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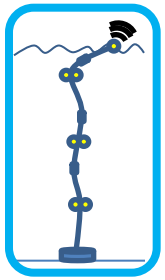
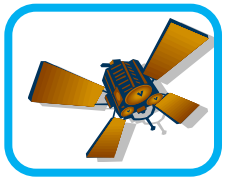



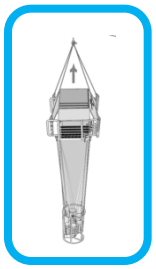

Oasis or dead zone in the open ocean?

Zooplankton distribution and migration in low-oxygen modewater eddies

Helena Hauss, Svenja Christiansen,
Miryan Edvam Lima, Rainer Kiko, Johannes Karstensen, Elizandro Rodrigues, Florian Schütte,
Carolin Löscher, Arne Körtzinger and Björn Fiedler

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Motivation

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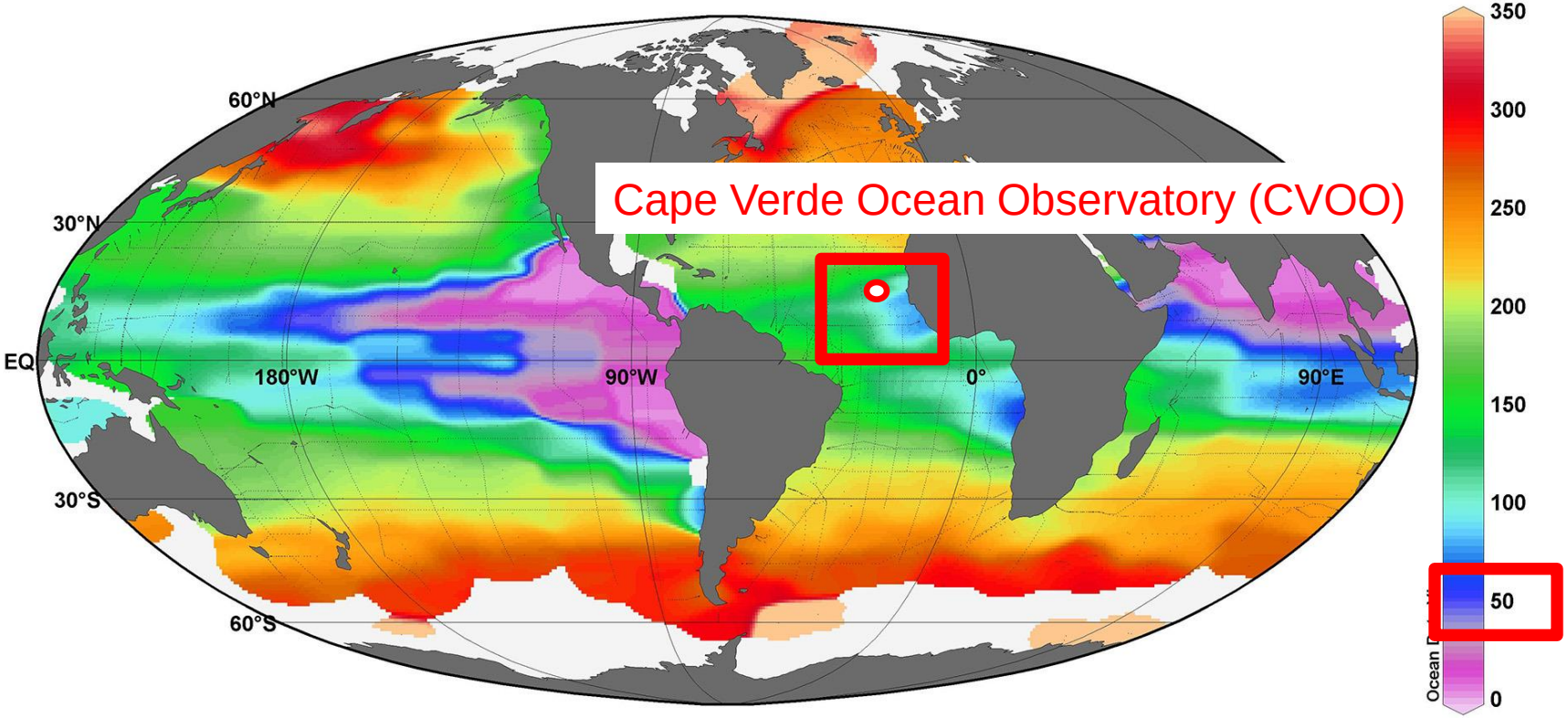
O_2 (µmol kg^{-1}) on Sigma-0 = 26.4 kg m^{-3}



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Motivation

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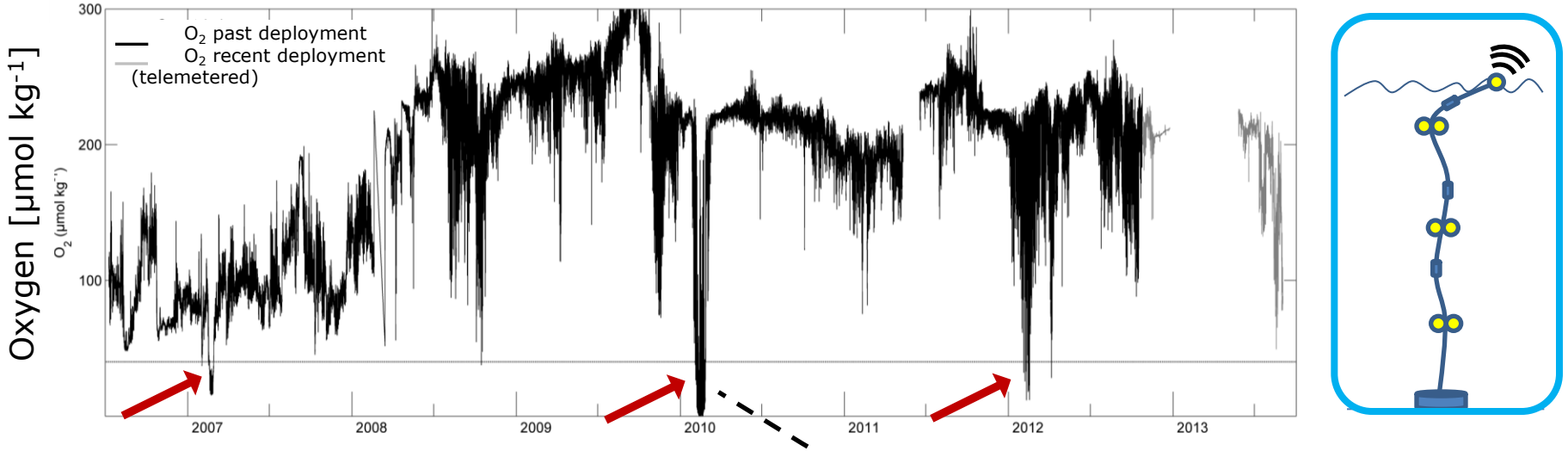
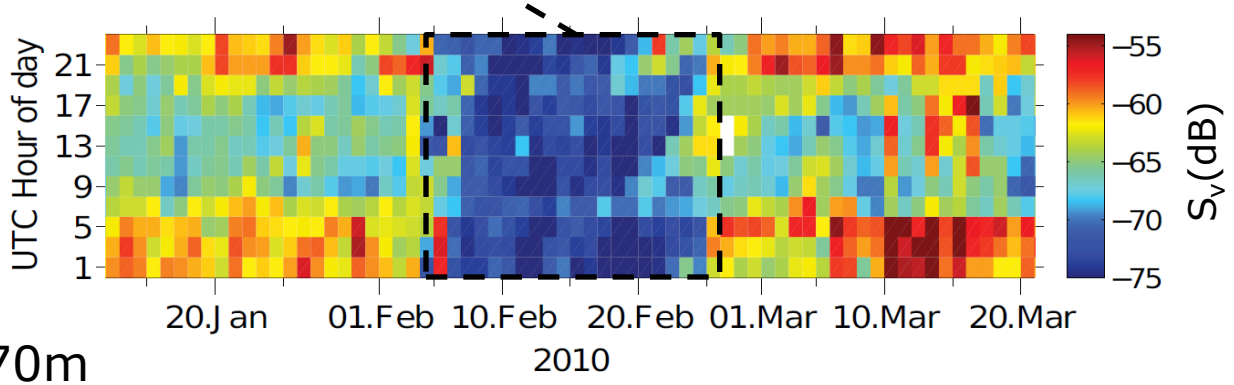
CVOO Mooring



40-60m O_2



300kHz ADCP at 65-70m

Karstensen et al., *Biogeosciences* 2015

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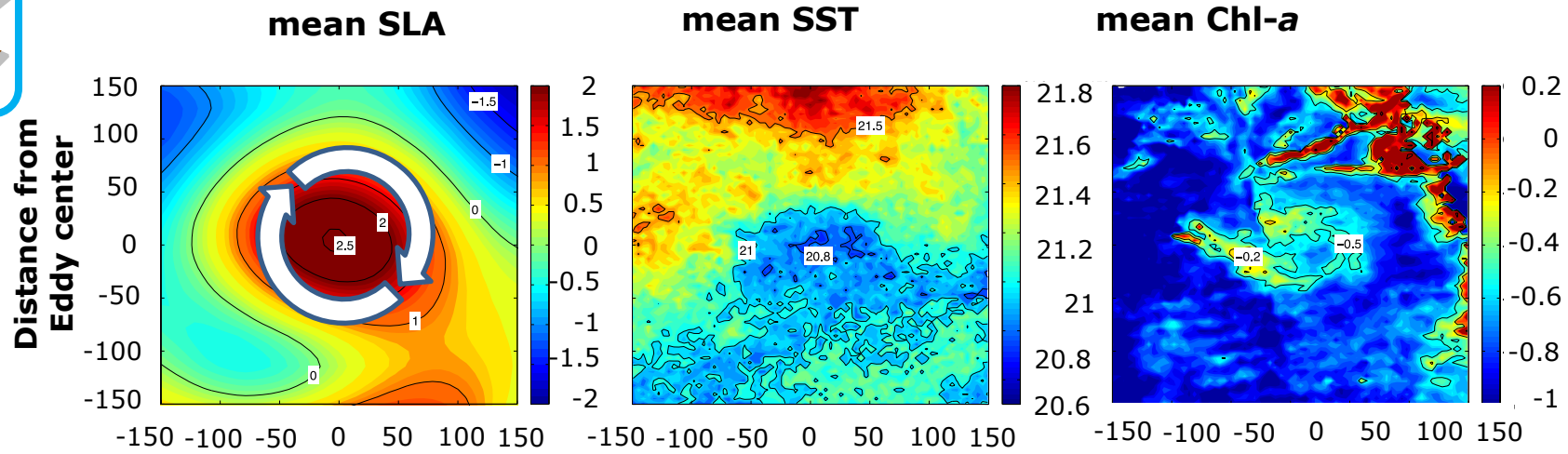
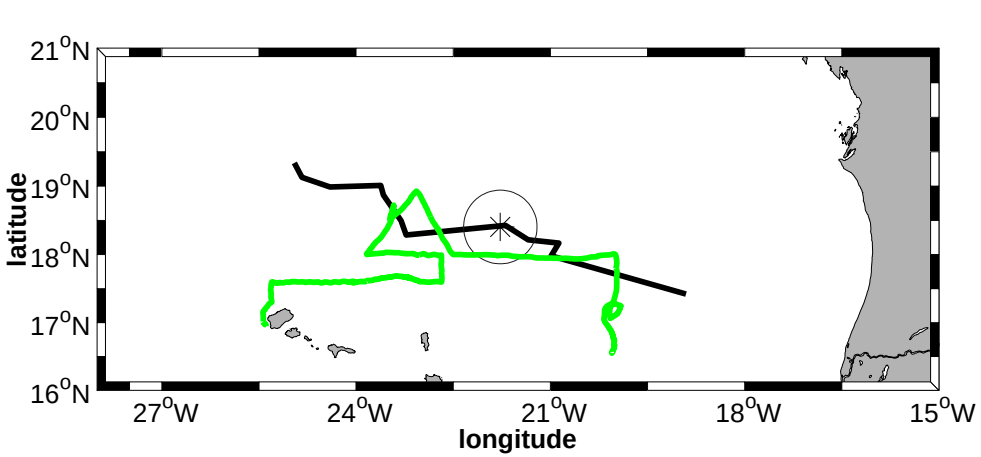
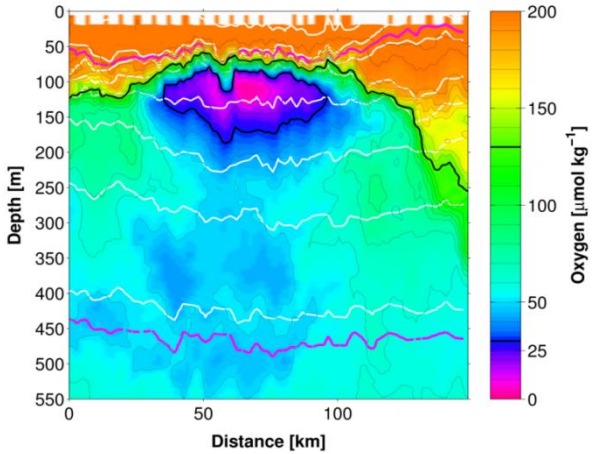
Methods: Remote survey







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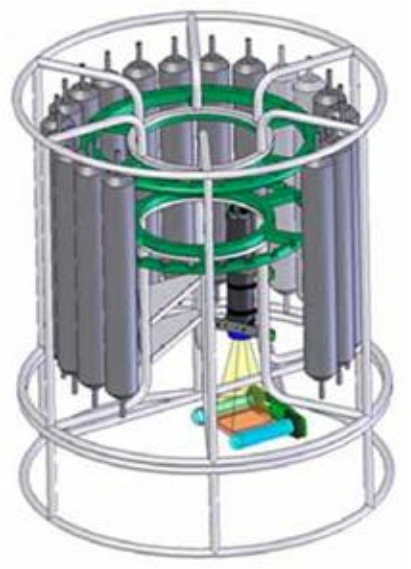
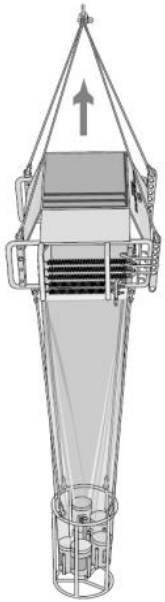
Methods: Site survey





Shipboard ADCP (75kHz)

CTD with UVP
(Underwater Vision Profiler 5)

Multinet (200µm, 5 nets)

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Methods: Site survey – Multinet and UVP5

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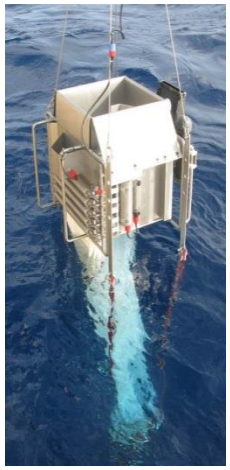
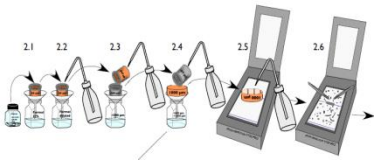
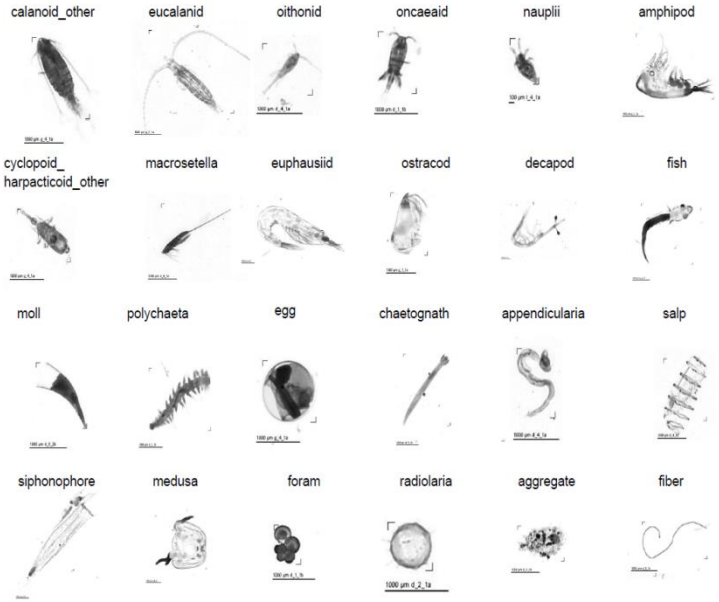
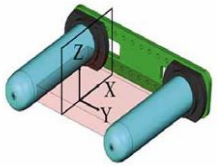


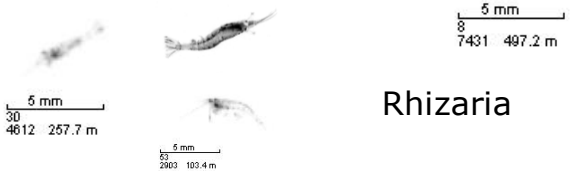






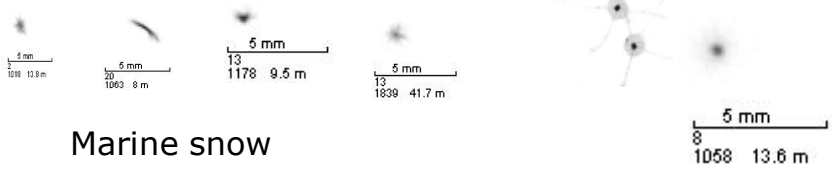
Copepod

Euphausiid



Rhizaria

Trichodesmium sp.



Marine snow

Gelatinous plankton

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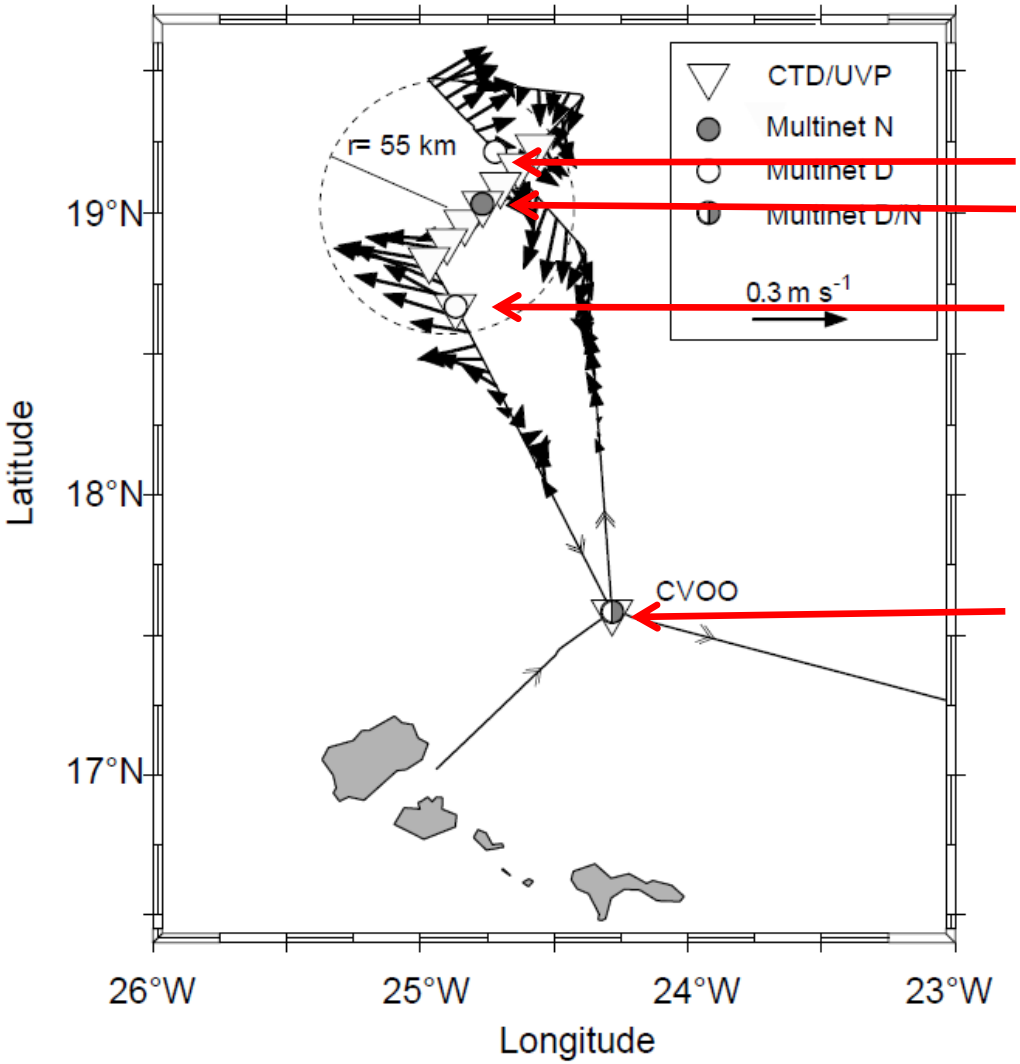
Materials & Methods: Site survey



D Haul
N Haul
Eddy core

D Haul
Eddy margin

D/N Haul
Outside Eddy (CVOO)

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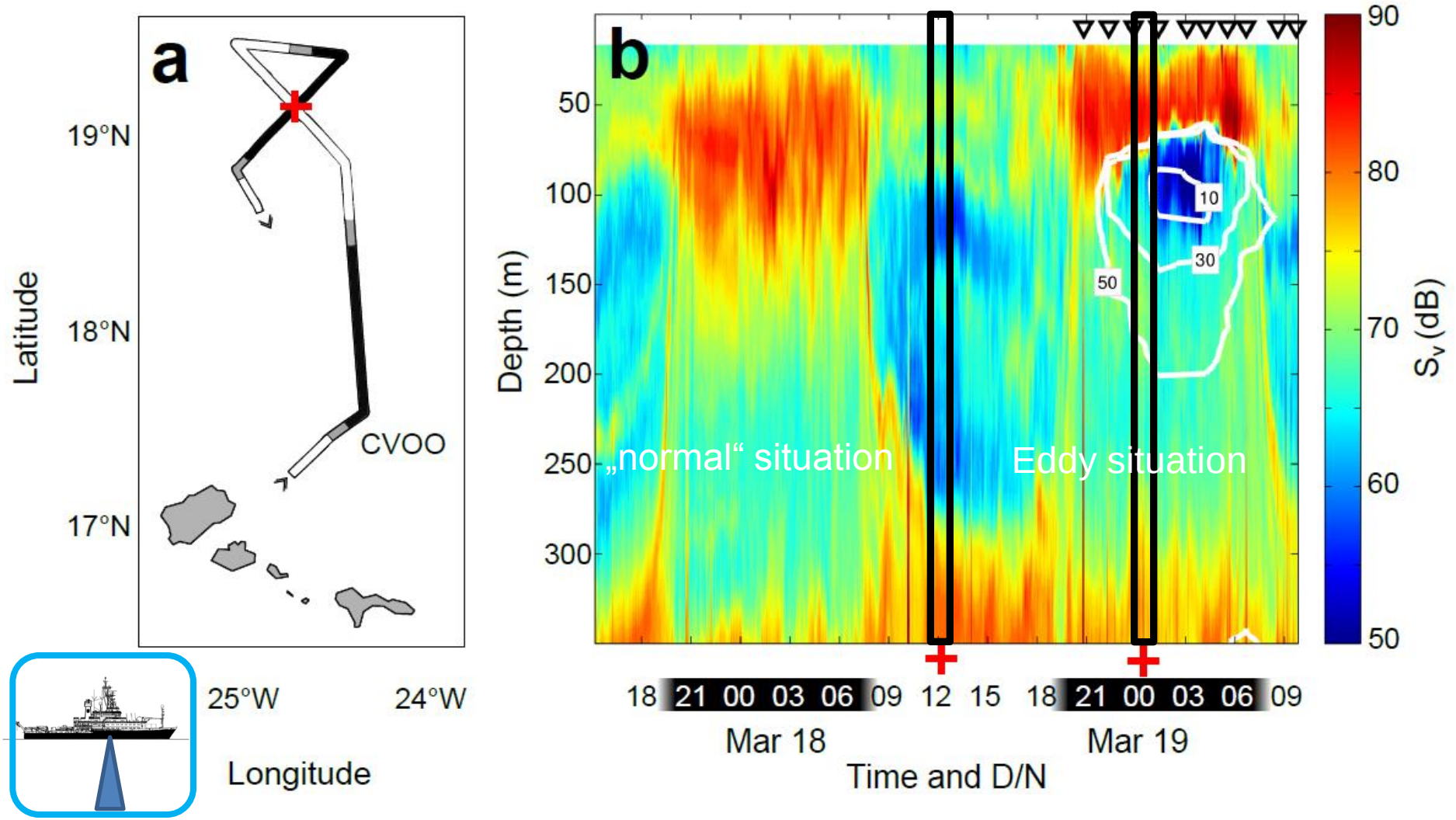
Results I: Shipboard ADCP section through the eddy



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Results II: UVP5 section through the eddy

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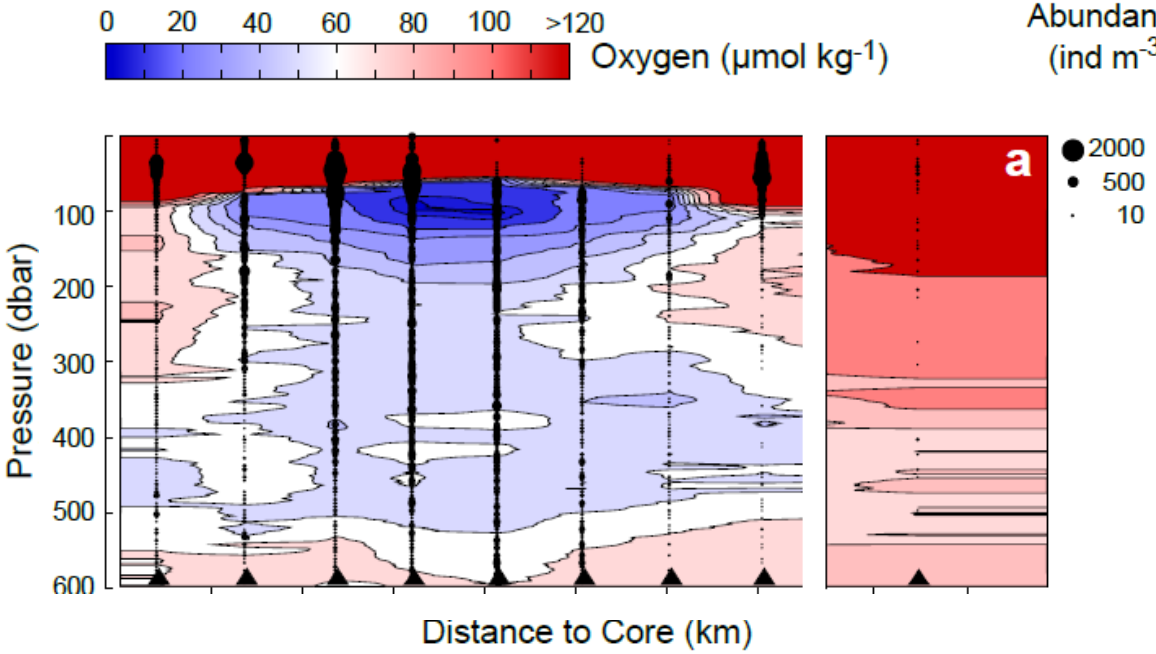
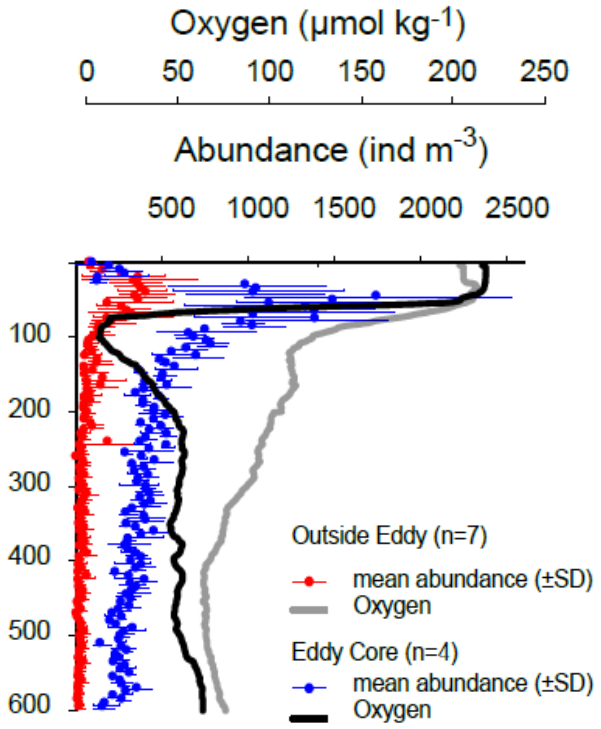
Aggregates





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Results II: UVP5 section through the eddy

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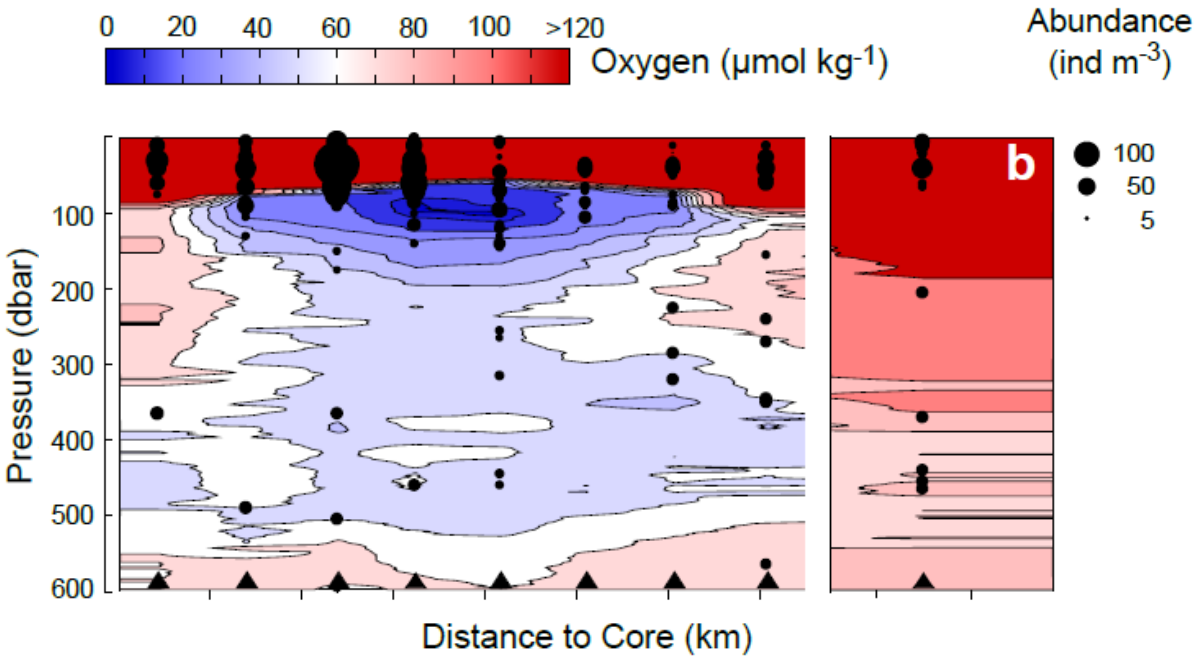
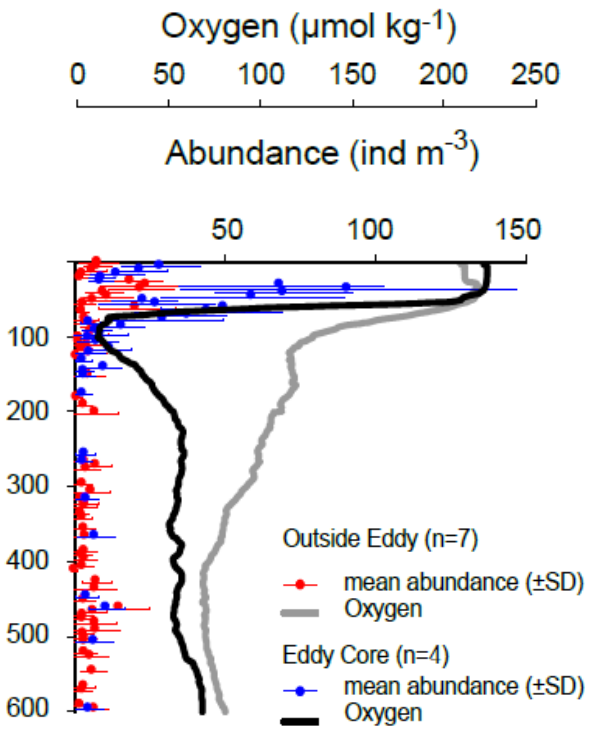
Copepods





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Results II: UVP5 section through the eddy

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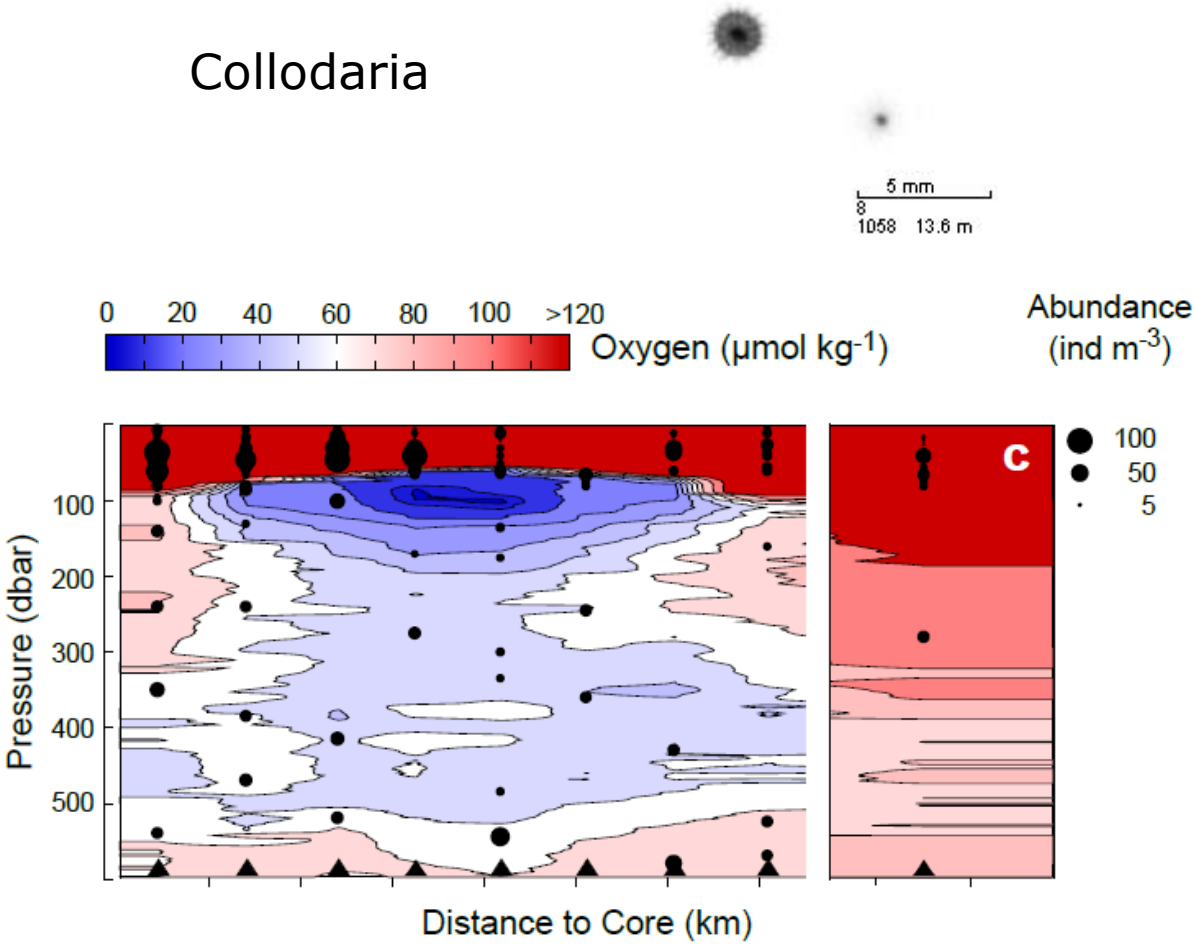
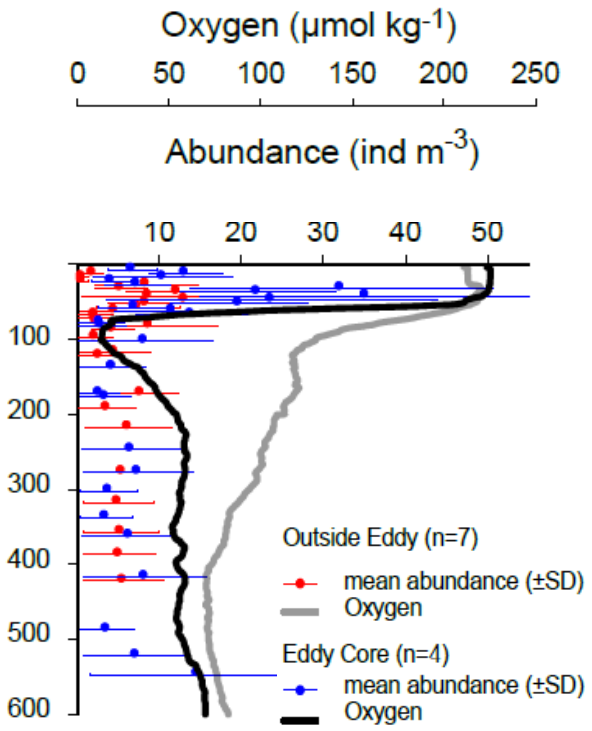
Collodaria





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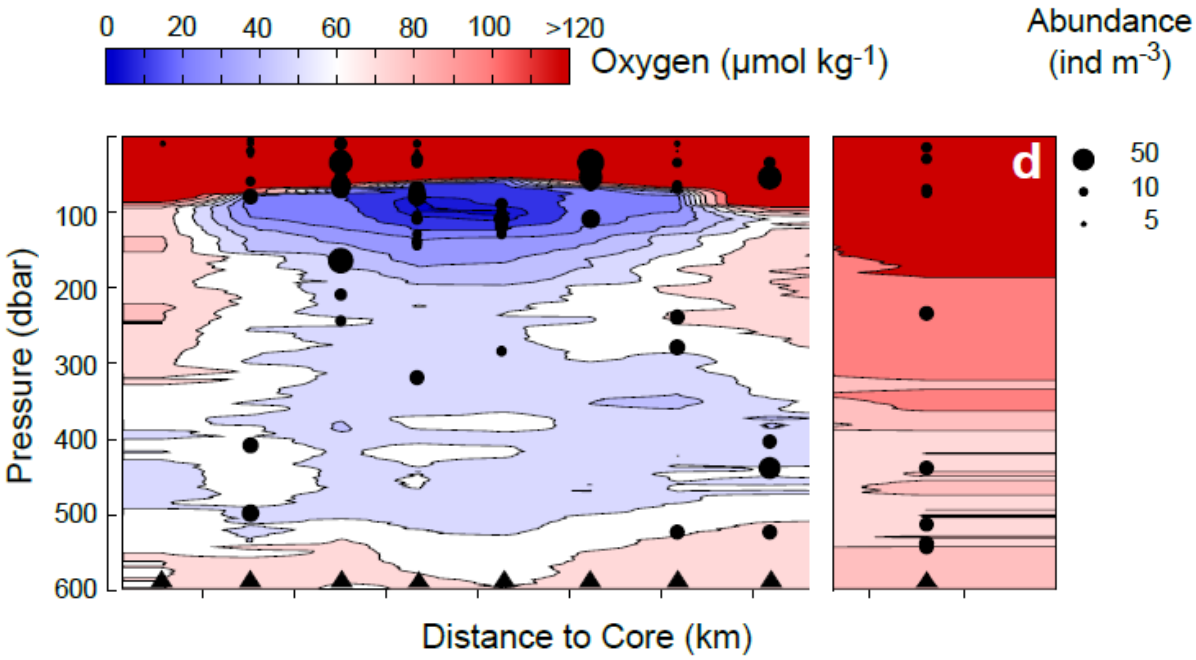
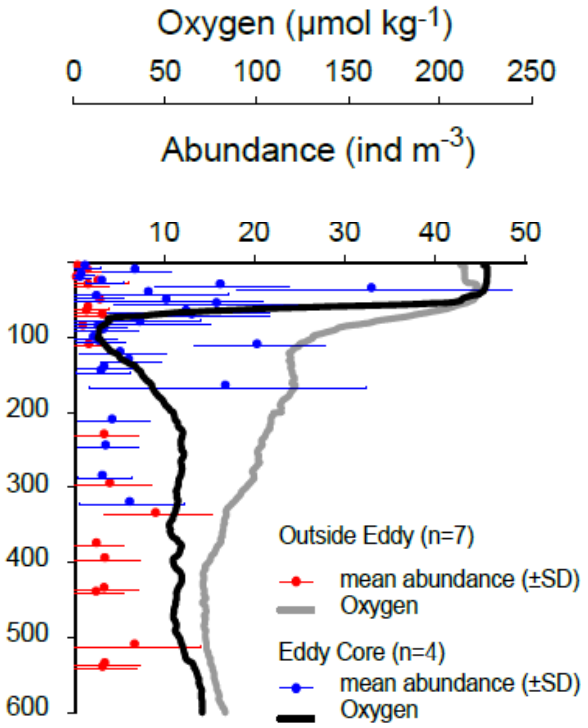
Results II: UVP5 section through the eddy

Jellies





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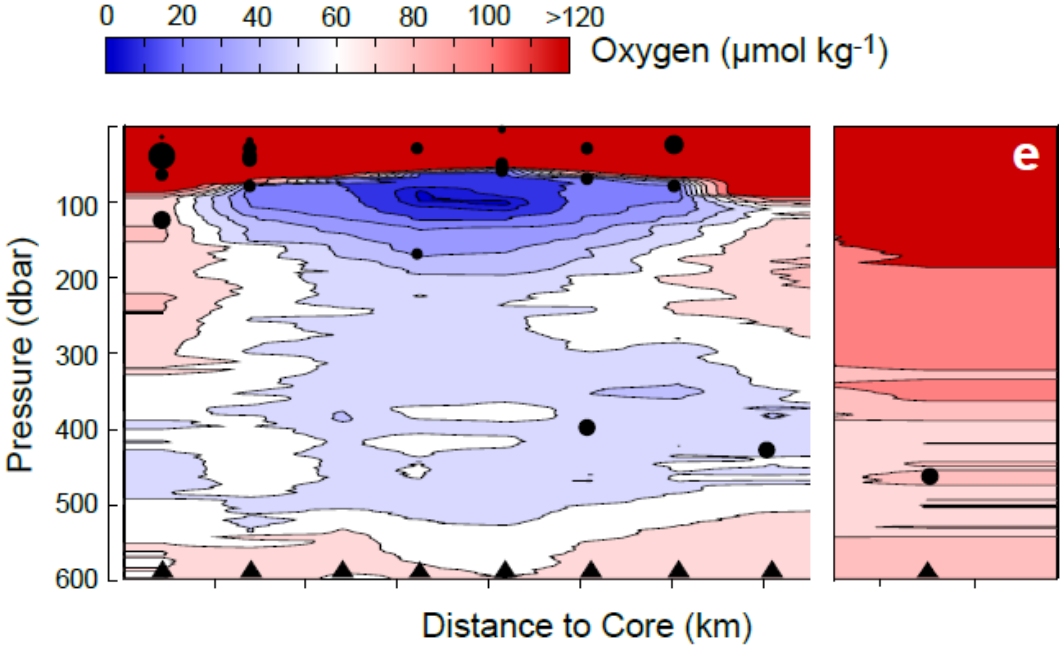
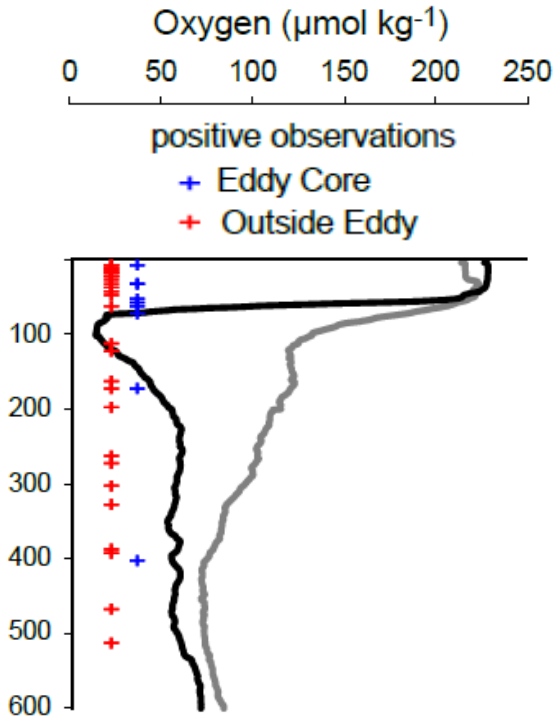
Results II: UVP5 section through the eddy

Euphausiids & Decapods





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Results III: Multinet section through the eddy

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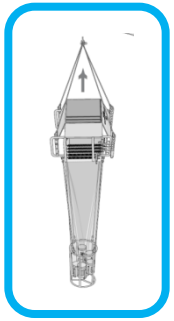
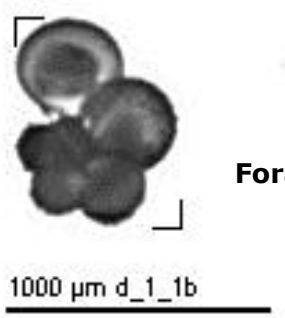
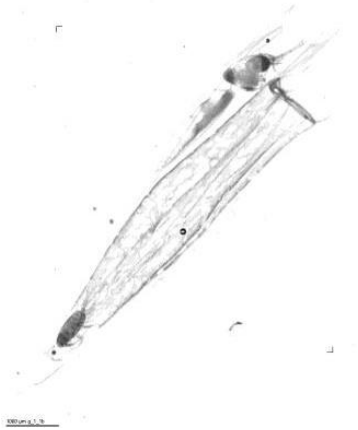




Foraminifera

Calanoid copepods

Euphausiids



Siphonophora

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Results III: Multinet section through the eddy

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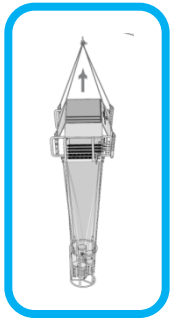
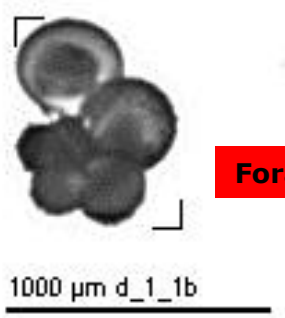
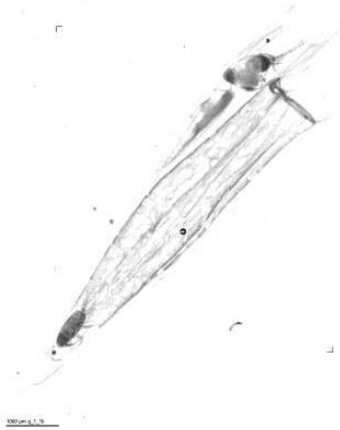




Foraminifera

Calanoid copepods

Euphausiids



Siphonophora

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Results III: Multinet section through the eddy

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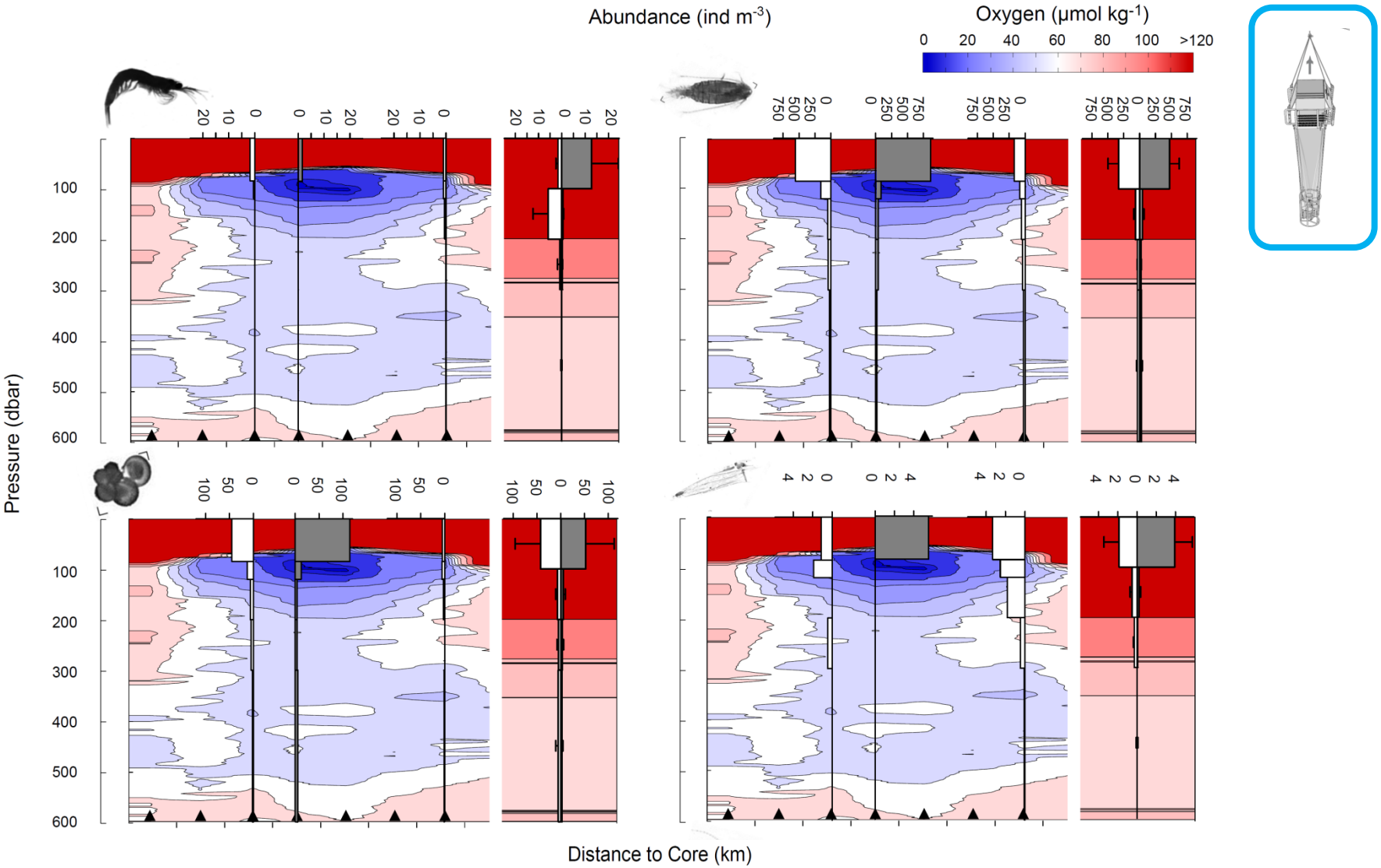

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Results III: Multinet section through the eddy

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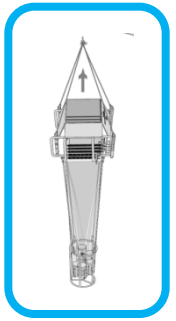
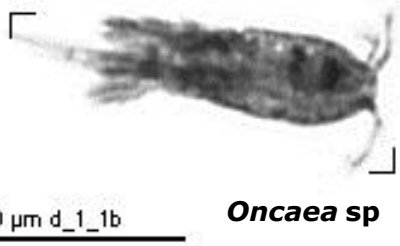
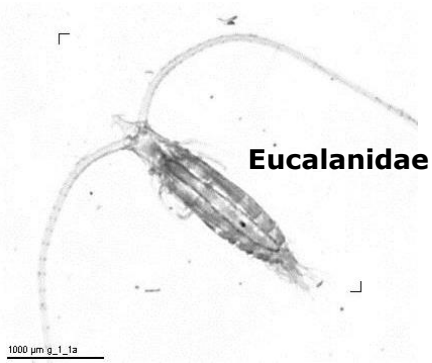


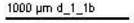


***Oncaea* sp**

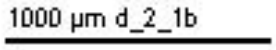


Eucalanidae

Polychaeta



Ostracoda



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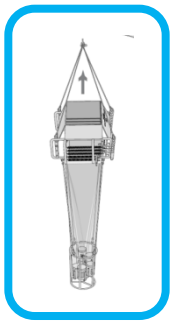
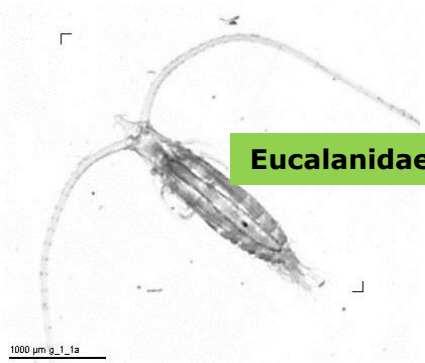
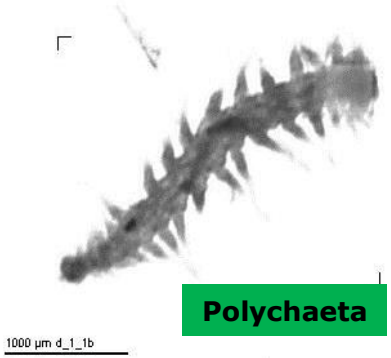


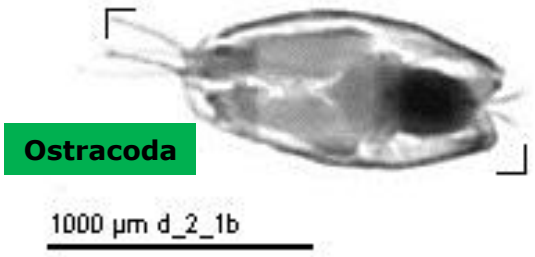
***Oncaea* sp**



Eucalanidae



Polychaeta



Ostracoda

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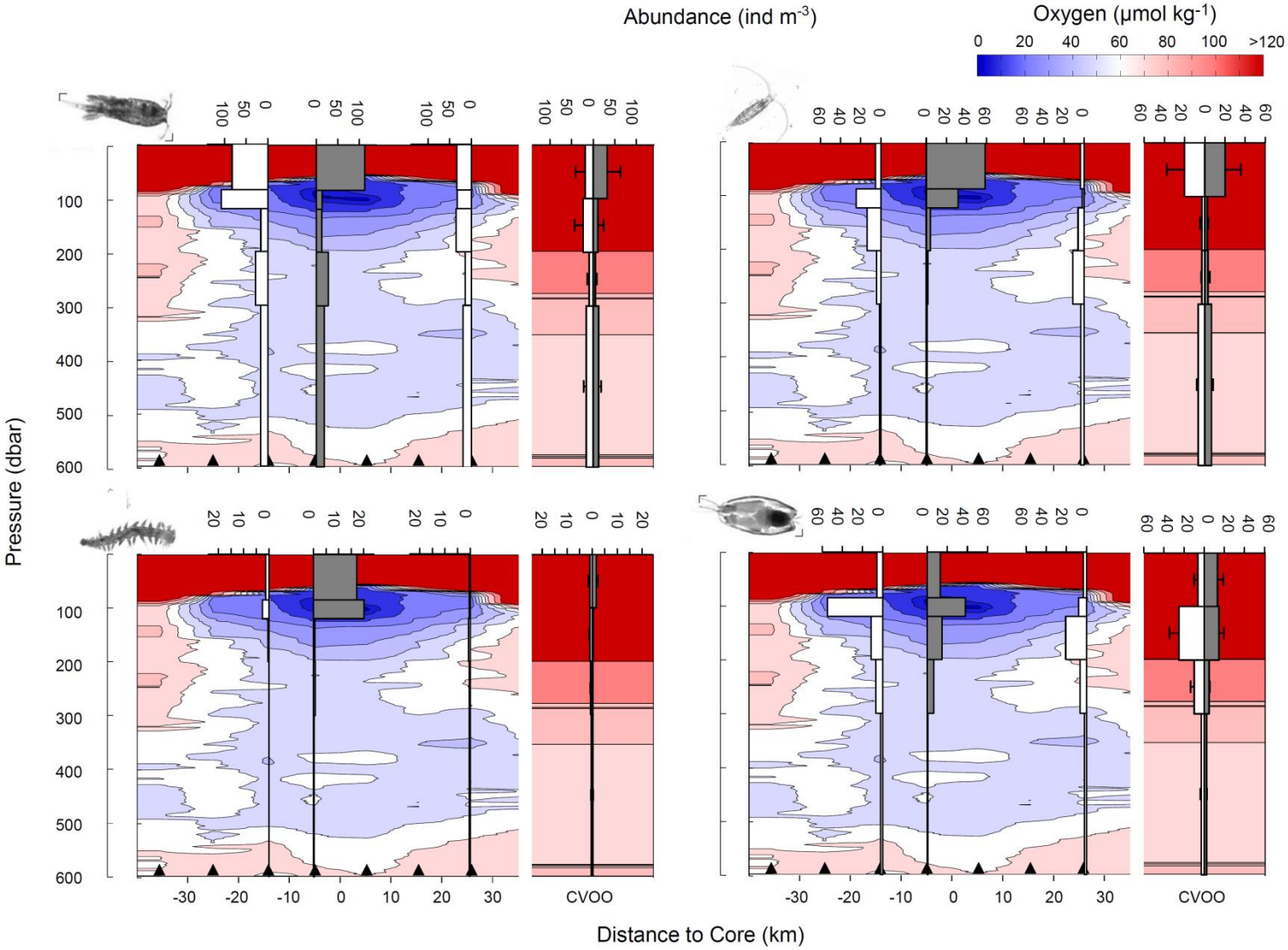

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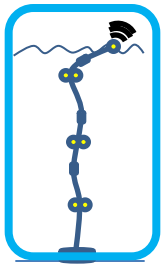
DVM impact



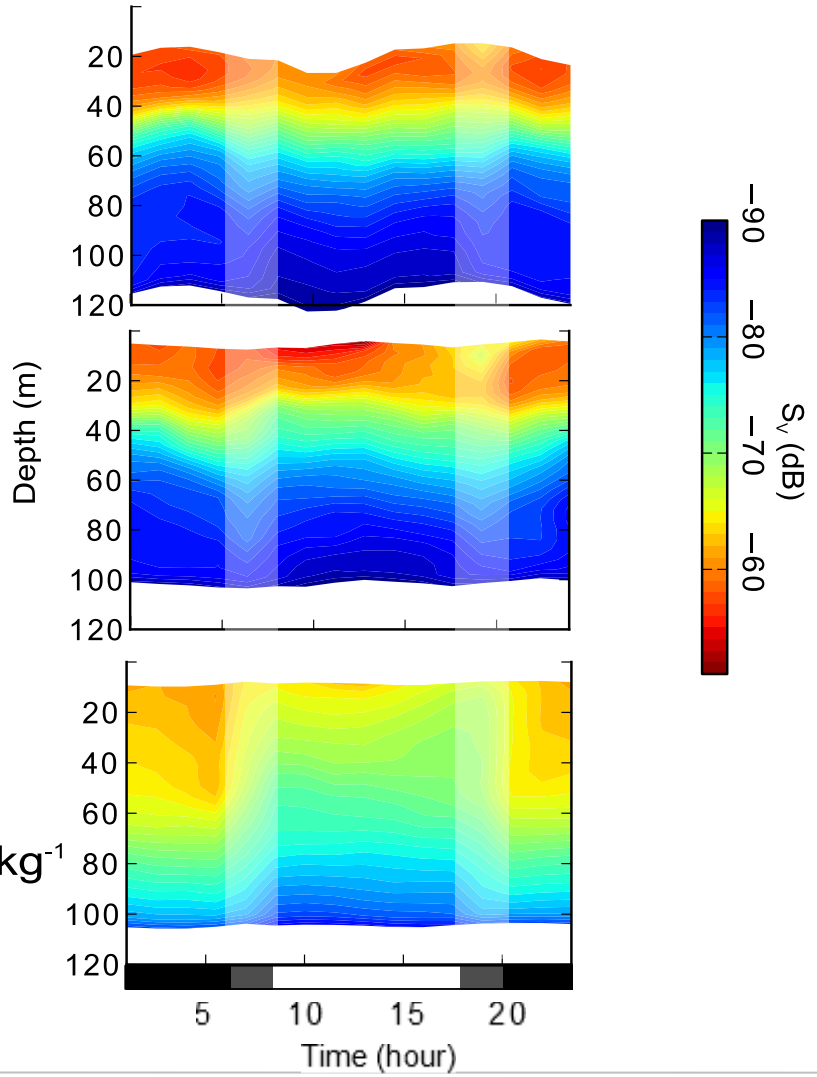
CVOO Mooring

ADCP

5-day average; O_2 5-20µmol kg^{-1}

7-day average; O_2 20-50 µmol kg^{-1}

54-day average; O_2 100 to 250 µmol kg^{-1}



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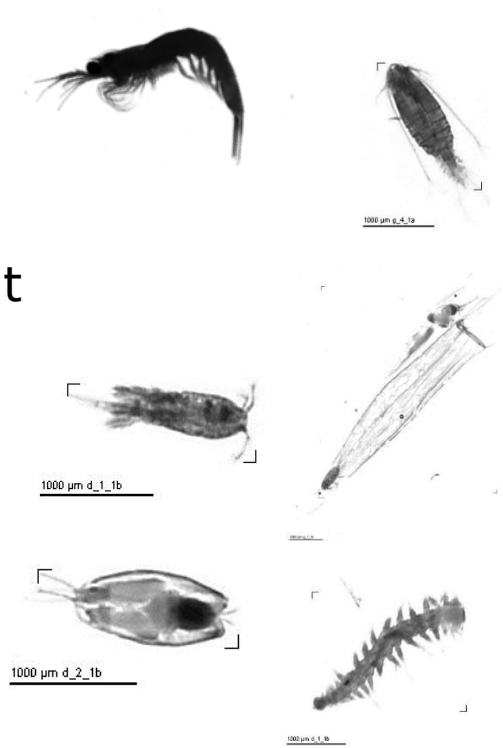
Strategies

1. OMZ avoidance / compression at the surface

2. Migration into shallow OMZ core during daytime, but paying O2 debt at the surface at nighttime

3. Permanently residing in the shallow OMZ day and night

4. DVM through the shallow OMZ from deeper oxygenated depths to the surface and back



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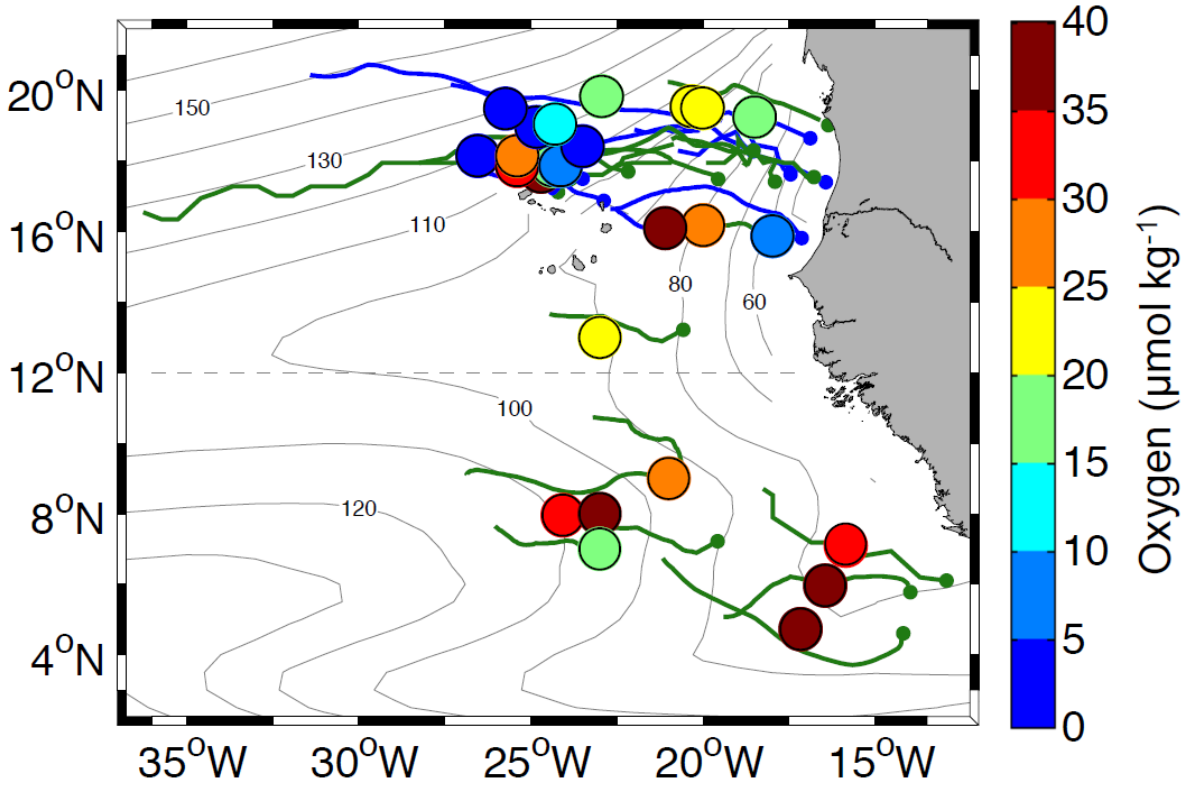
Outlook

Cyclonic Eddies
(*n*=10)

Anticyclonic Mode Water Eddies
(*n*=17)



Schütte et al., *Biogeosciences Discussions* 2016

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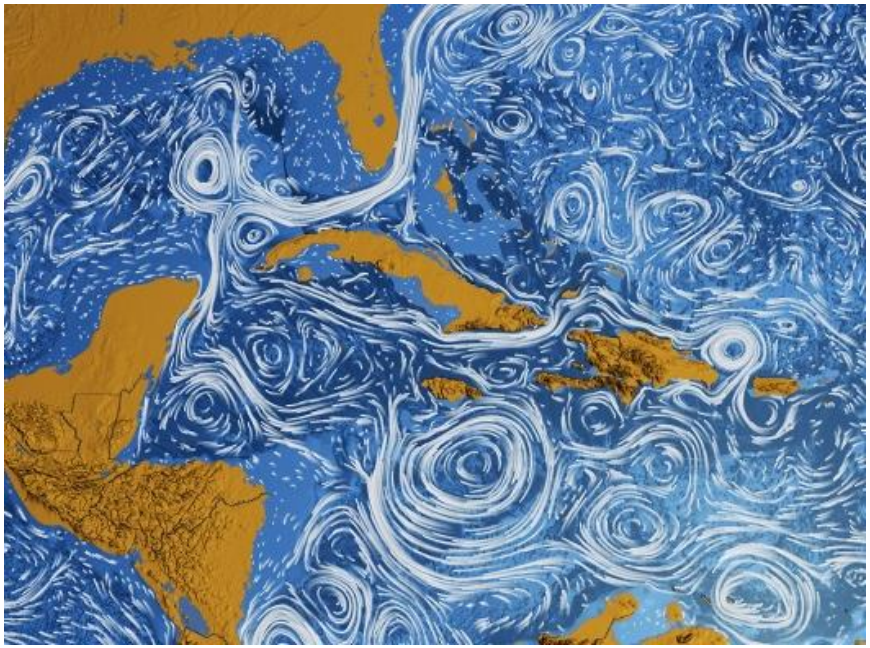
Thanks!

The „Starry Night“, Van Gogh 1889



„Our Perpetual Ocean“, NASA 2012

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