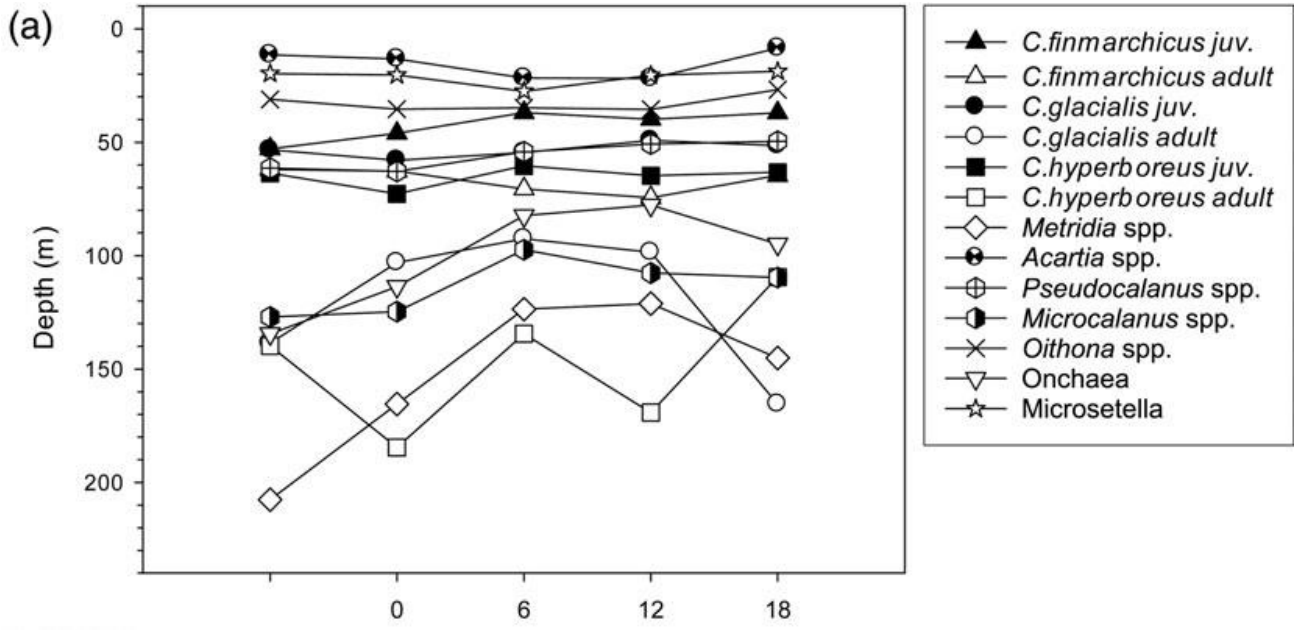
I have added 4 references to the previous works that used ADCP for ice draft measurements: (Banks et al., 2006; Björk et al., 2008; Shcherbina et al., 2005; Visbeck and Fischer, 1995).

4) There is a basic understanding or basis for a DVM pattern regulated by light that is not really presented, but which is essential to the entire manuscript. I would strongly suggest that the authors first describe this general and consistent DVM, and then focus on how this is disrupted. One way of doing this would be to compared noon with midnight mean position in the water column throughout the entire data series.

Mean position method is working well when is used in actual zooplankton sampling:
for example the paper (Munk et al., 2015). They used the following formula:

$$CM = \frac{\sum a_j \times b_j}{\sum b_j}, j = 1, \dots, n$$

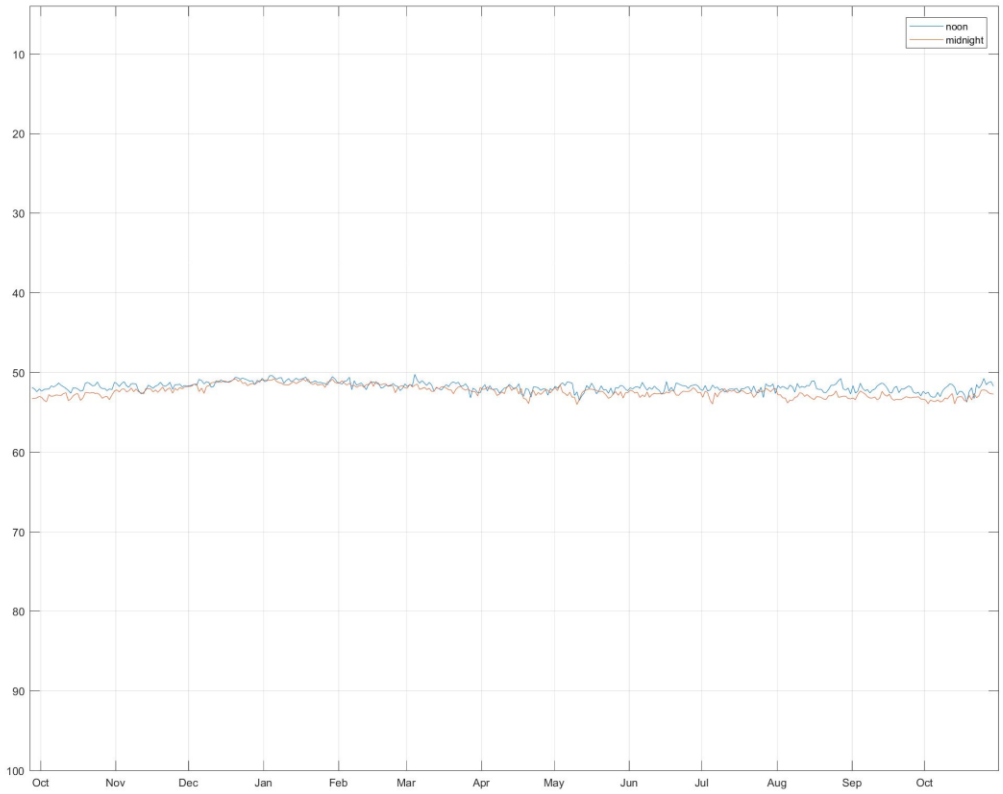
Where a_j is the mean depth of sampling interval j, and b_j is abundance within sampling intervals, j.
There is a different mean position for various species and their variation for day and night also varies for various species. Below is a figure from Munk et al., 2015:



From this graph one can see that for some types of Calanus the difference between day and night is not really big just around 1-2m.

In our case we are not doing the actual sampling but just analyzing the backscatter created by composition of various migrating species.

I did a quick estimate for mean position based on VBS for my dataset in Matlab:



The only thing we can say that this method gives very close results for both day and night and that depth is 51-52m, which is typical for juvenile Calanus glacialis and Pseudocalanus spp.

Munk, P., Nielsen, T. G. and Hansen, B. W.: Horizontal and vertical dynamics of zooplankton and larval fish communities during mid-summer in Disko Bay, West Greenland, J. Plankton Res., 37(3), 554–570, doi:10.1093/plankt/fbv034, 2015.

When these issues are sorted, I recommend that the manuscript is accepted for publication

We would like to thank Anonymous Reviewer #2 for all these helpful comments.

Regards,

On behalf of all authors

Vladislav Petrusevich