

Thelma Panaïotis

HIGH THROUGHPUT IN SITU IMAGING REVEALS COMPLEX ECOLOGICAL BEHAVIOUR OF GIANT MIXOTROPHIC PROTISTS

T Panaïotis, T Biard, L Caray-Counil, R Faillettaz, J Luo, CM Guigand, RK Cowen and JO Irisson

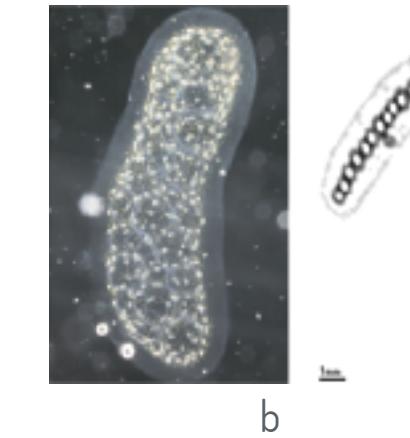
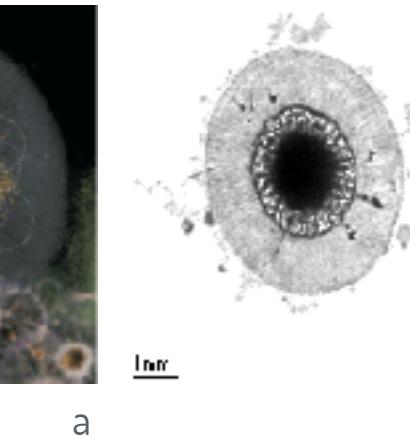
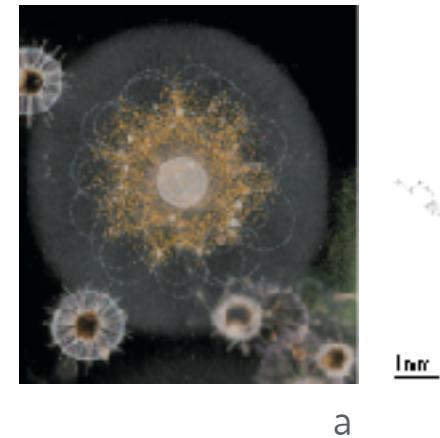
Computational Plankton Ecology (COMPLEX team)
Laboratoire d'Océanographie de Villefranche



RHIZARIA

- Unicellular eukaryotes
- Poor knowledge of their ecology
- Mixotrophic VS non mixotrophic
 - Fine-scale distribution and relation to the environment
 - Acquisition of symbionts (no vertical transmission)

Collodaria



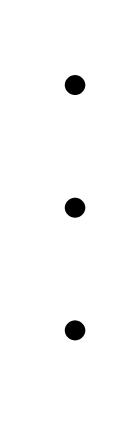
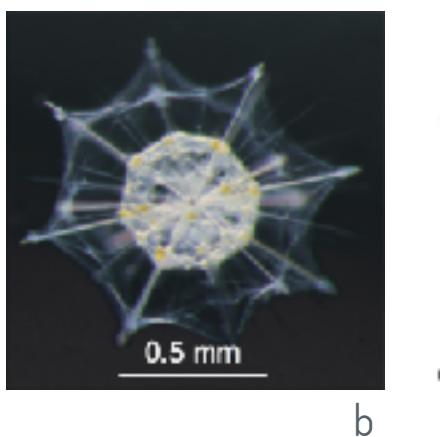
- solitary or colonial
- mixotrophic
- no shell

^a Sardet 2015

^b Biard and Ohman 2020

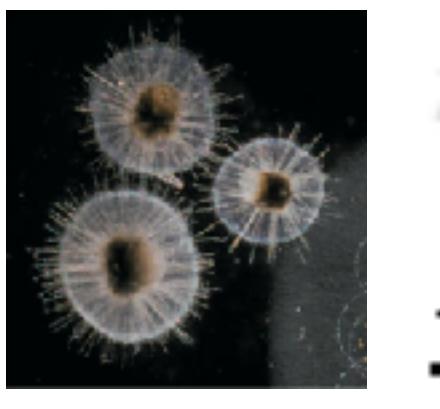
^c Biard et al, 2018

Acantharia



- solitary
- mixotrophic
- strontium sulphate skeleton

Phaeodaria



- solitary
- heterotrophic
- siliceous skeleton

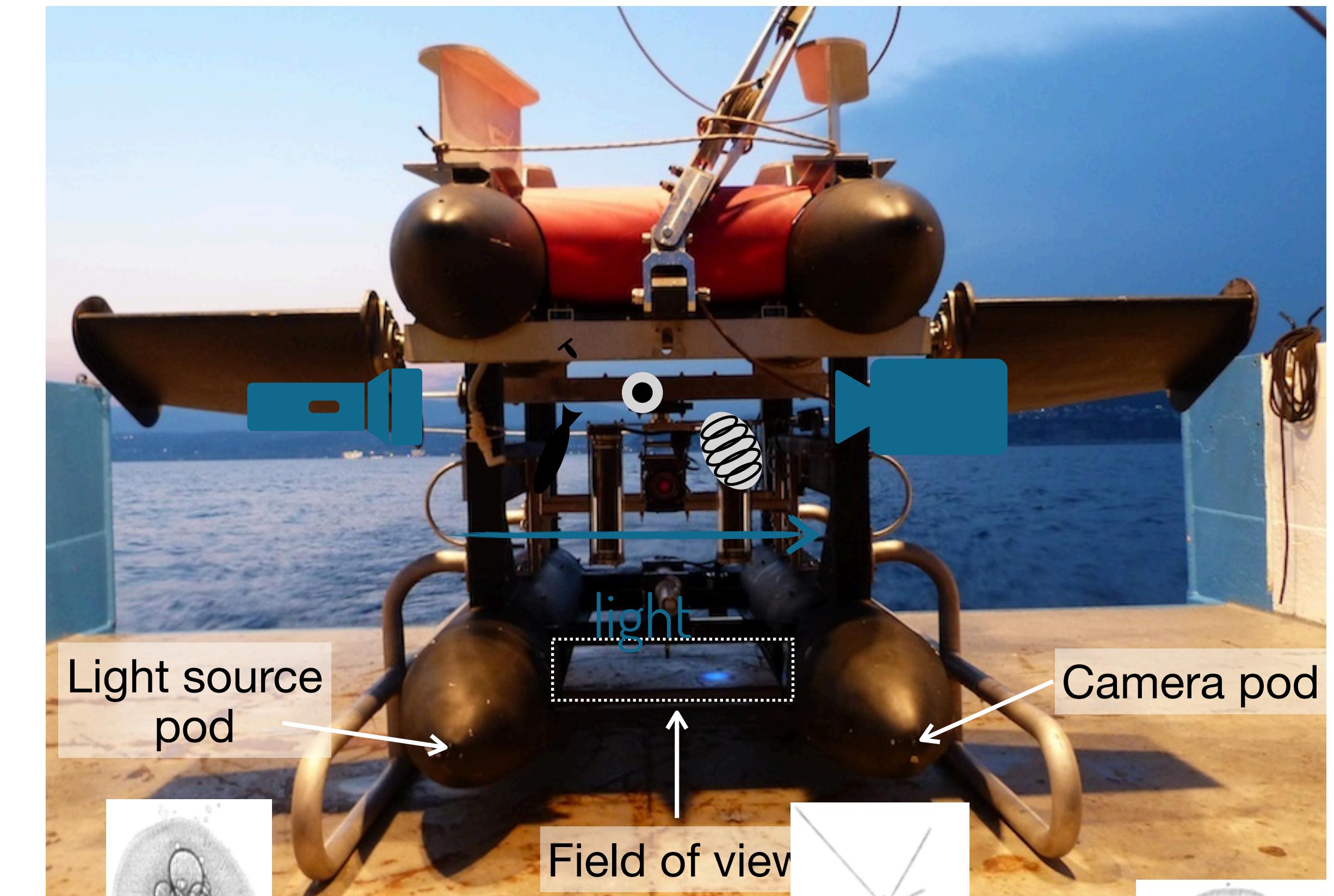
DOES TROPHIC ECOLOGY AFFECT THE FINE-SCALE DISTRIBUTION OF RHIZARIA?

ISIIS

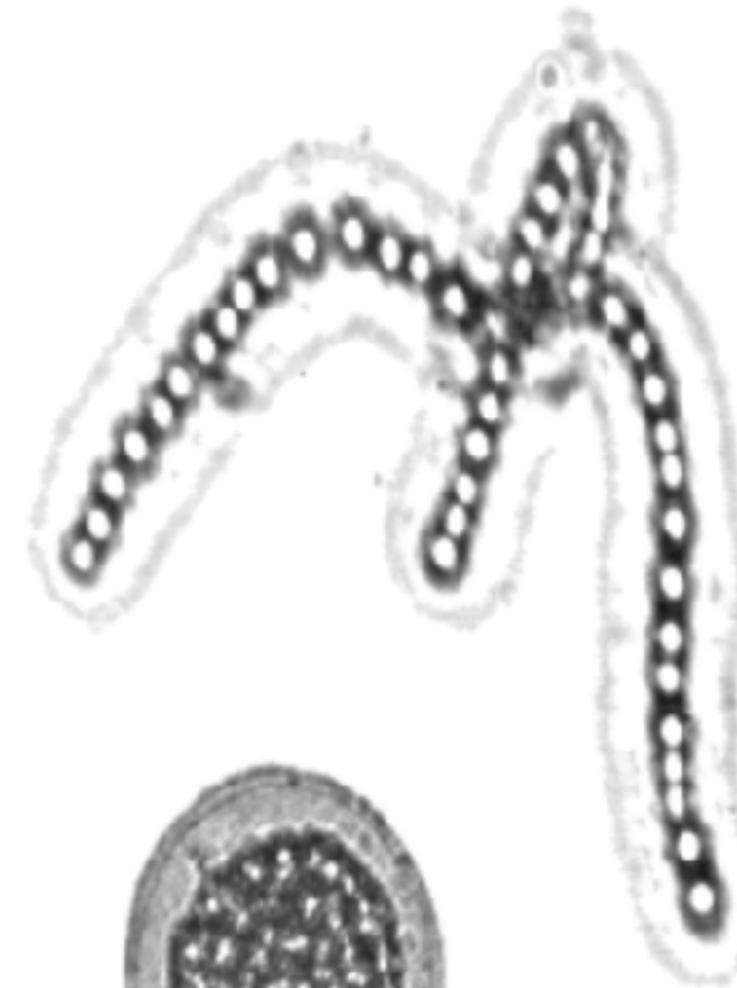
In Situ Ichthyoplankton Imaging System

Cowen and Guigand, 2008

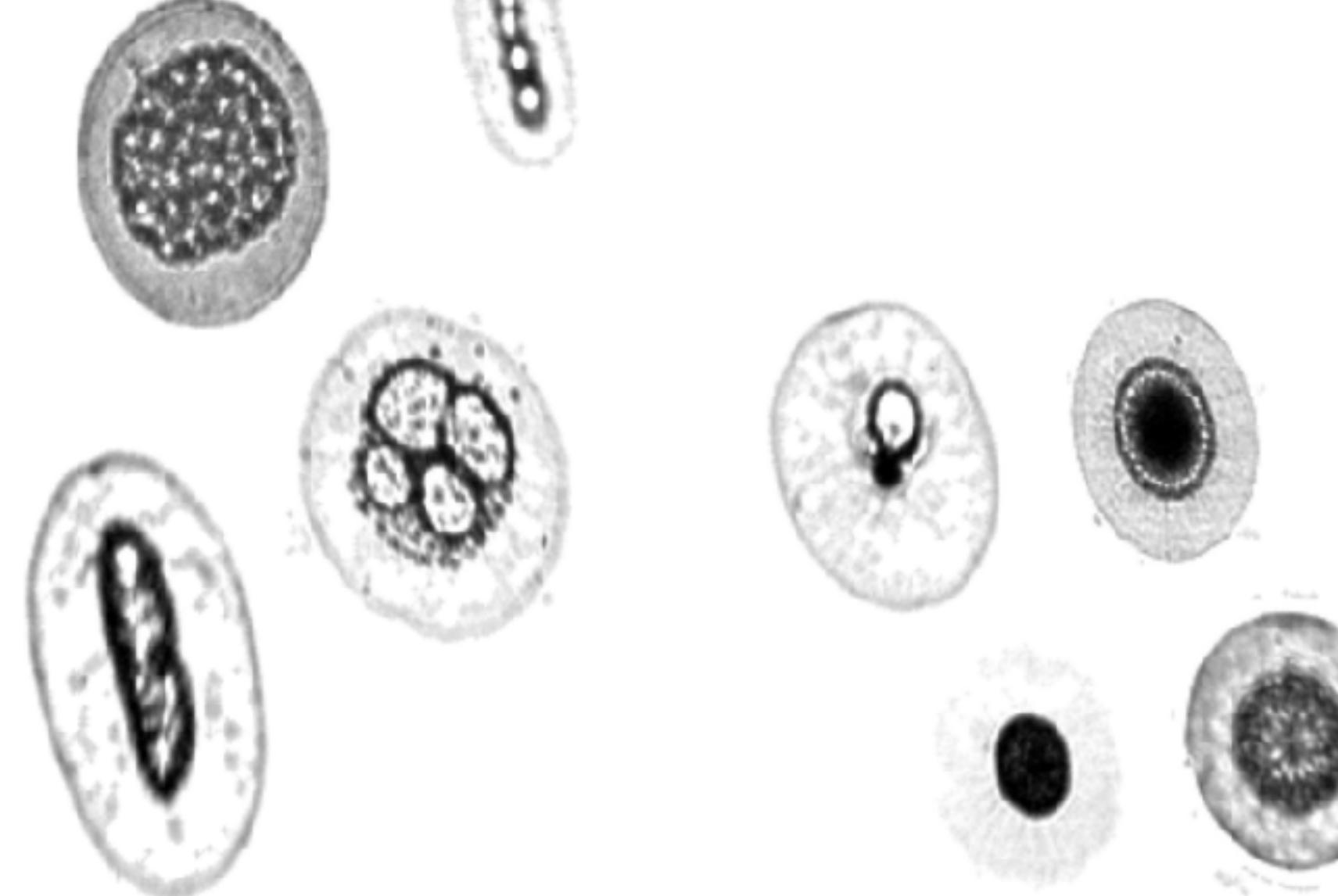
- organisms in 250 µm - 10 cm
- shadowgraphy
- undisturbed organisms



DATASET COMPOSITION

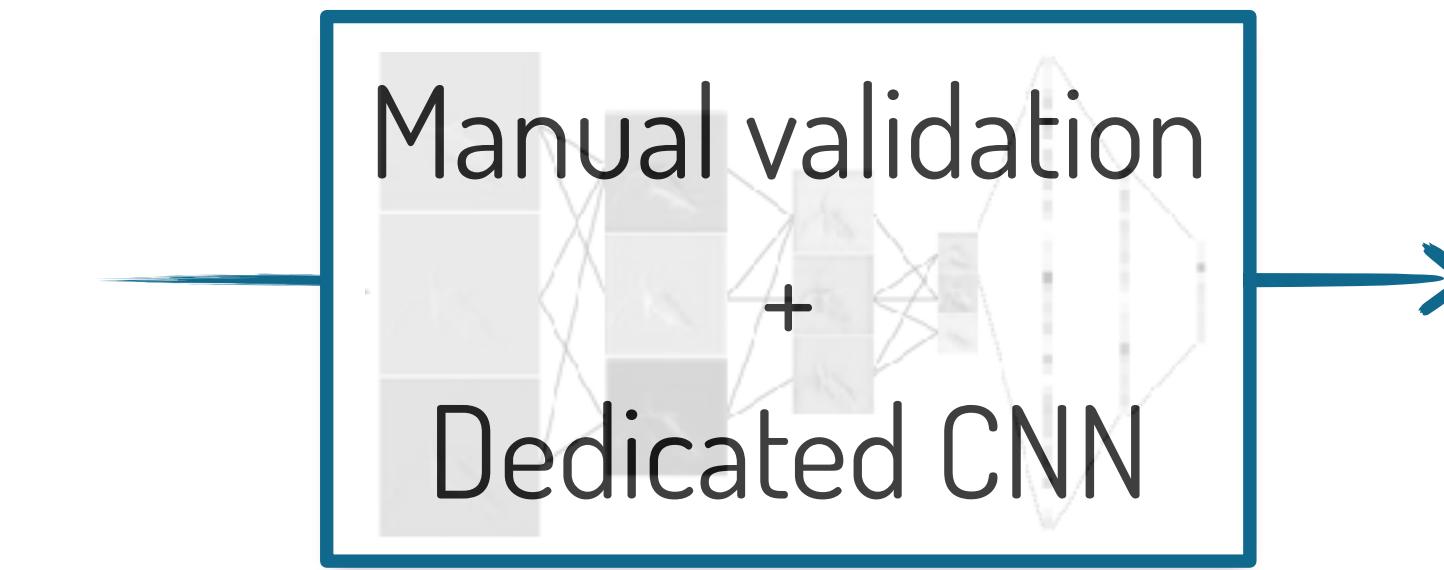


8 M planktonic
organisms



Collodaria (colonial)

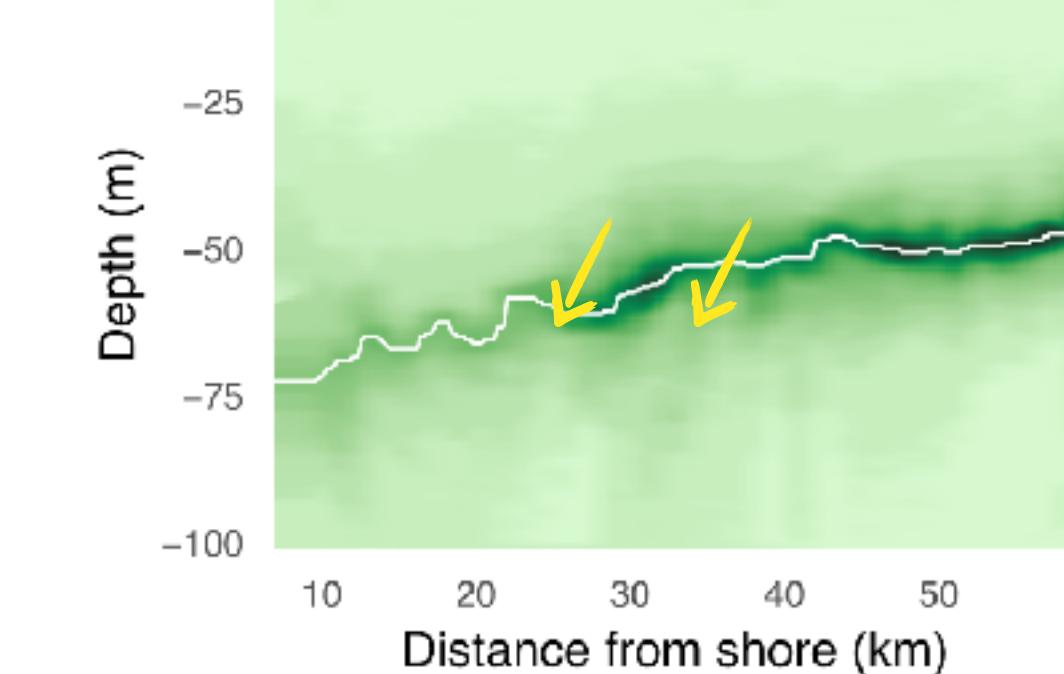
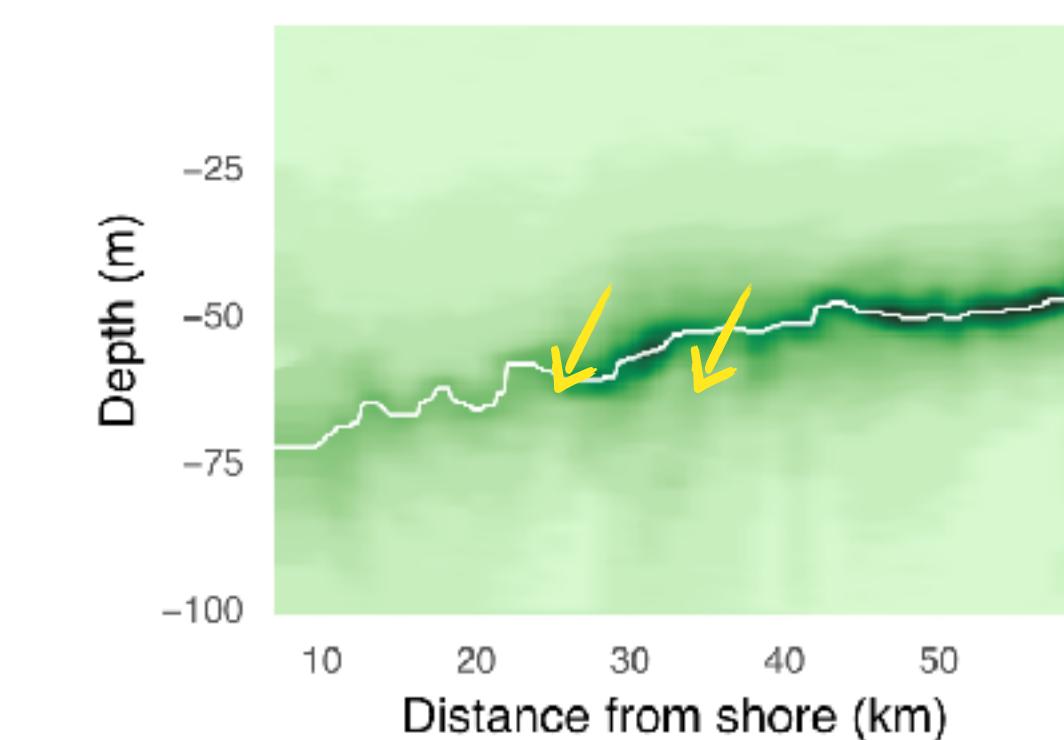
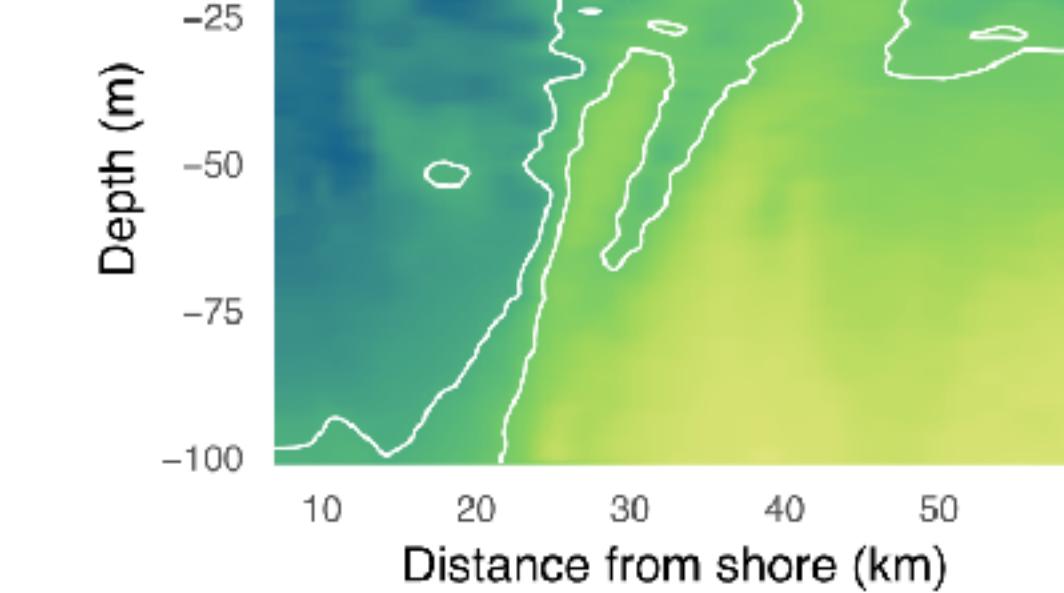
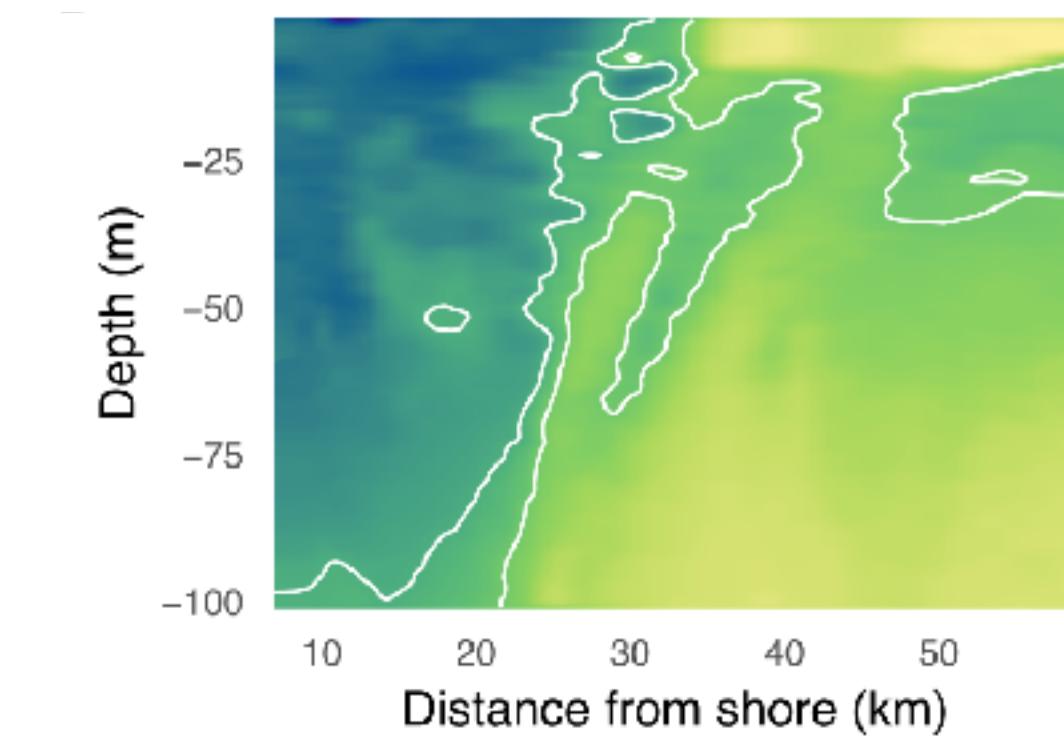
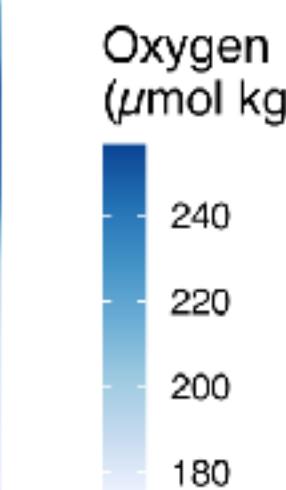
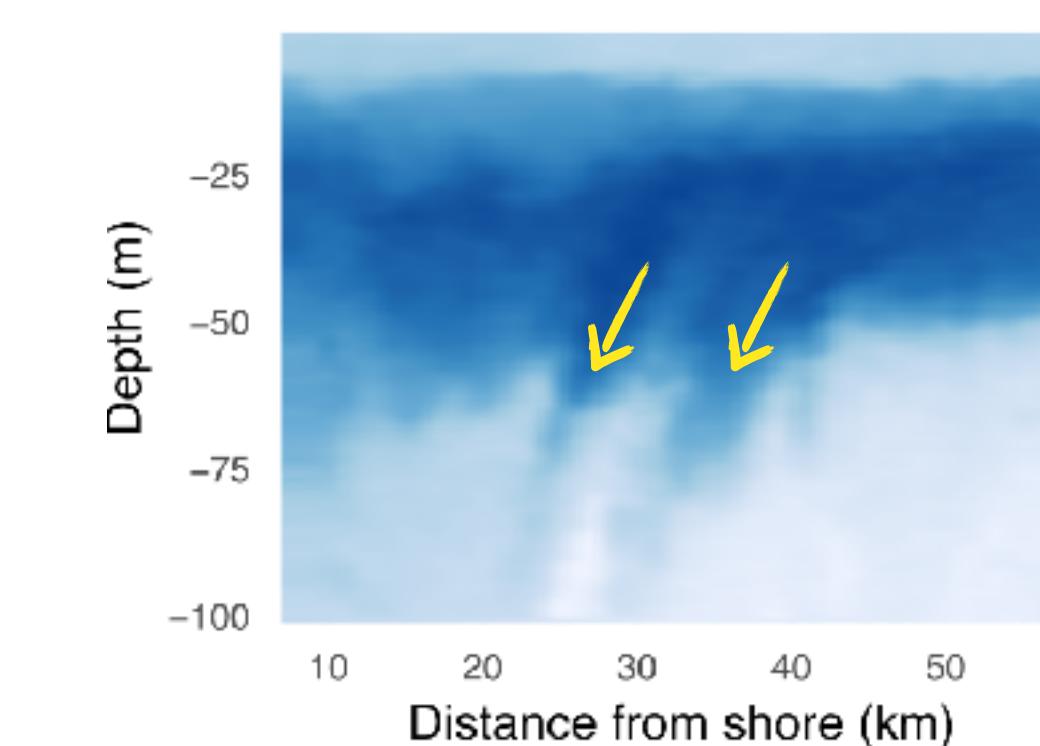
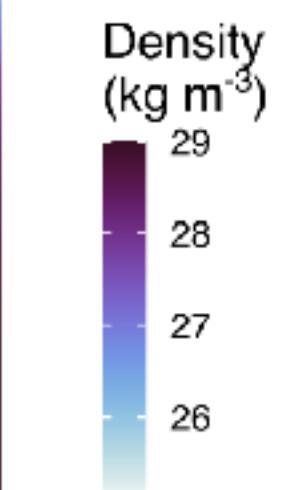
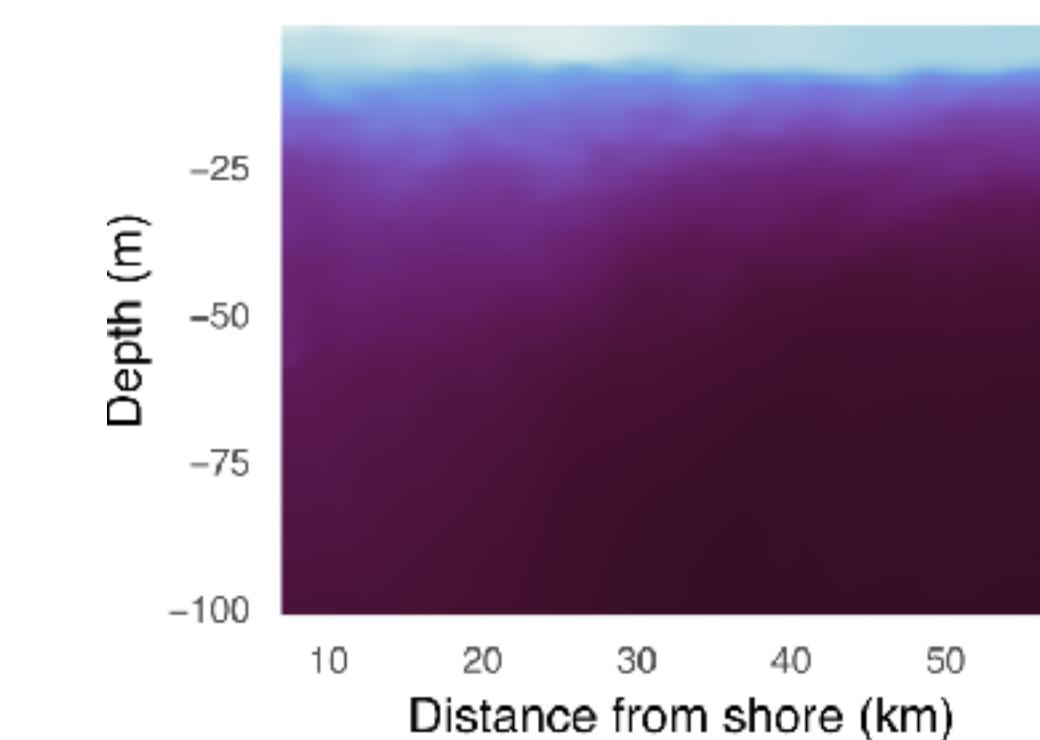
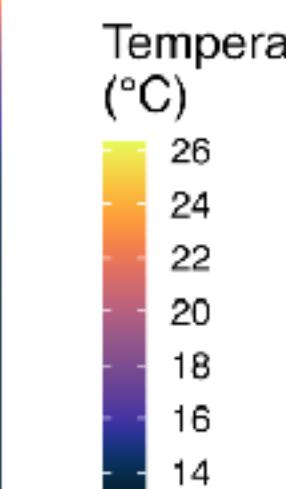
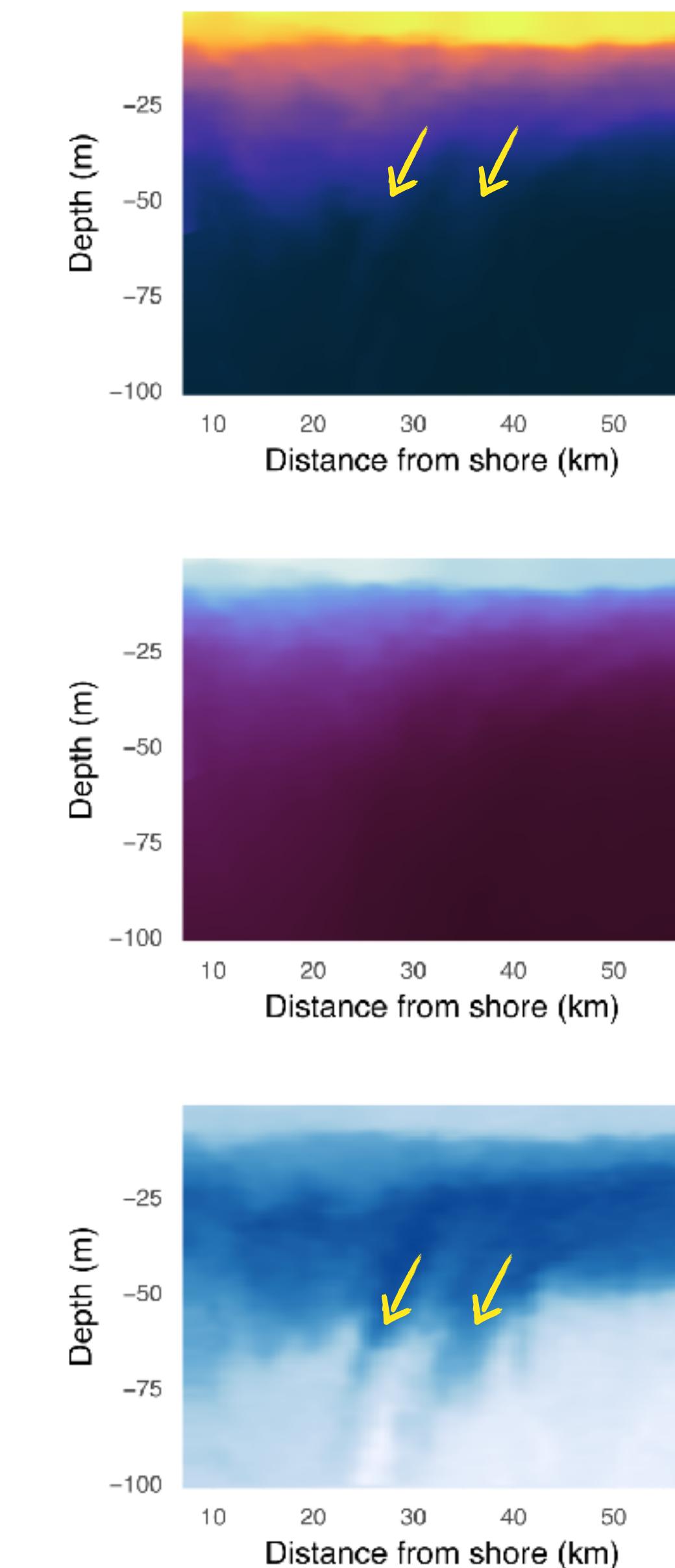
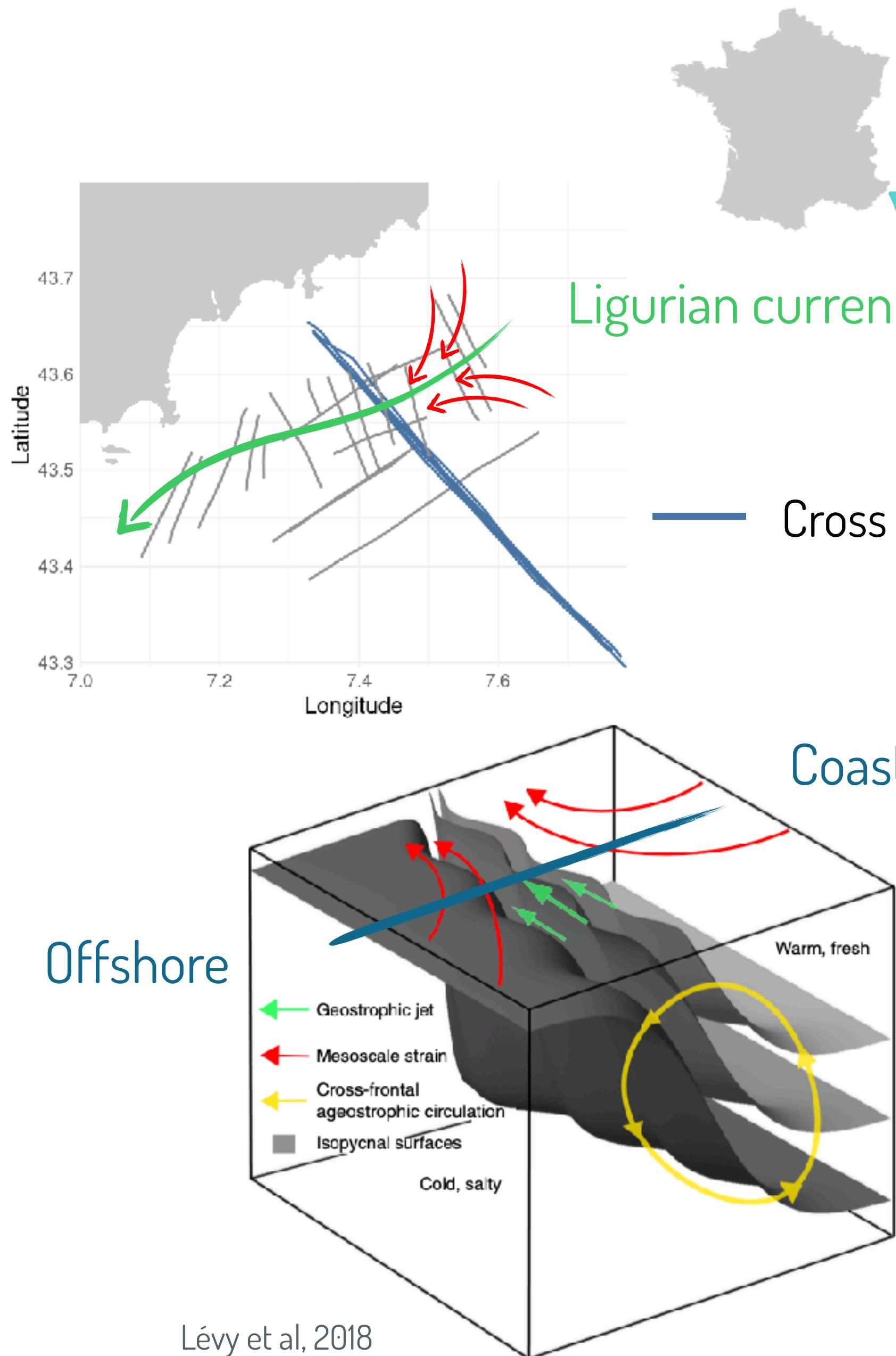
Collodaria (solitary)



Acantharia

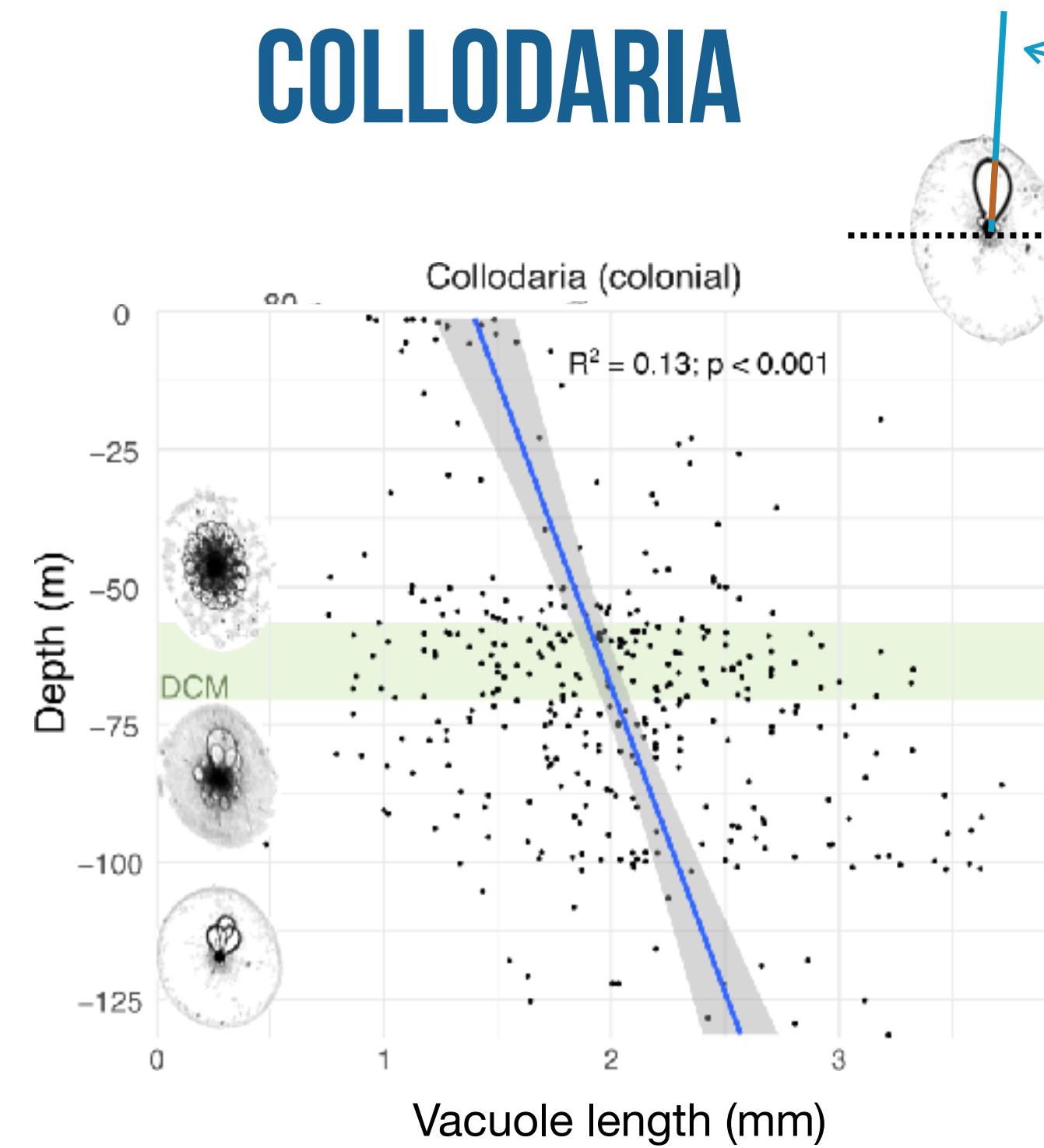


Phaeodaria



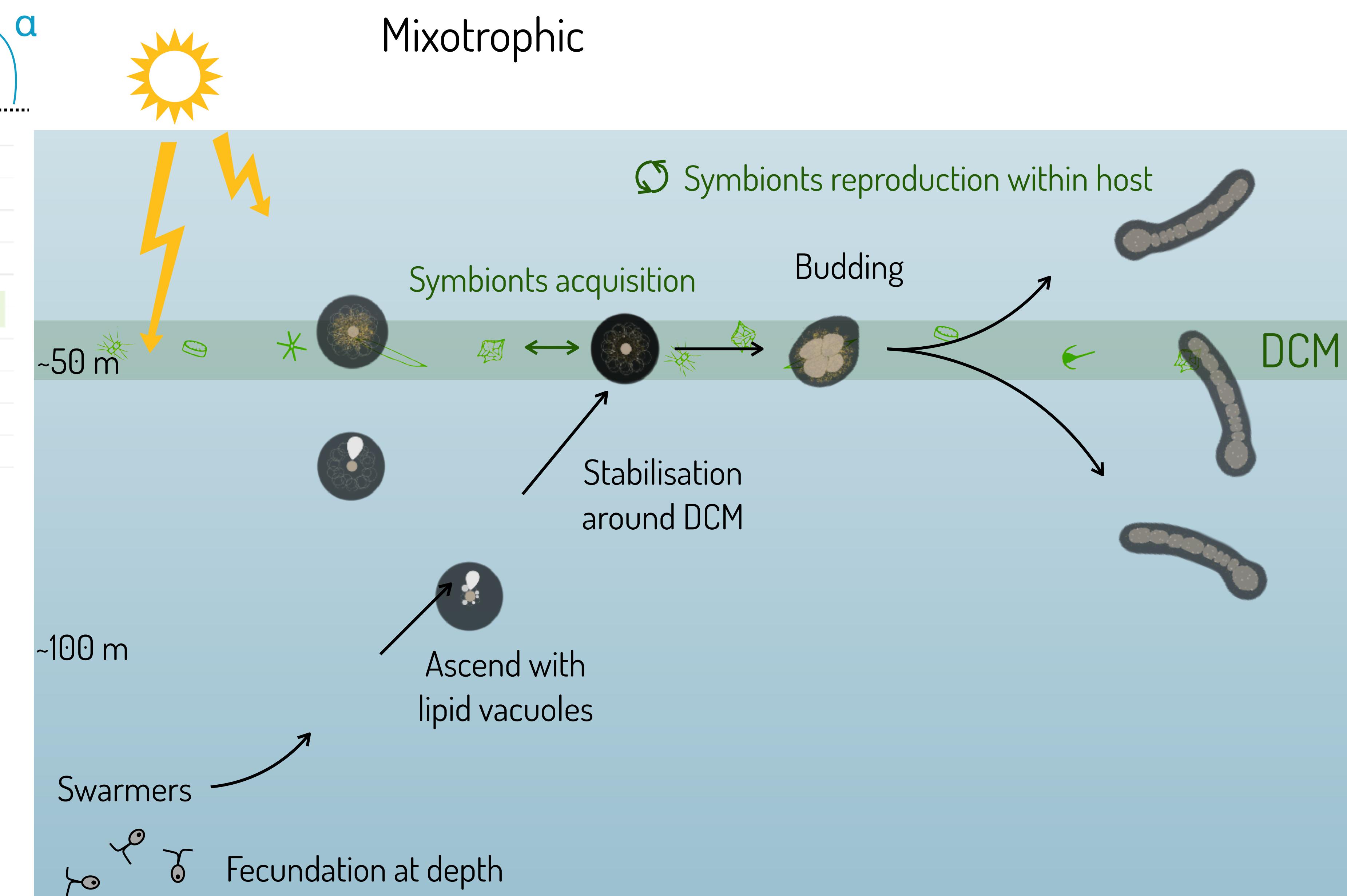
Cross frontal circulation

COLLODARIA

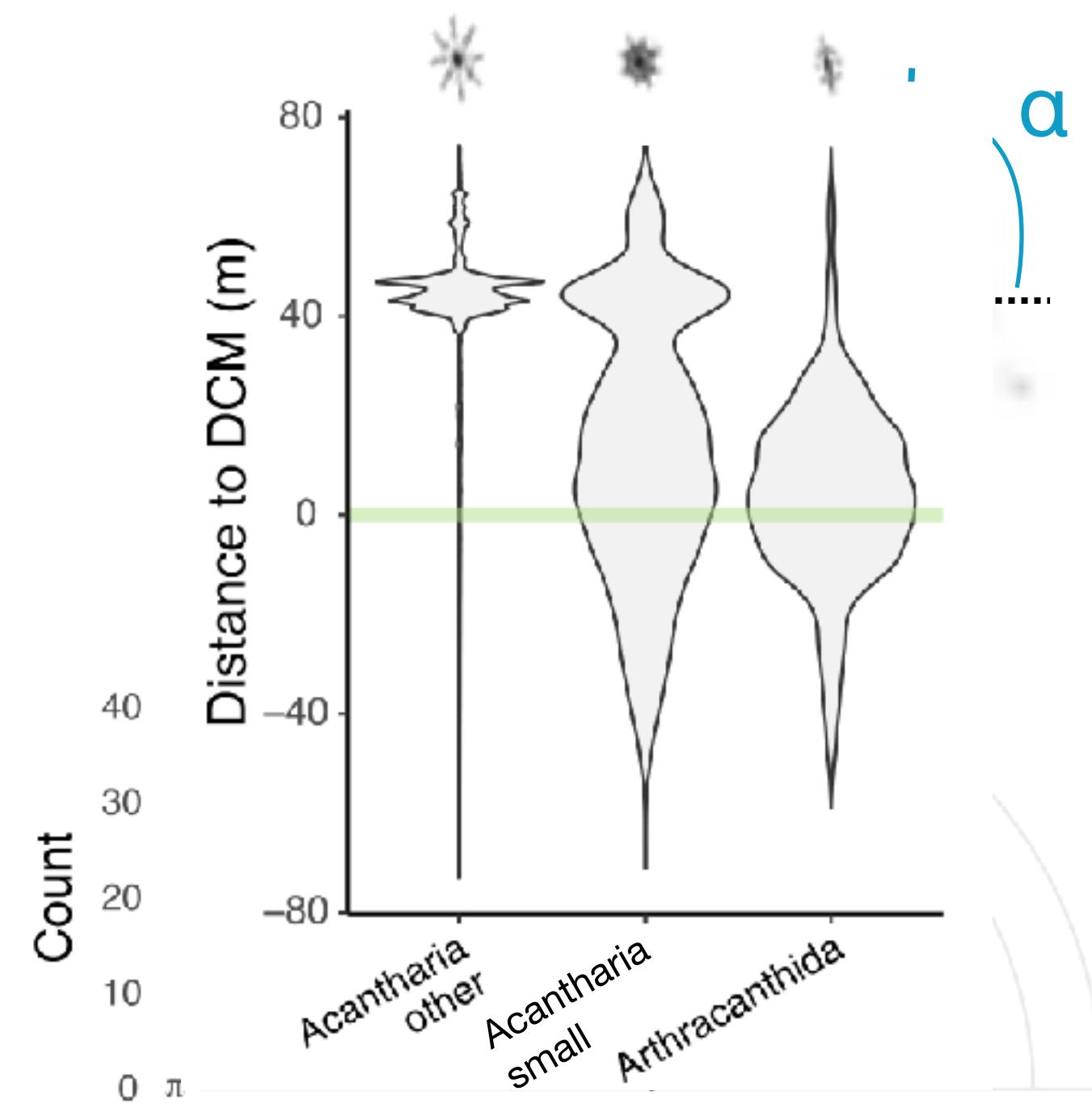


- Active positioning to acquire symbionts
- Different exploitation of the water column by different forms

Mixotrophic

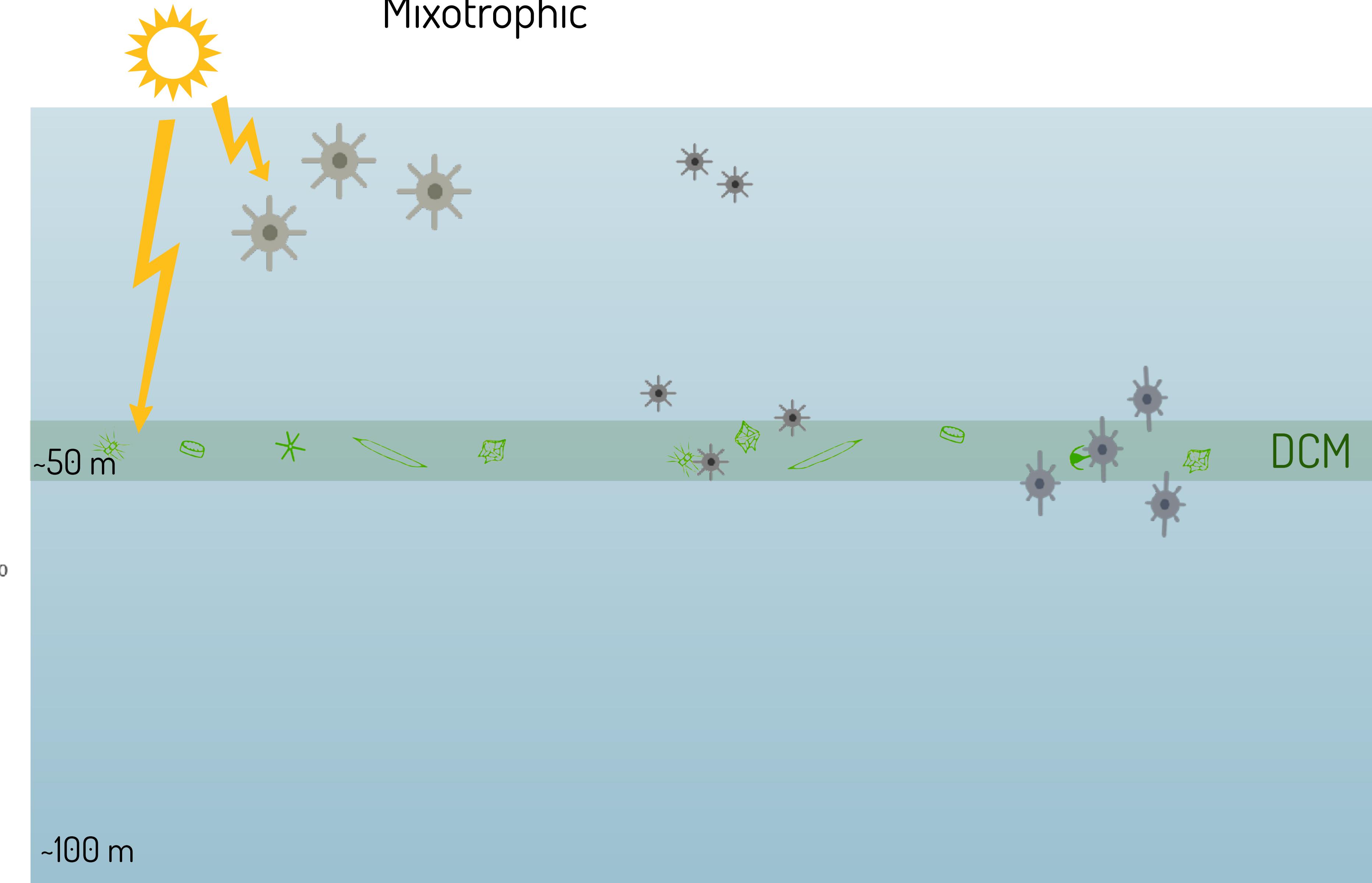


ACANTHARIA

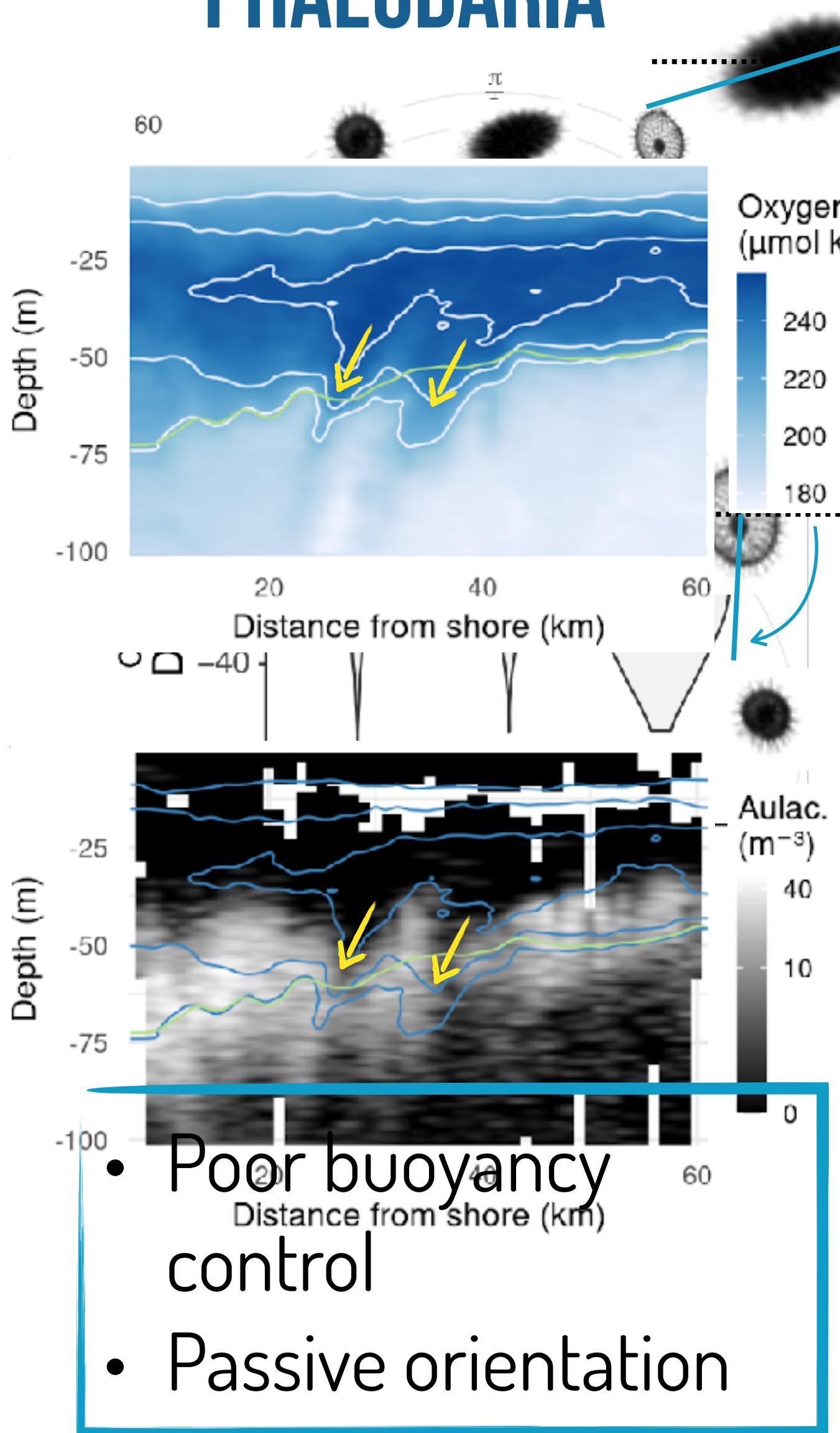


- Different symbionts for different niches
- Active positioning

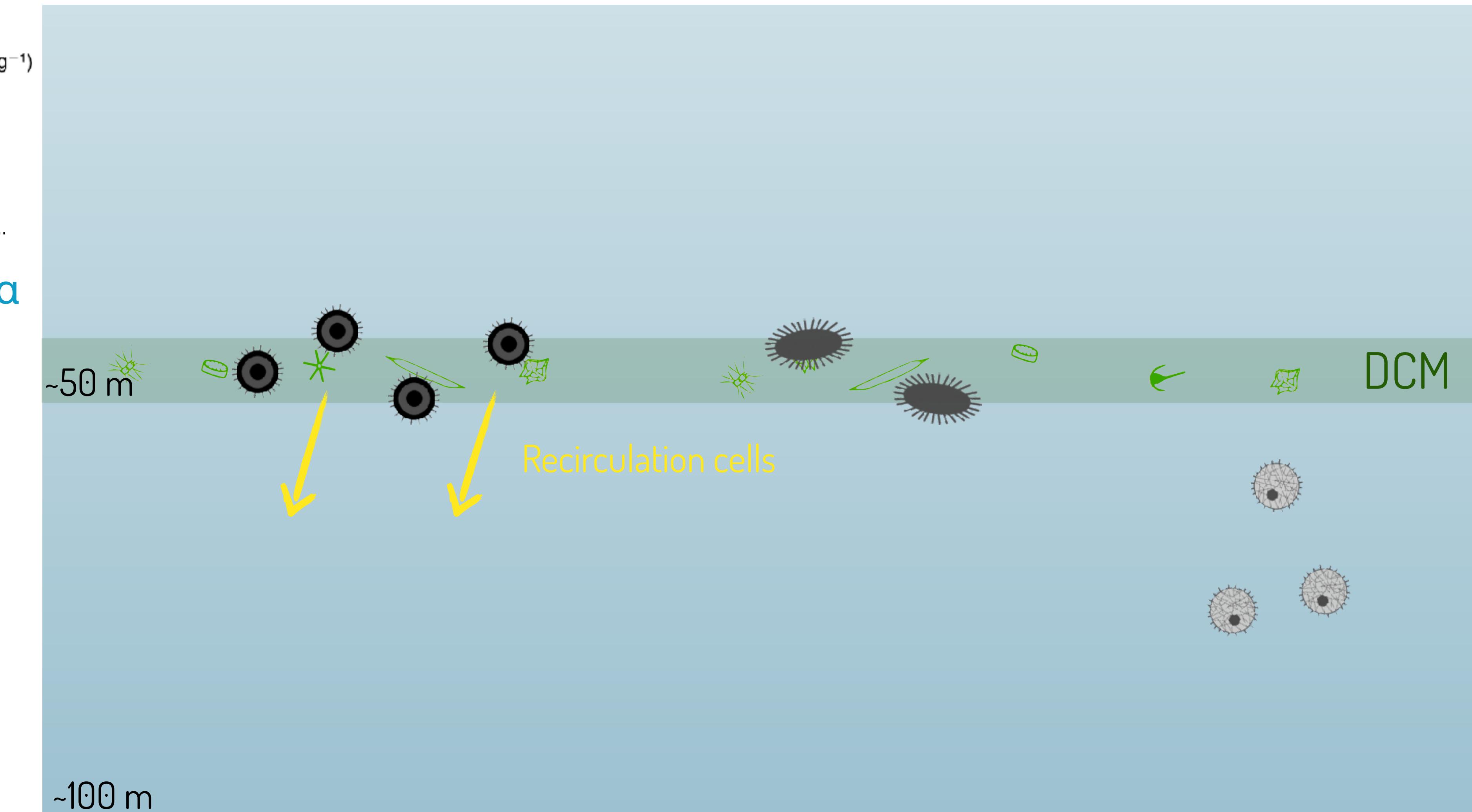
Mixotrophic



PHAEODARIA

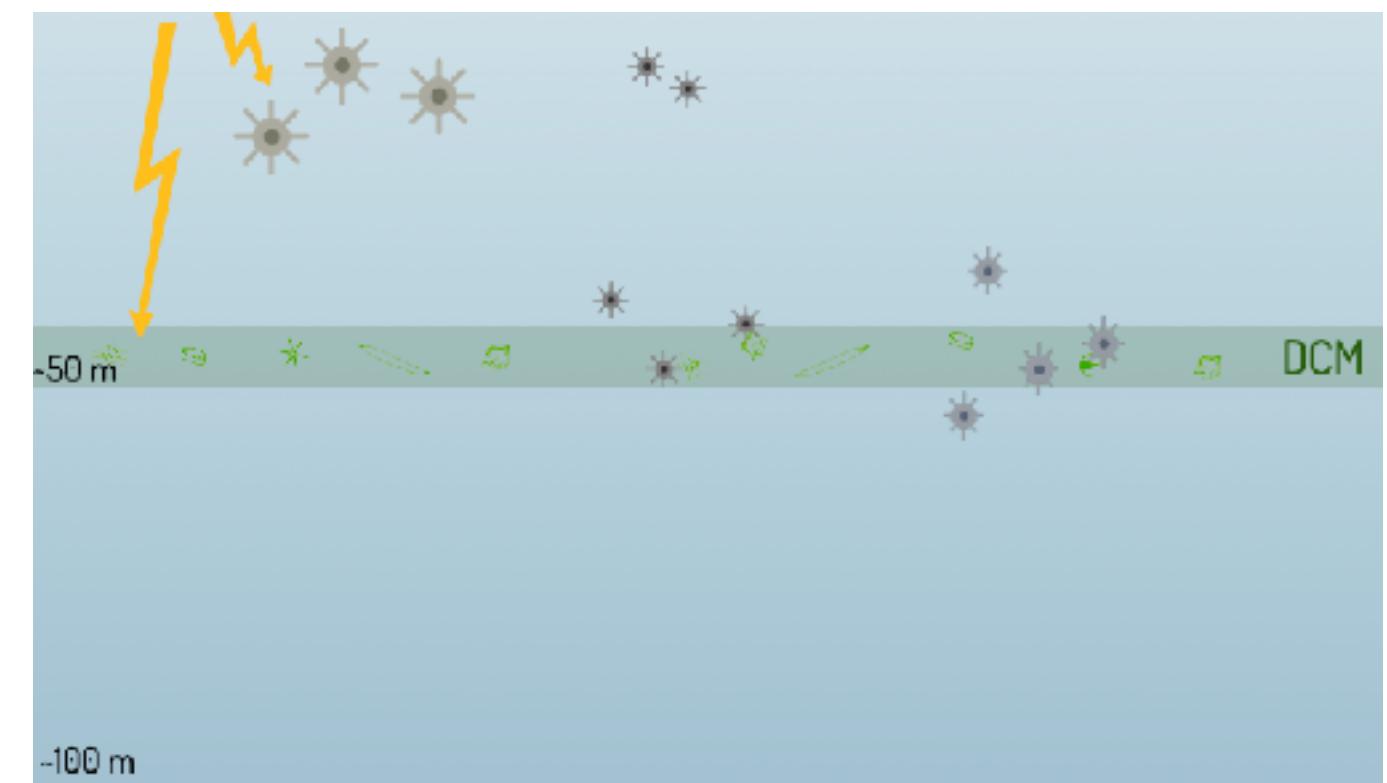
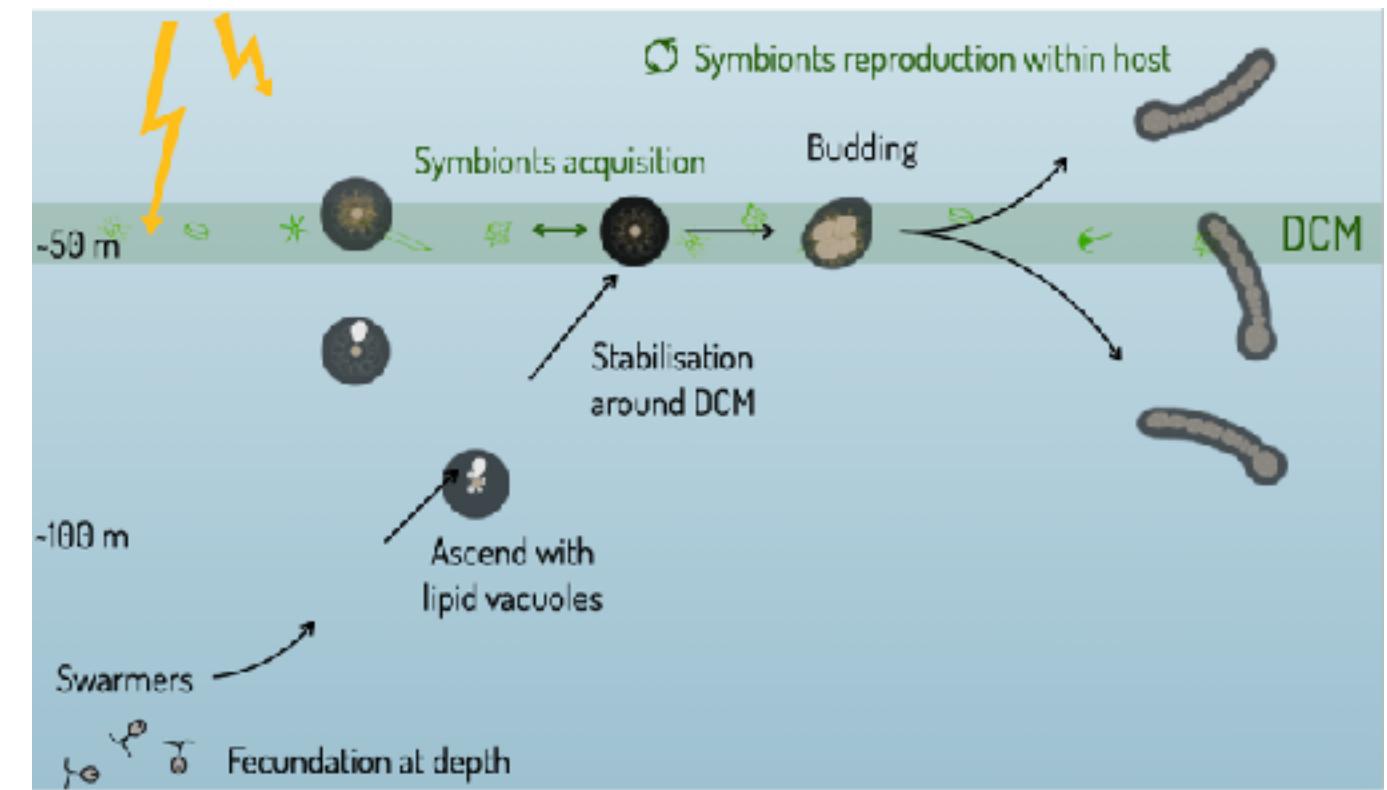


Non mixotrophic



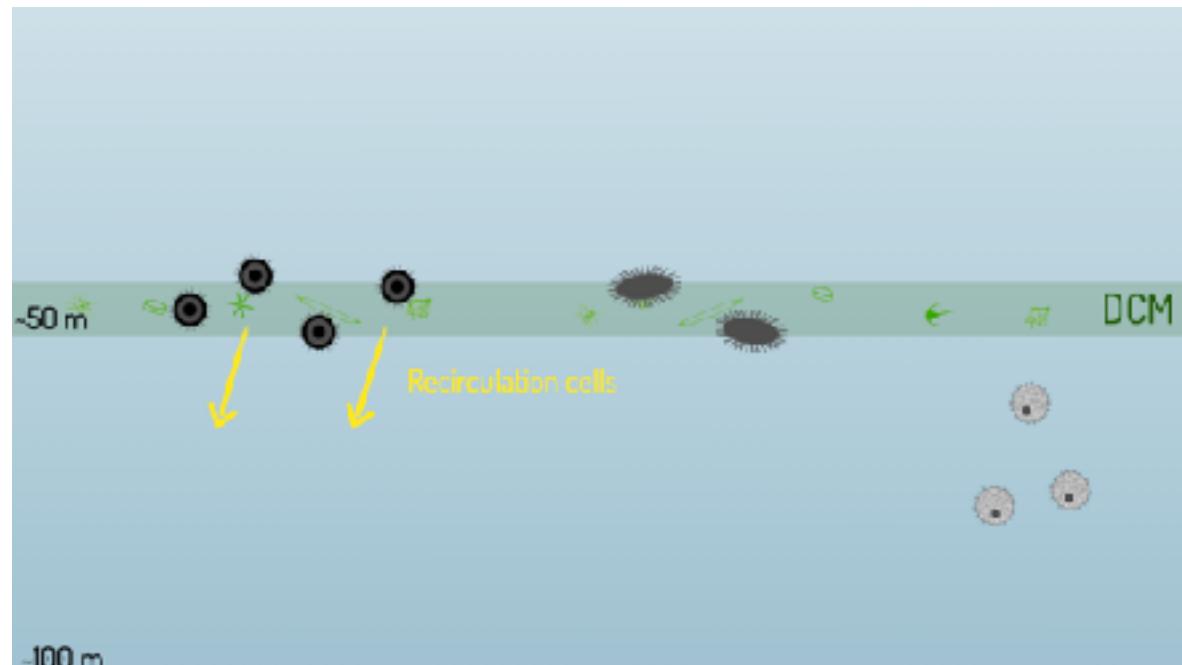
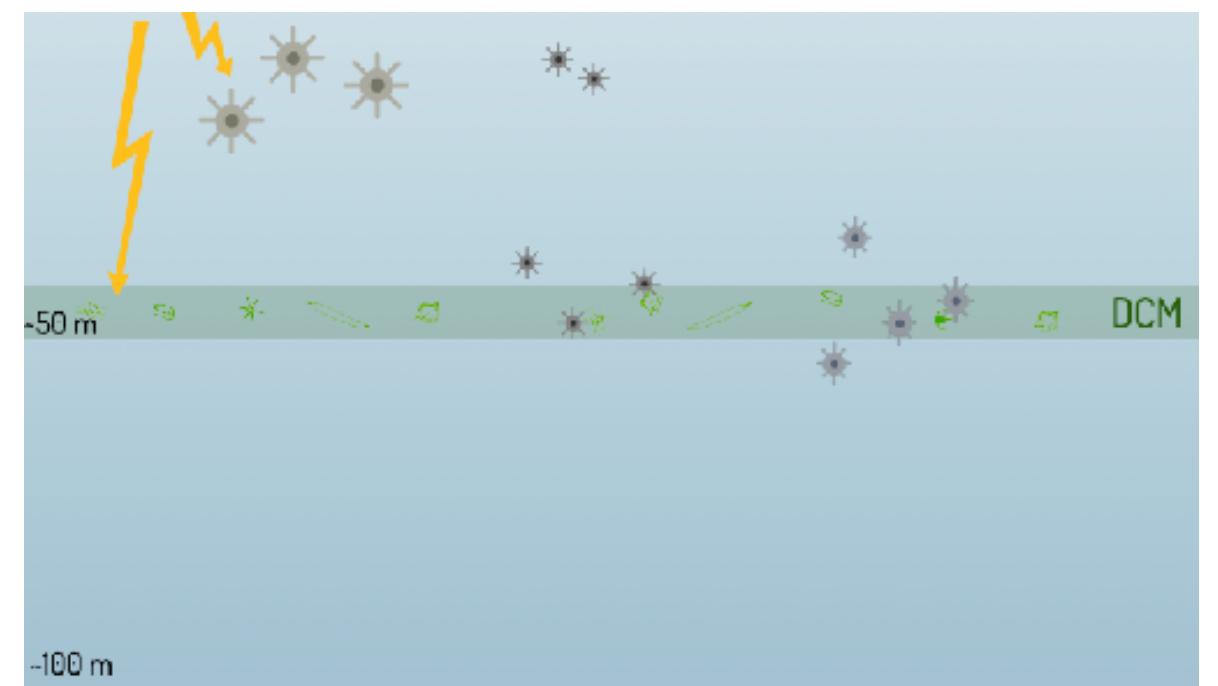
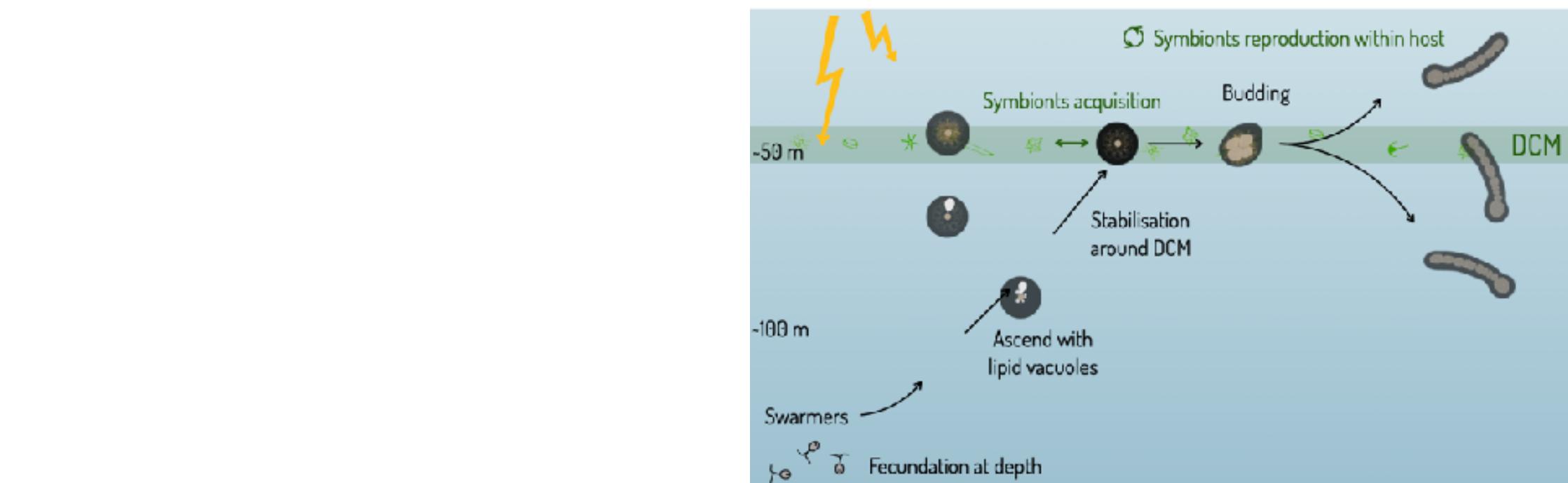
MIXOTROPHY AND FINE-SCALE DISTRIBUTION

- Differential exploitation of the water column between solitary and colonial Collodaria
- Different symbionts allow the occupation of different niches (Collodaria VS Acantharia)



POSITION CONTROL WITHIN THE WATER COLUMN

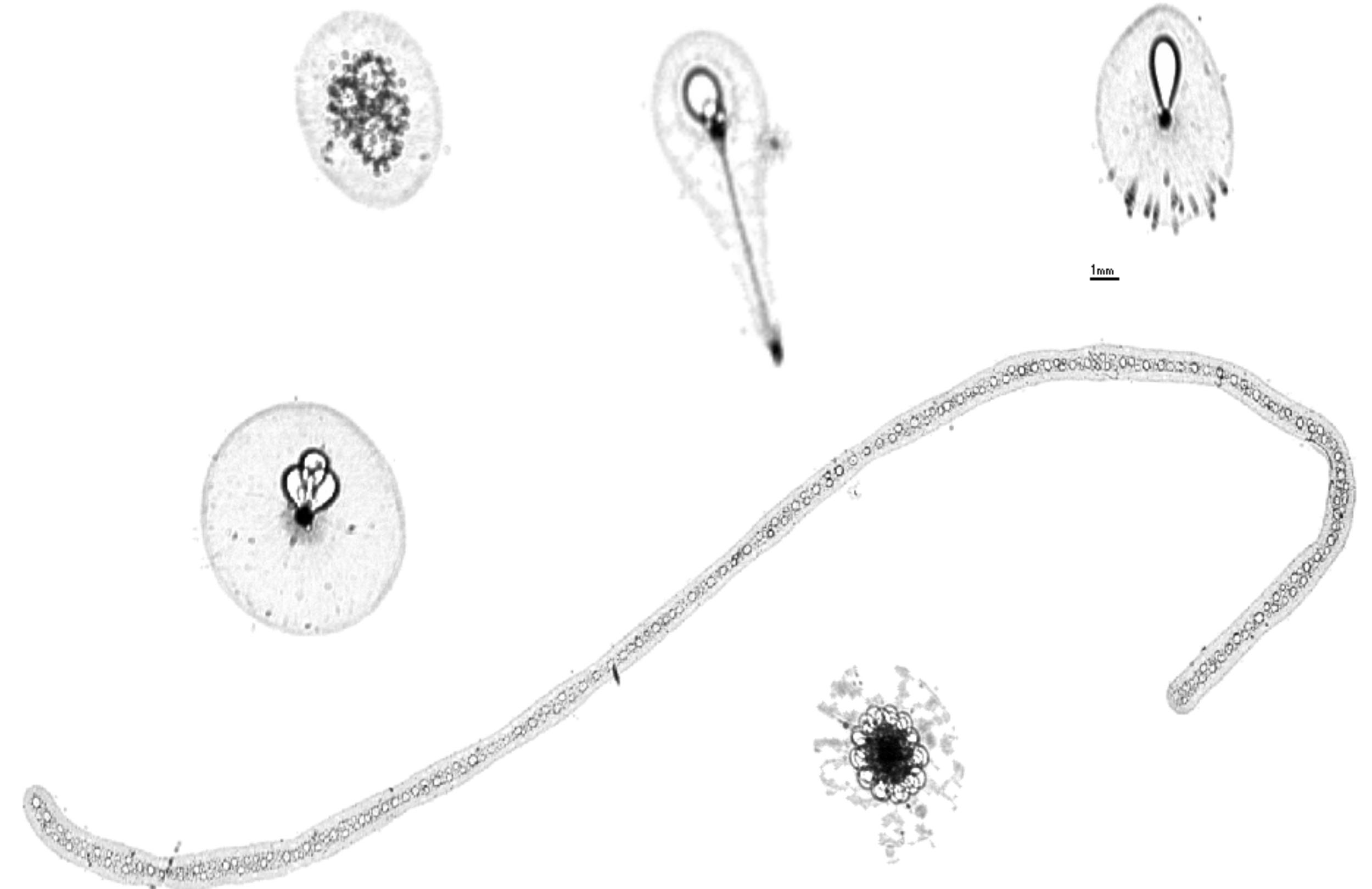
- Active positioning control for mixotrophic Rhizaria
 - Collodaria: symbiont acquisition & DCM
 - Acantharia: vertical orientation & DCM
- Lack of control for Phaeodaria



In situ imagery to understand protist ecology

Many open questions regarding Collodaria

- early offspring stages, fluorescence in situ
- other seasons





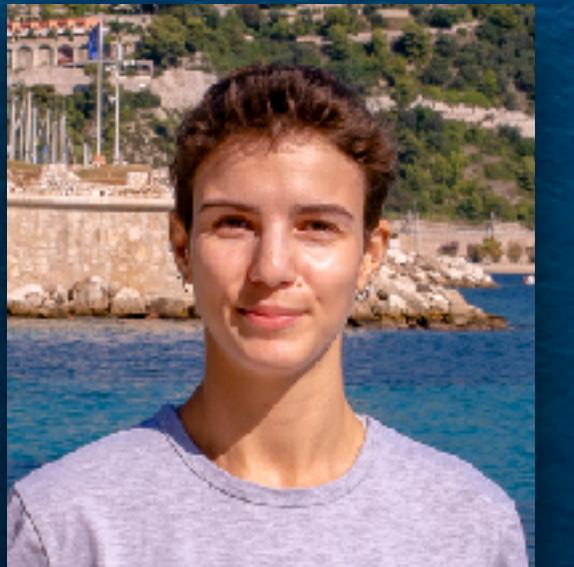
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D'OCÉANOGRAPHIE
DE VILLEFRANCHE



SCIENCES
SORBONNE
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THANKS

- co-authors
- cruise members
- funders
- providers of computational resources



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