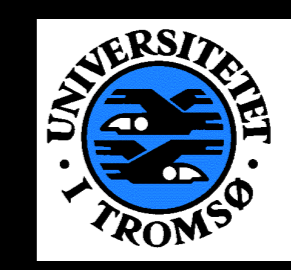


Diel variation in the vertical distribution of arctic mesozooplankton during the polar night

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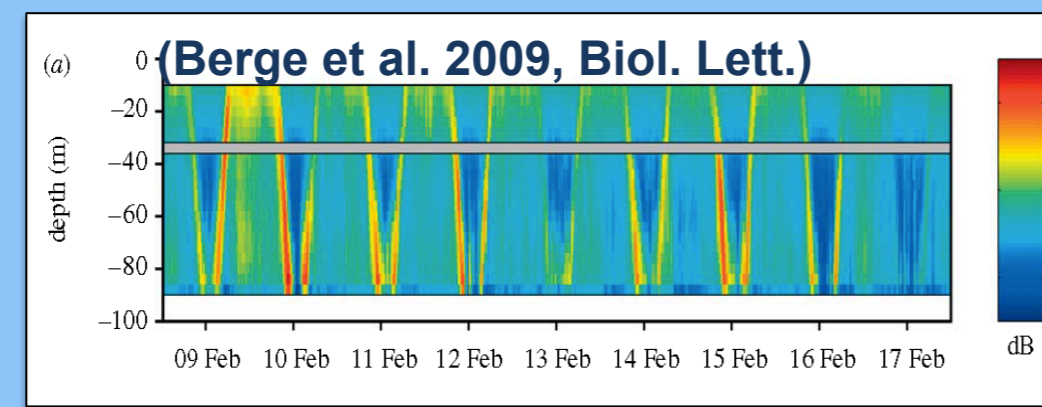


1. INTRODUCTION

Zooplankton Diel Vertical Migration (DVM) occurs in all oceans and lakes, constituting the most widespread and synchronized movement of biomass on the planet. Therefore, DVM should be a crucial factor to consider if we are to understand marine food-web interactions and ecosystem structure.

Typically, migrators spend daylight hours at depth and move to the surface under cover of darkness, and the cue for this behaviour is widely accepted to be changes in light intensity. But recent studies based on acoustic data in Svalbard (cf. Berge et al. 2009) provide evidence for synchronized DVM in the polar night period when intensity and diel variation of ambient light are minimal.

The taxa performing this dark DVM remain unknown due to the lack of net or optical sampling.

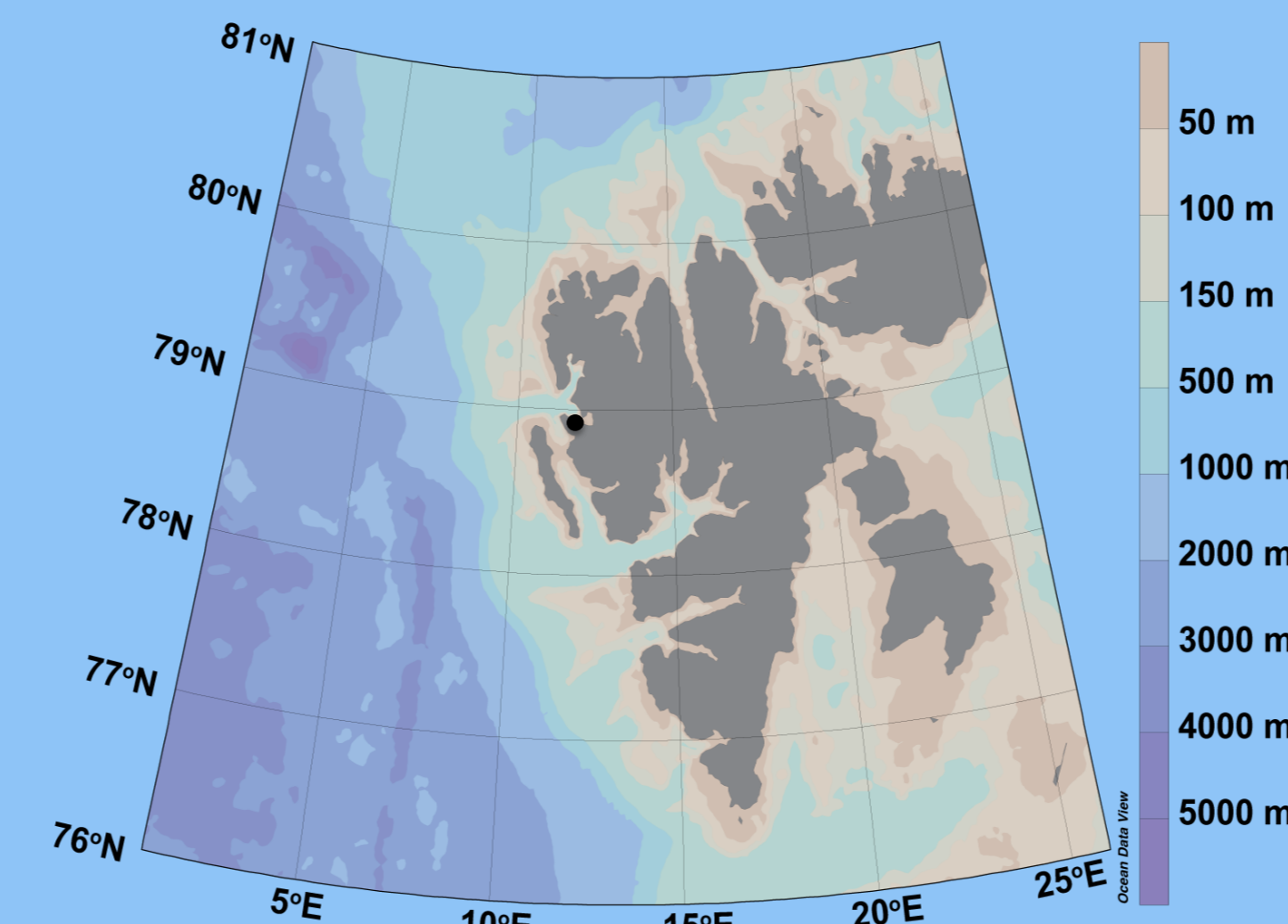


Objectives:

- Identify DVM patterns in January 2013 and 2014.
- Determine the taxa involved in polar night DVM.

2. STUDY AREA

Kongsfjorden, Svalbard



RV *Helmer Hanssen* in Ny-Ålesund on 15 January 2013 at 13:00



3. METHODS

Sampling

Multinet Hydrobios fitted with five 200 µm nets.

Standard deployment: bottom to surface vertical tows at 30 m min⁻¹.

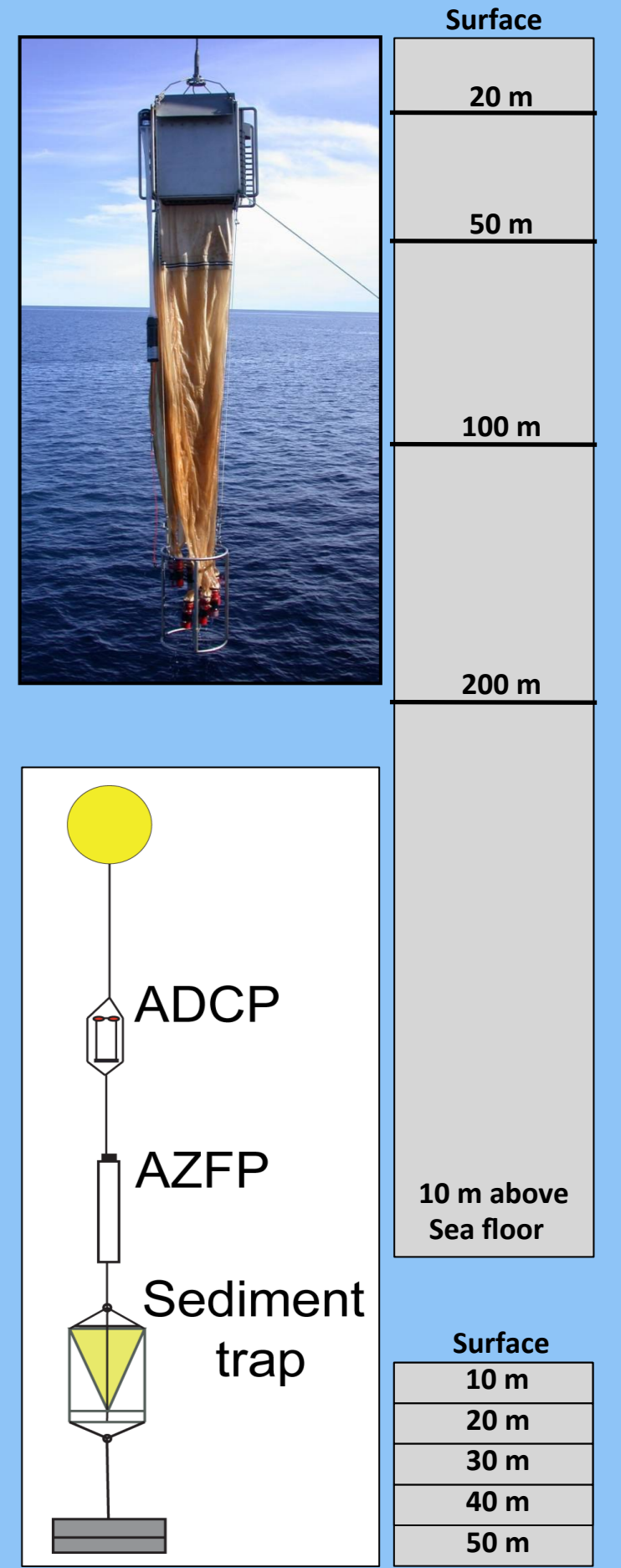
High resolution deployment: 50-0 m with 10-m depth strata.

Acoustic Doppler Current Profiler (ADCP) on a mooring.

Analysis

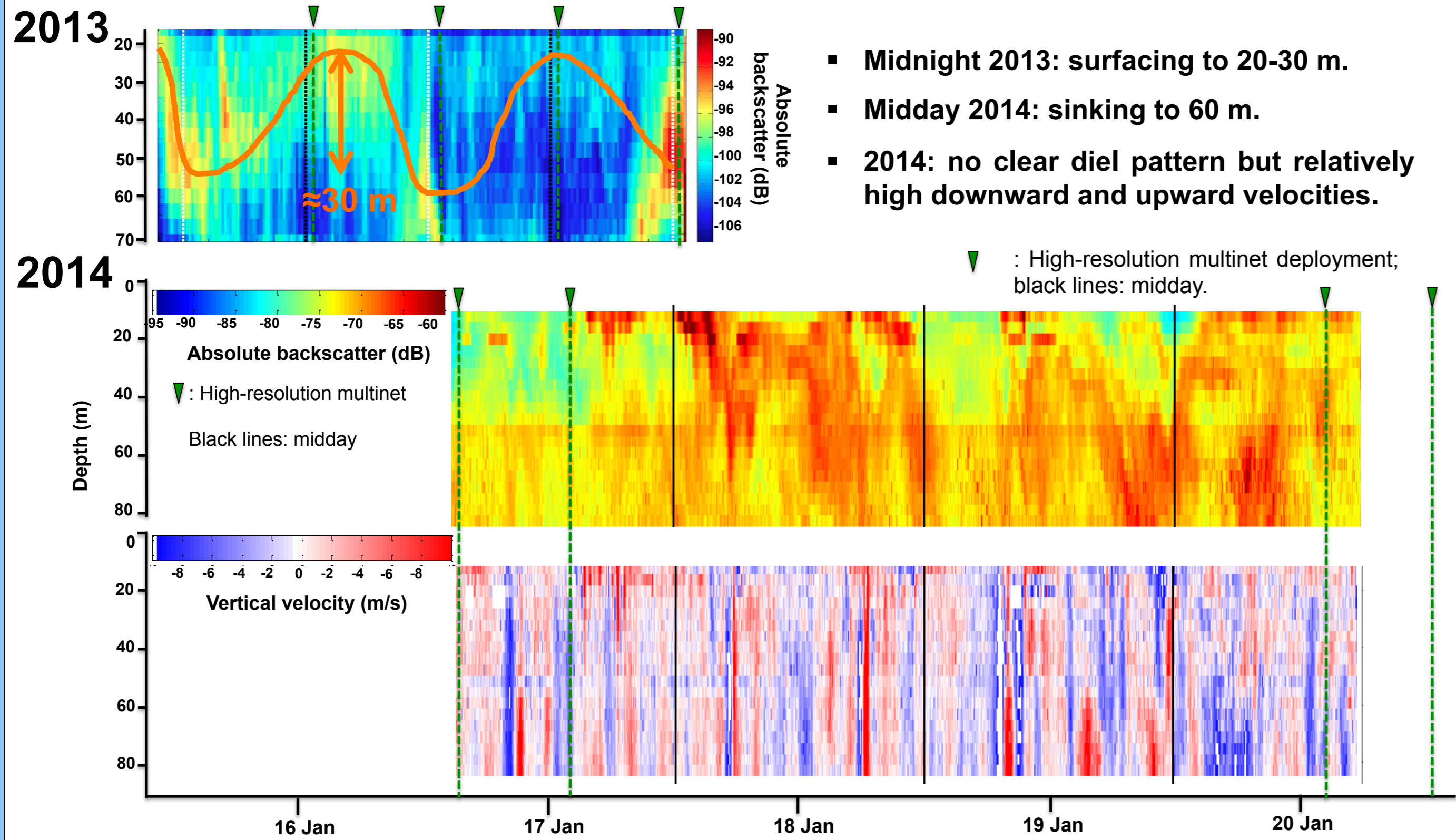
Zooplankton enumeration and identification at the lowest taxonomic level possible in preserved samples.

Calculation of Weighted Mean Depth of populations (WMD).



4. RESULTS

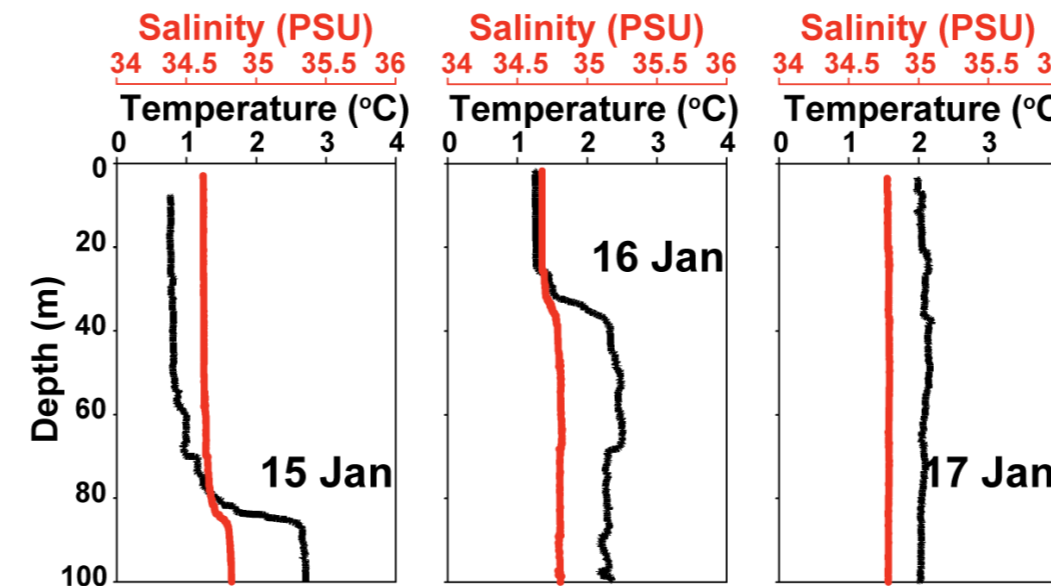
Vertical migration based on ADCP data for 2013 and 2014



- Midnight 2013: surfacing to 20-30 m.
- Midday 2014: sinking to 60 m.
- 2014: no clear diel pattern but relatively high downward and upward velocities.

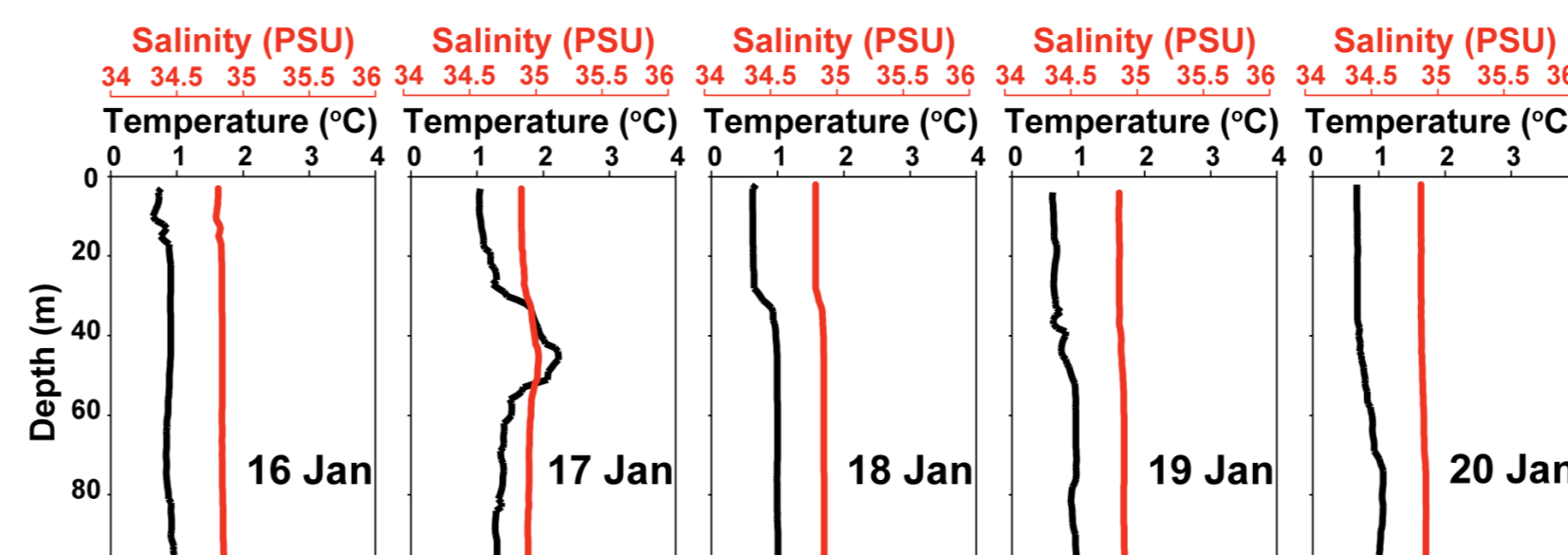
Temperature and salinity

2013



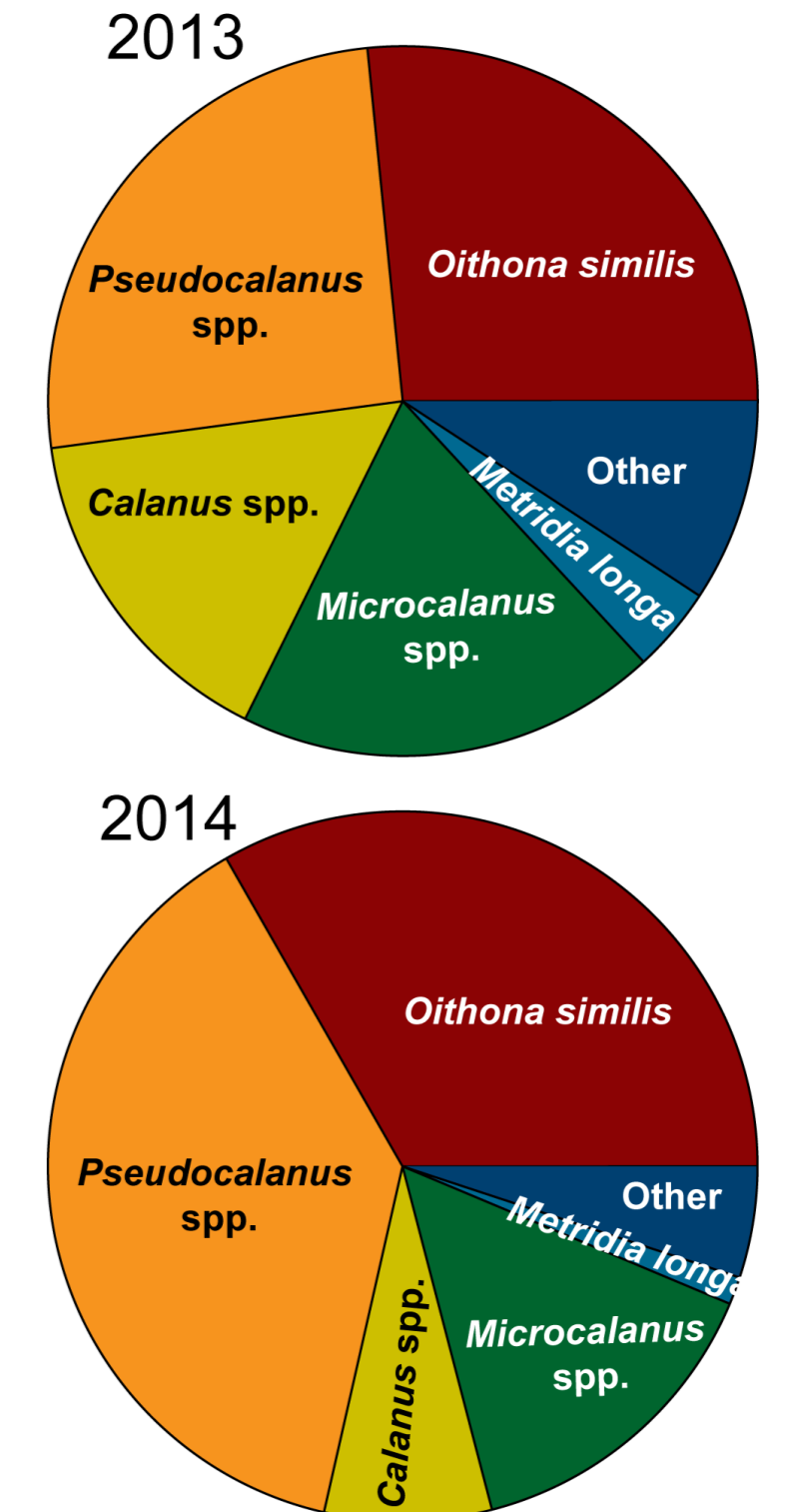
- 2013: Gradual increase in temperature (1°C) in the 80-0 m layer.

2014

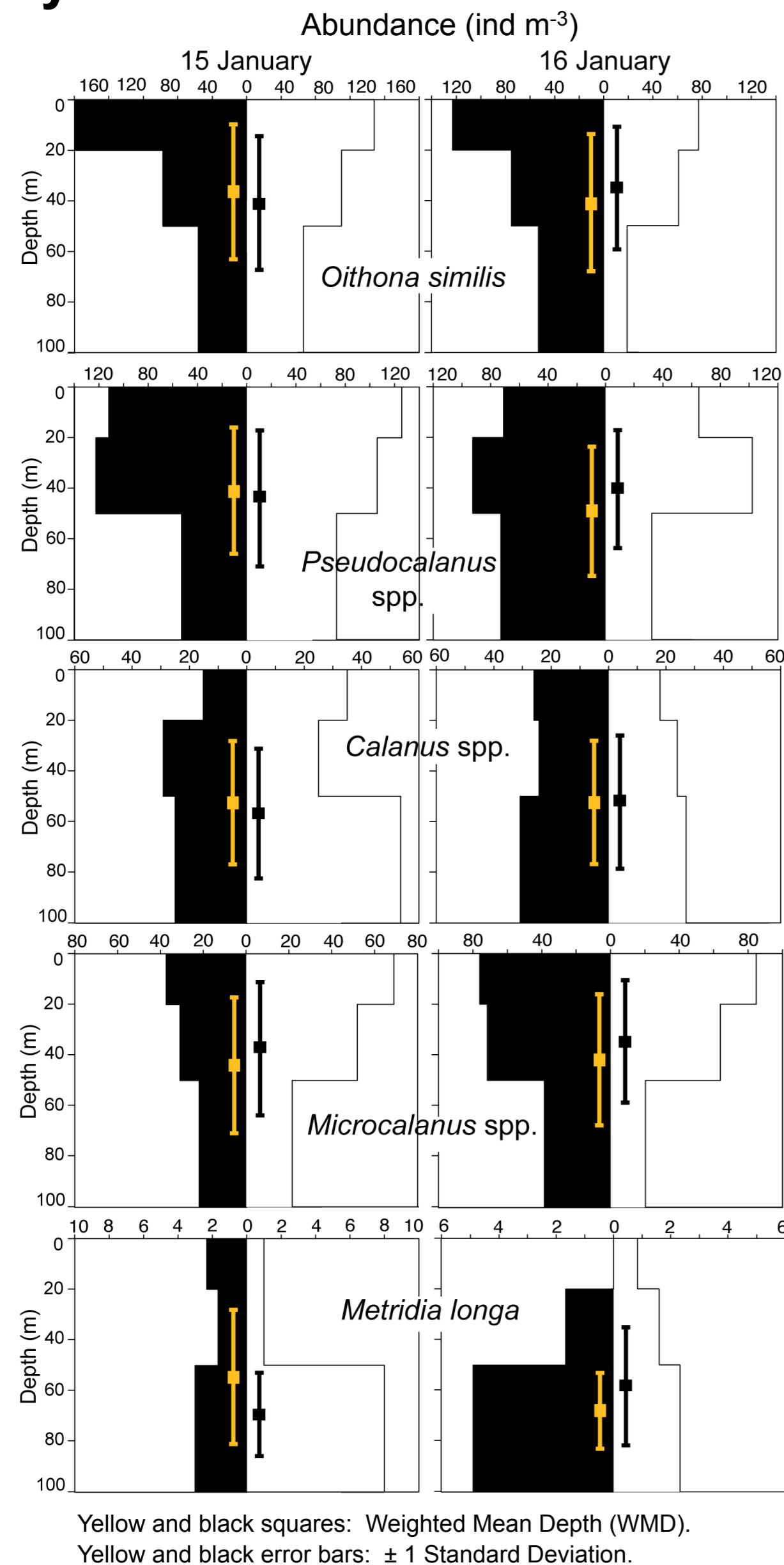


- 2014: No gradual change in the 100-0 m layer from 16 to 20 January.

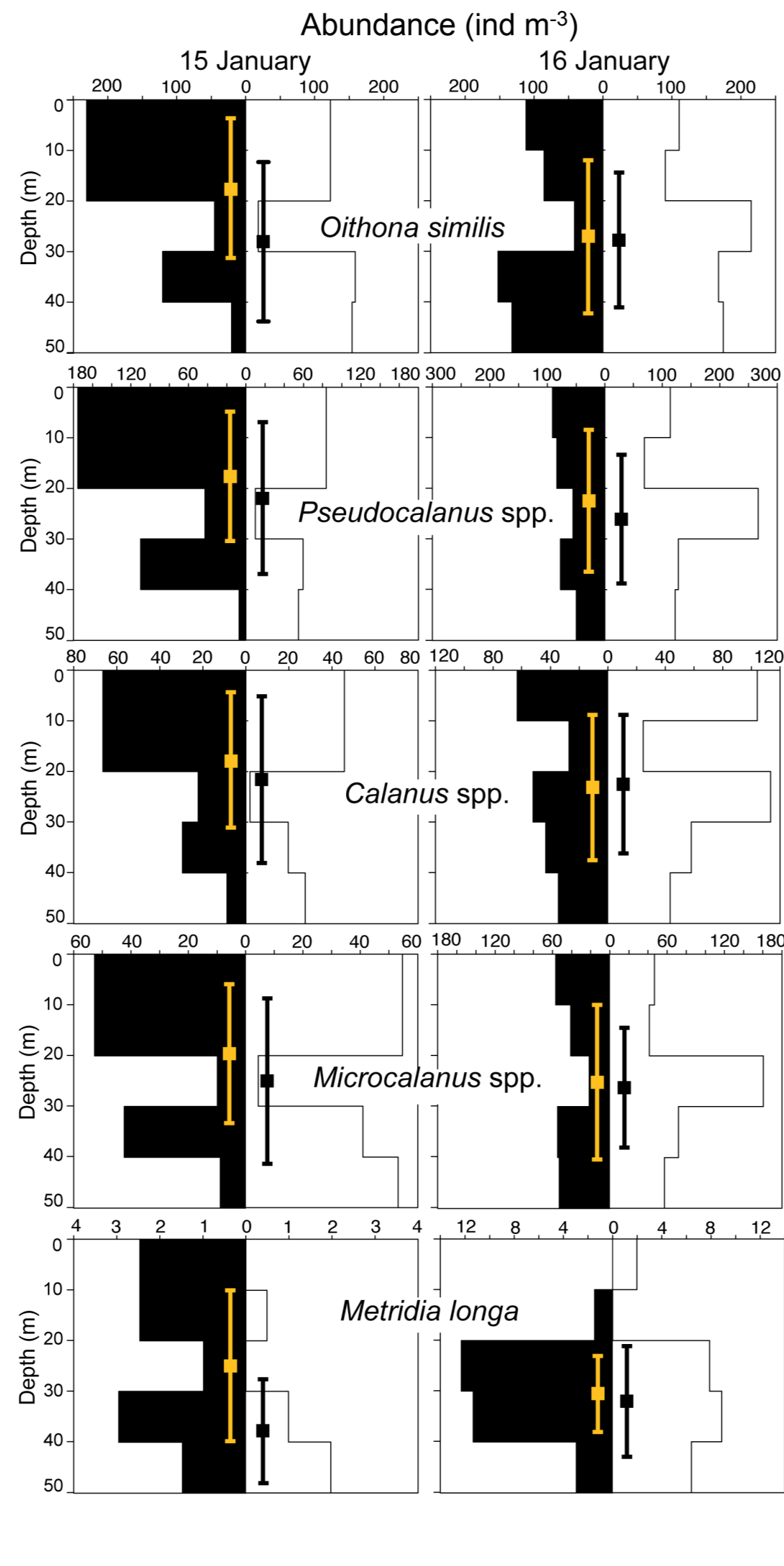
Mesozooplankton composition



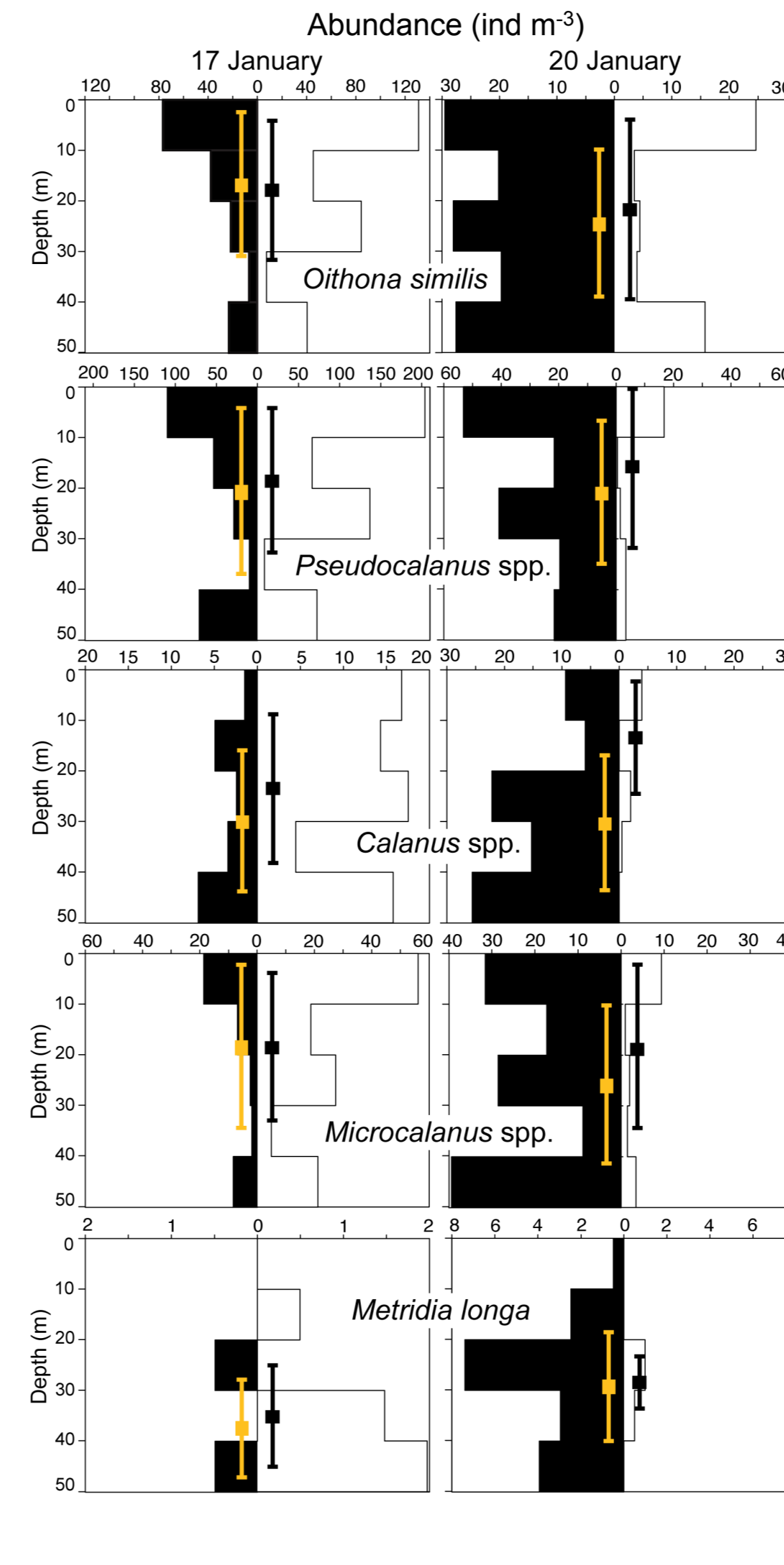
Vertical distribution in the 100-0 m layer 2013



Vertical distribution in the 50-0 m layer 2013



2014



5. CONCLUSION

- Stronger DVM pattern in 2013 than in 2014.
- Active movements in 2014, but not on a clear diel basis.
- Mesozooplankton numerically dominated by the same 5 copepods in 2013 and 2014.
- Midnight and midday comparison of distributions not showing migration among the 5 dominant zooplankton.
- DVM in 2013 and vertical movements in 2014 suspected to be made by macrozooplankton (euphausiids or amphipods).

6. Future work

- Study of diel variation in vertical distribution of the macrozooplankton size class sampled during the same campaigns.
- Study of the influence of atmospheric (moon, clouds) and artificial light (ship) on the vertical distribution shown by the ADCP data (2014).

