

La vie du plancton à petite échelle

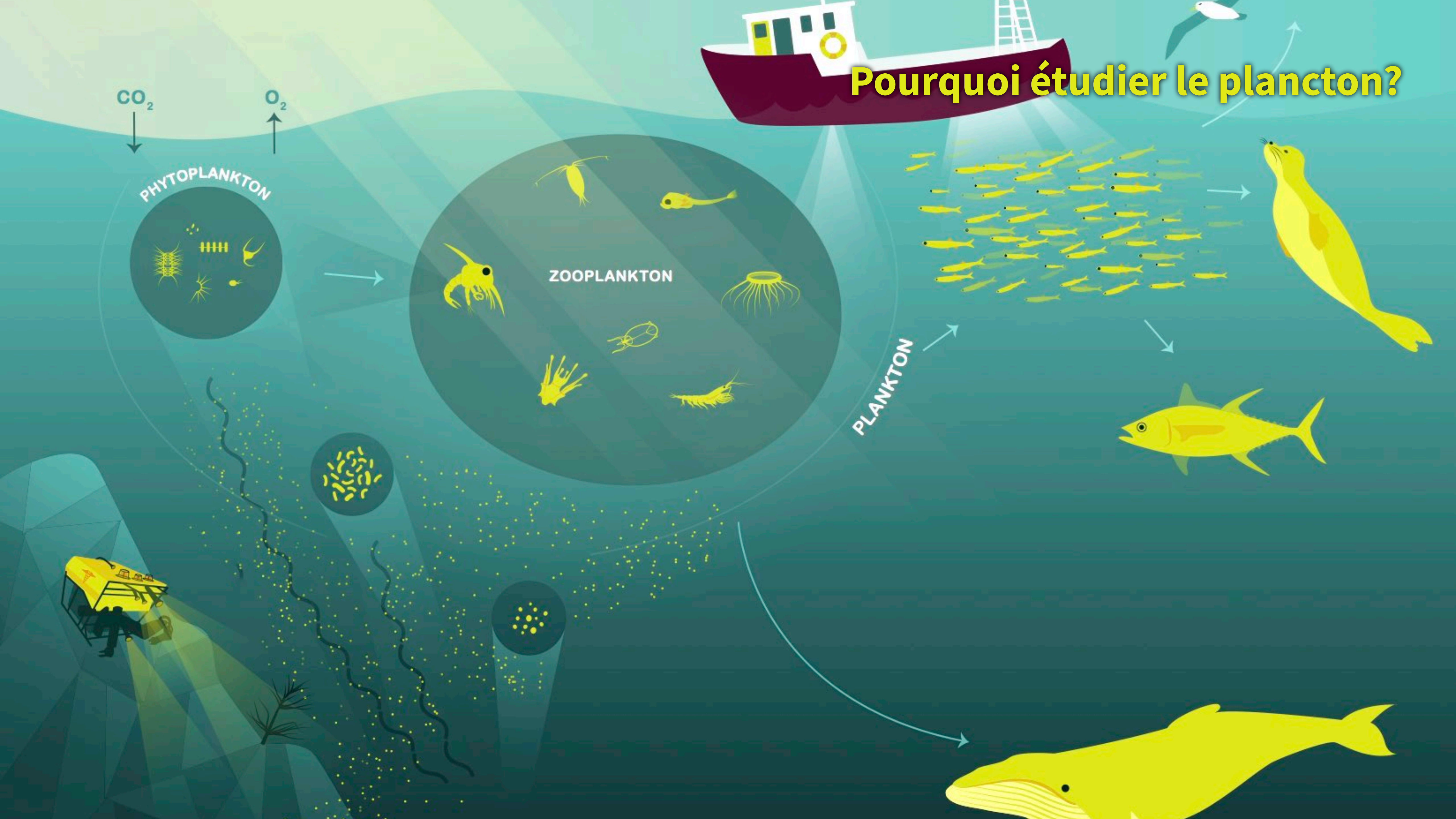
Interactions entre physique et biologie



Qu'est-ce que le plancton?



Pourquoi étudier le plancton?



OXYGÈNE

CO_2

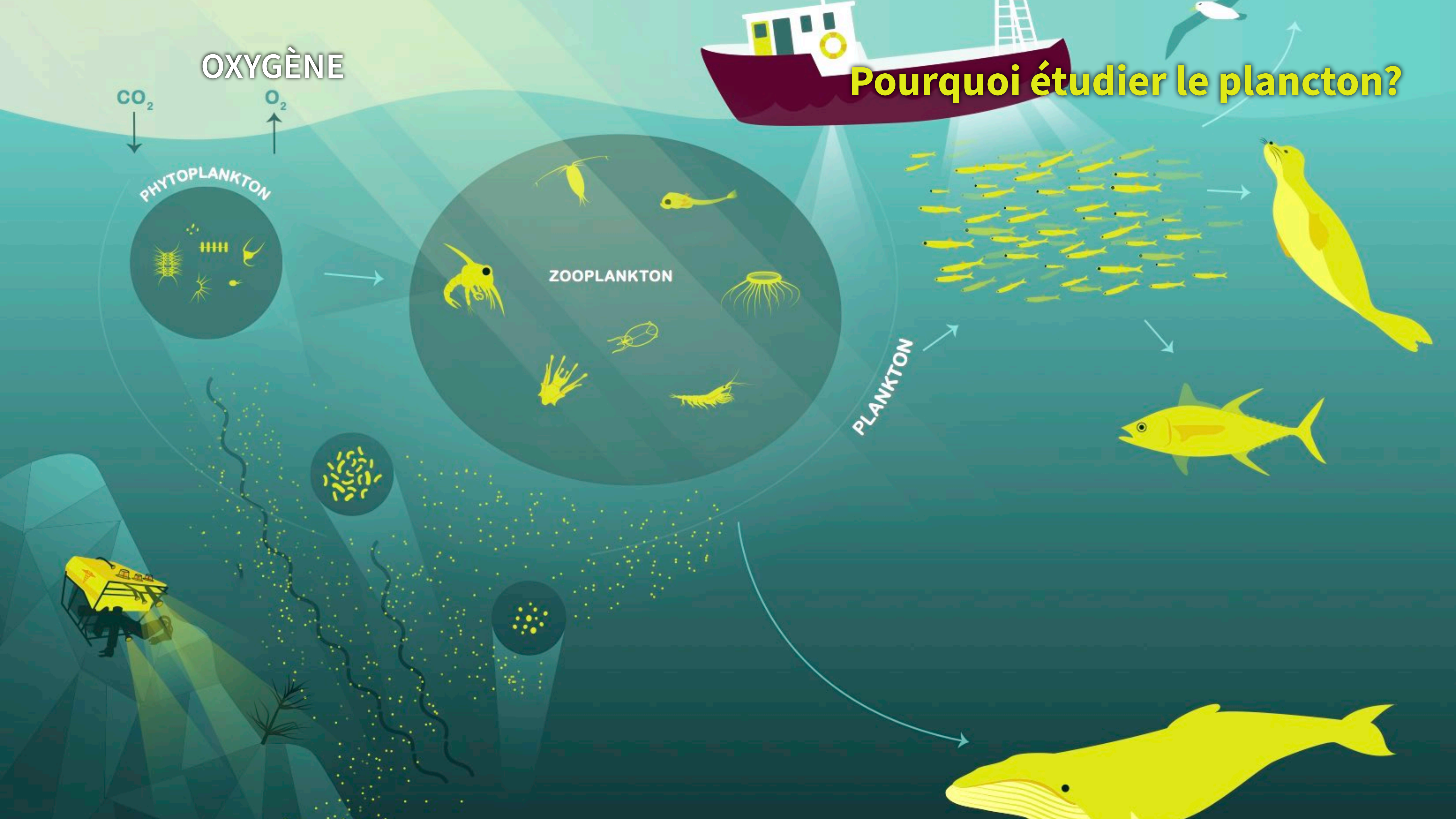
O_2

PHYTOPLANKTON

ZOOPLANKTON

PLANKTON

Pourquoi étudier le plancton?



OXYGÈNE

CO_2

O_2

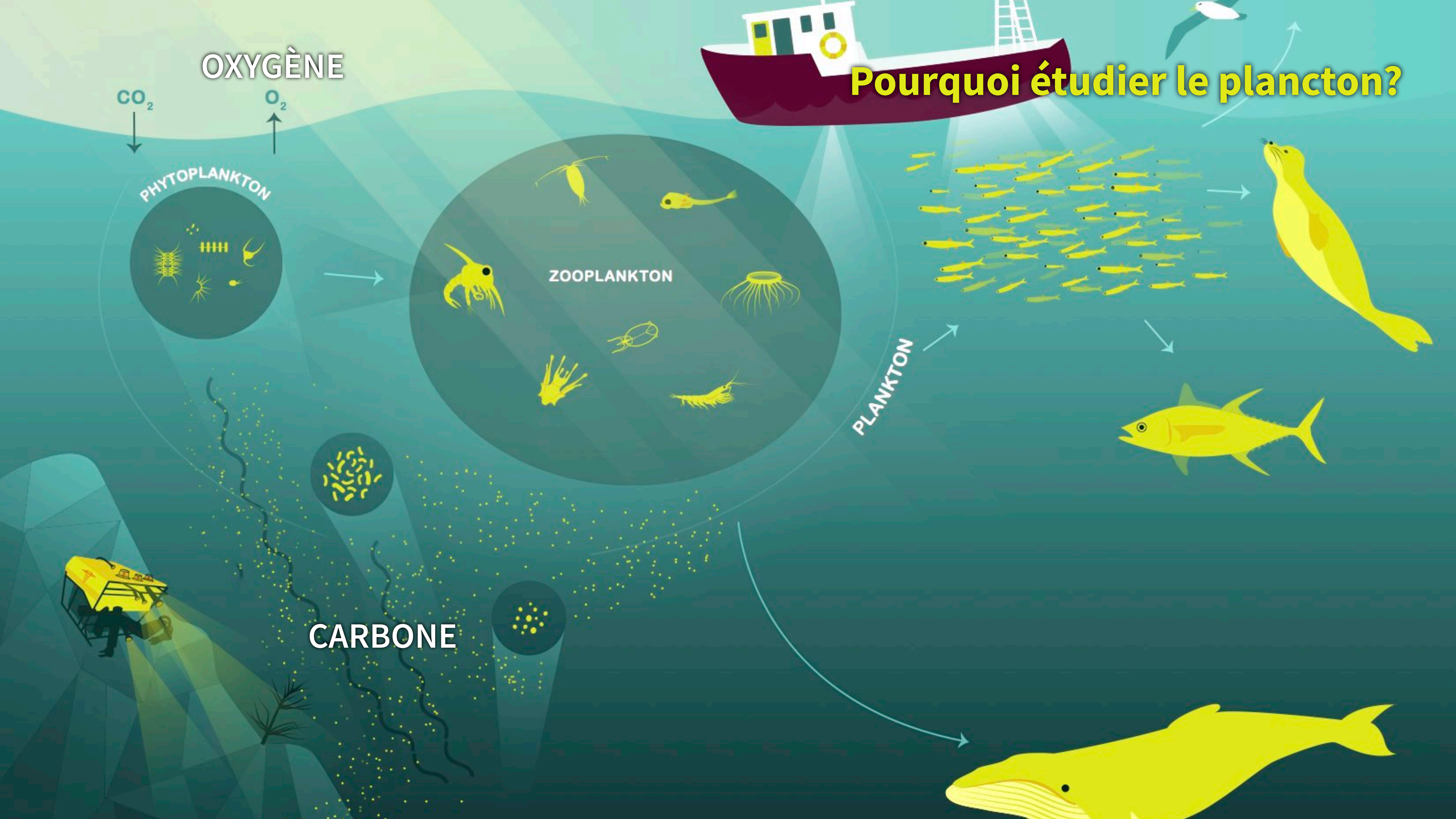
PHYTOPLANKTON

ZOOPLANKTON

PLANKTON

CARBONE

Pourquoi étudier le plancton?



OXYGÈNE

CO₂

O₂

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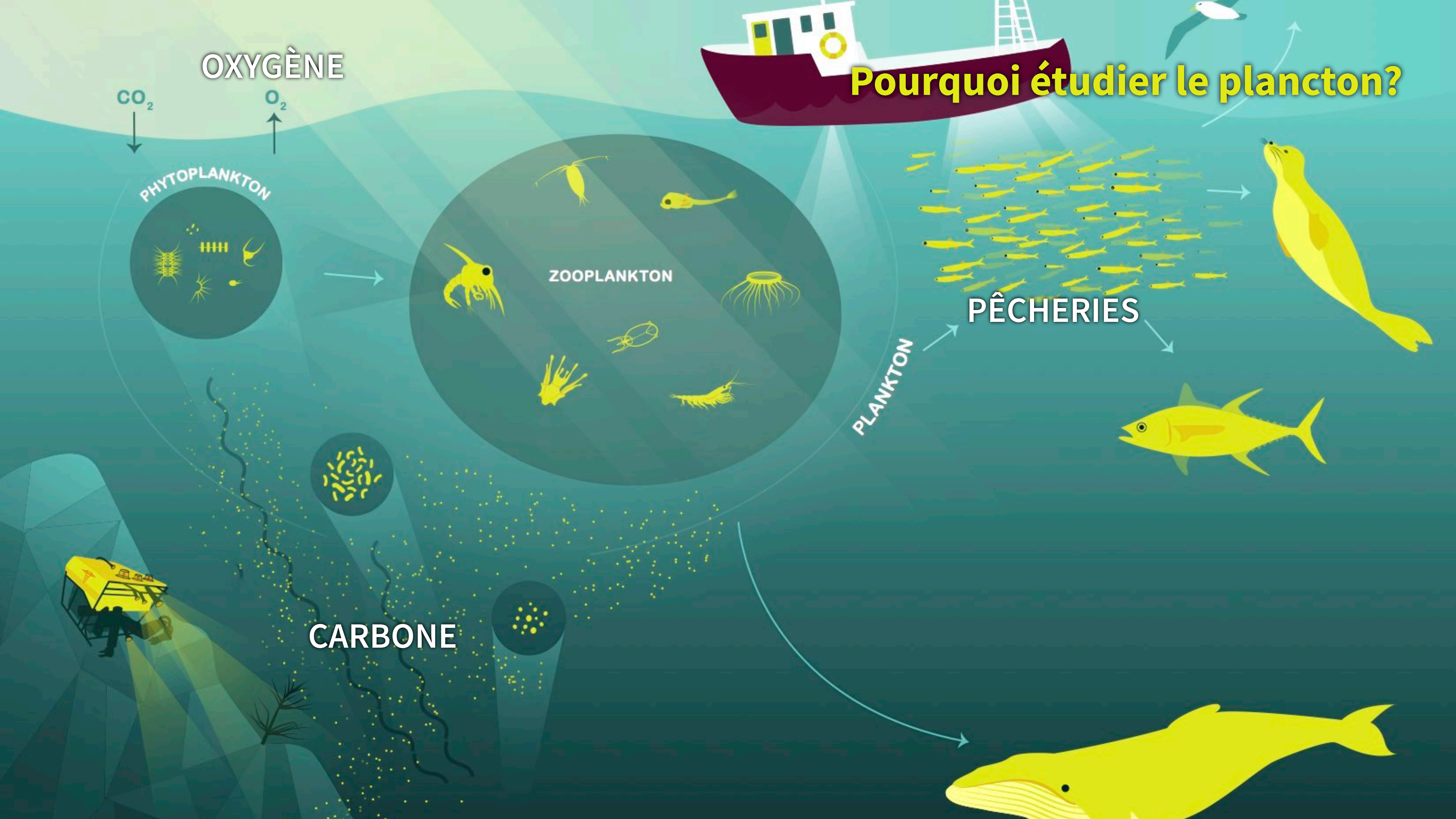
PHYTOPLANKTON

ZOOPLANKTON

PÊCHERIES

PLANKTON

CARBONE



OXYGÈNE

CO₂

O₂

Pourquoi étudier le plancton?

PHYTOPLANKTON

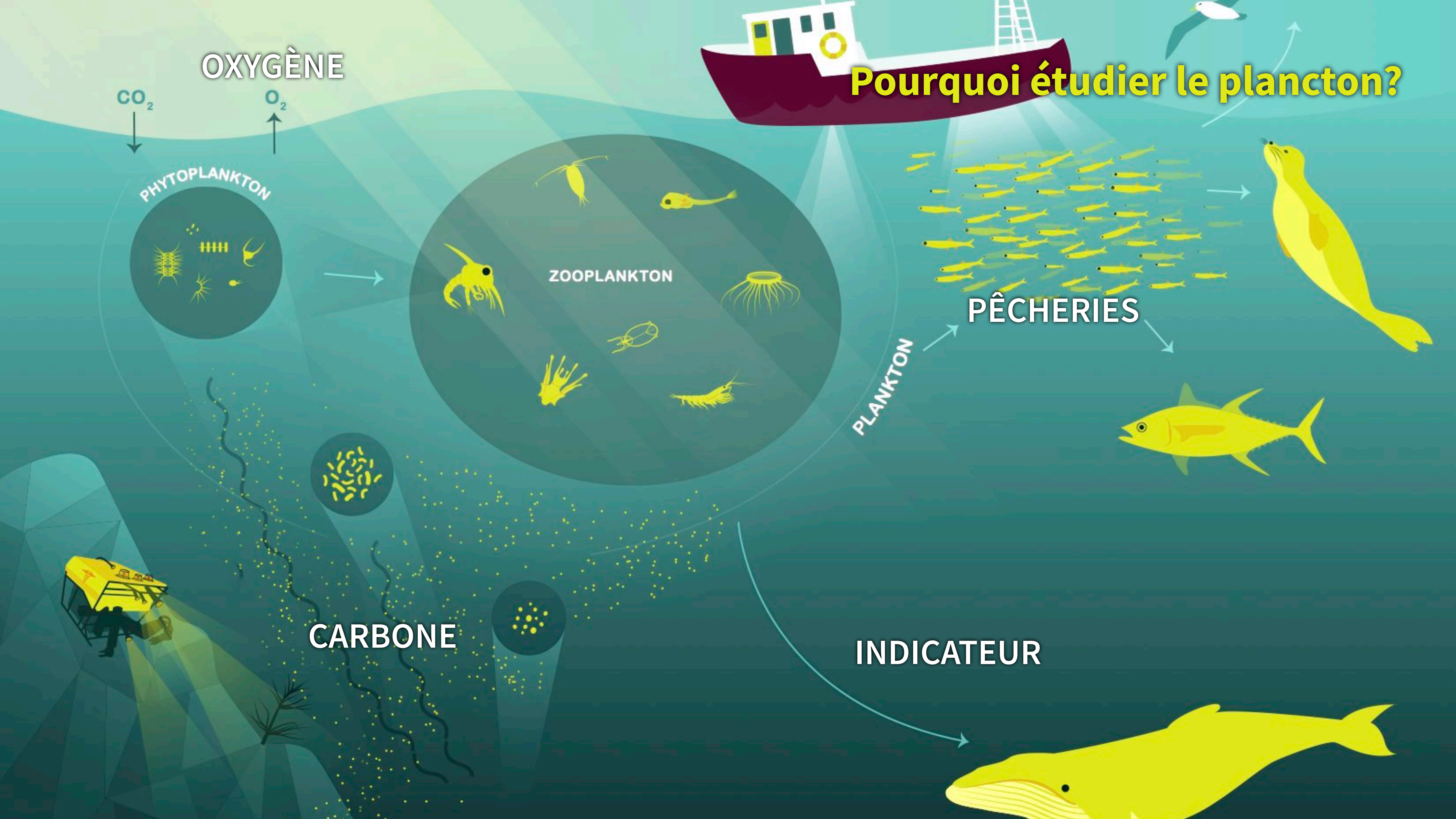
ZOOPLANKTON

PÊCHERIES

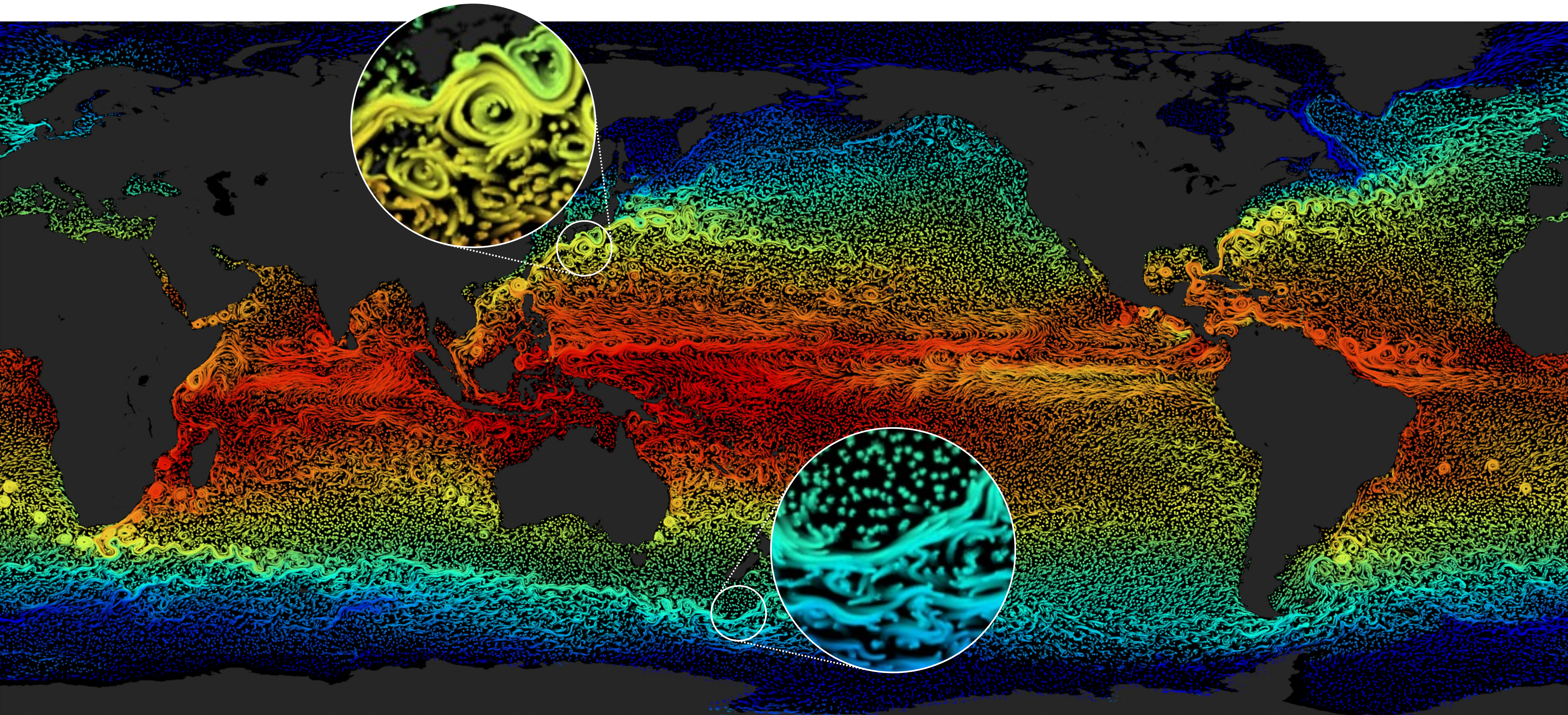
PLANKTON

CARBONE

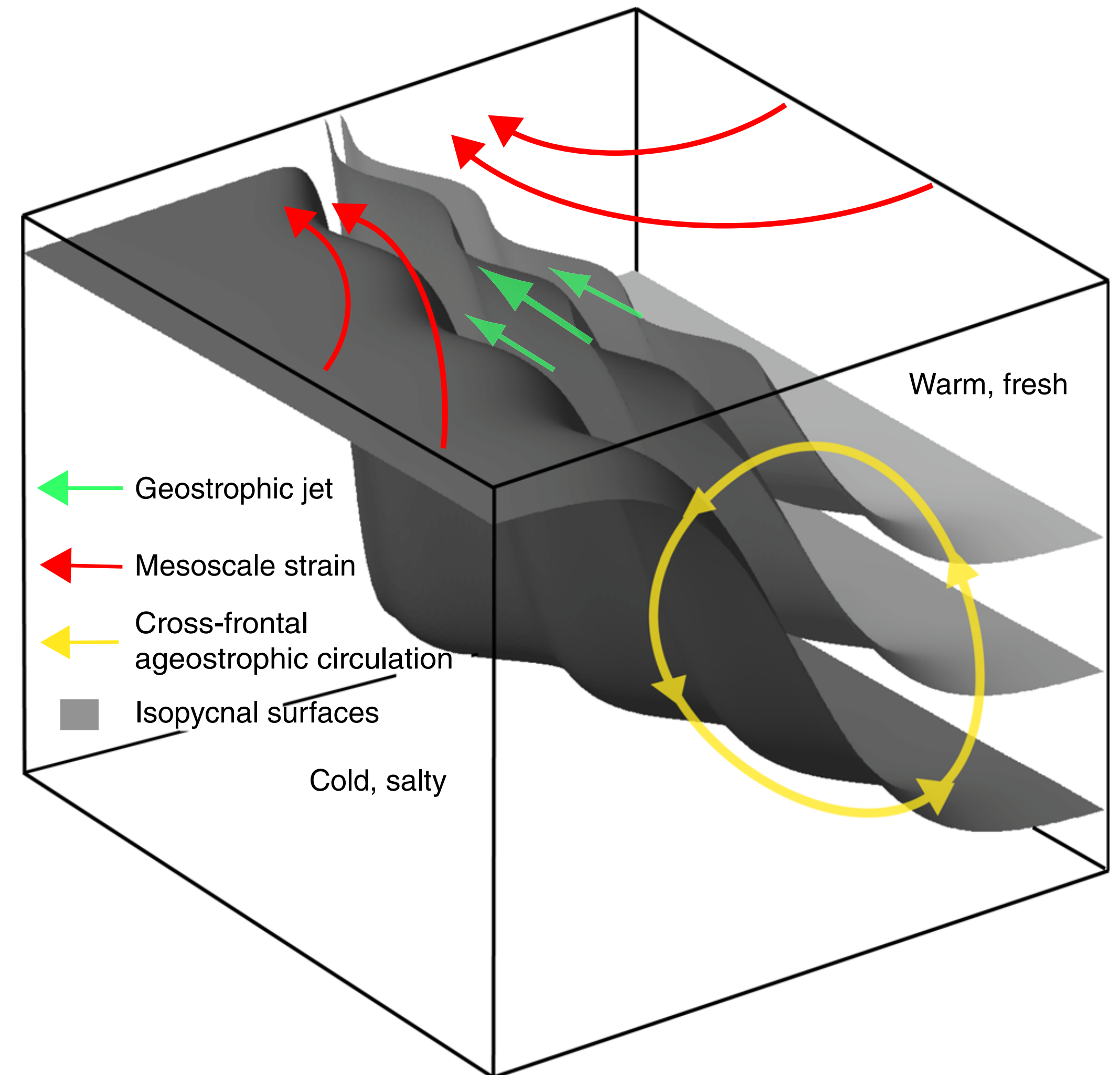
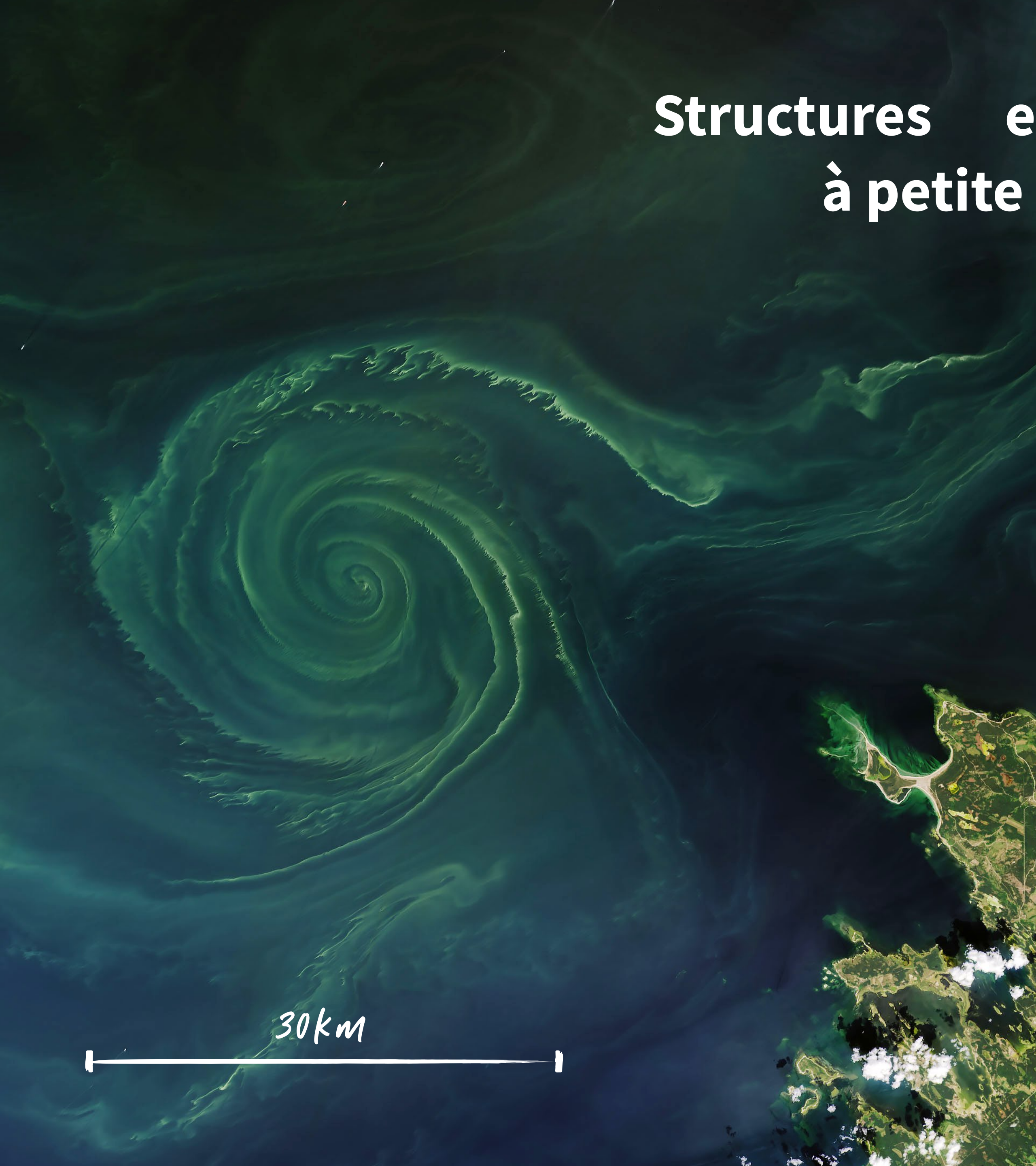
INDICATEUR



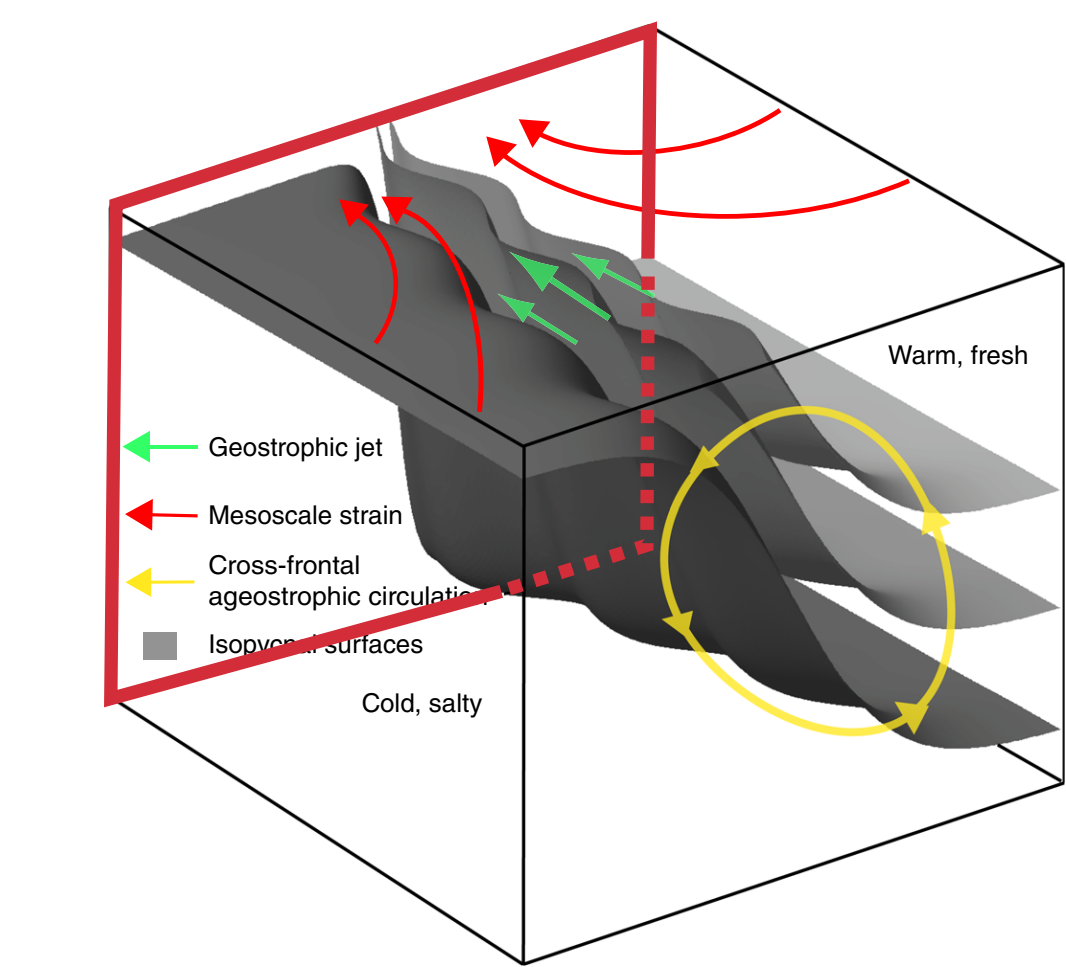
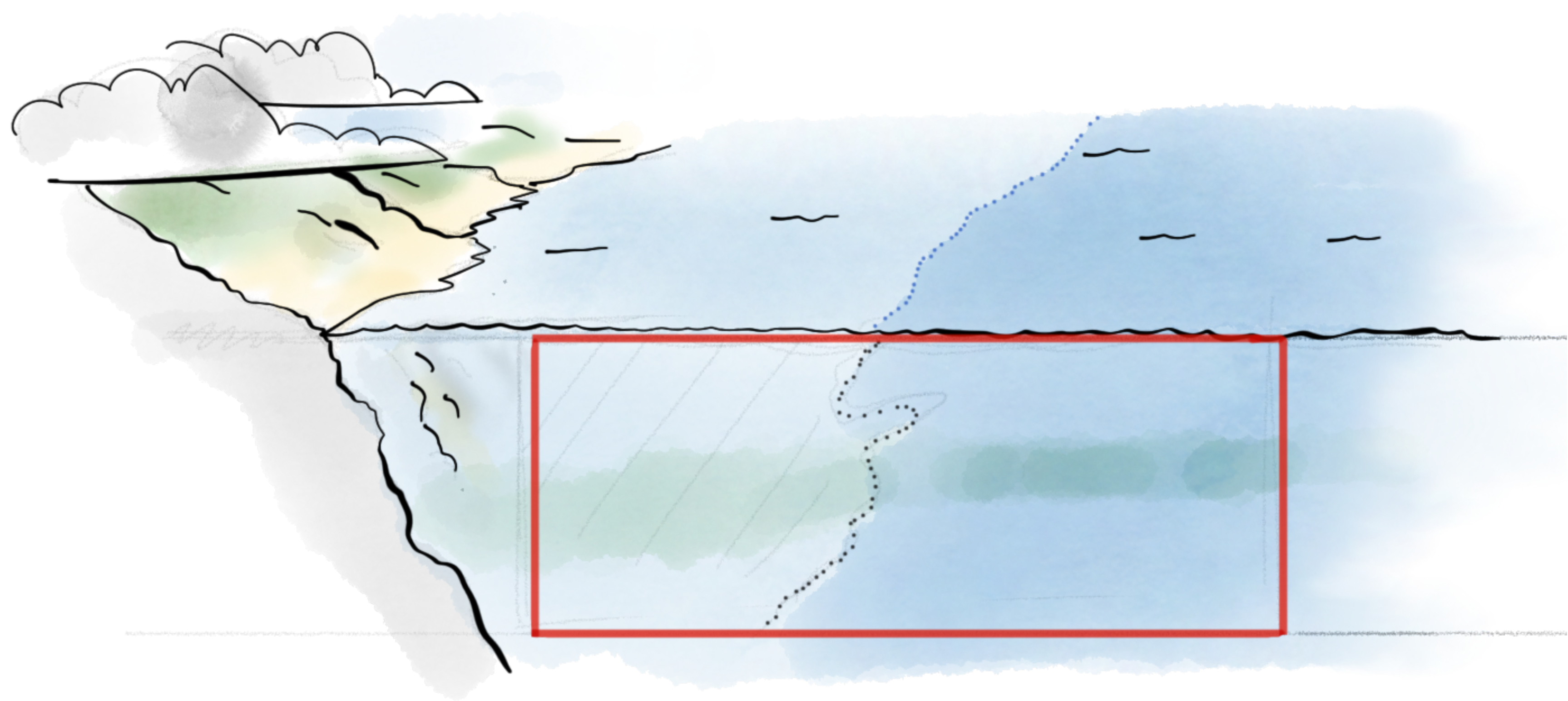
Pourquoi l'étudier à petite échelle?



Structures et Processus à petite échelle



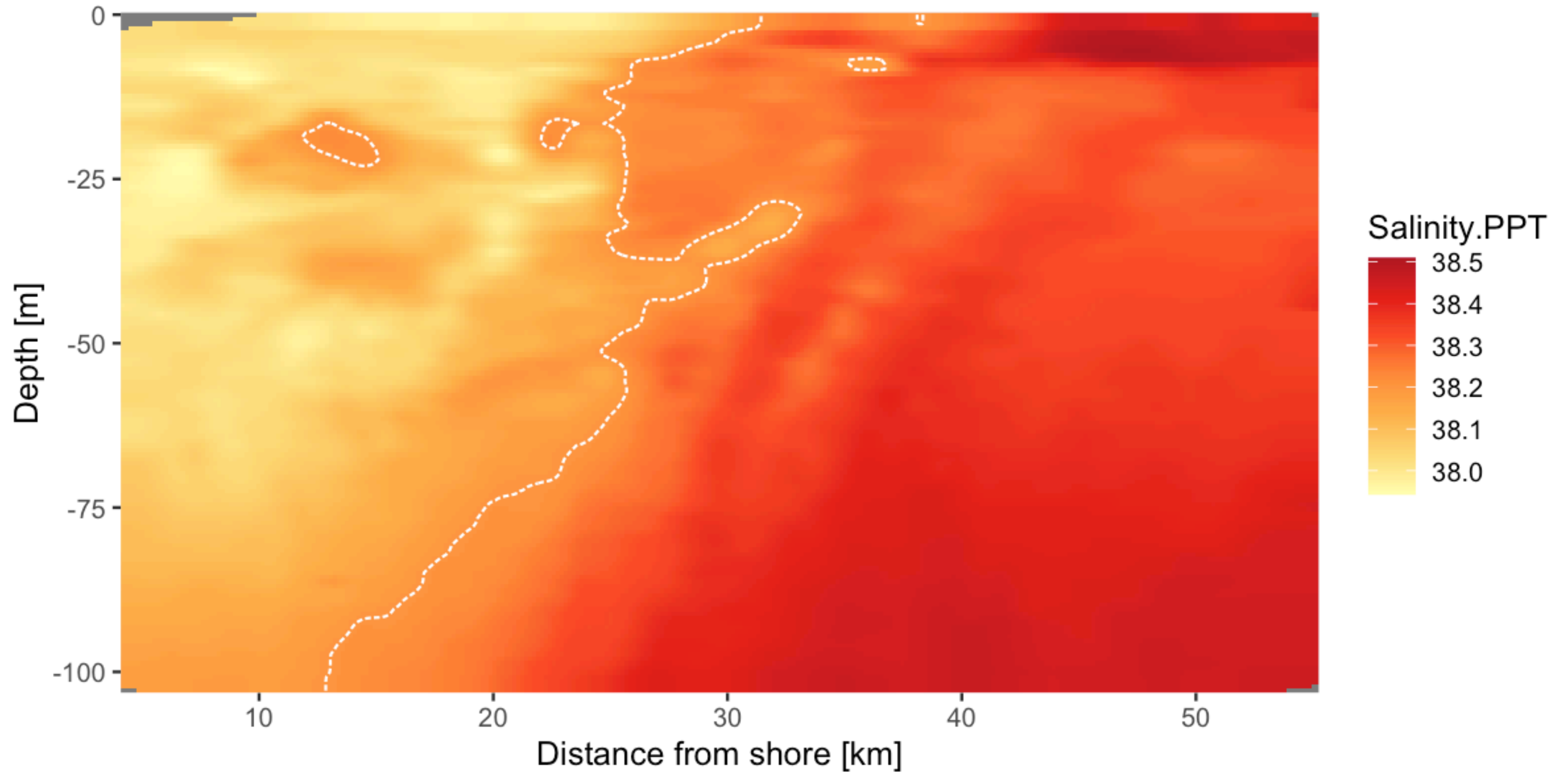
Observation du zooplancton au travers d'un front



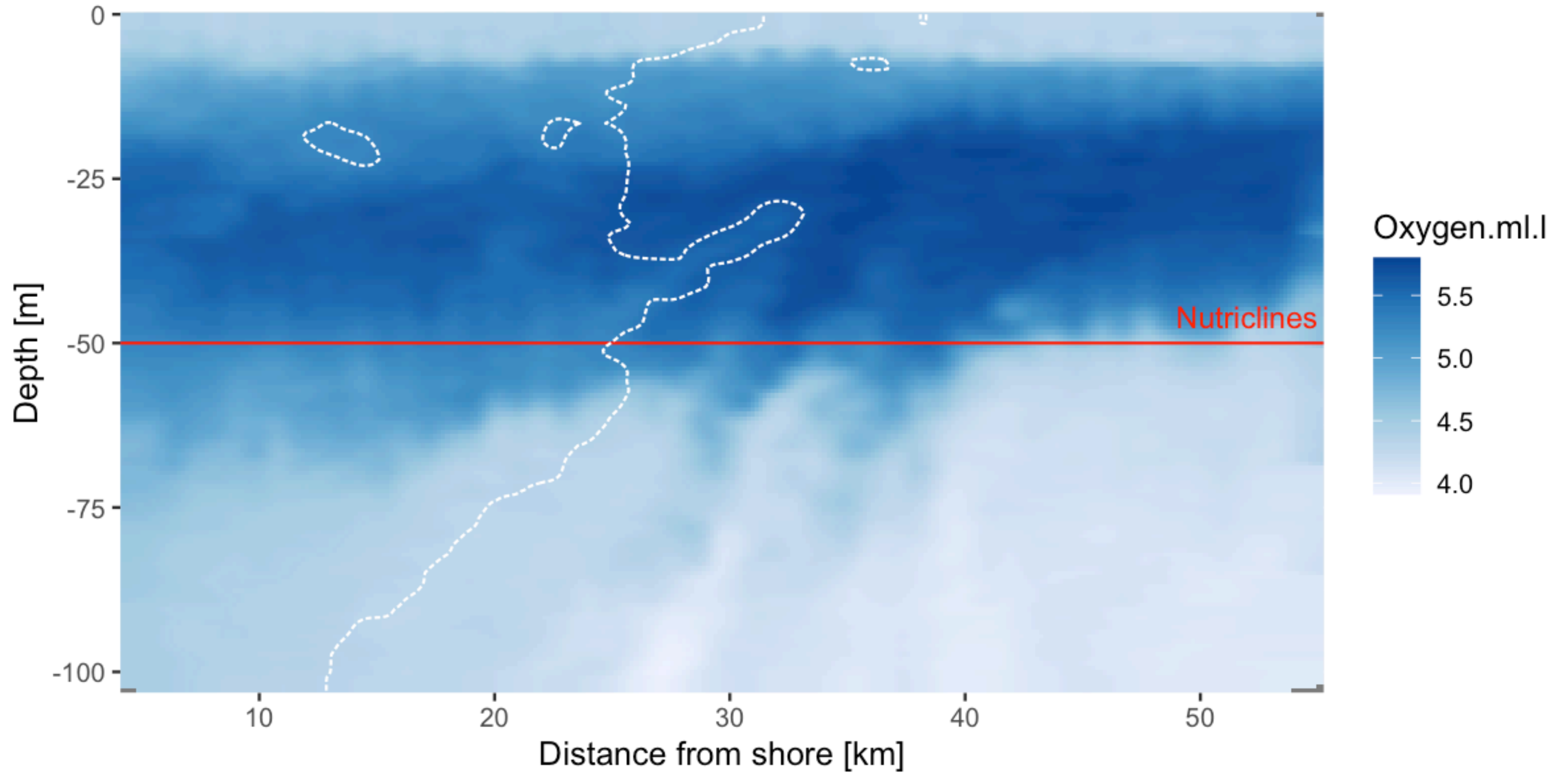




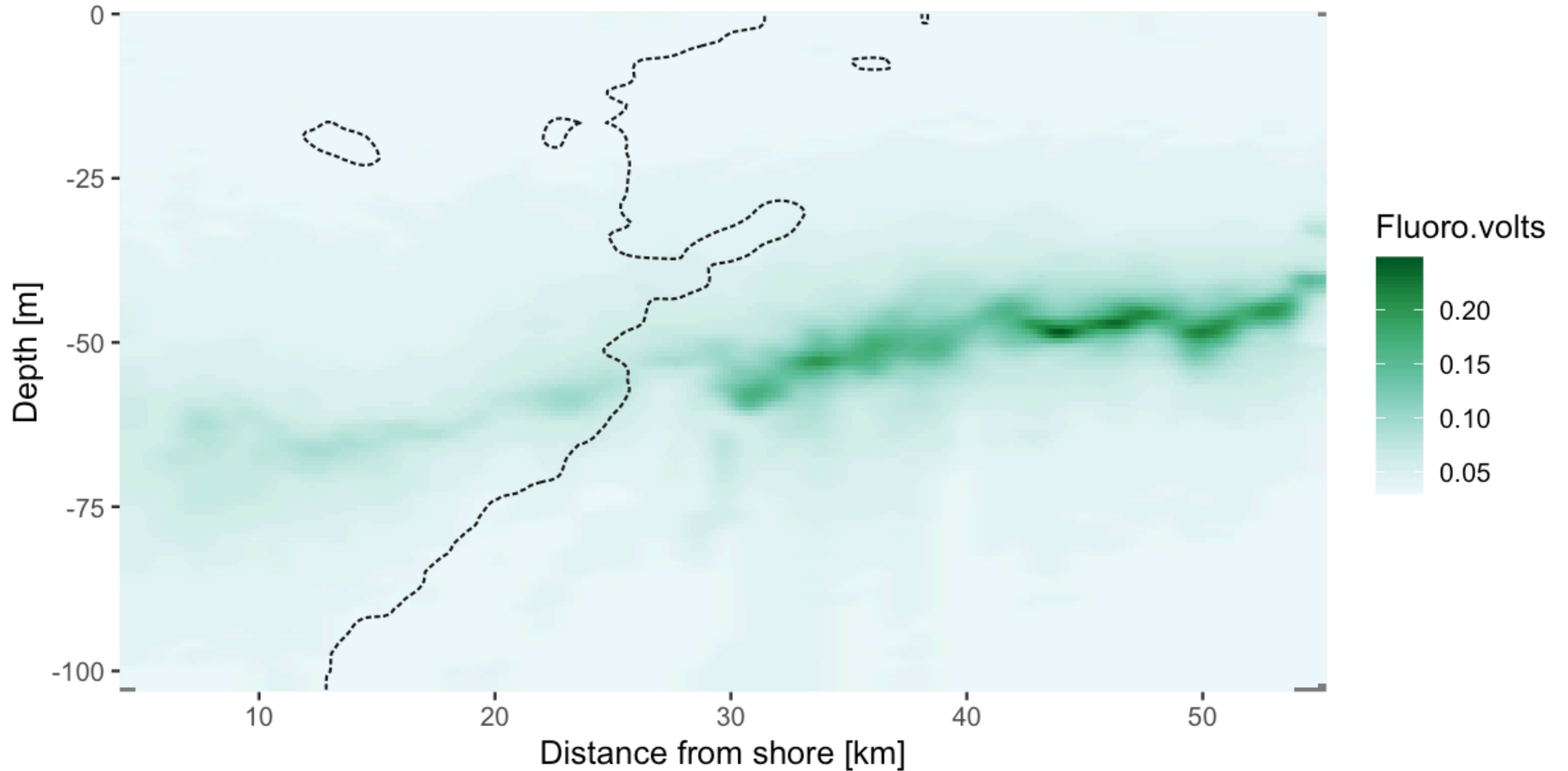
Identifications de structures de submésoséchelle



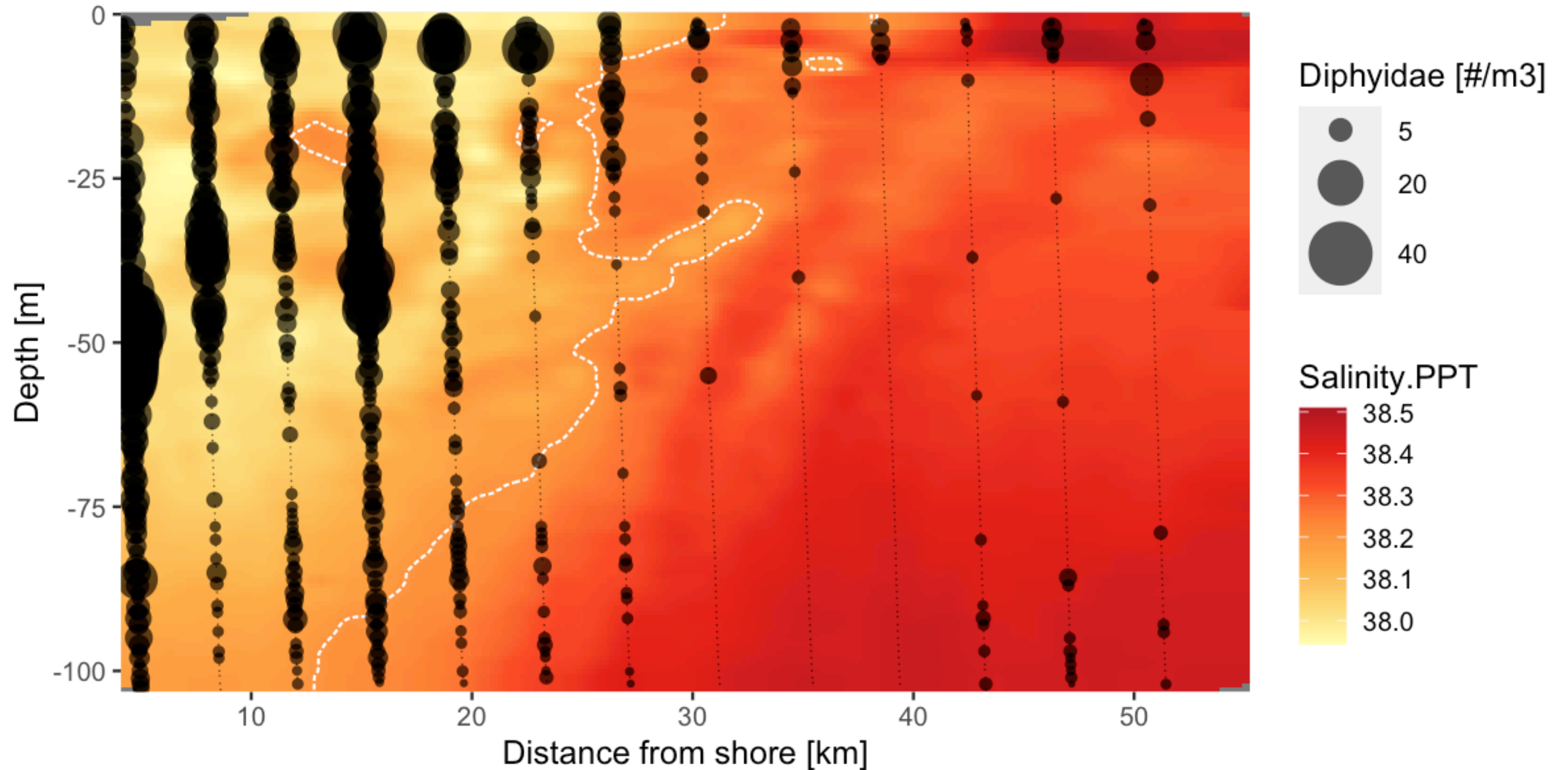
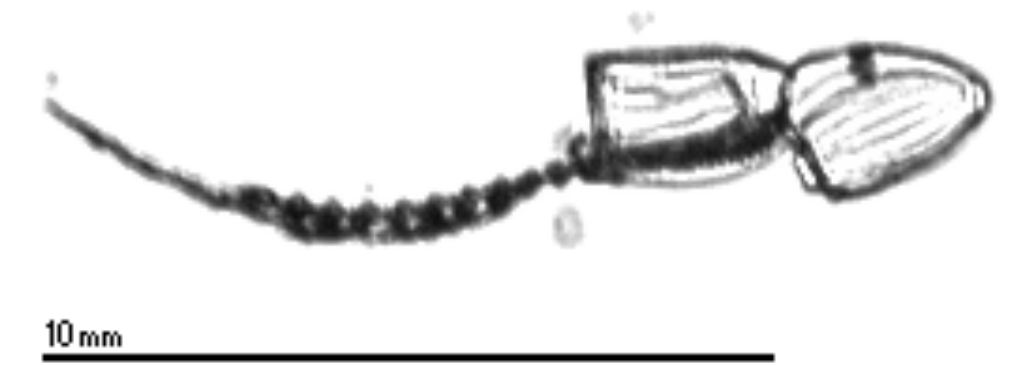
Identifications de structures de submésoséchelle

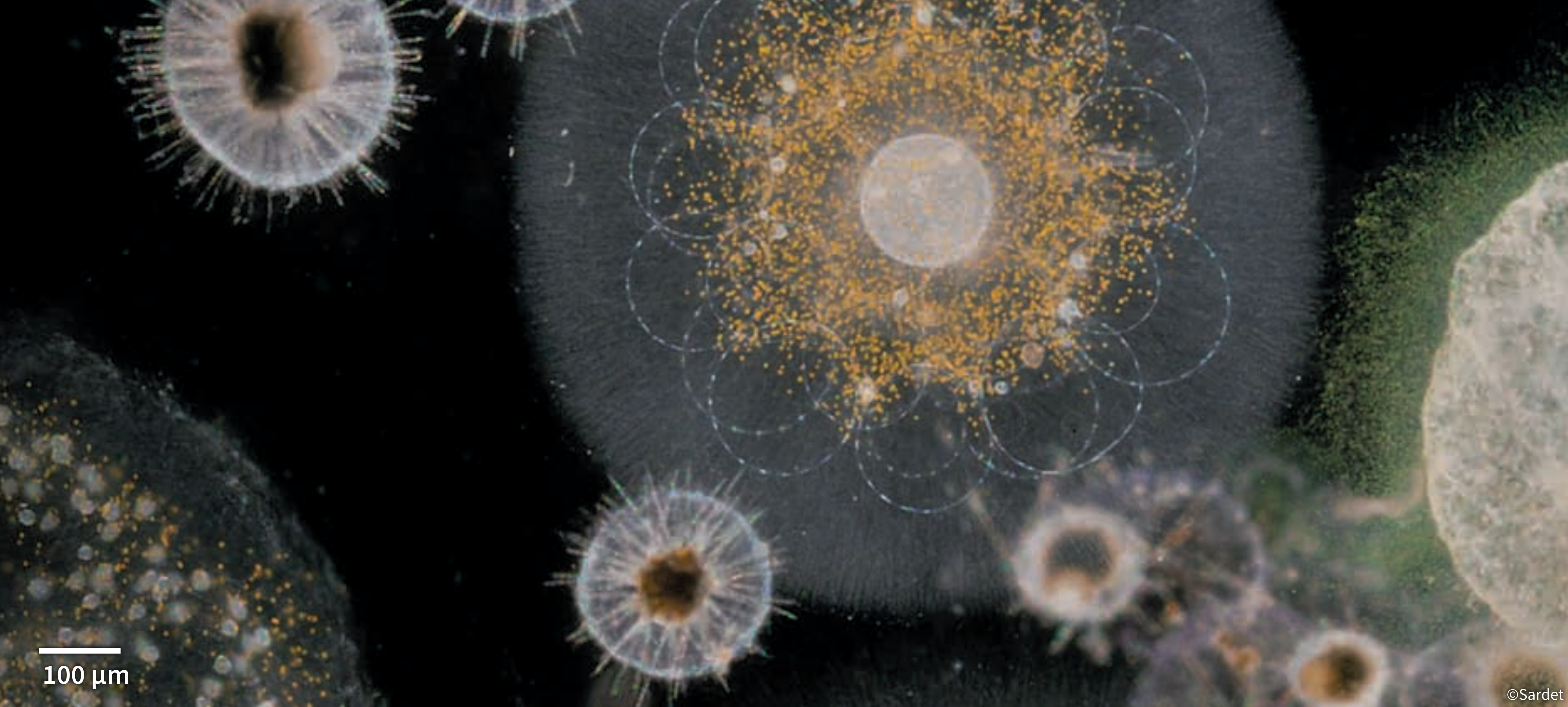


Conséquences pour le phytoplancton



Distribution de prédateurs zooplanctoniques

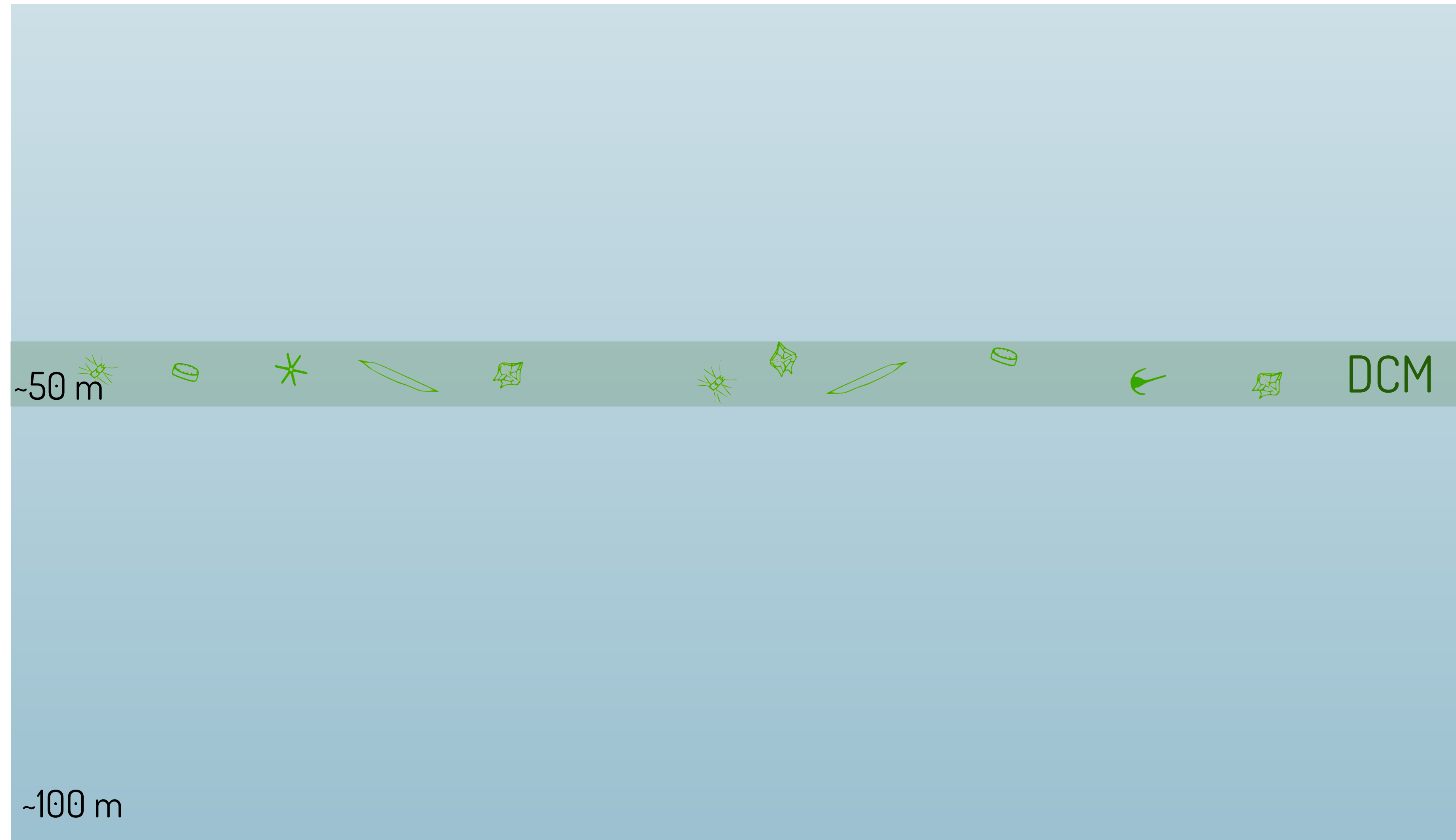




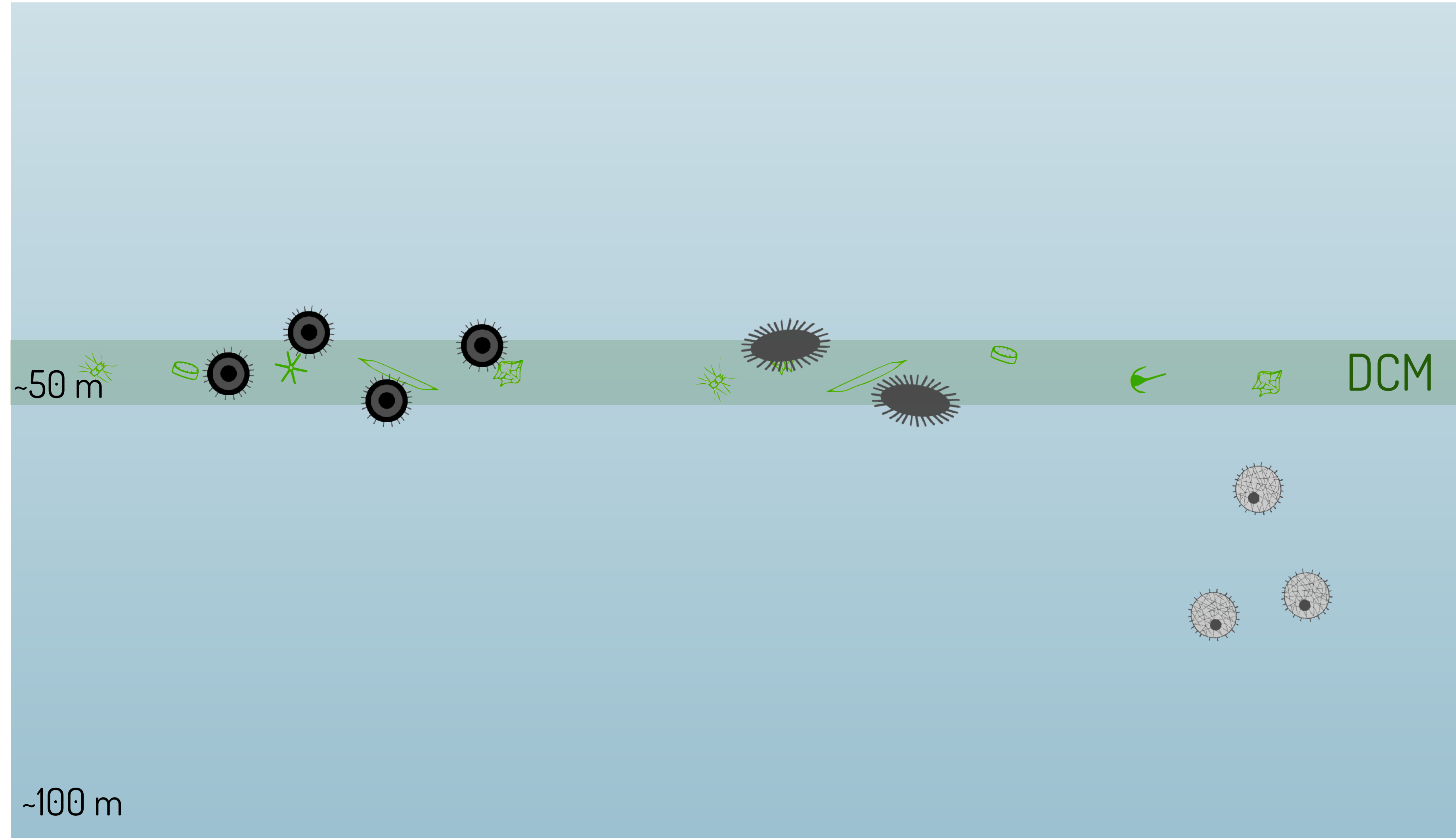
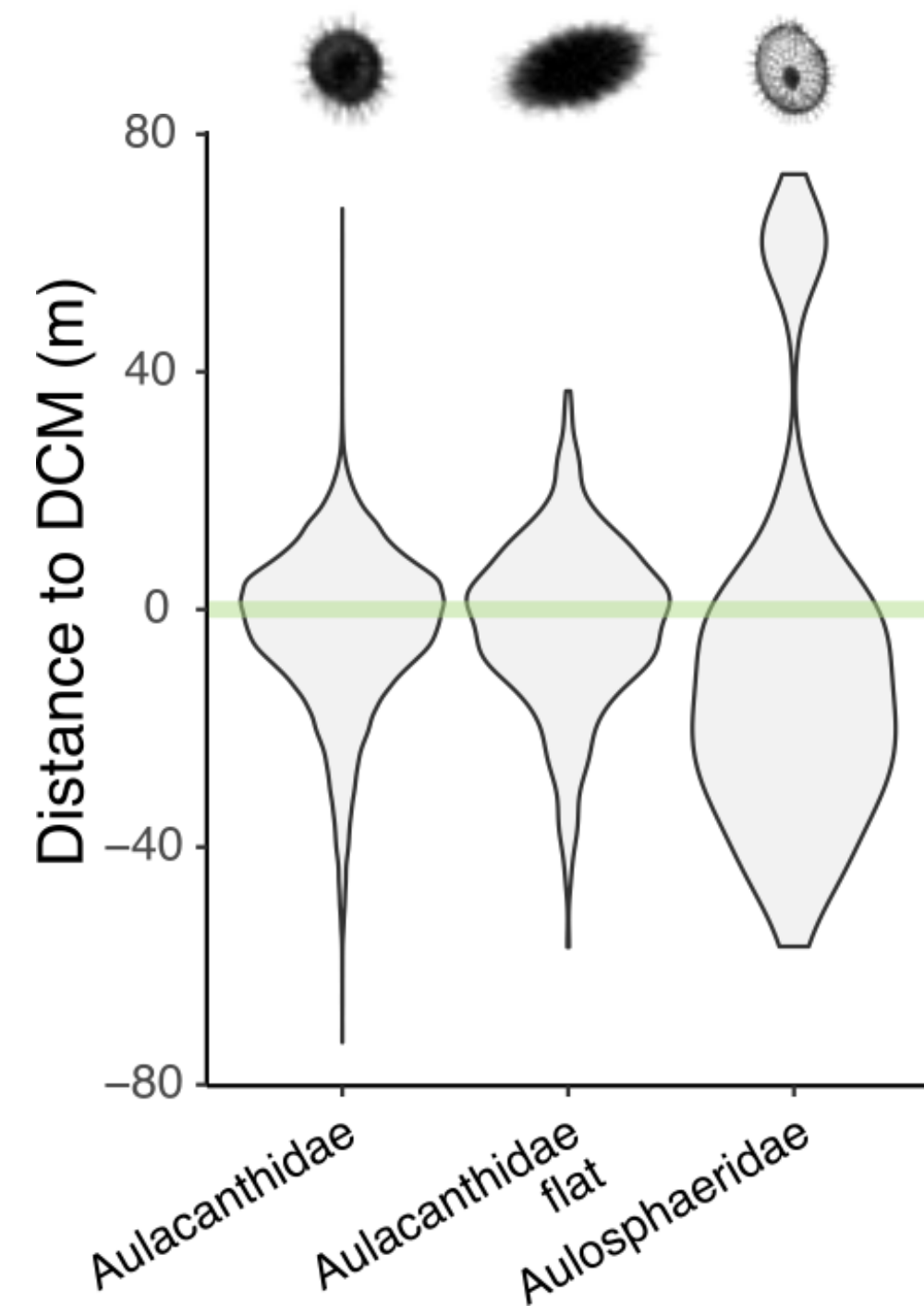
Protistes: Radiolaires

Cellules géantes, mixotrophes

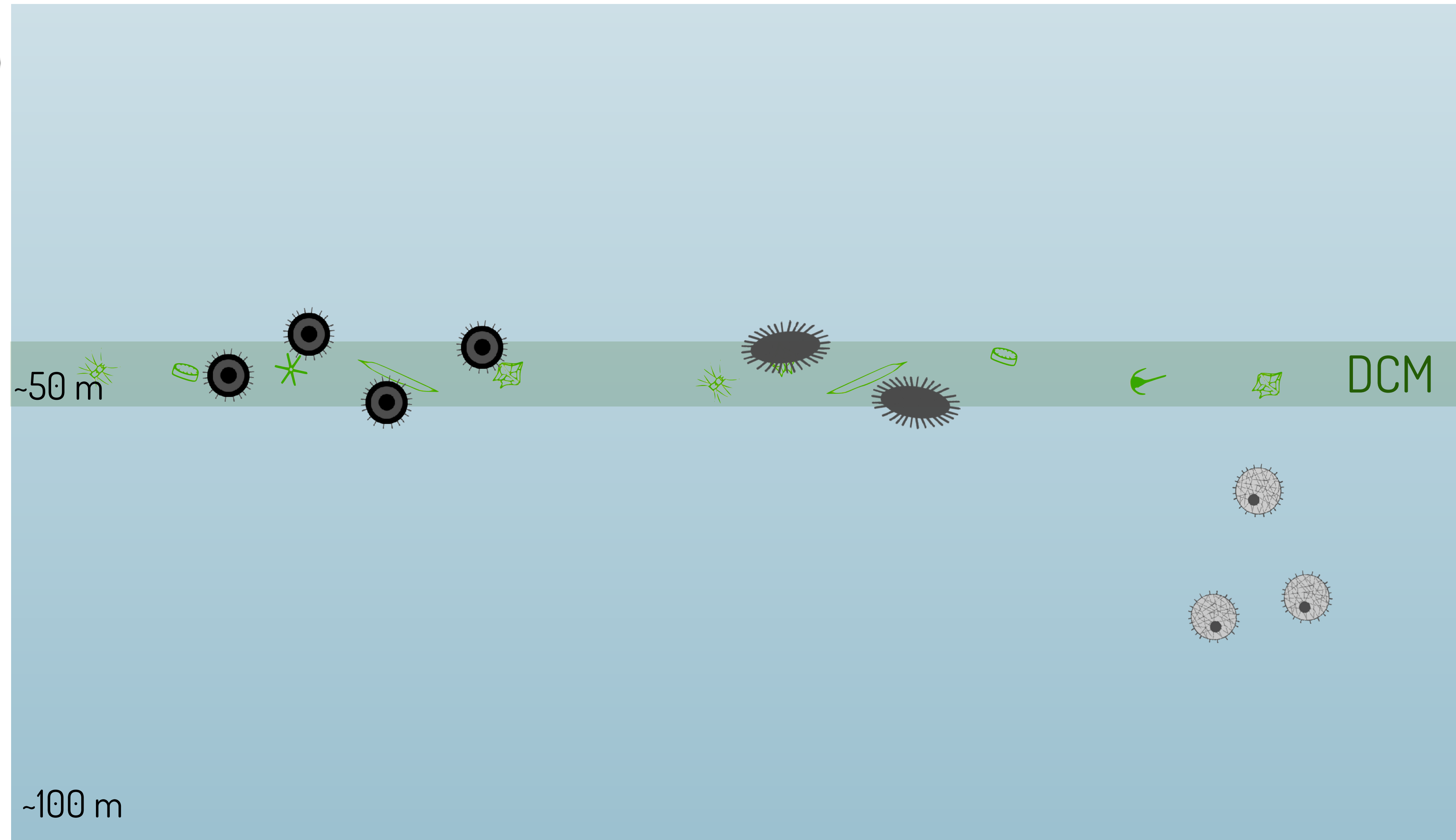
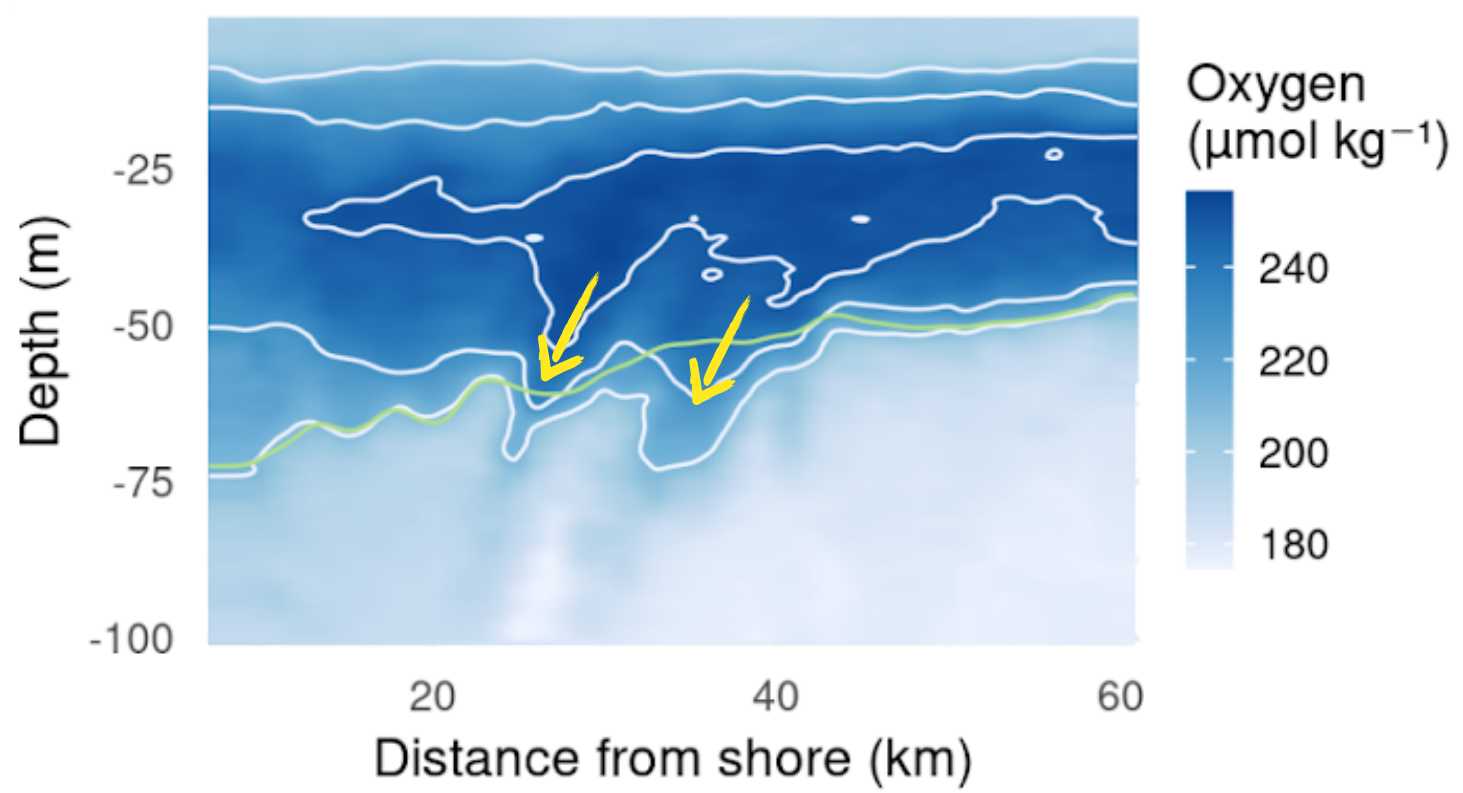
Phaeodaires: entrainement en profondeur (mais orientation)



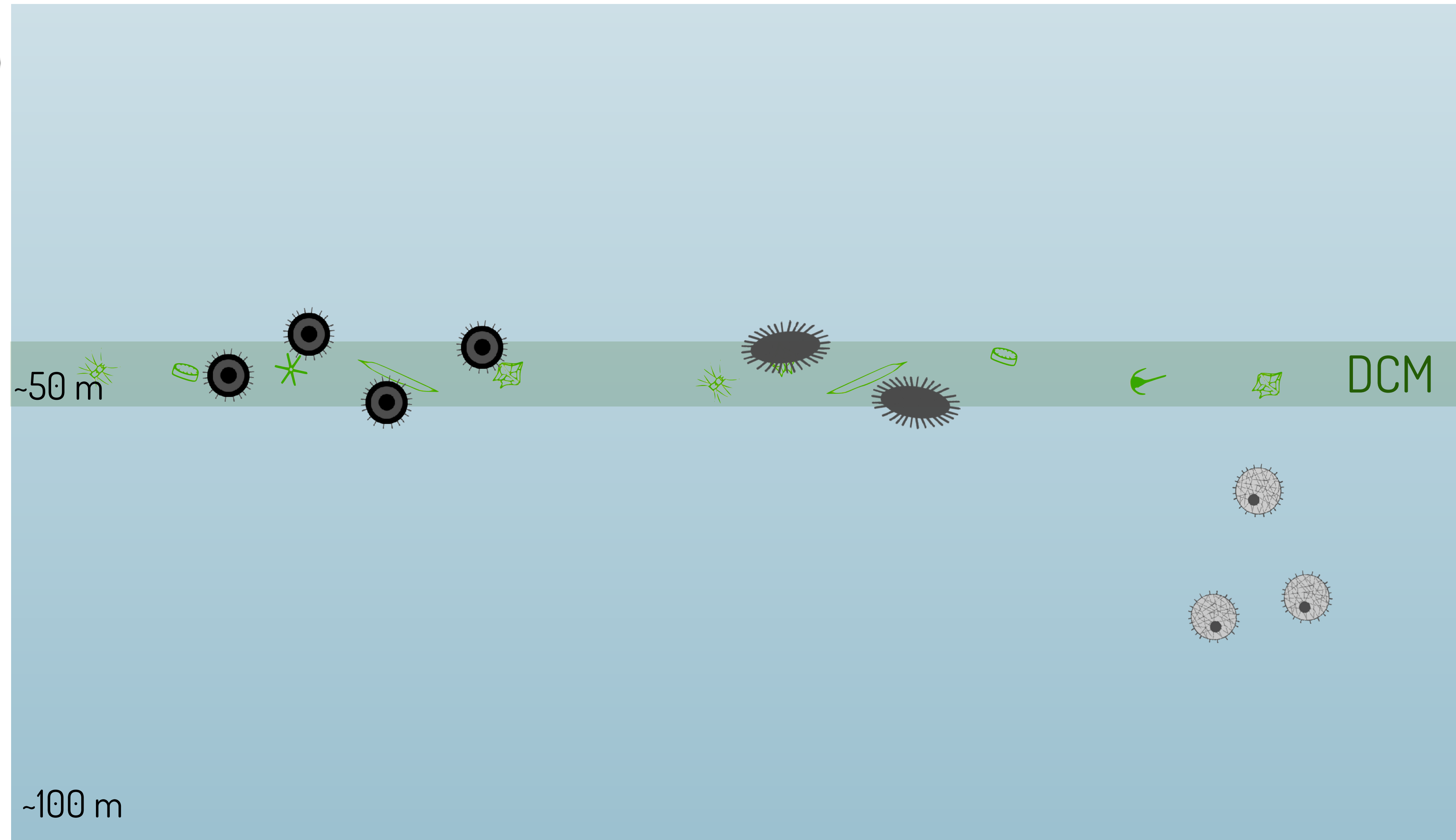
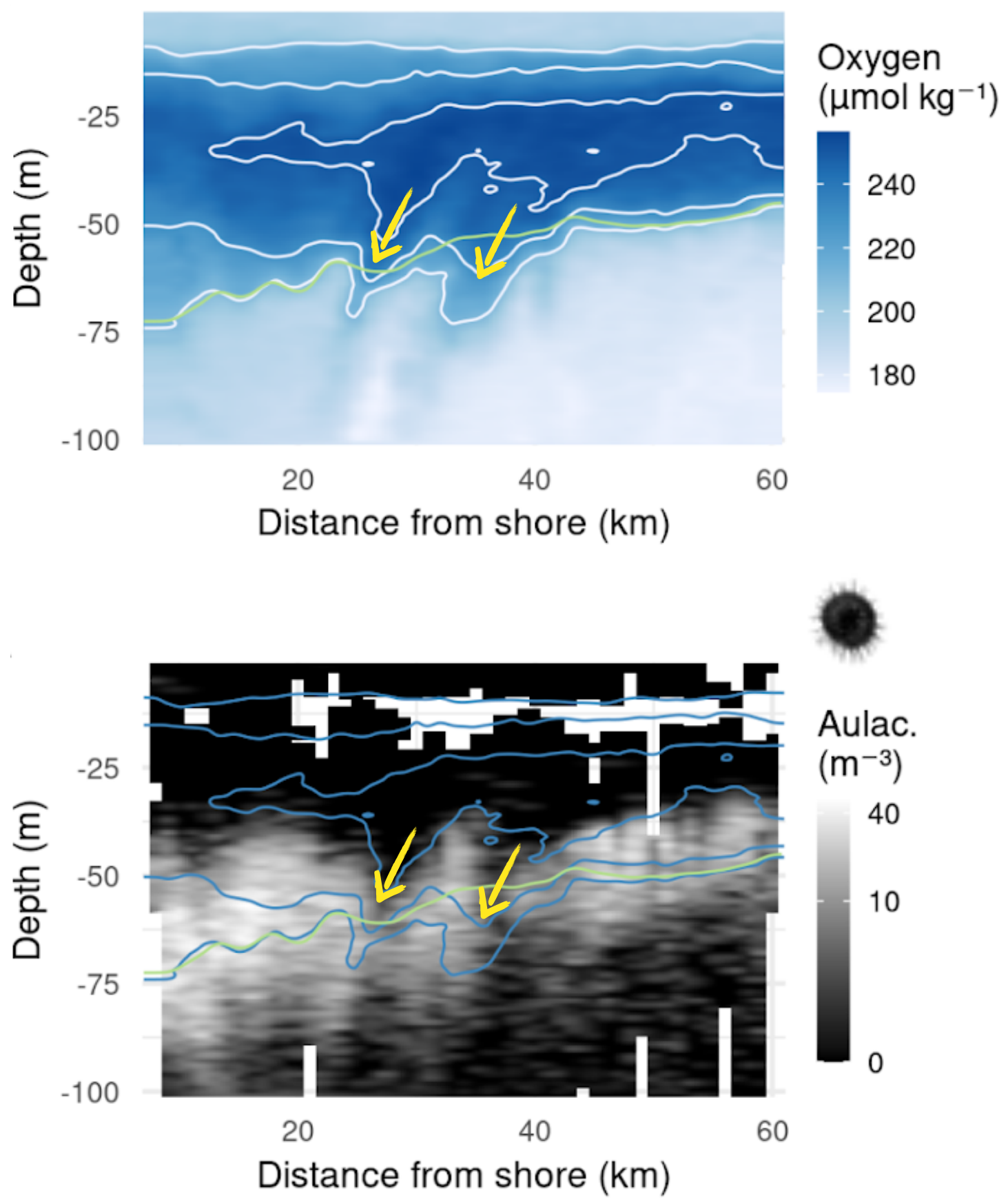
Phaeodaires: entrainement en profondeur (mais orientation)



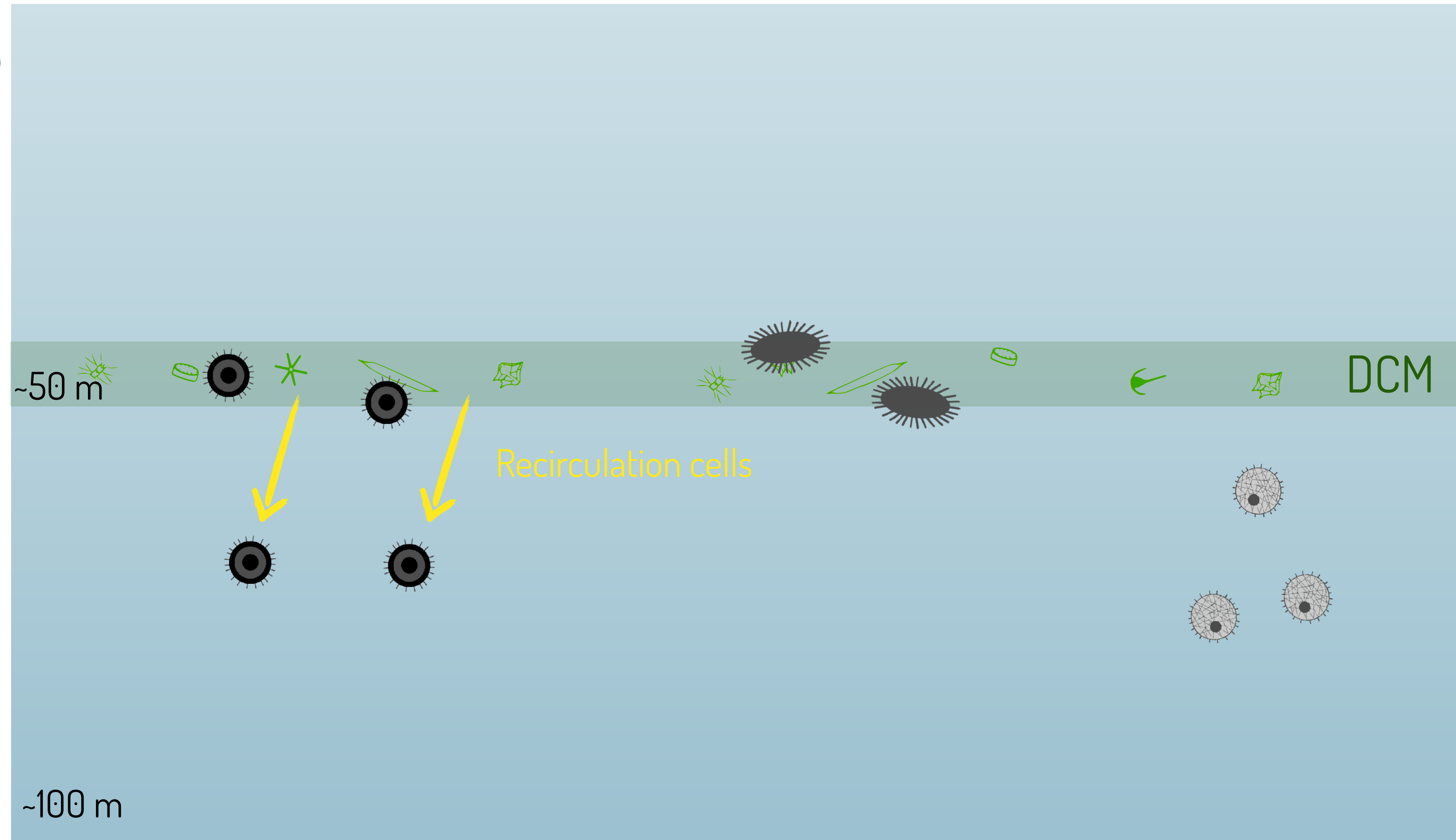
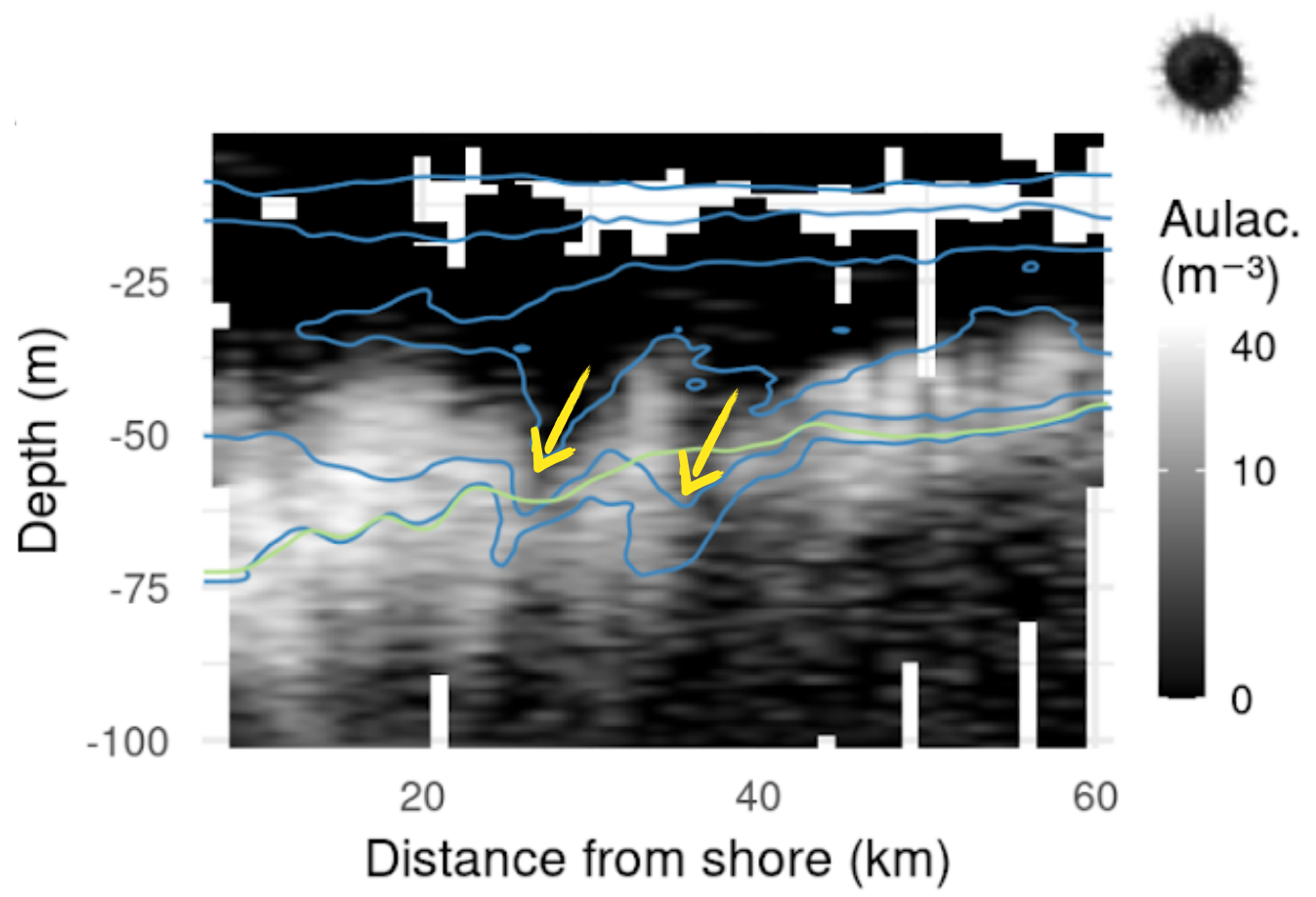
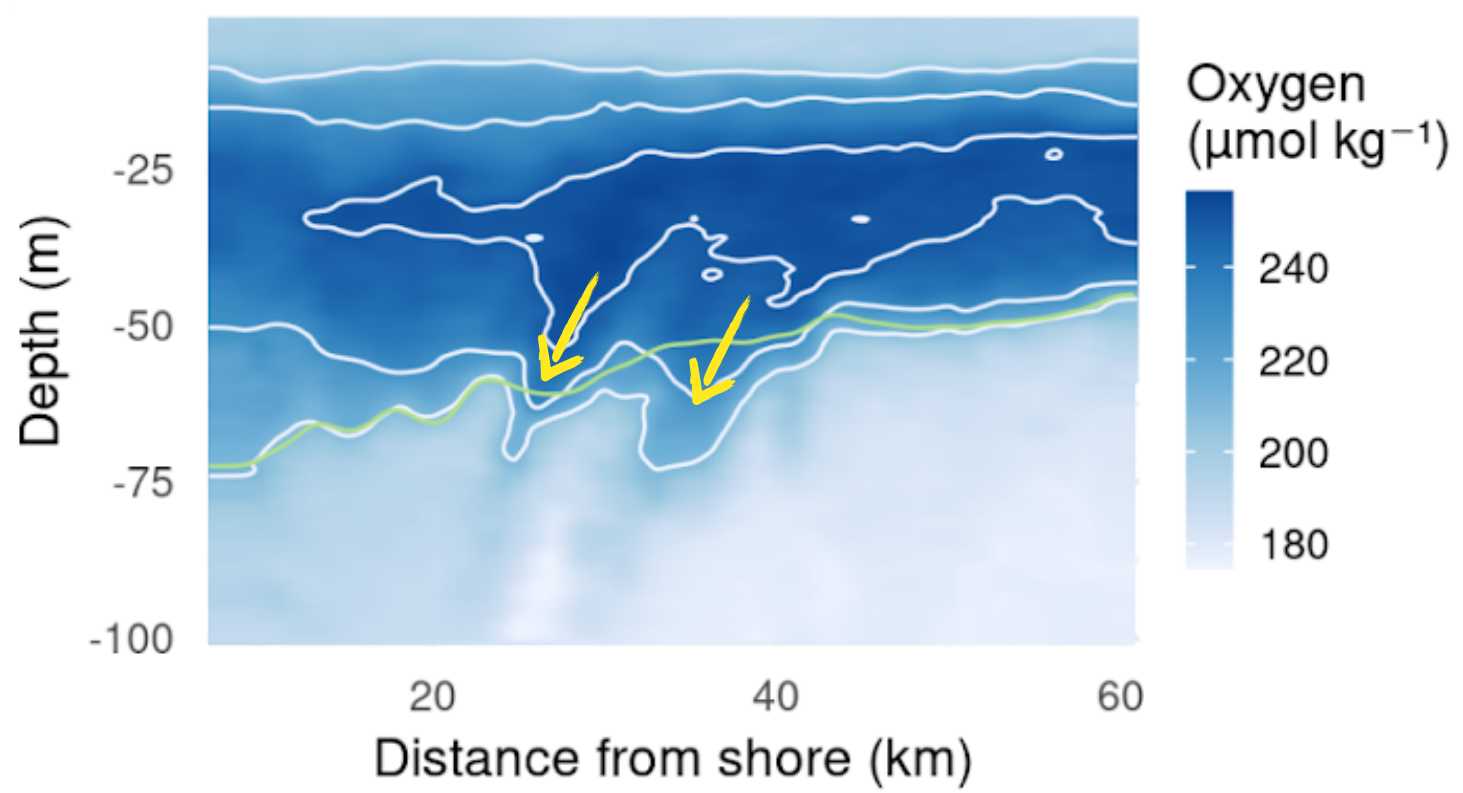
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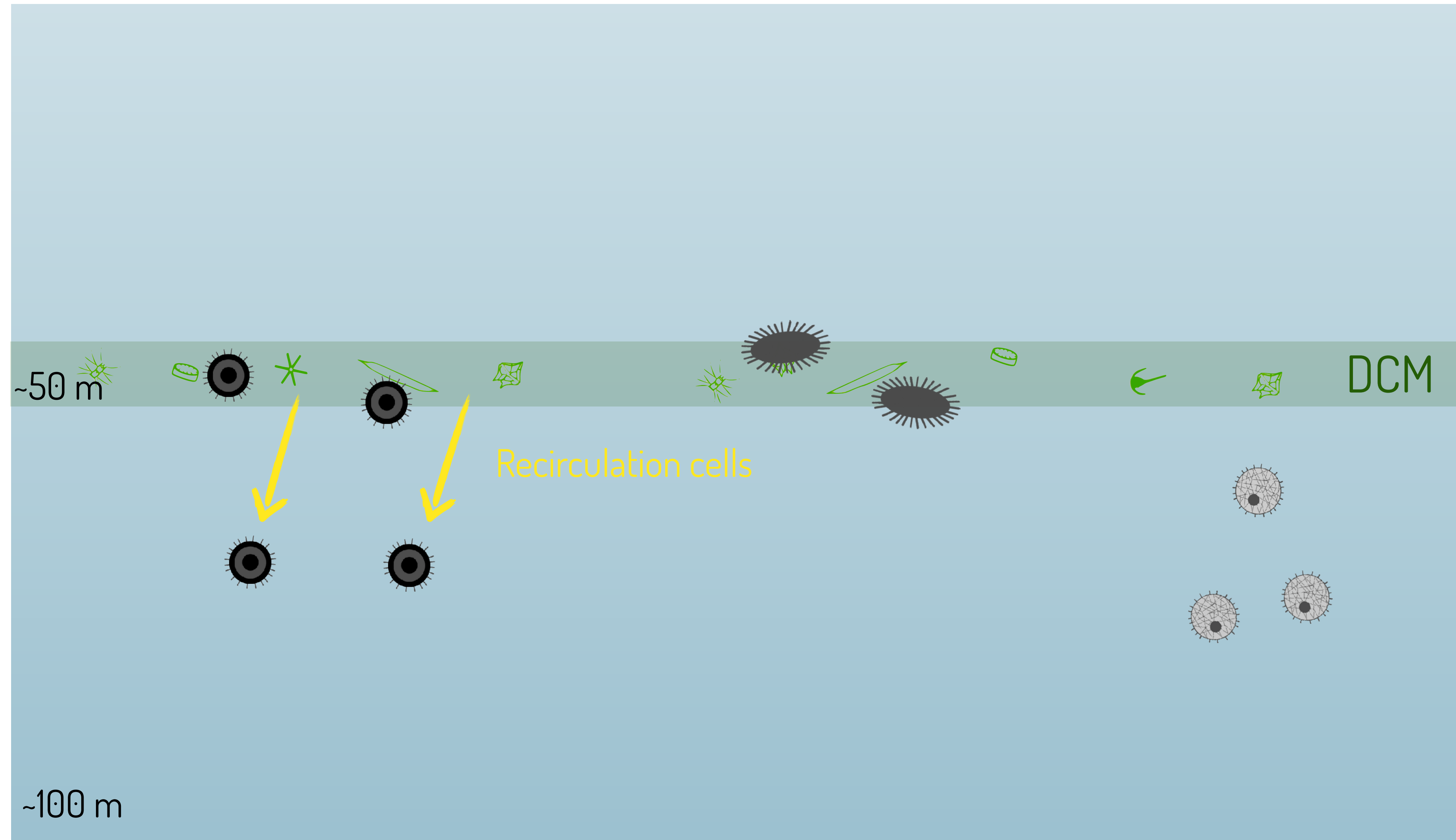
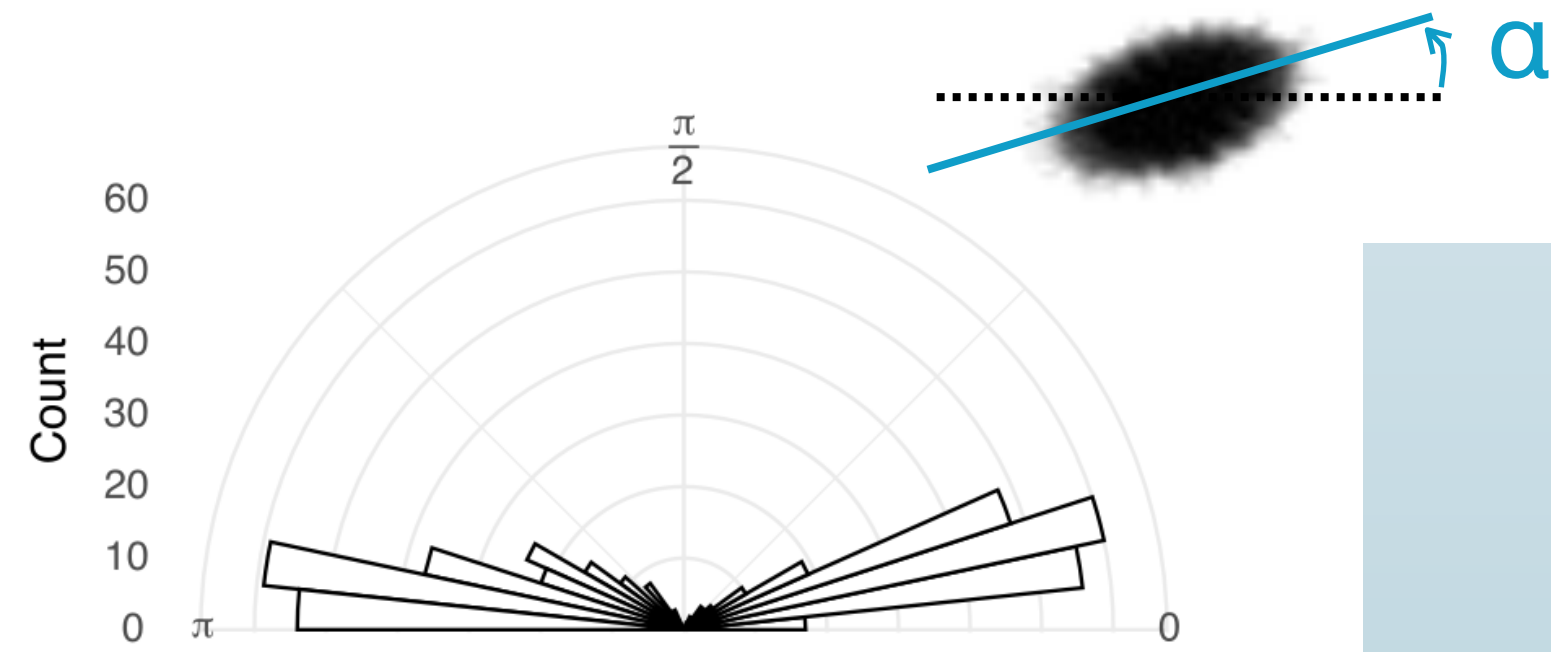
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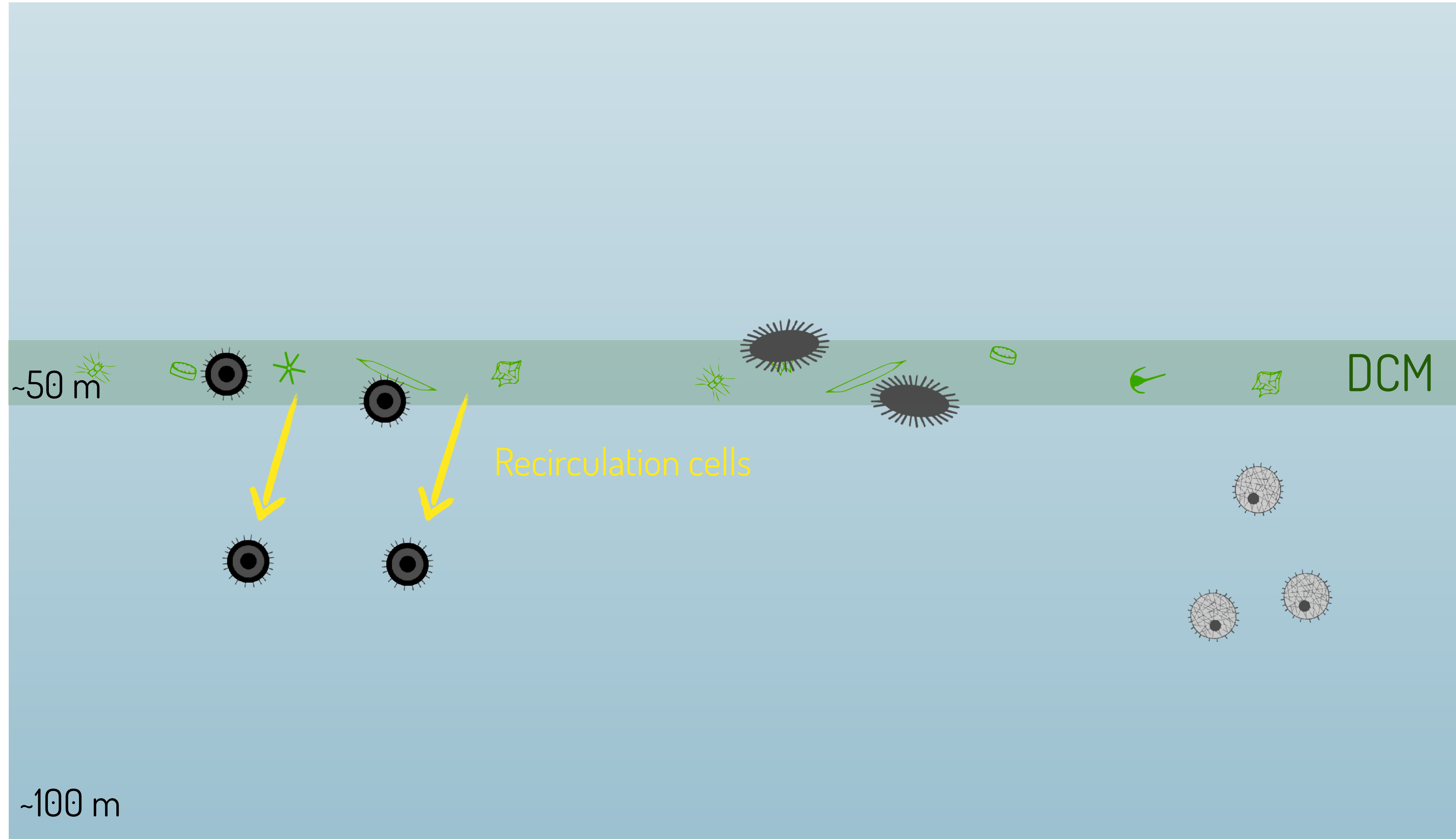
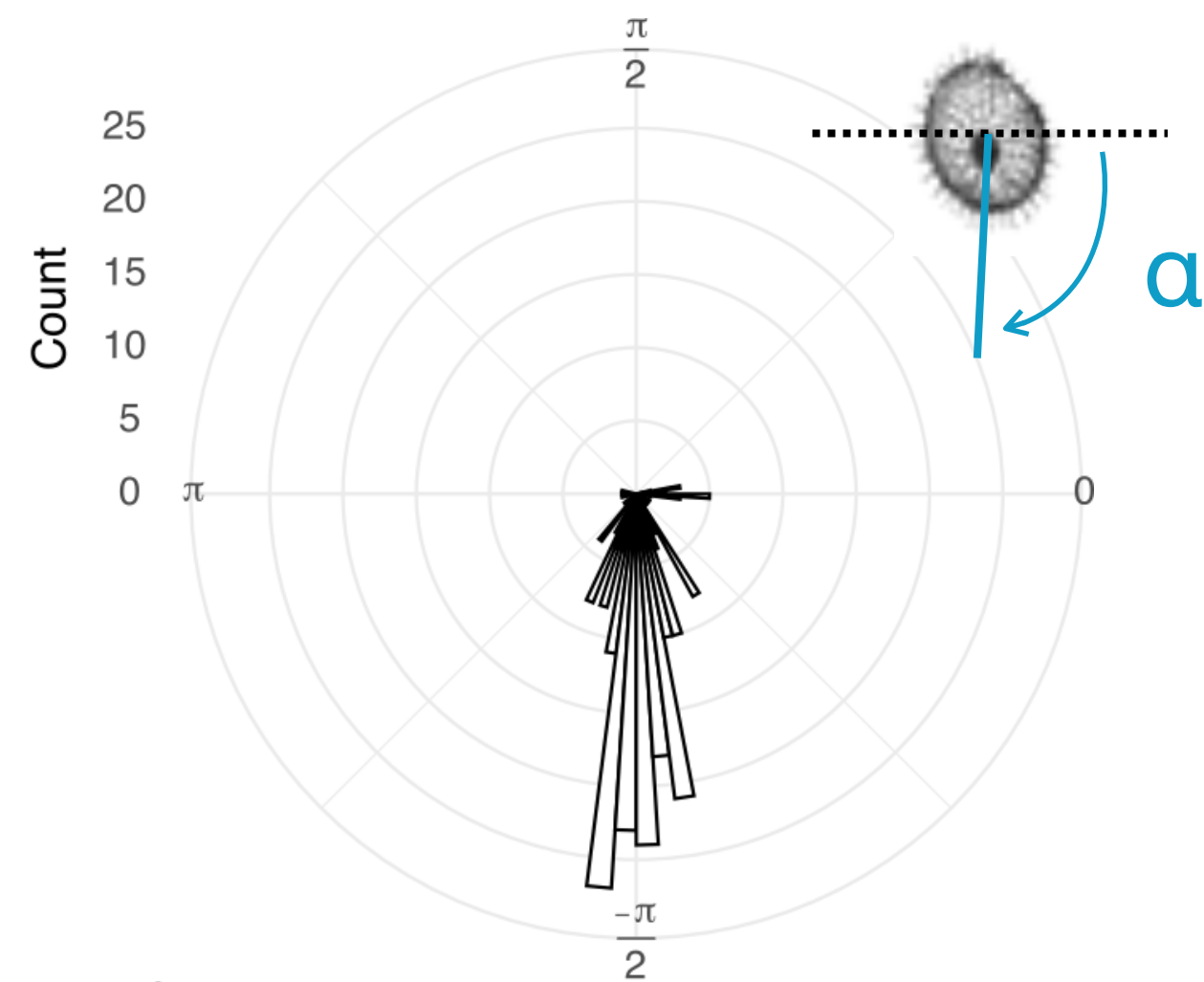
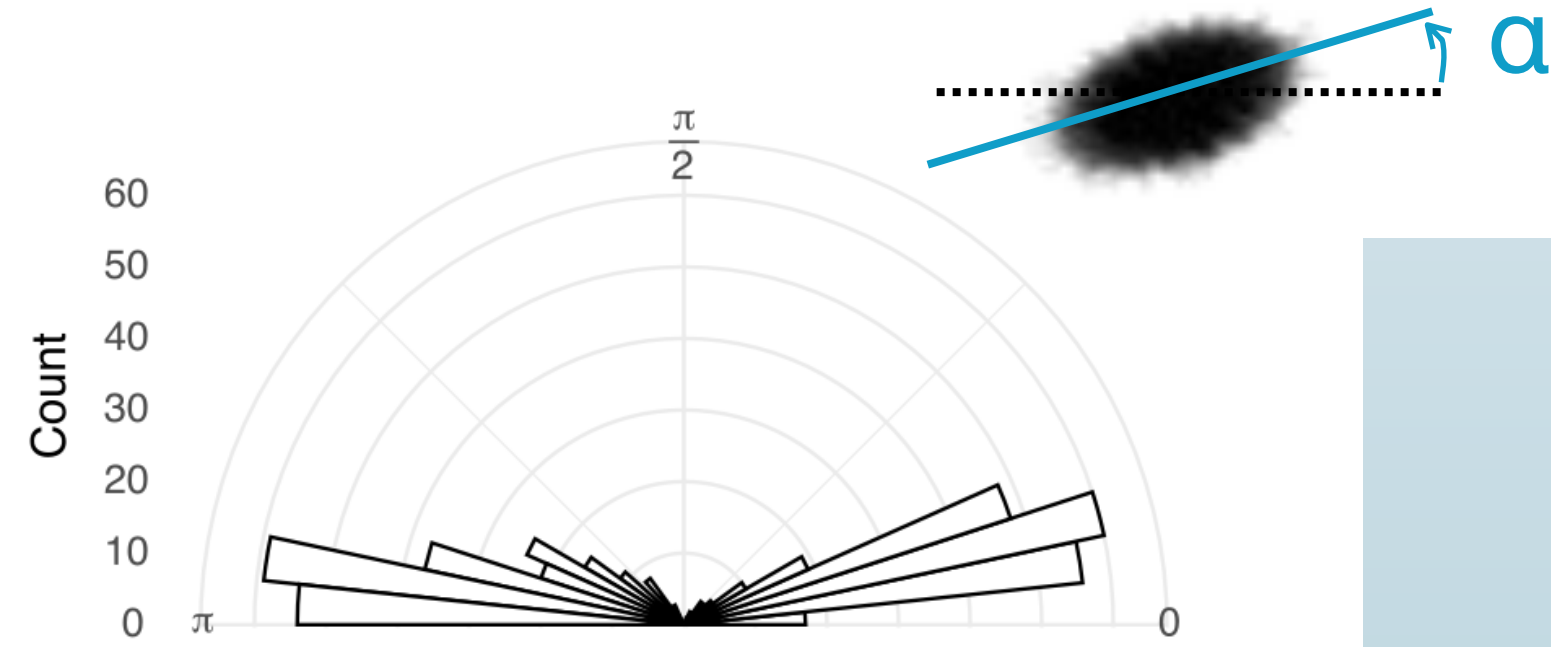
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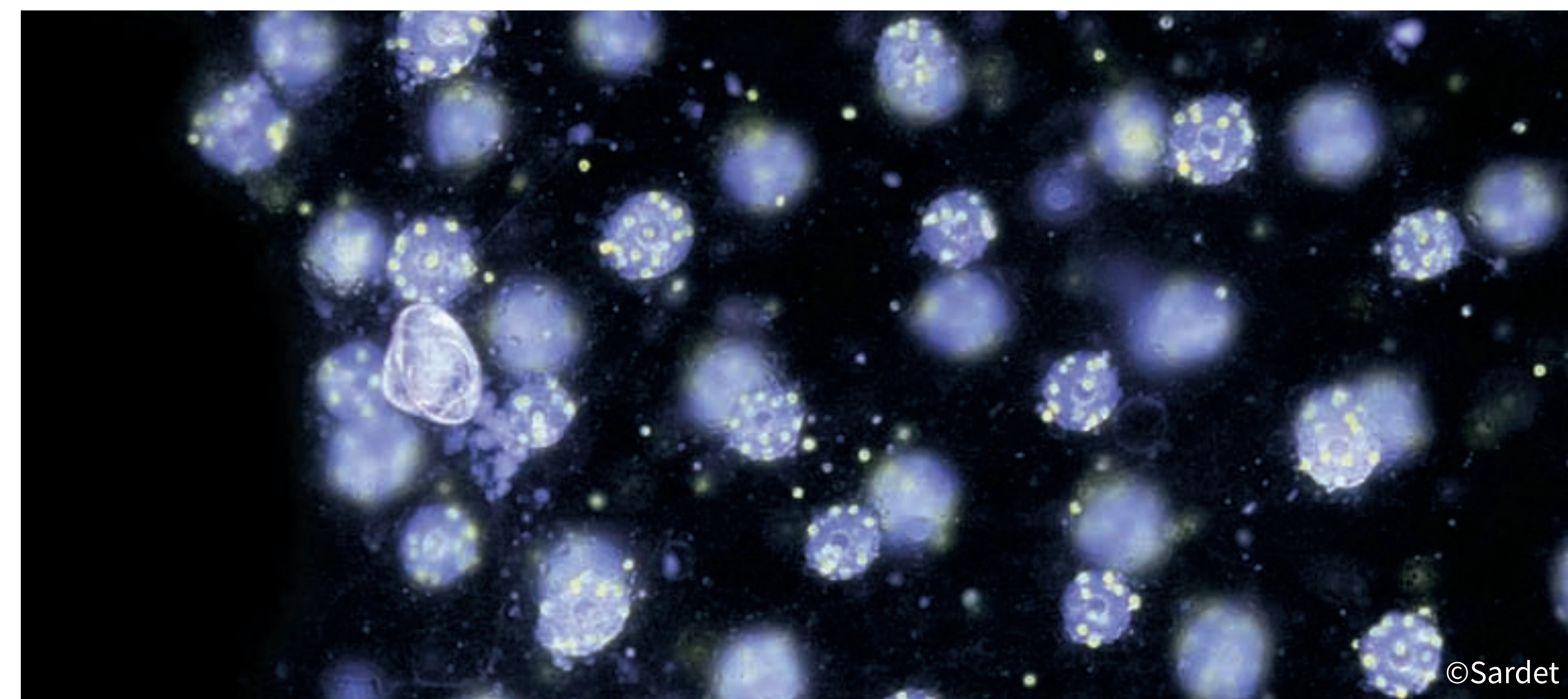
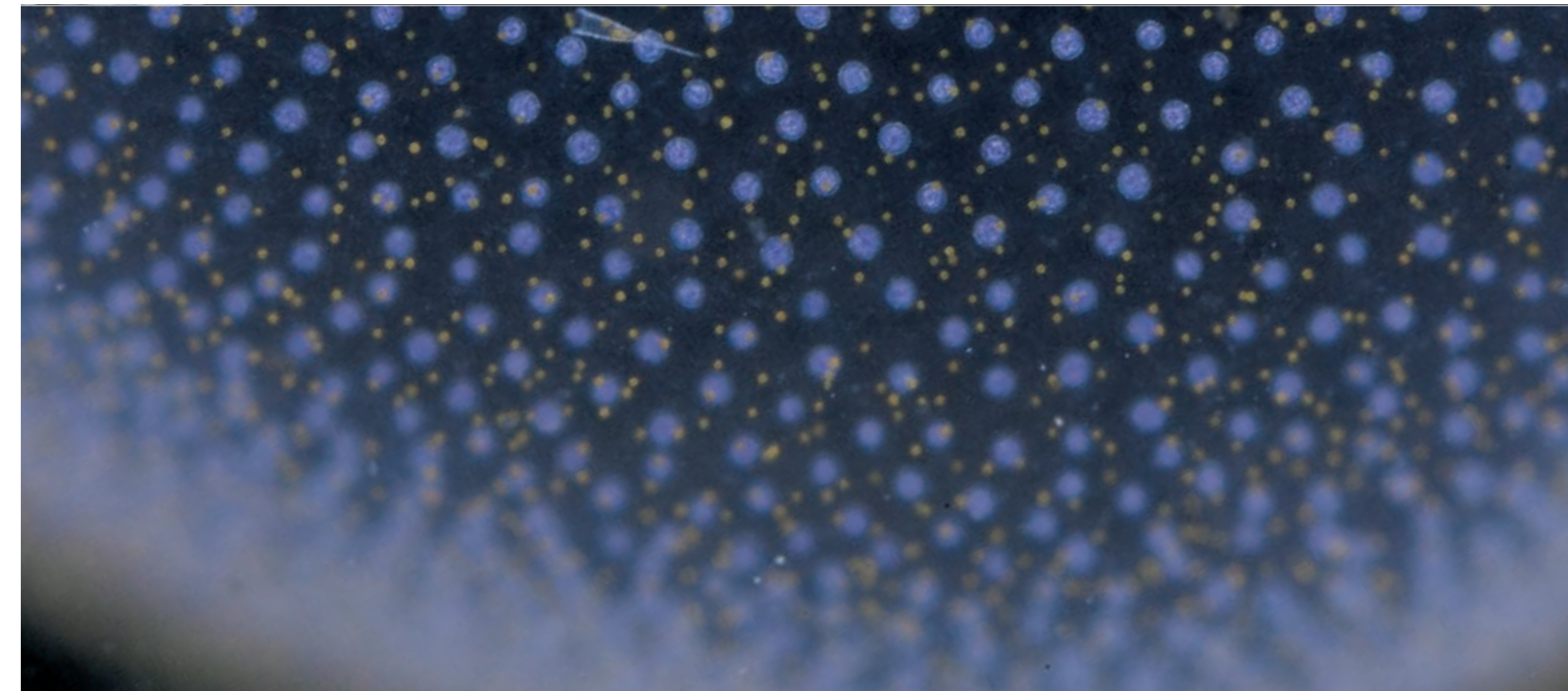
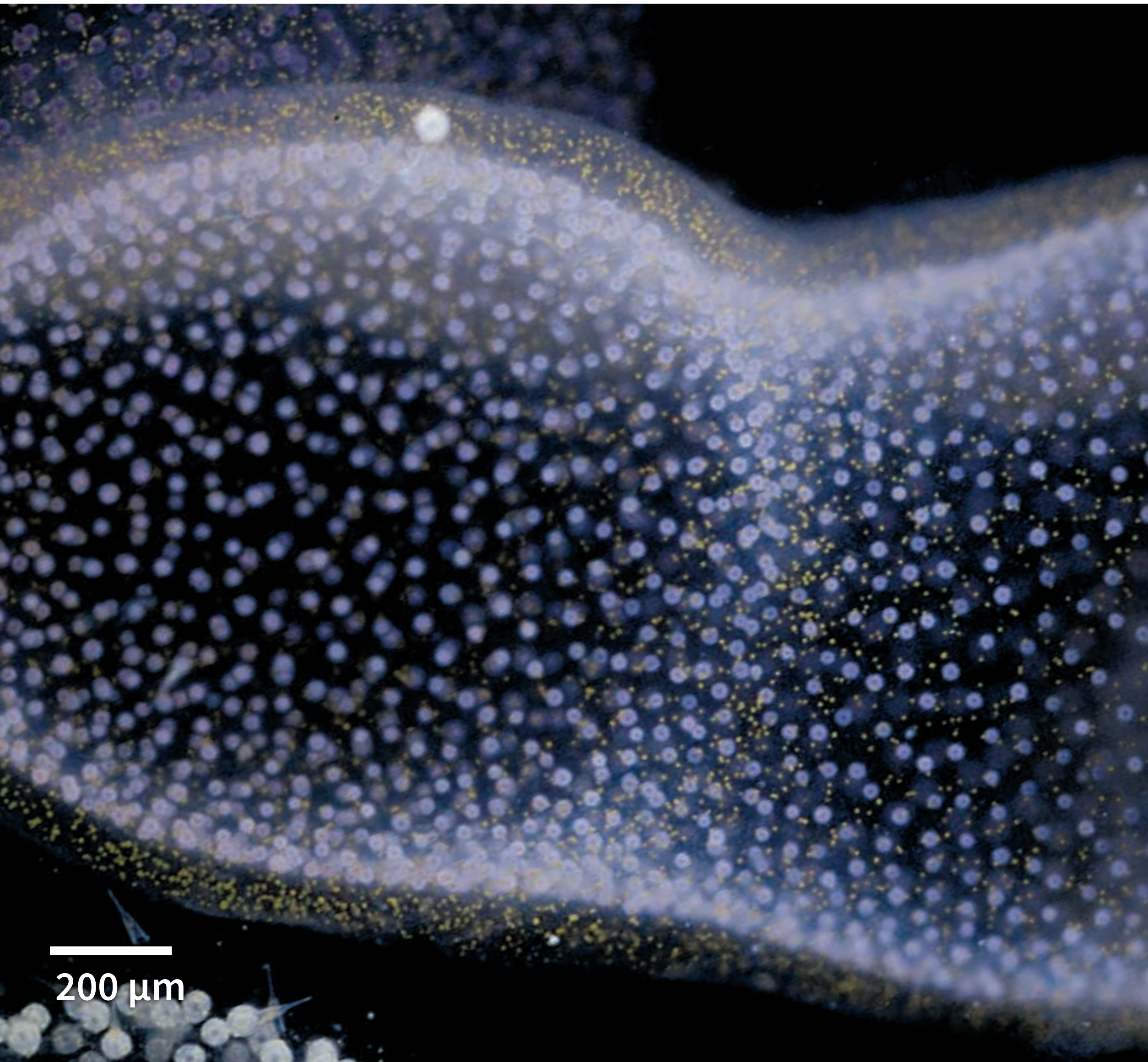


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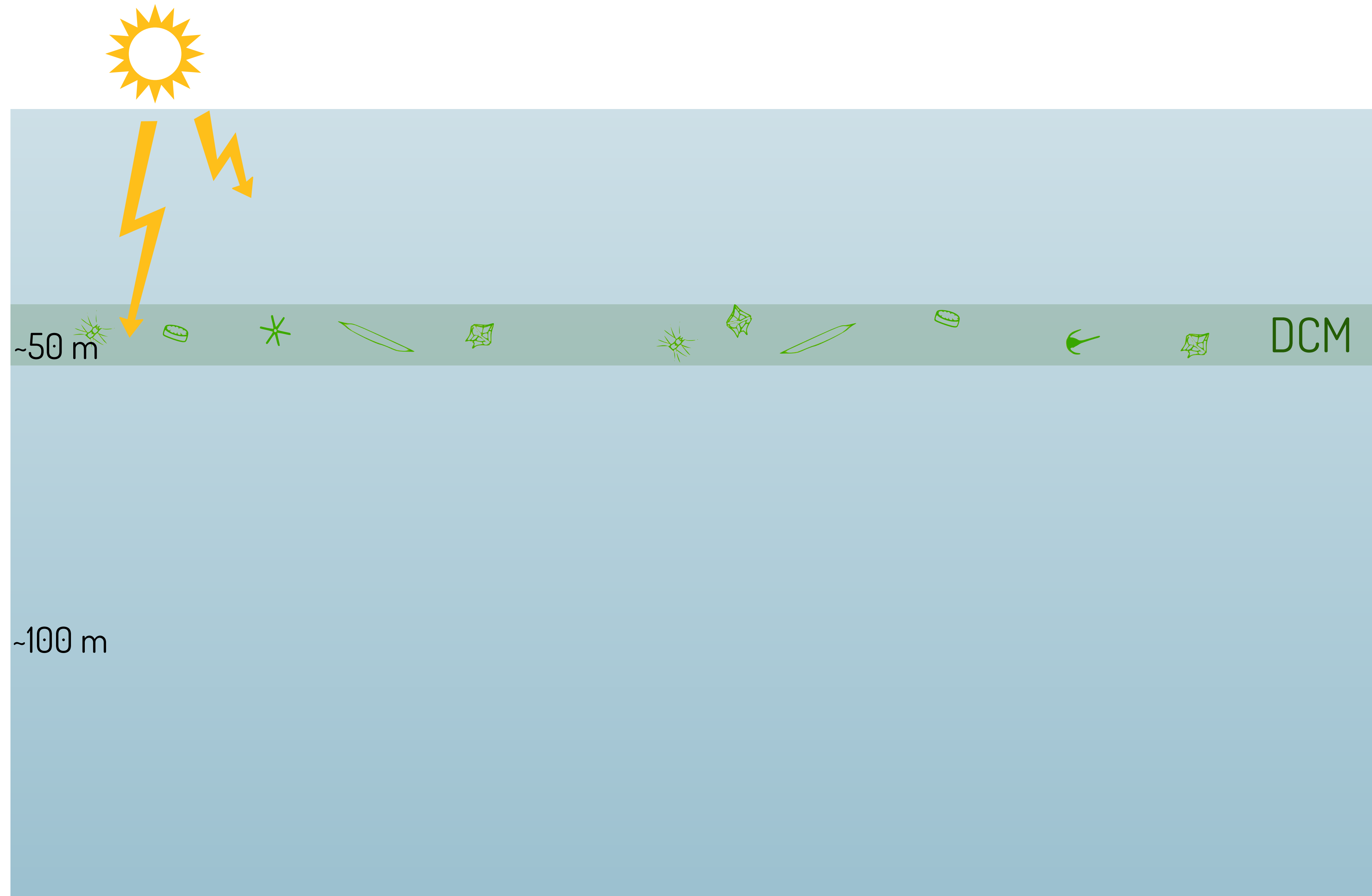


Protistes: Collodaires

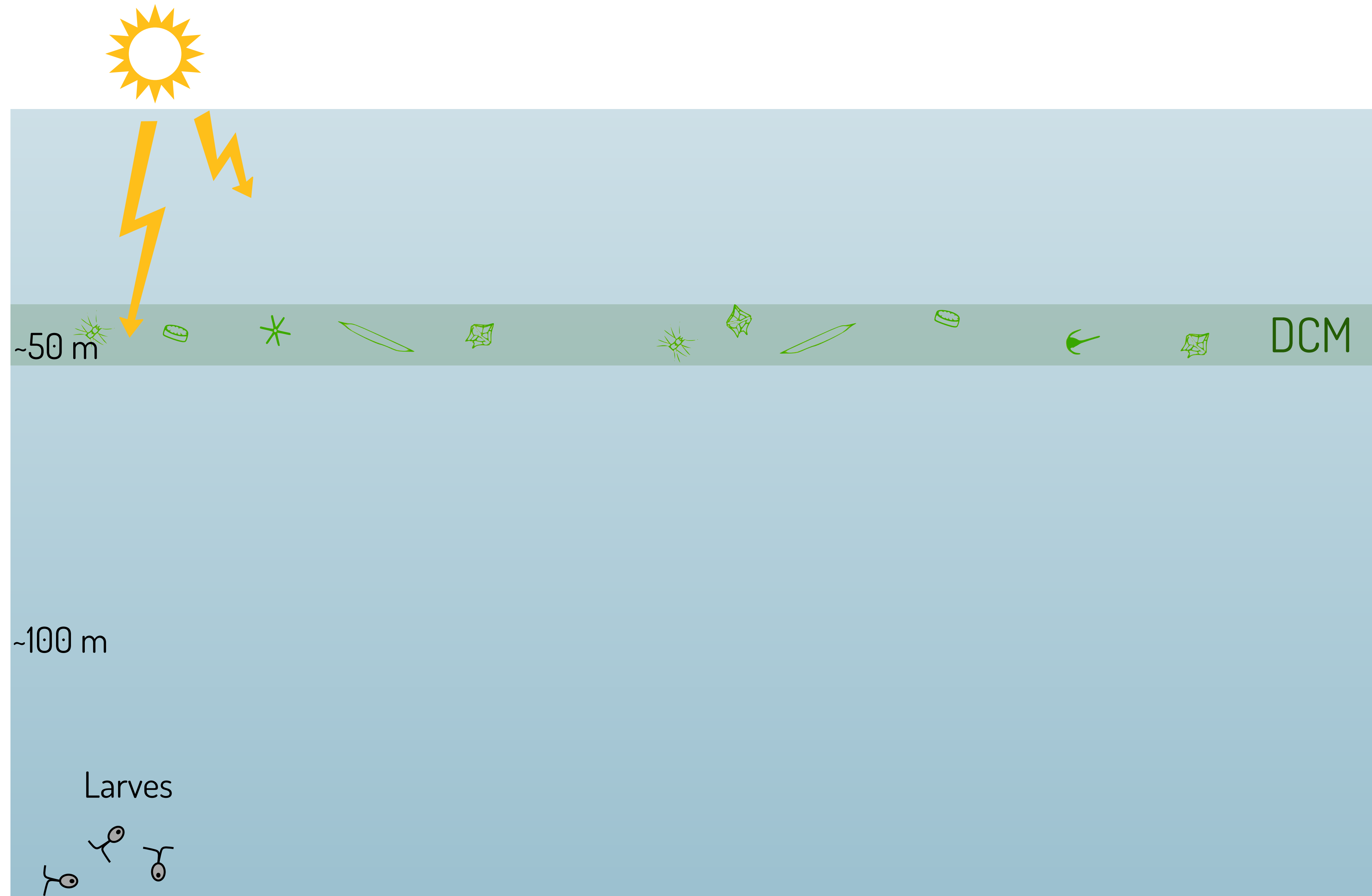
La vie en colonie



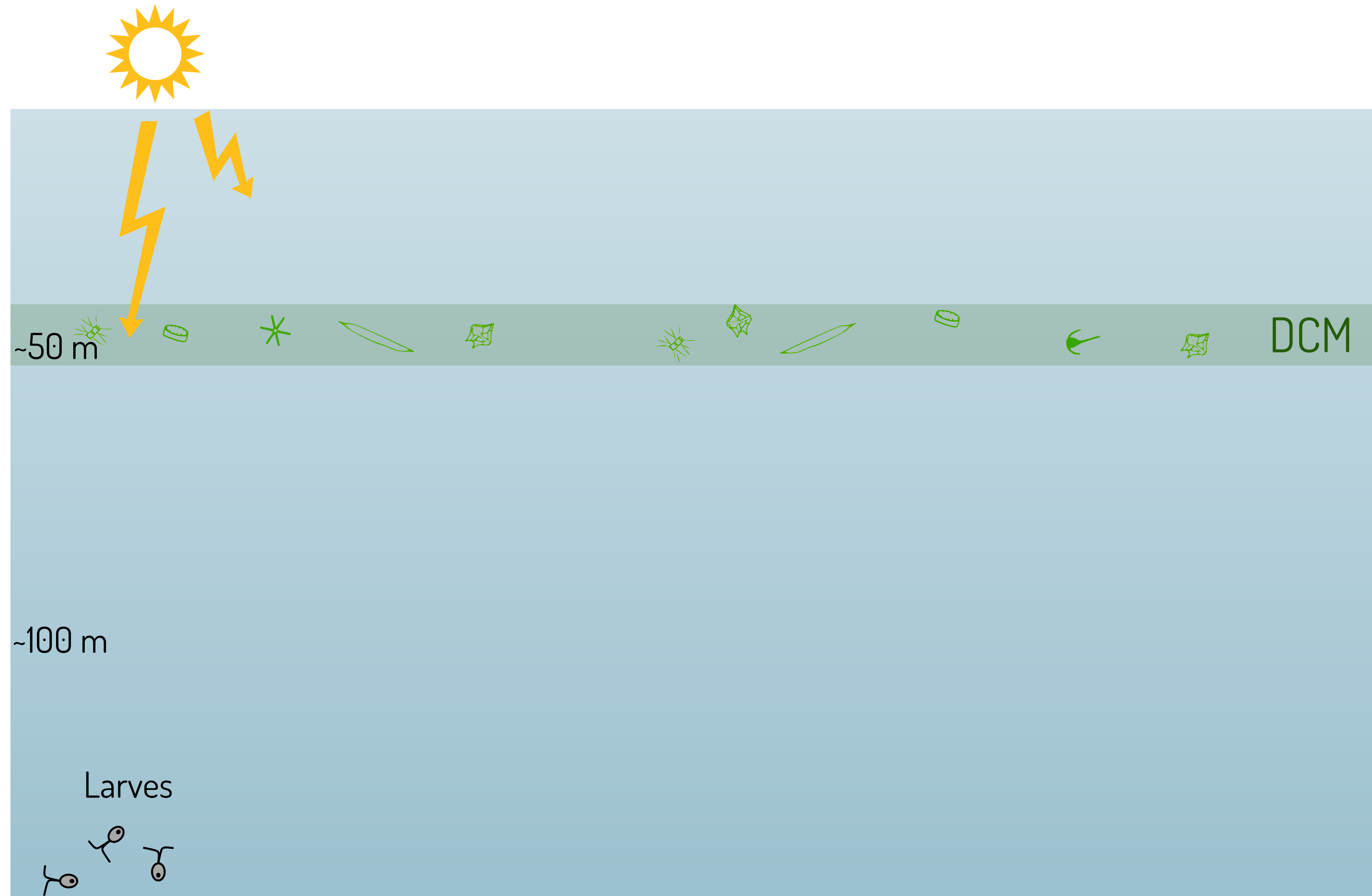
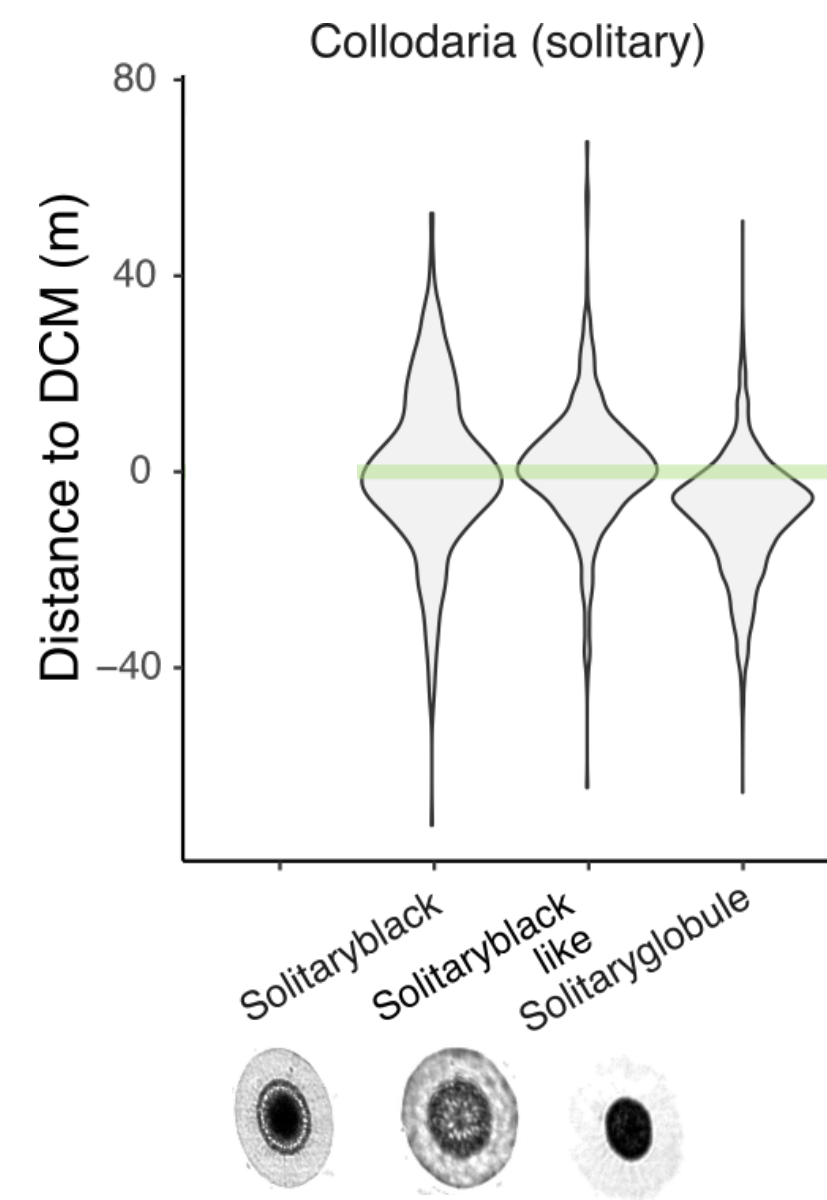
Mixotrophie et acquisition de symbiotes



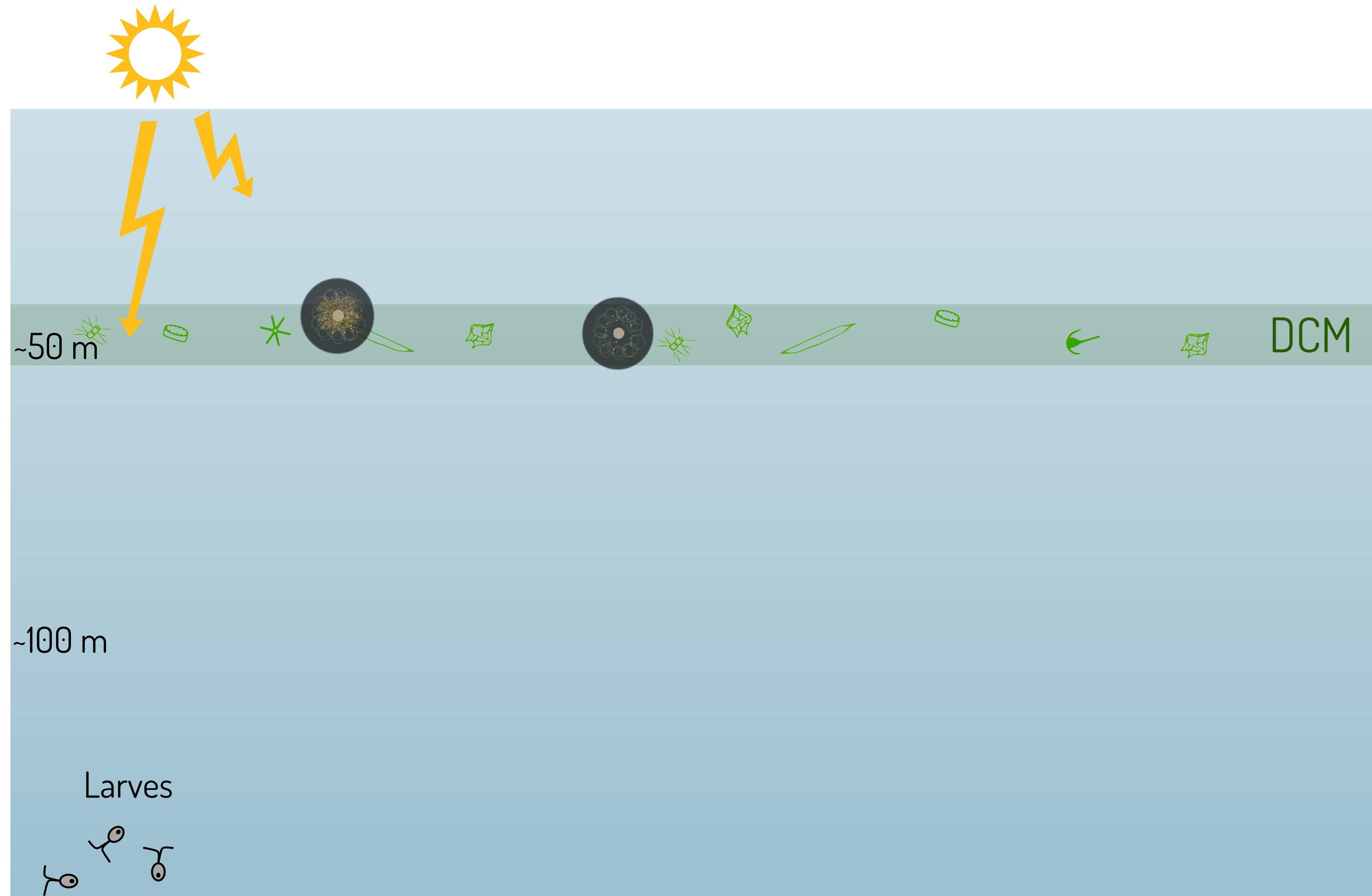
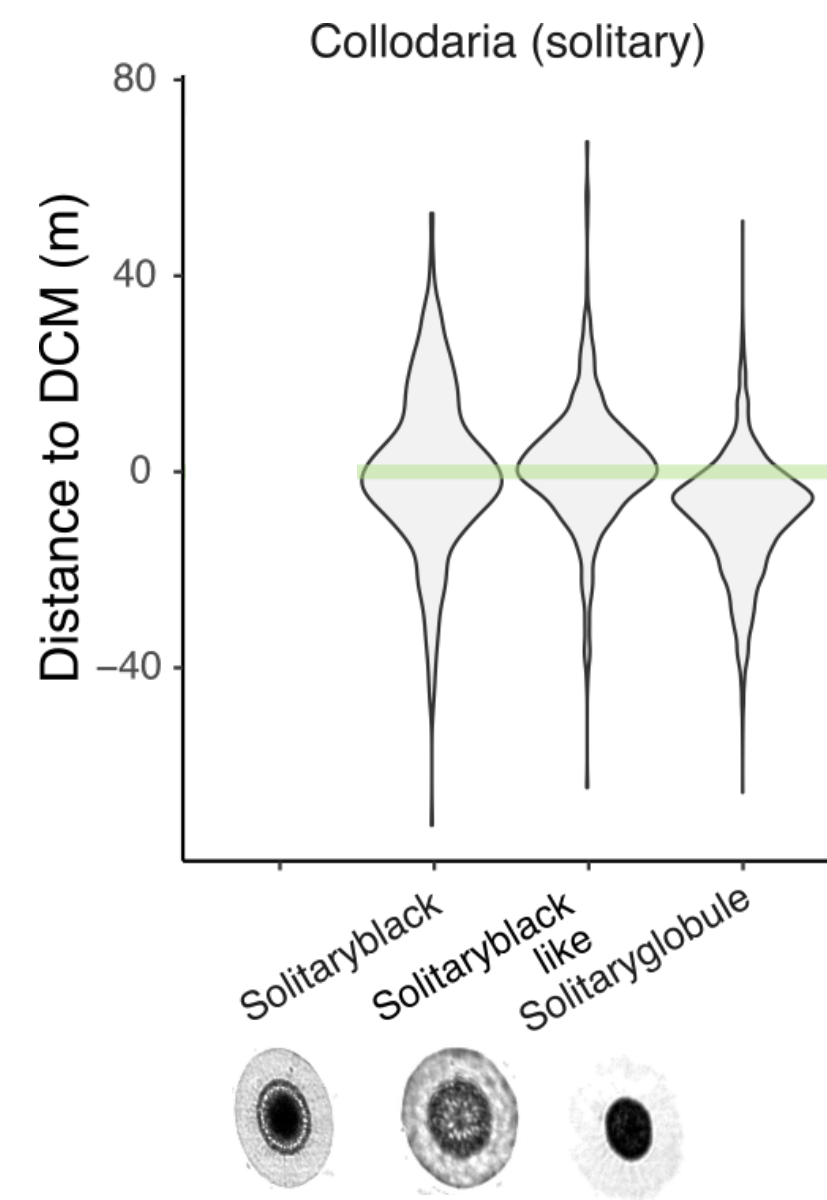
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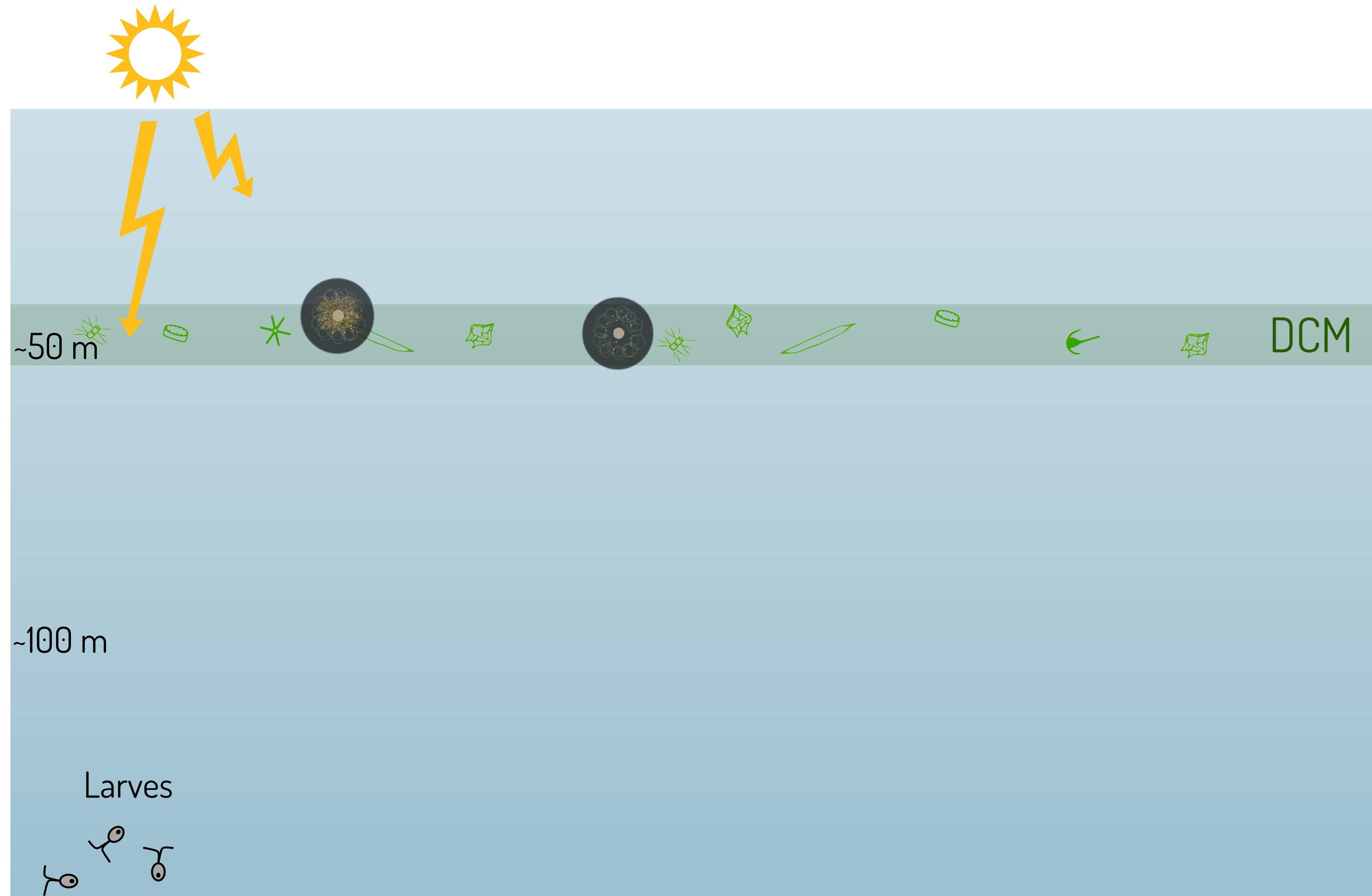
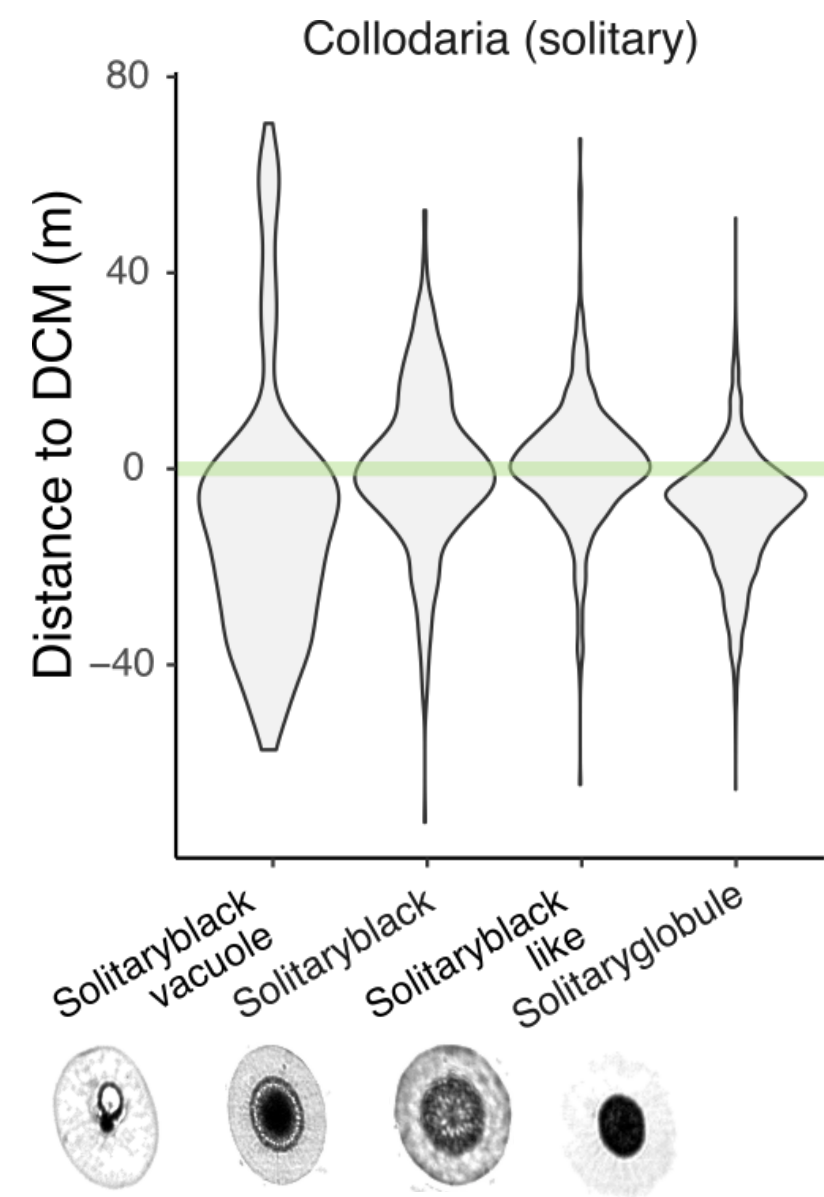
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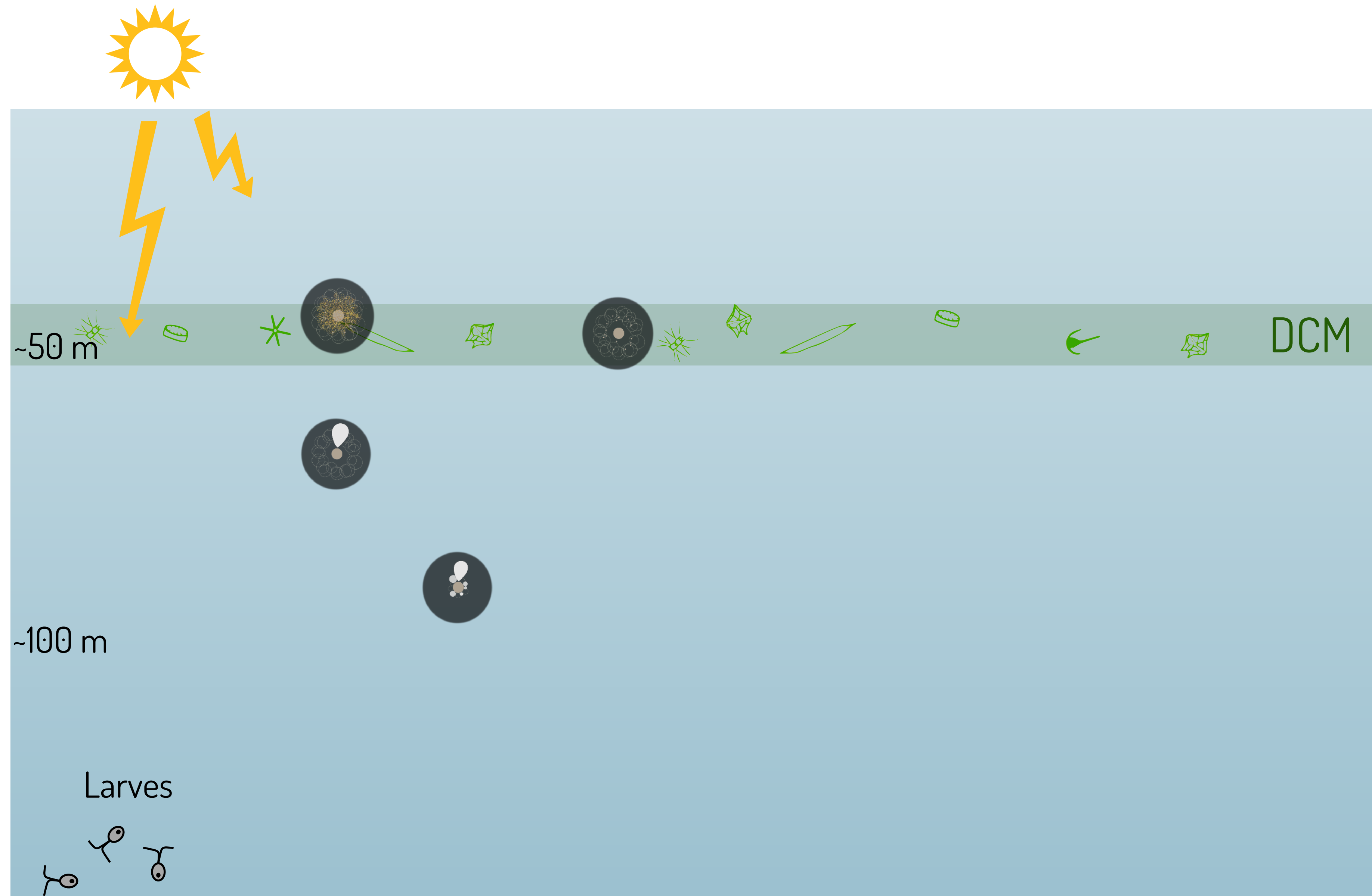
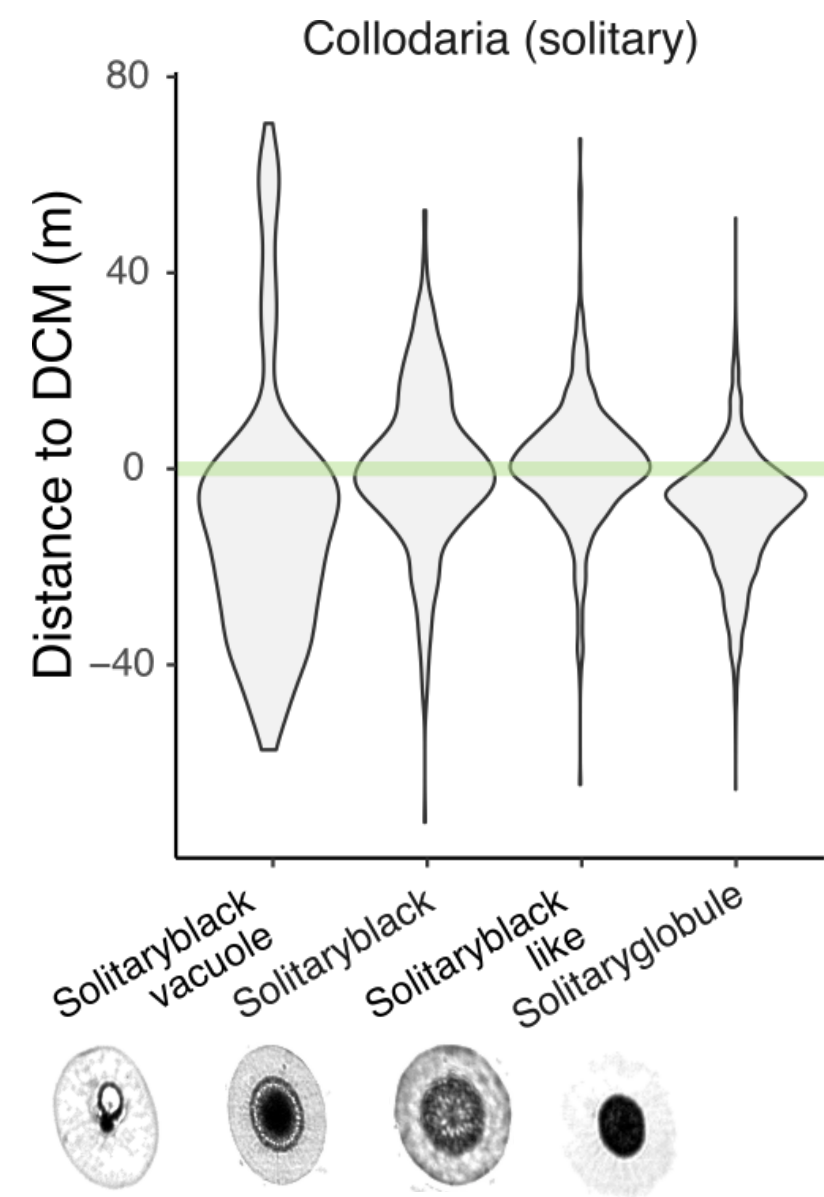
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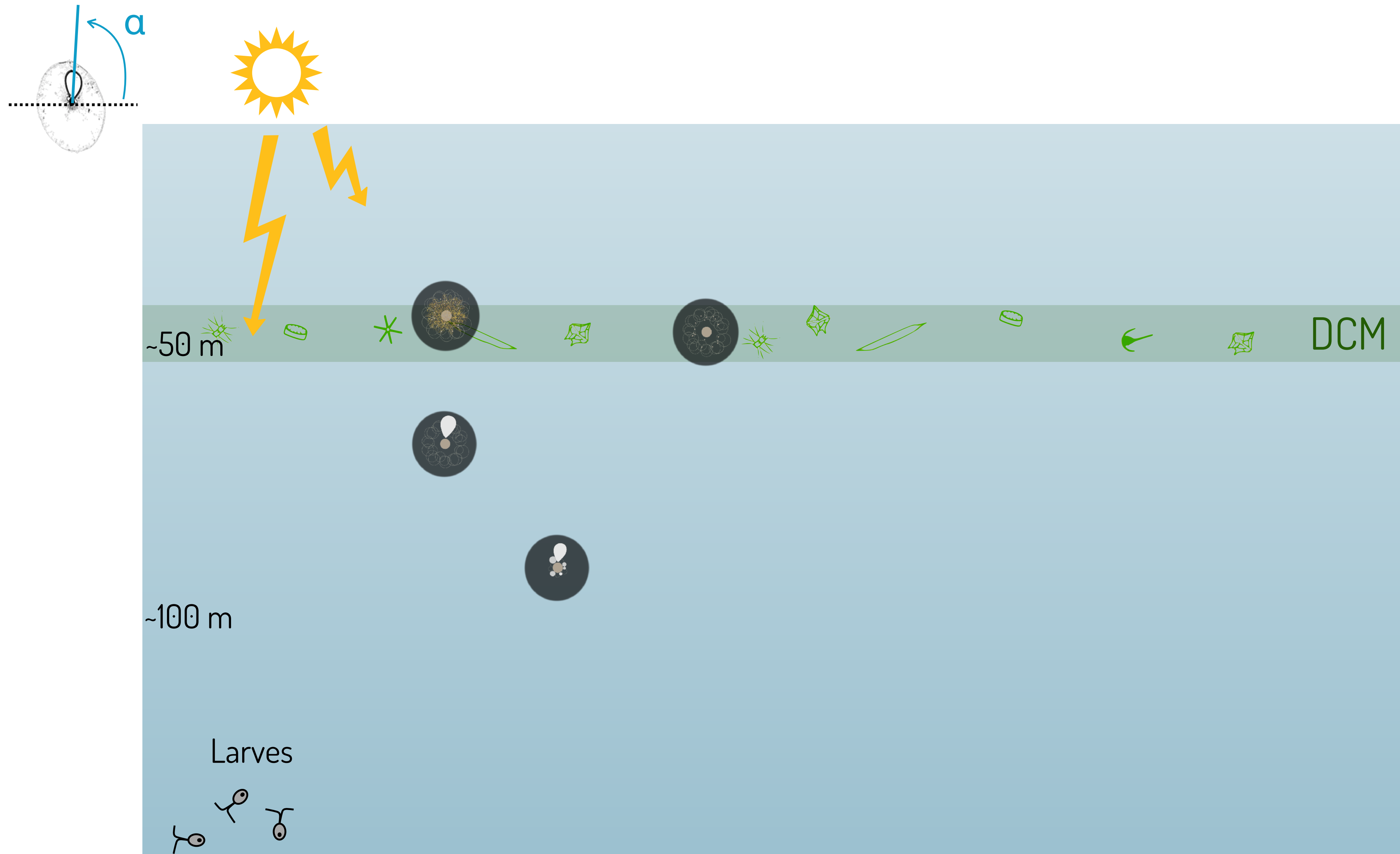
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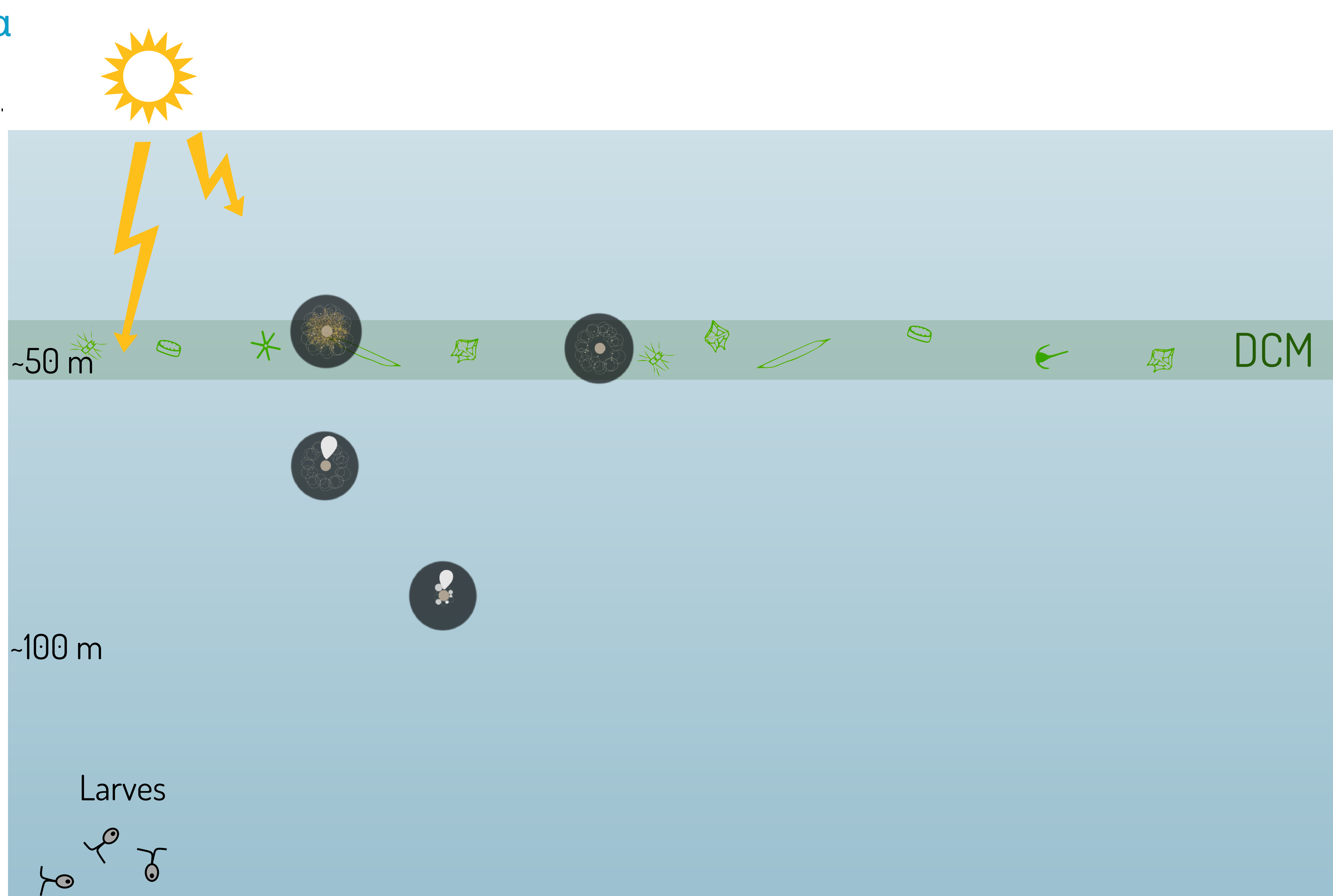
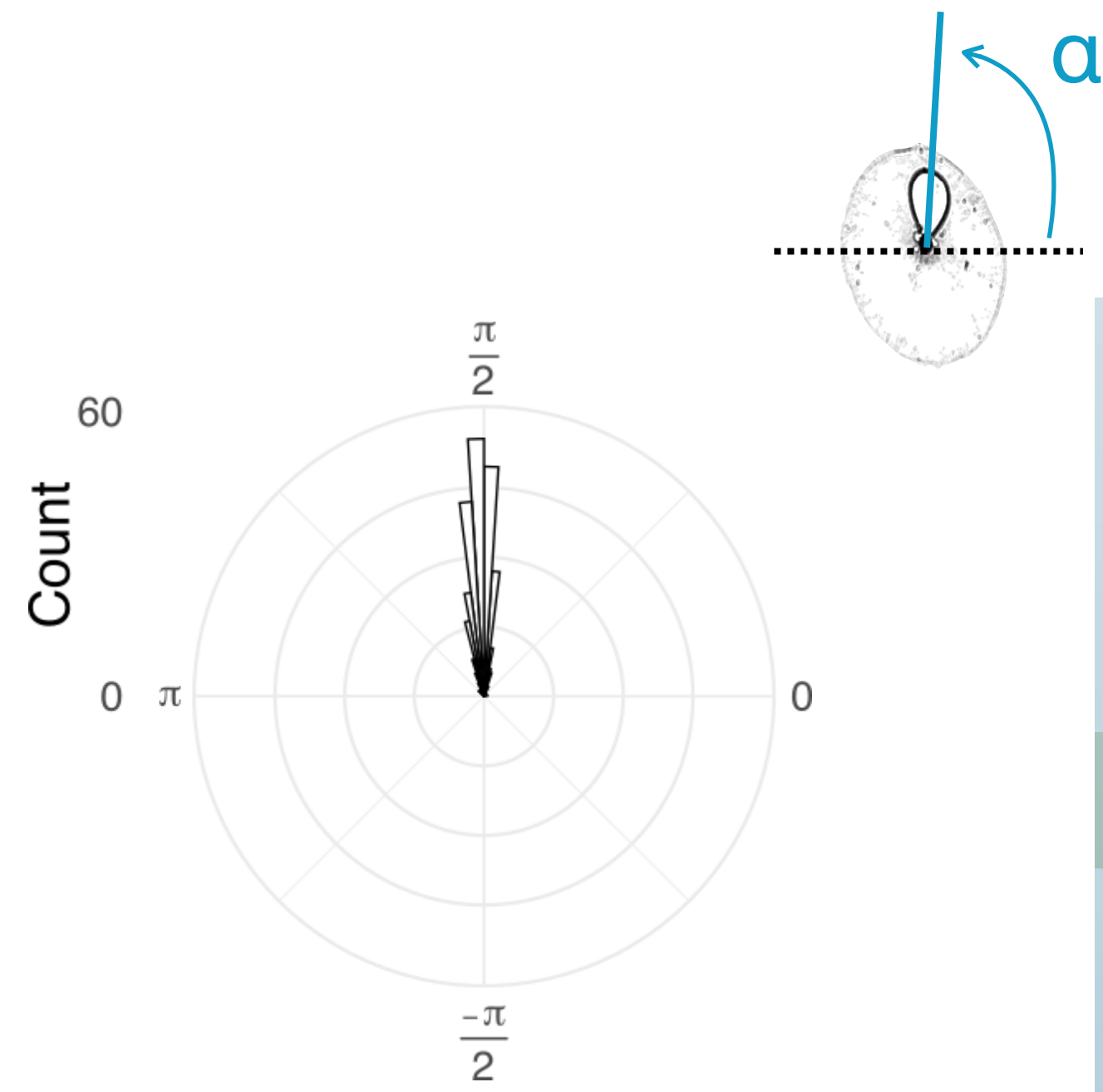
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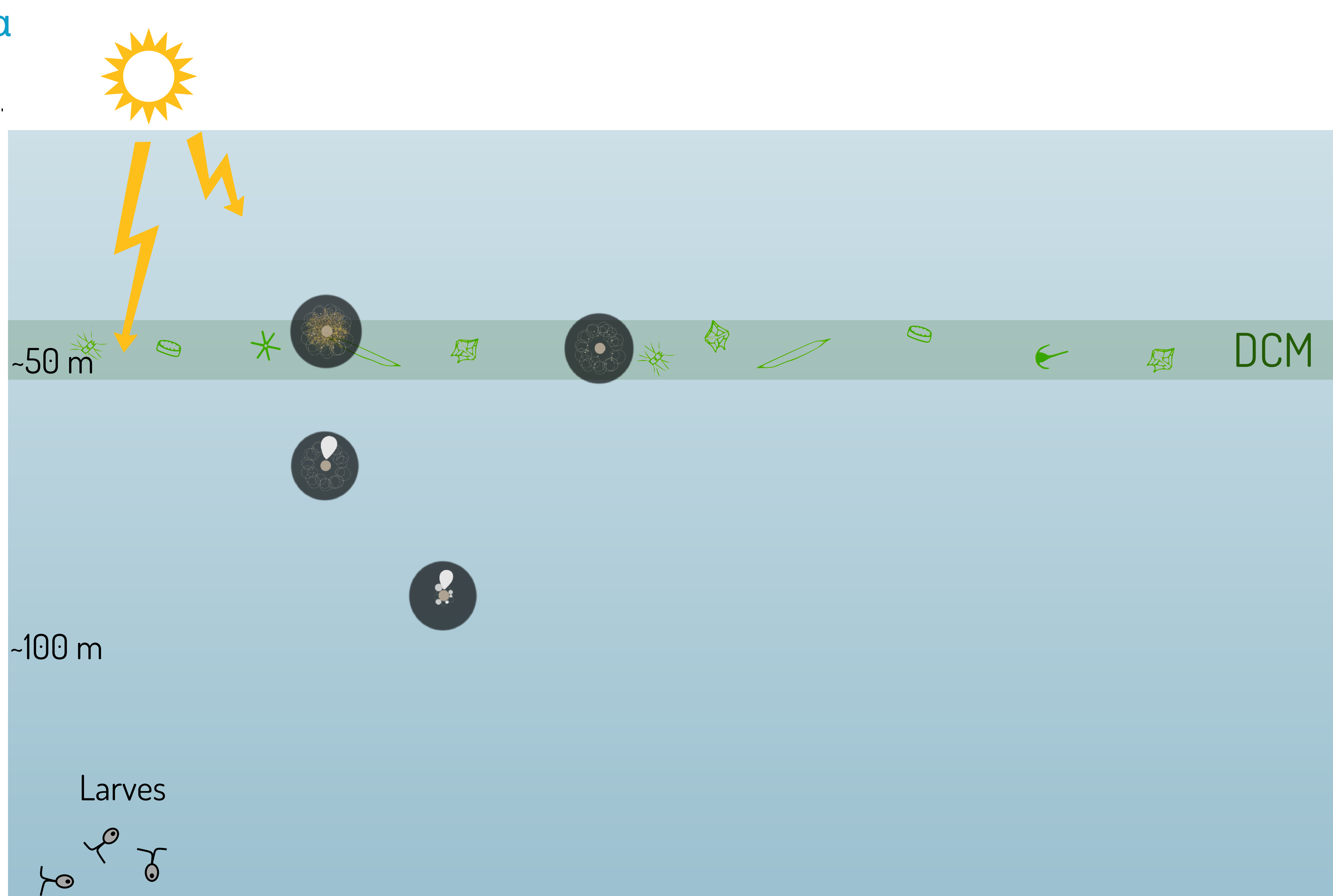
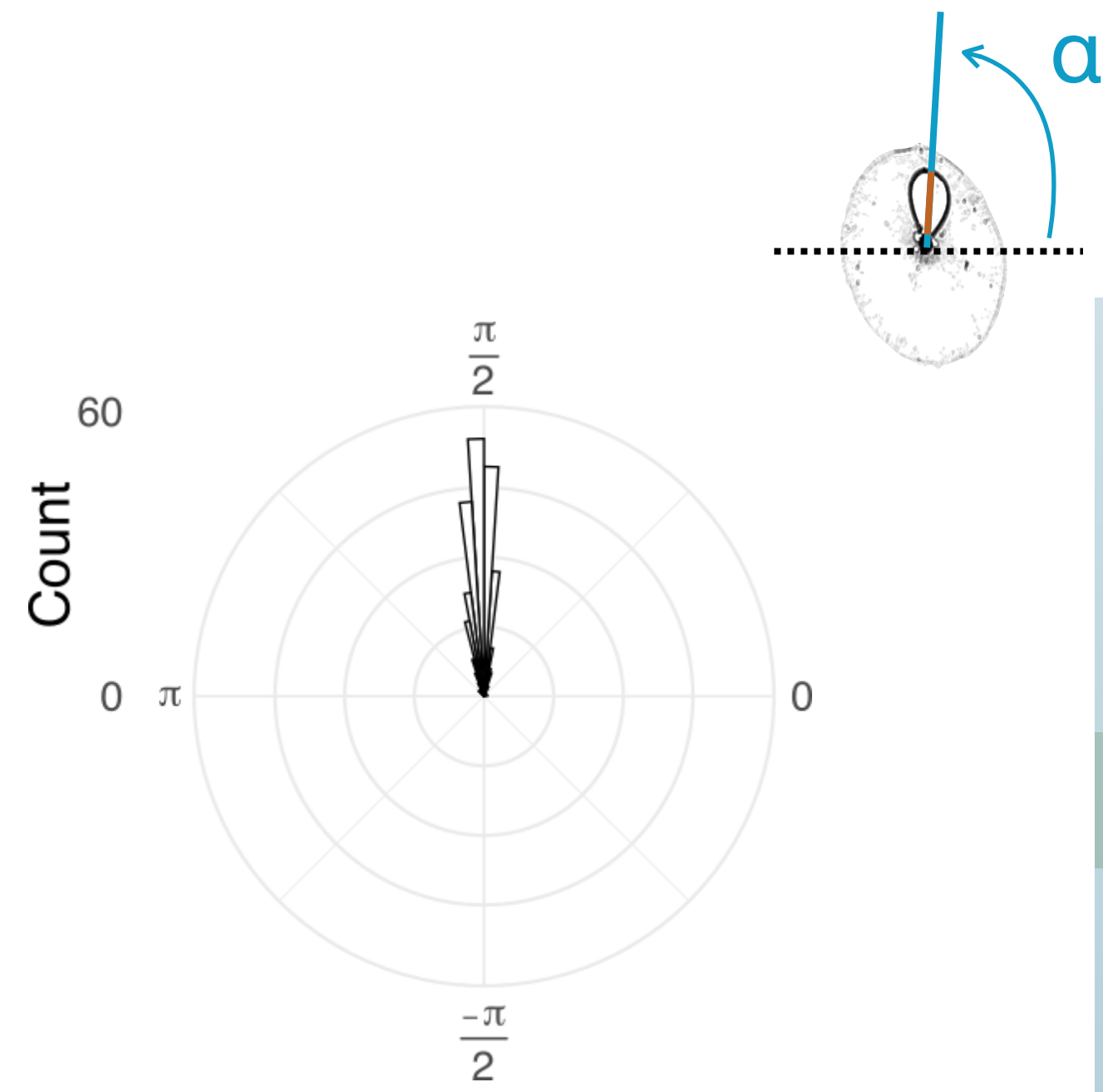
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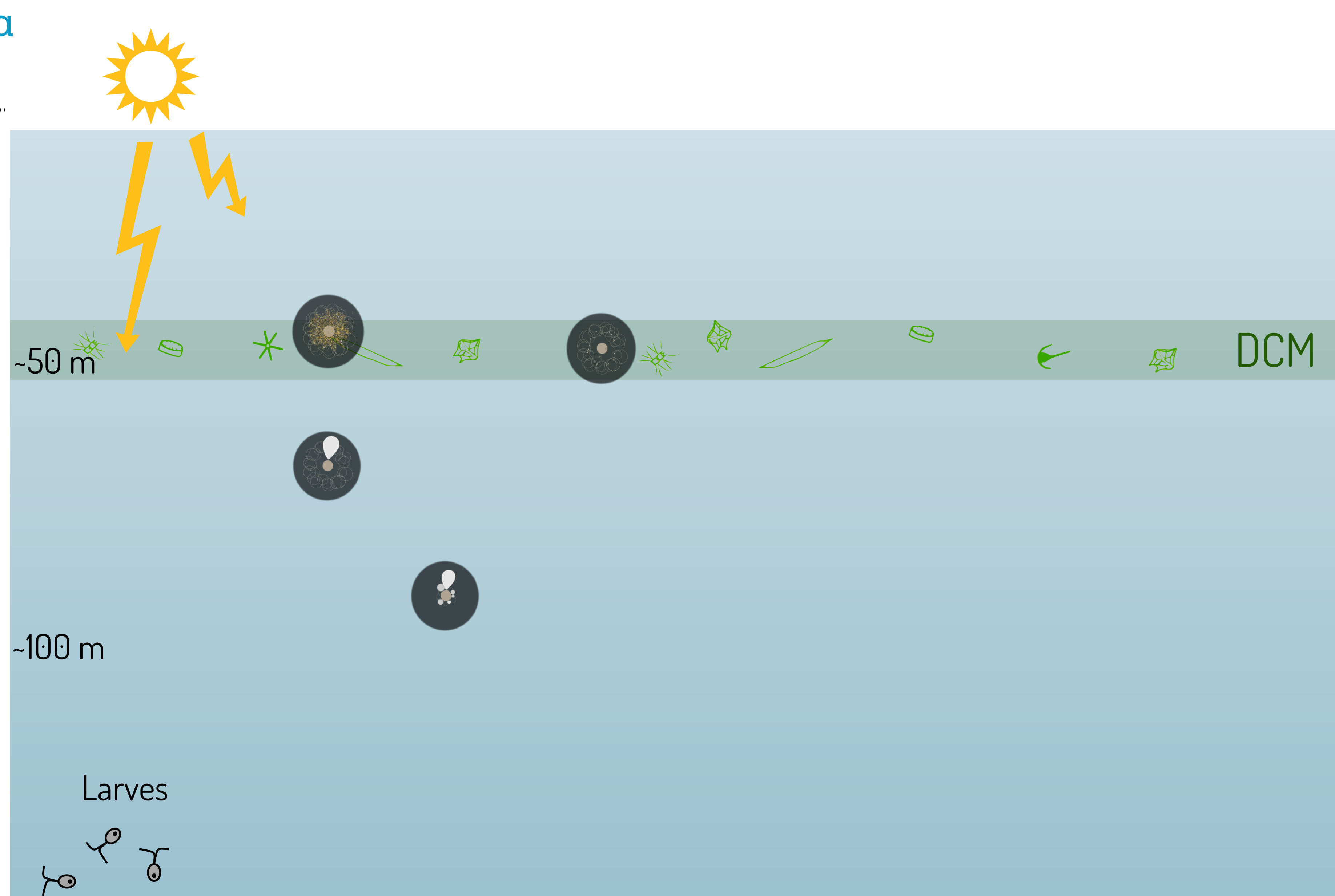
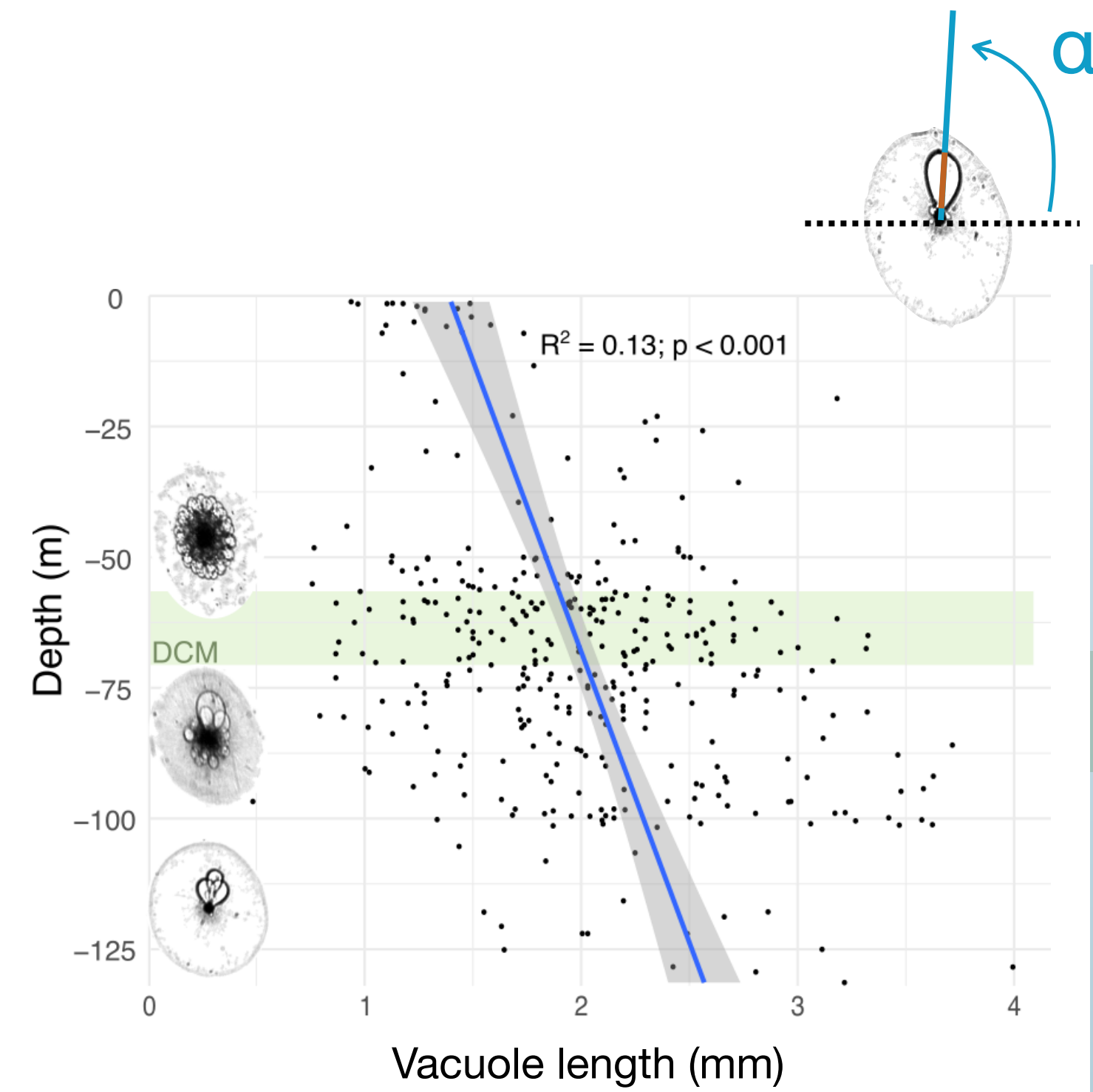
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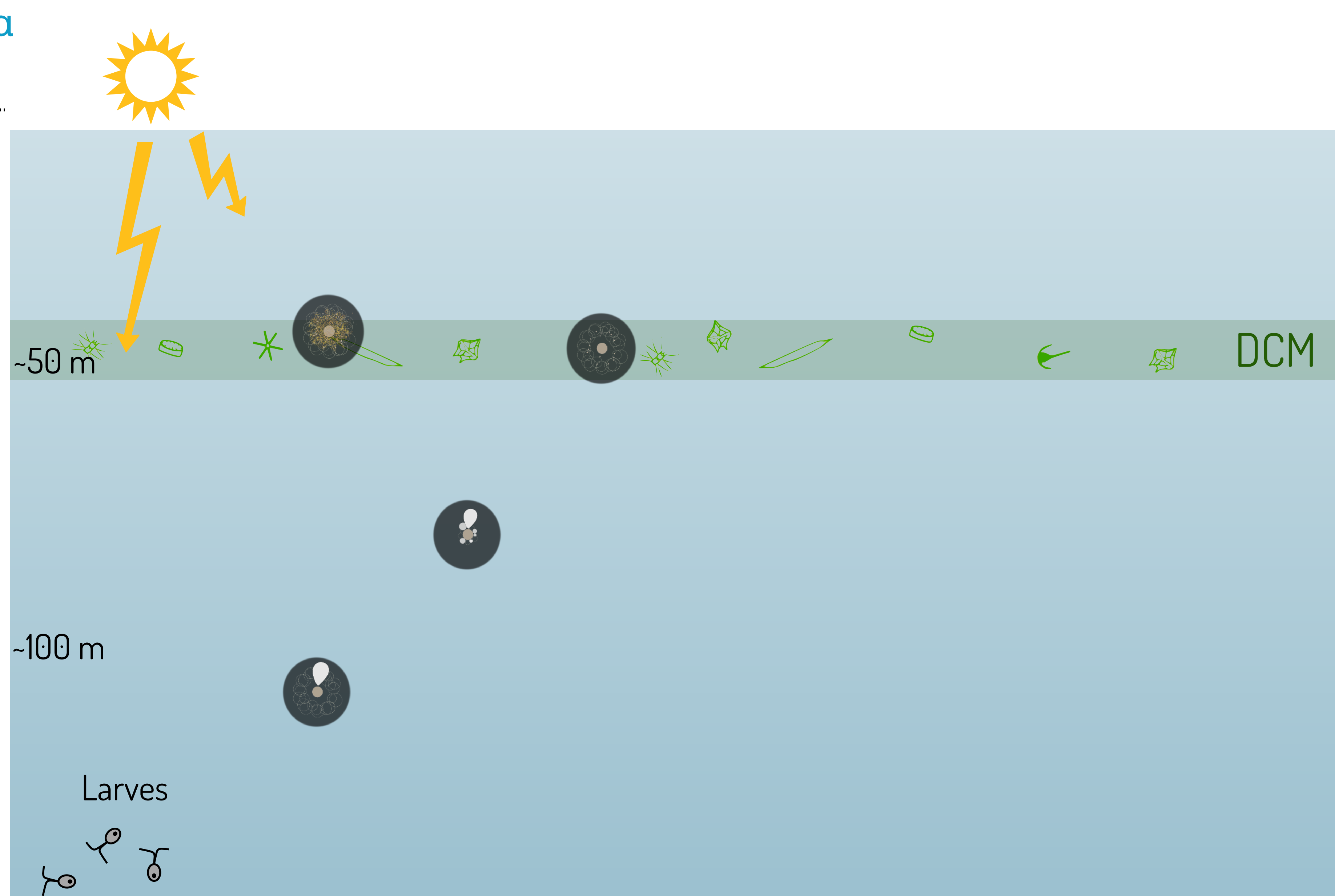
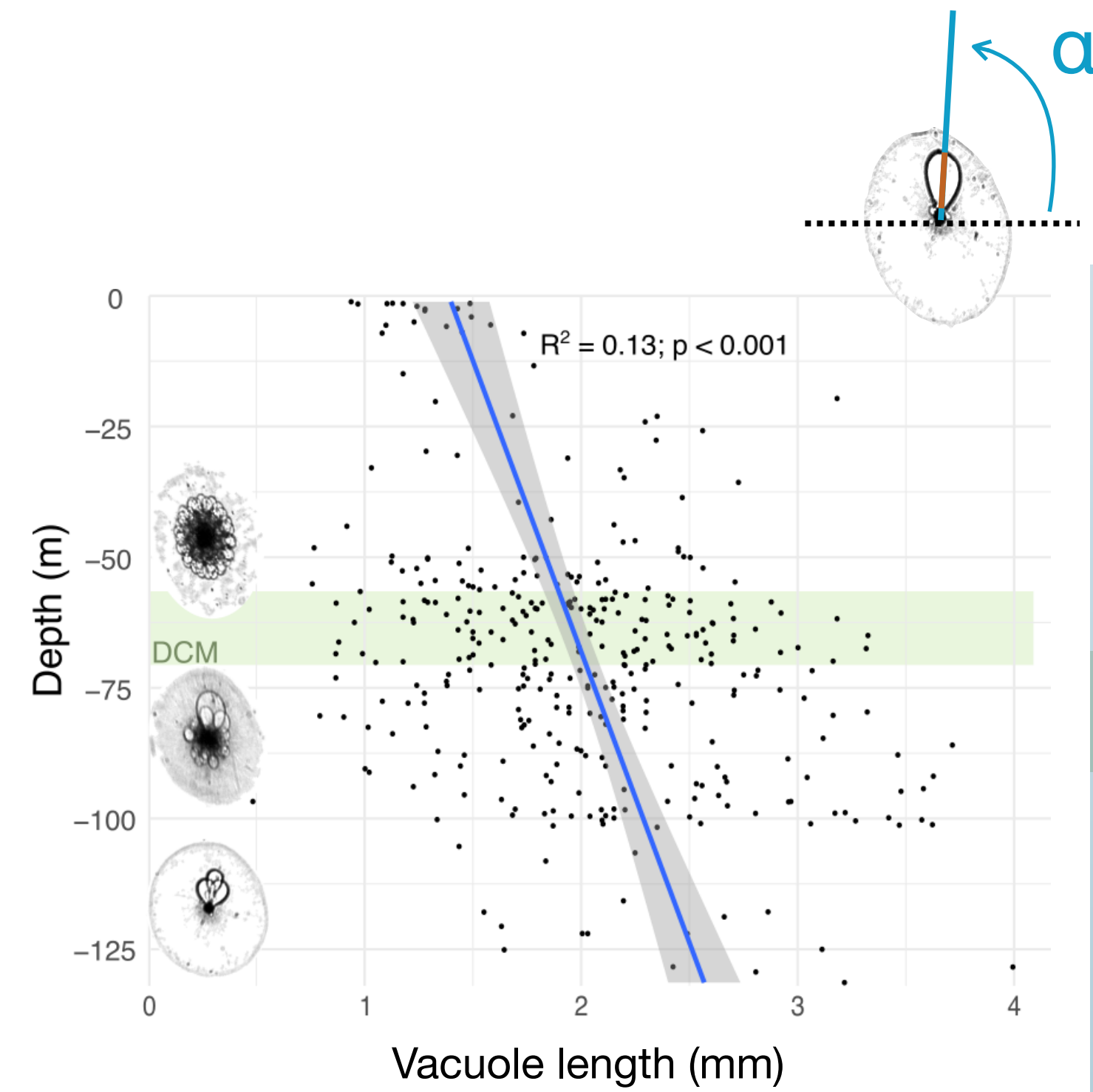
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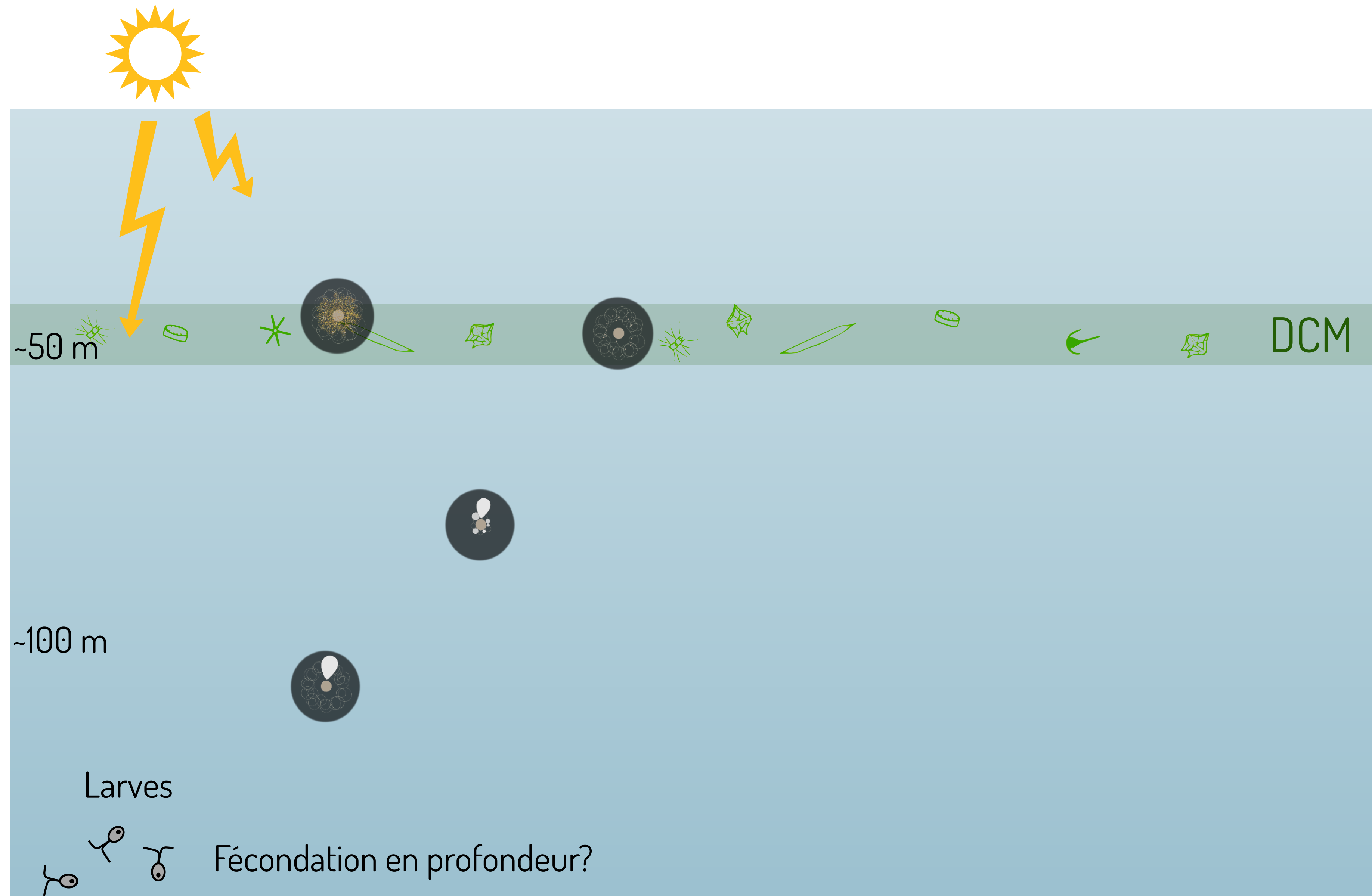
Mixotrophie et acquisition de symbiotes



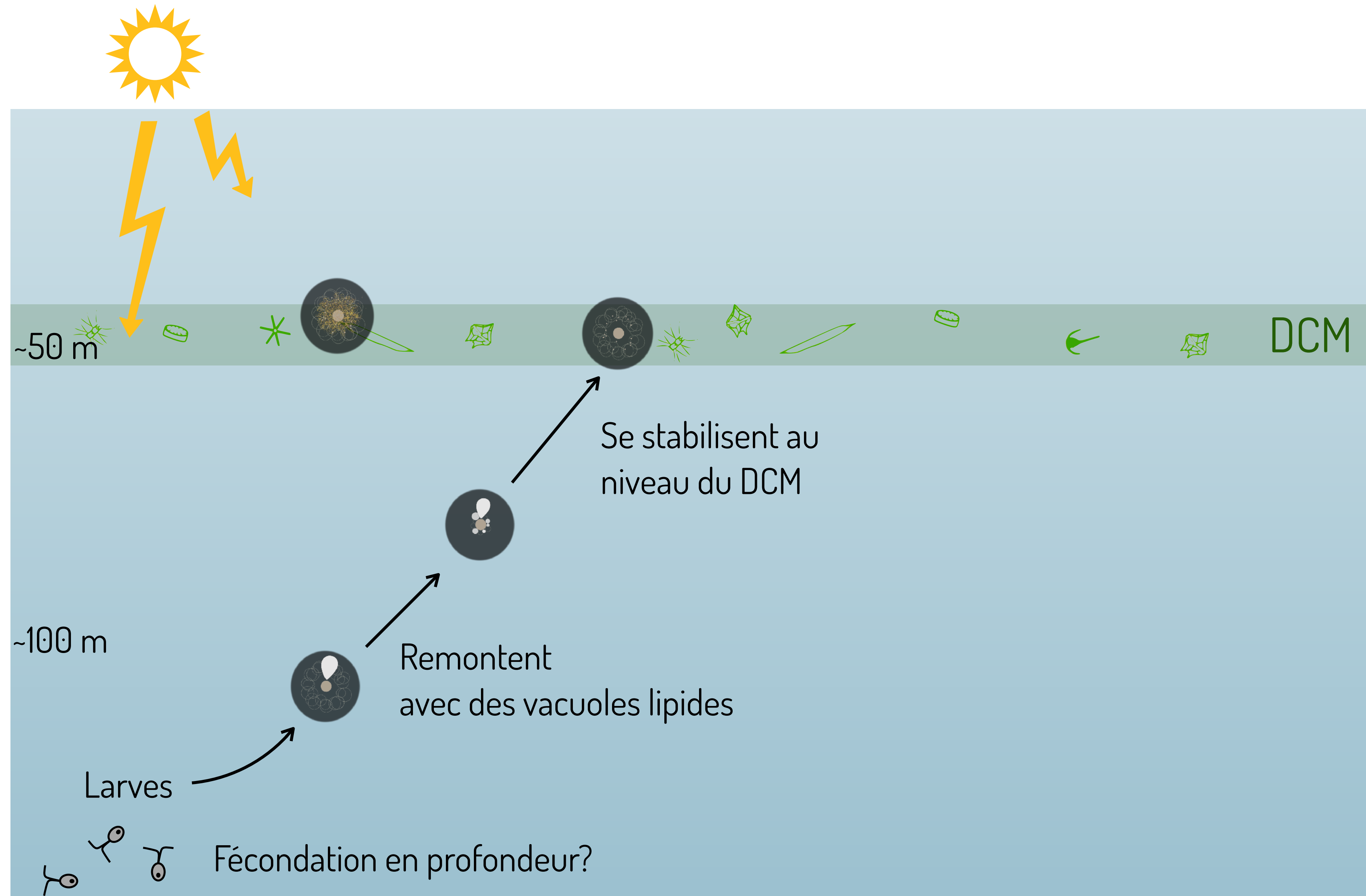
Mixotrophie et acquisition de symbiotes



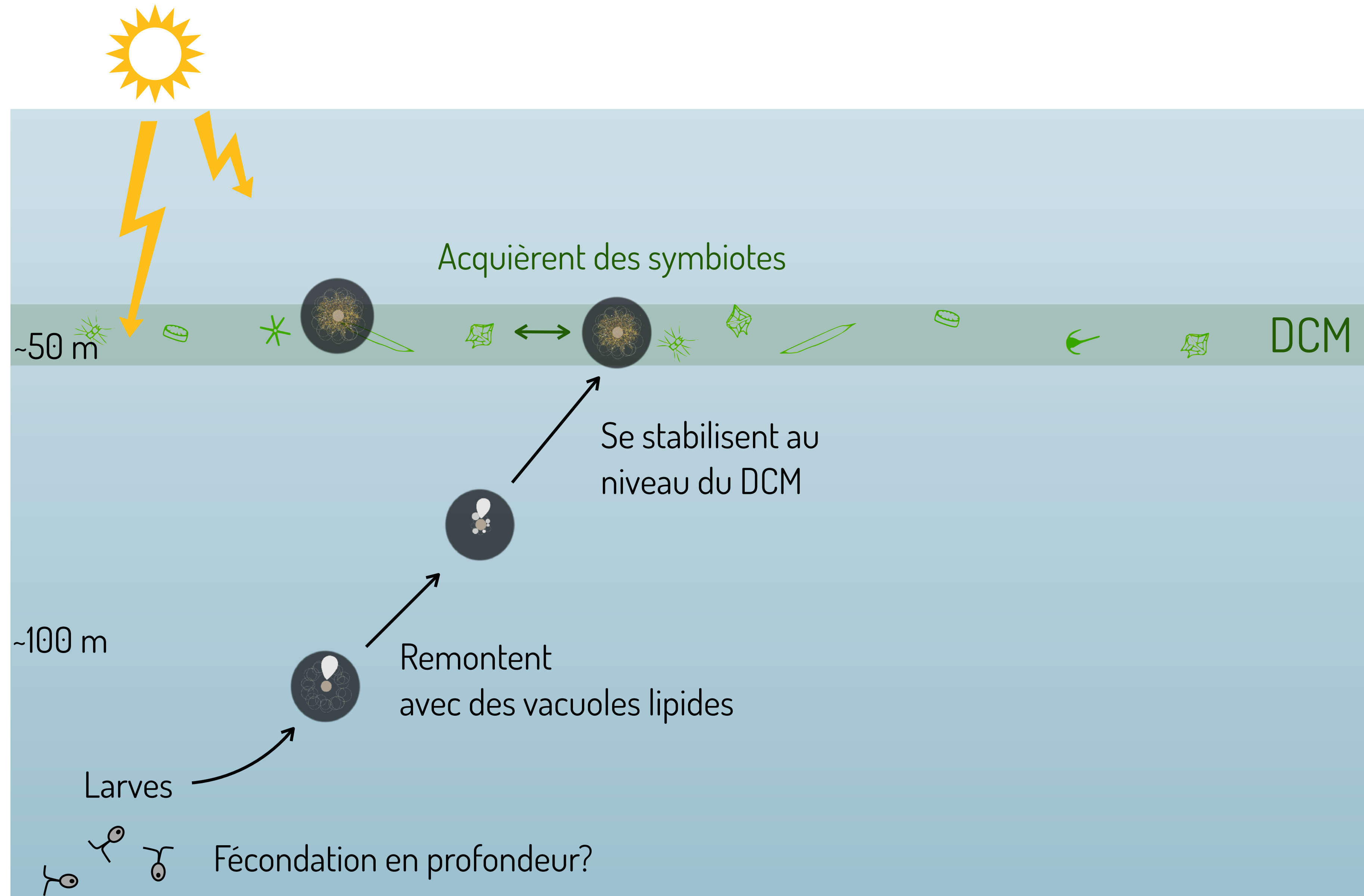
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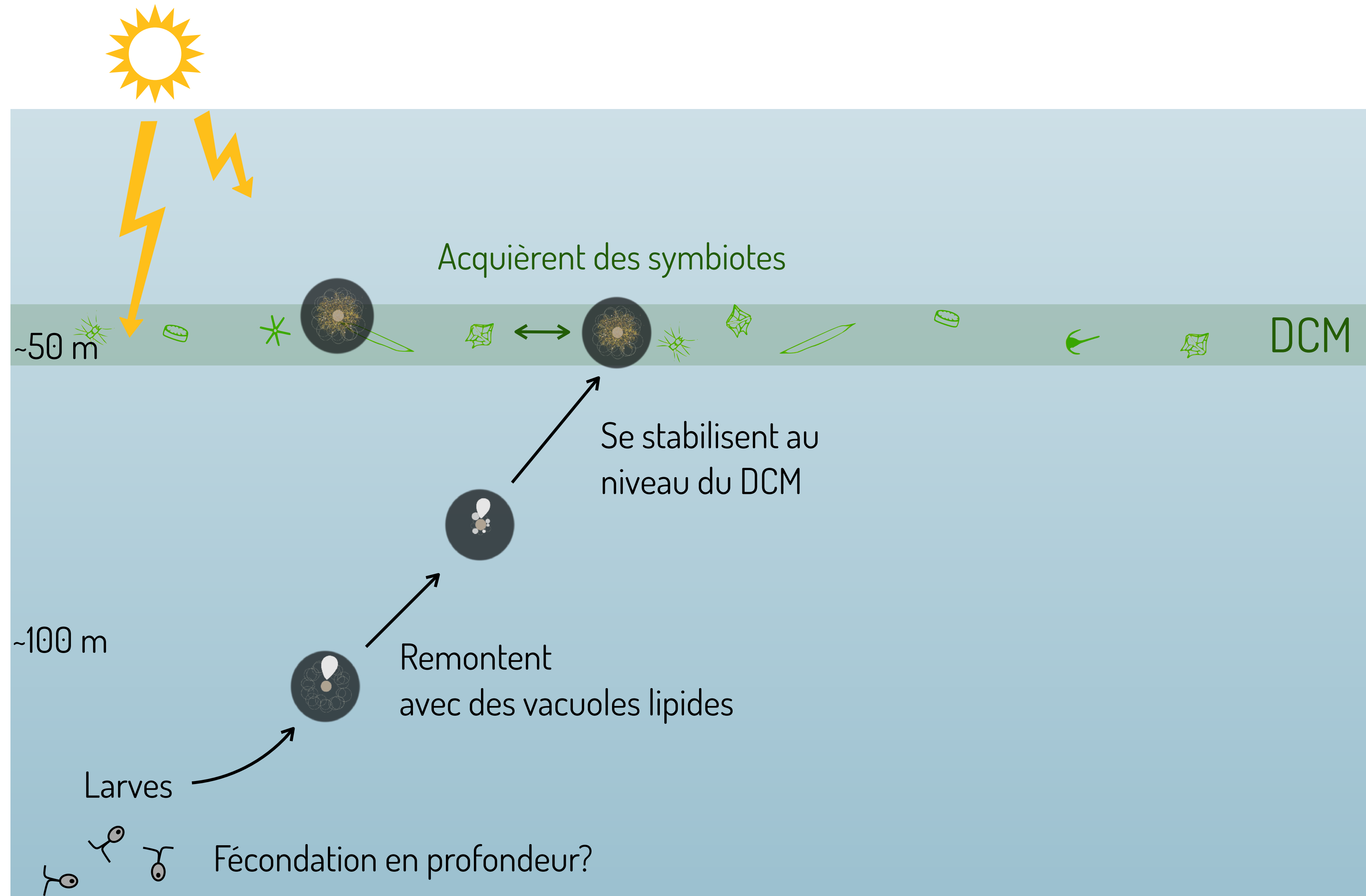
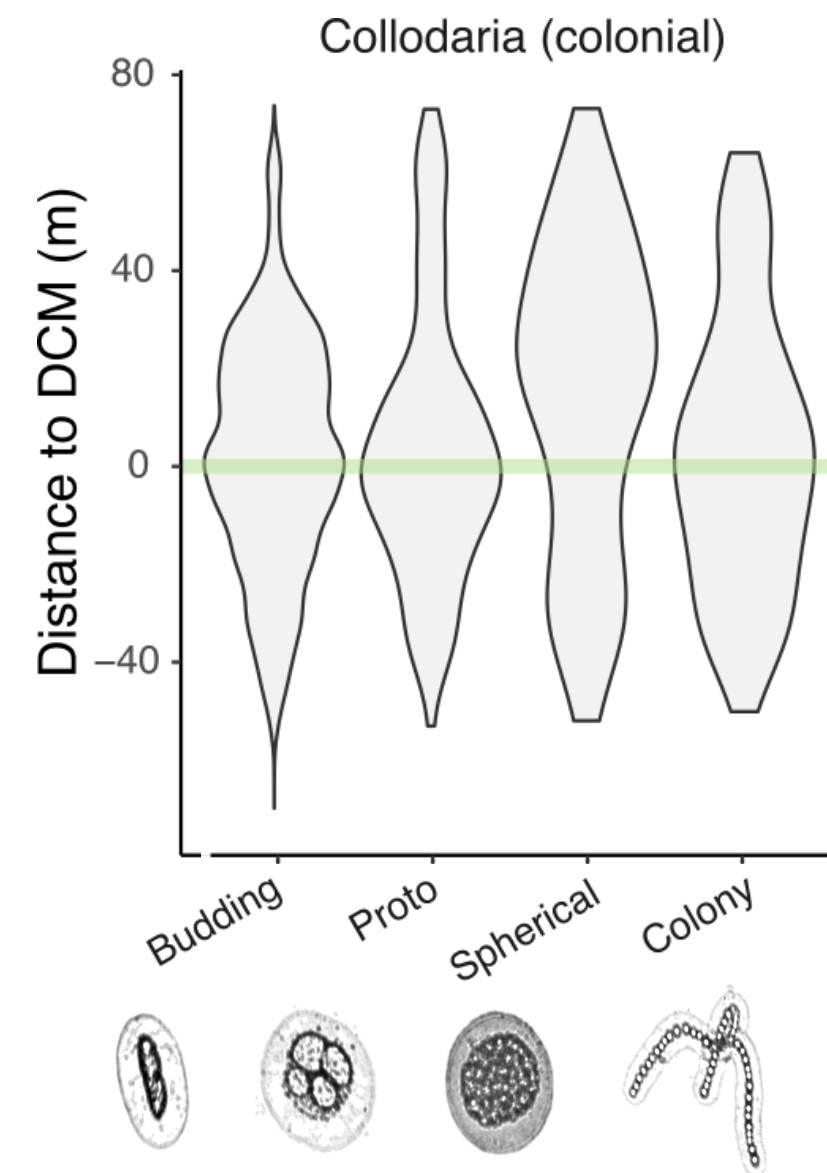
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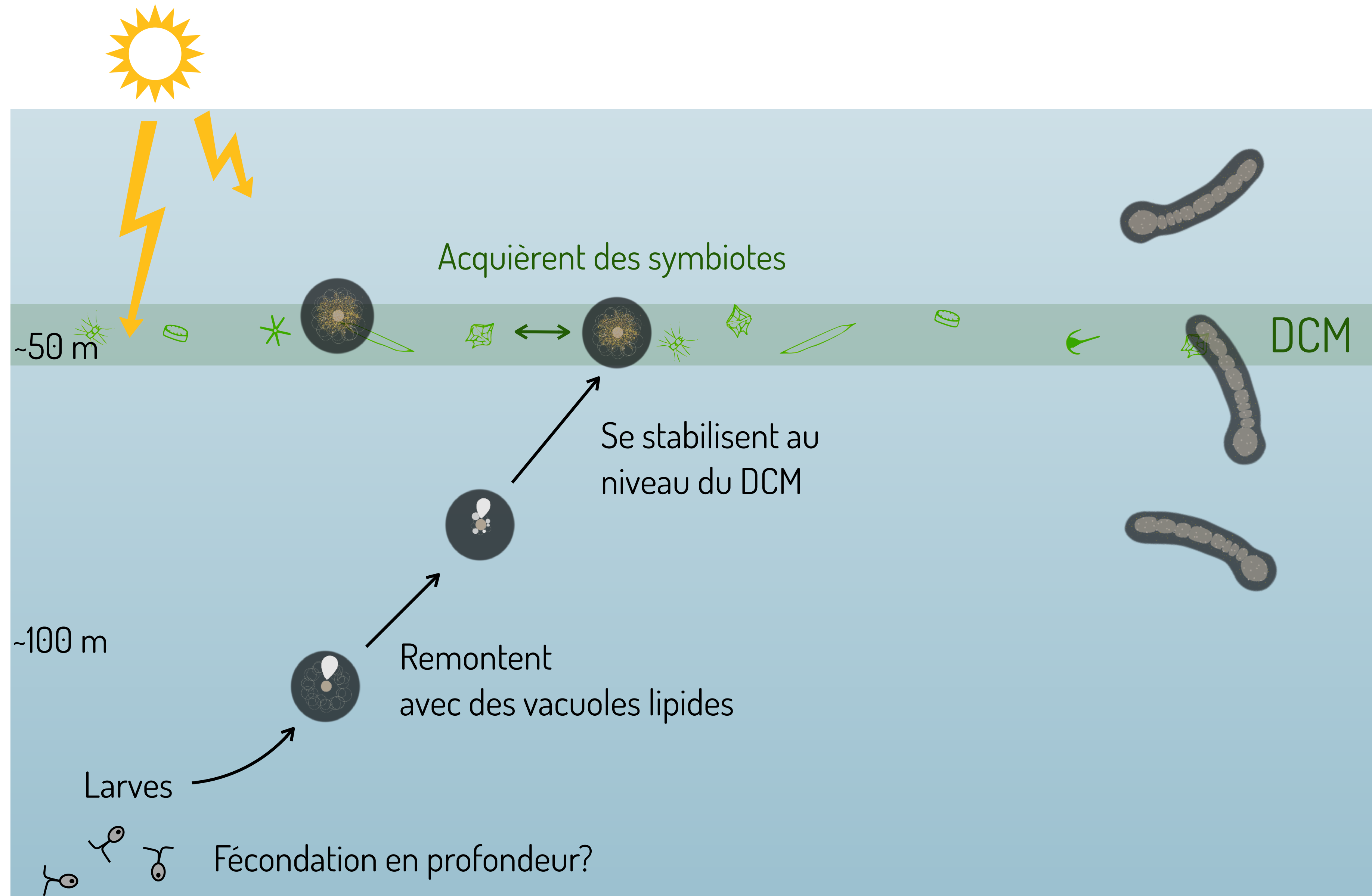
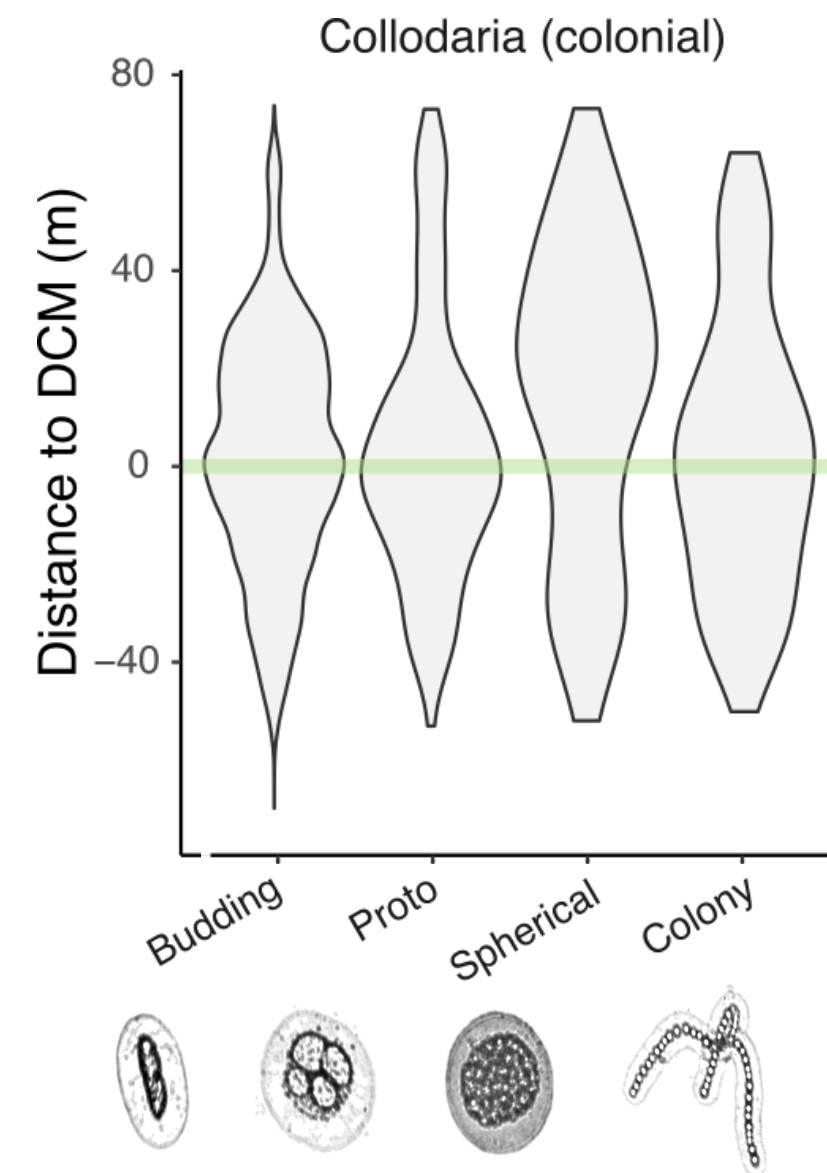
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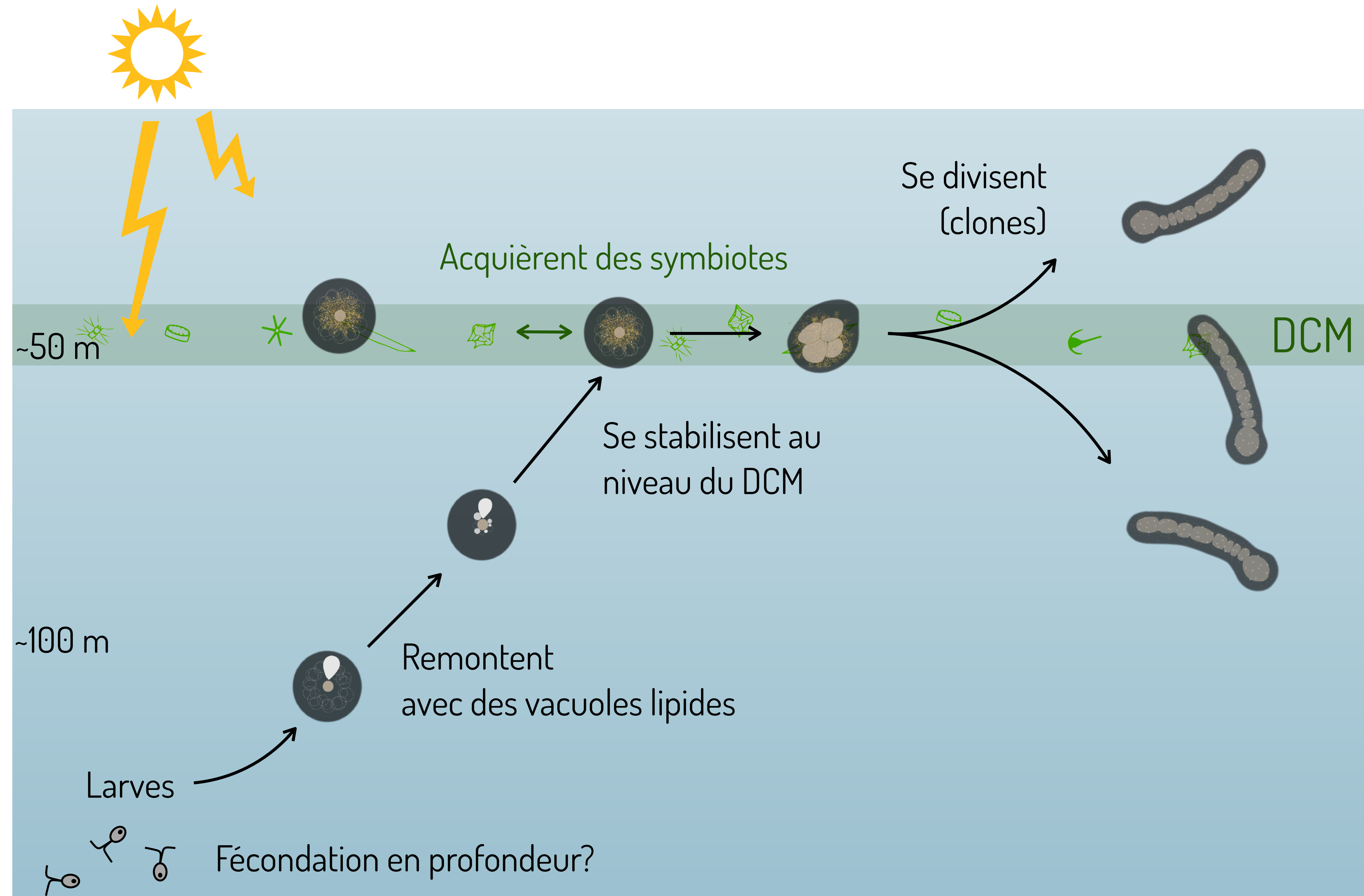
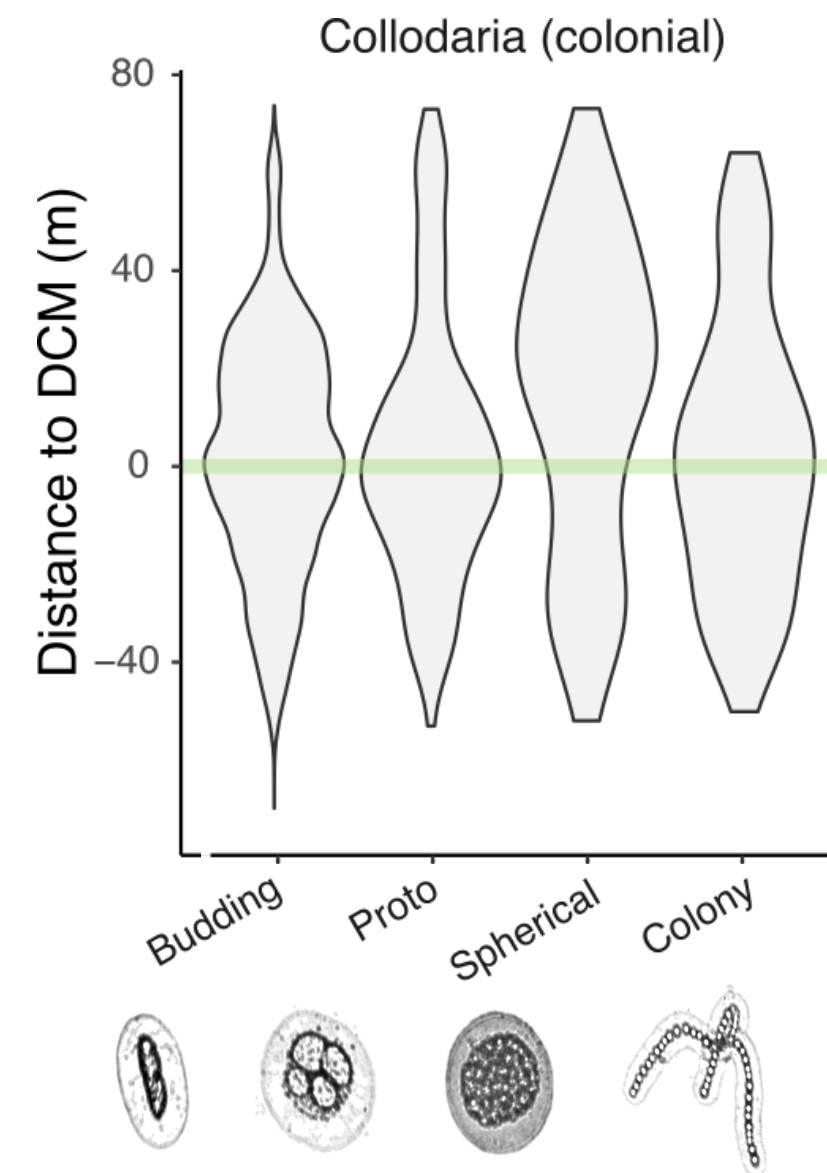
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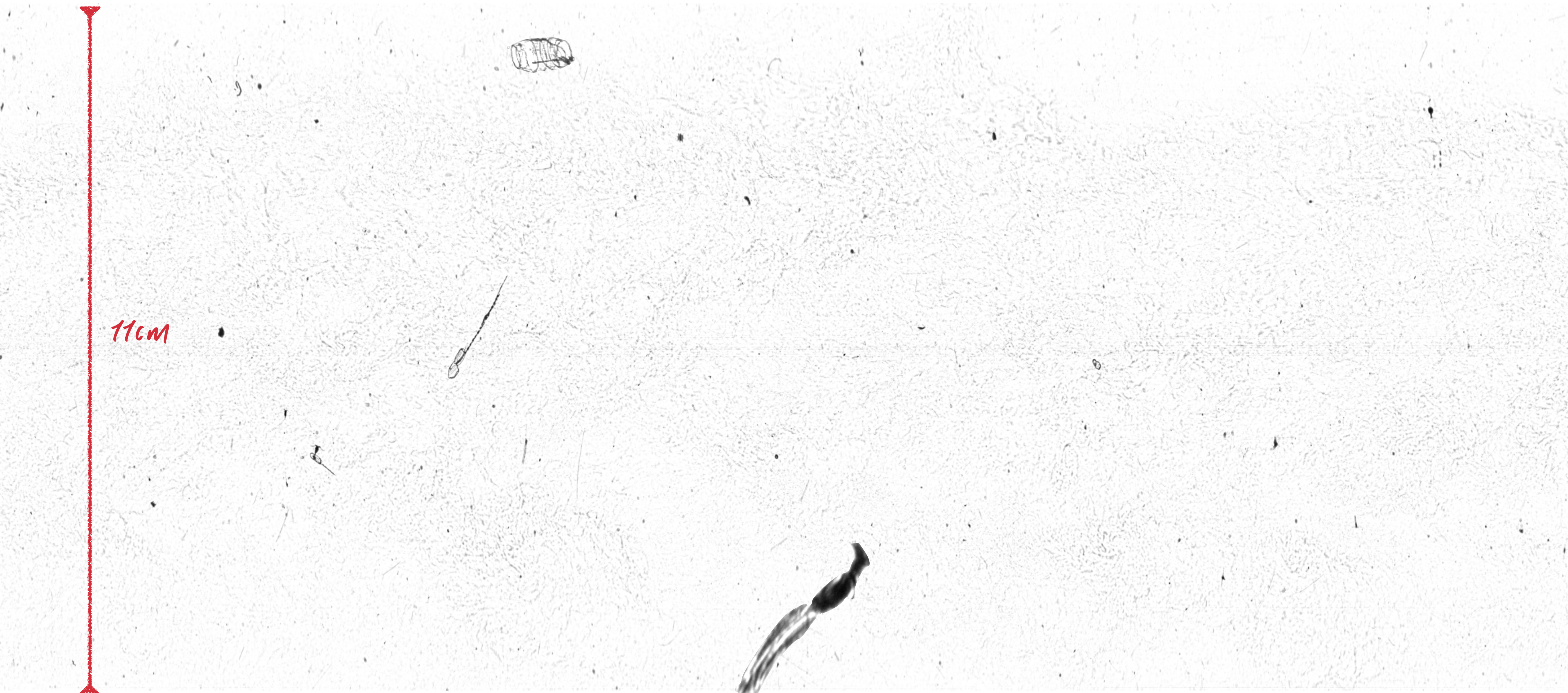
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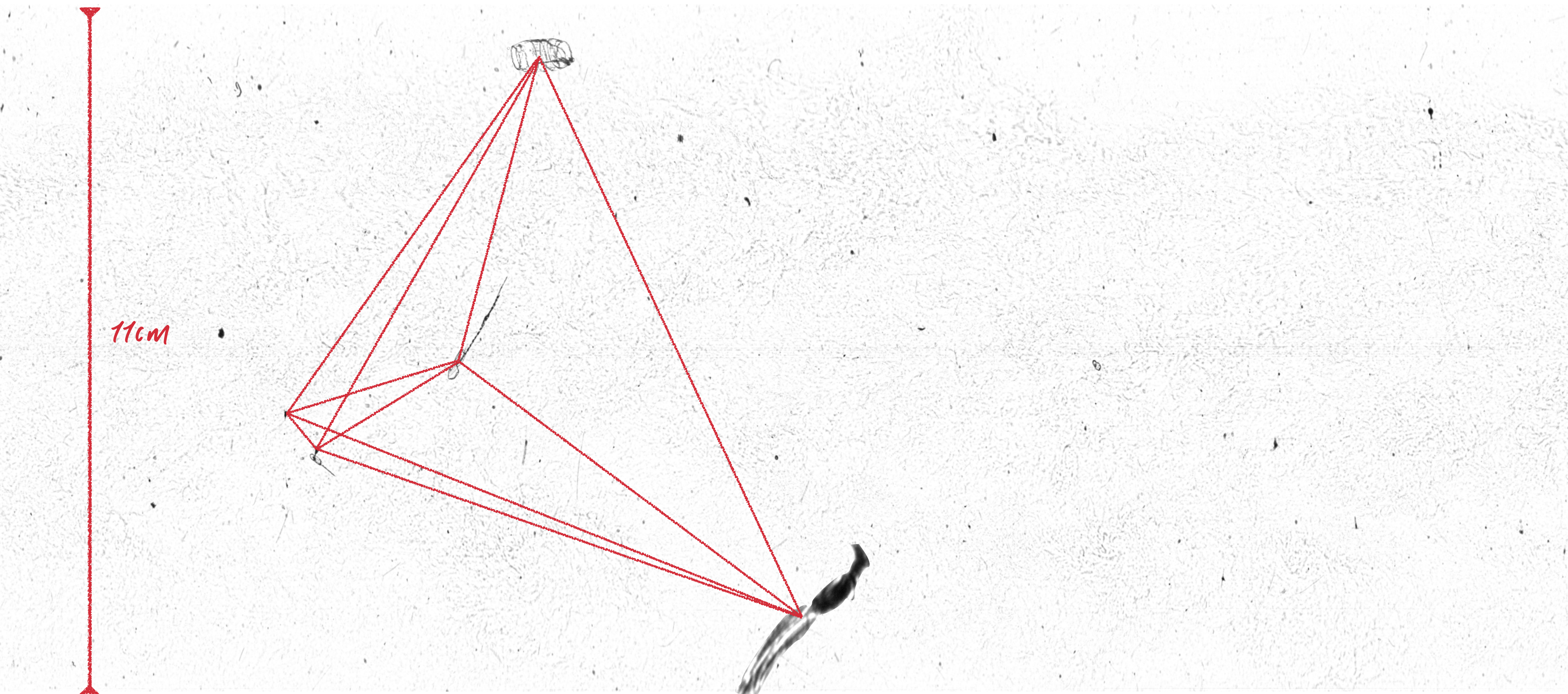
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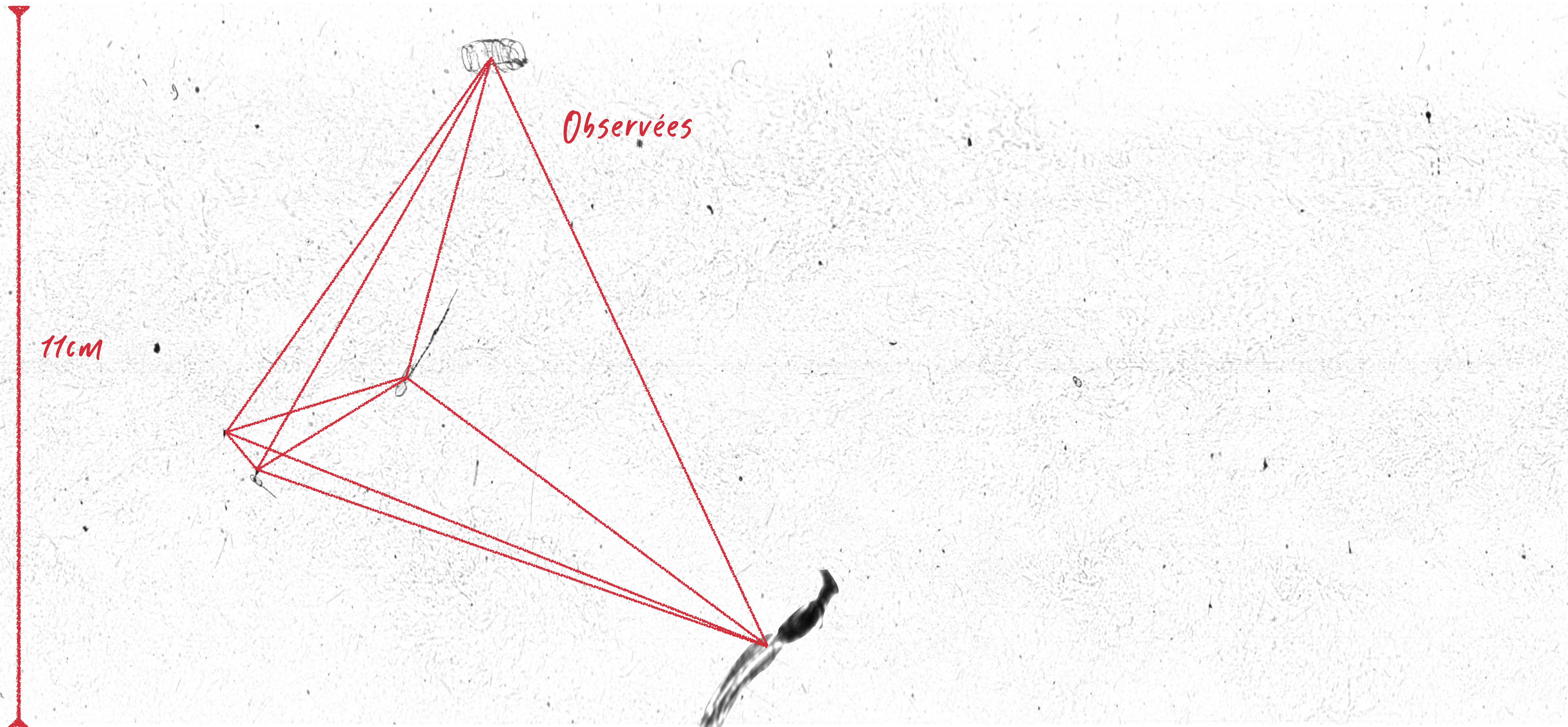
Évaluation des distances entre individus



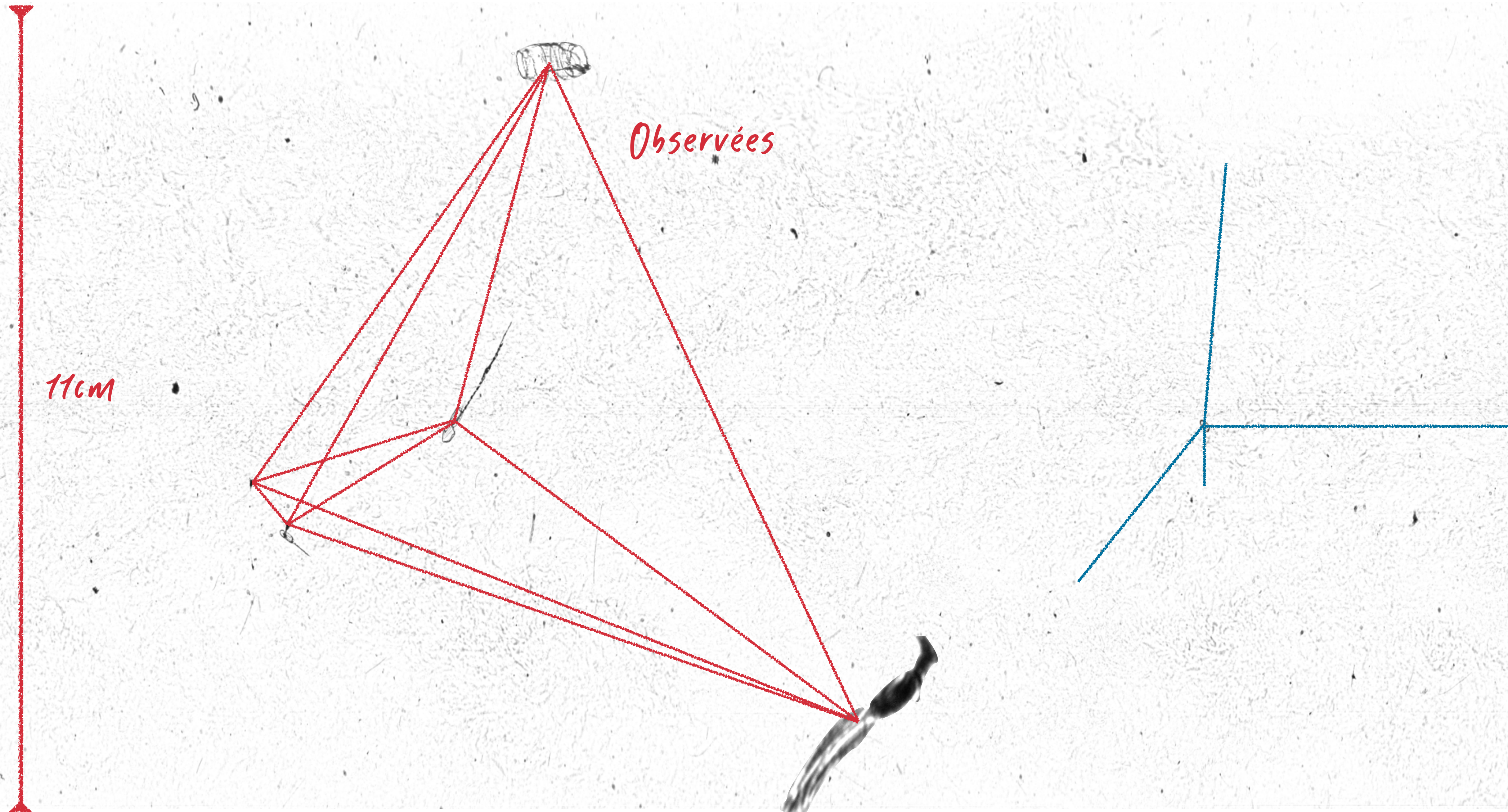
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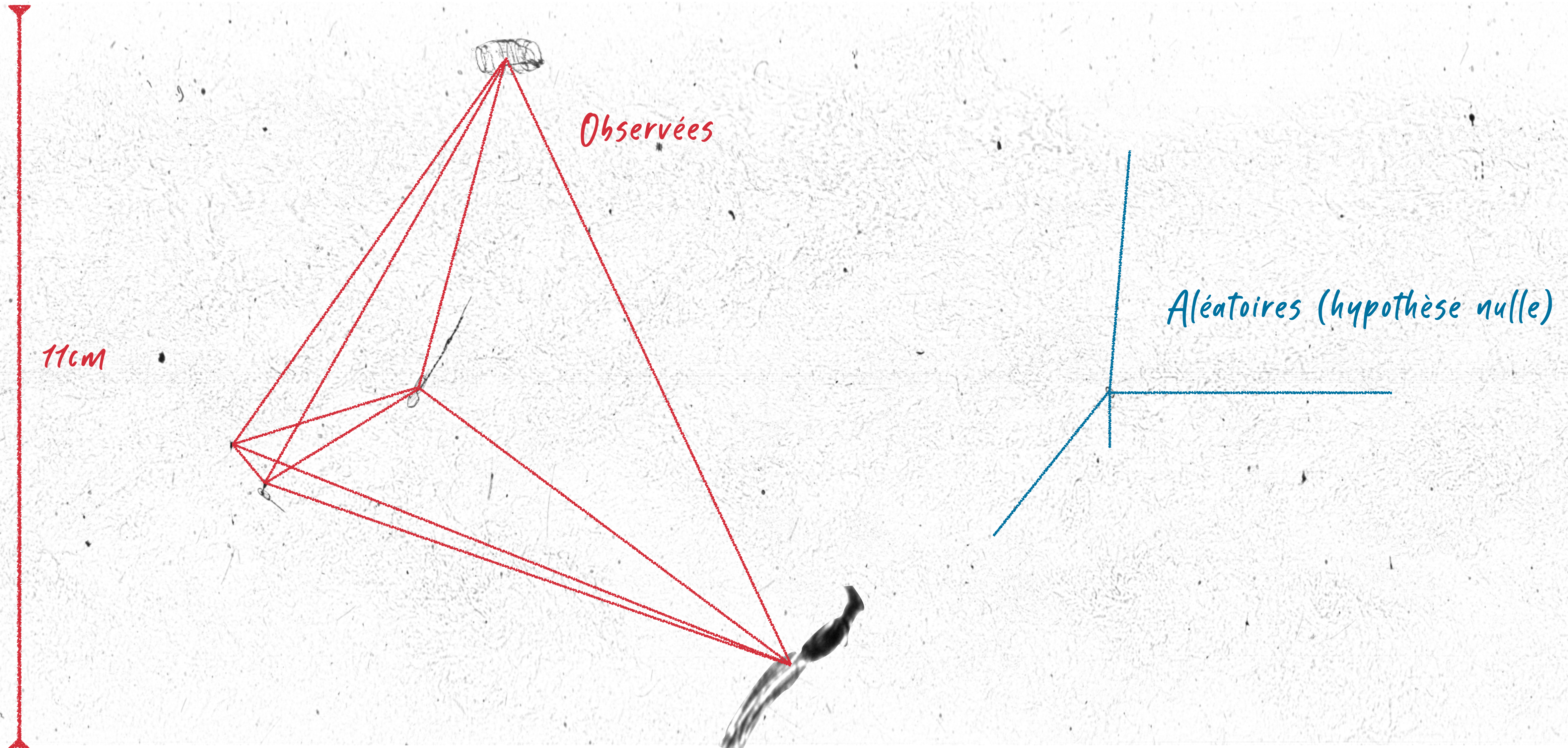
Évaluation des distances entre individus



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Évaluation des distances entre individus



Grégarité?

Les organismes sont **plus proches** qu'attendu au hasard

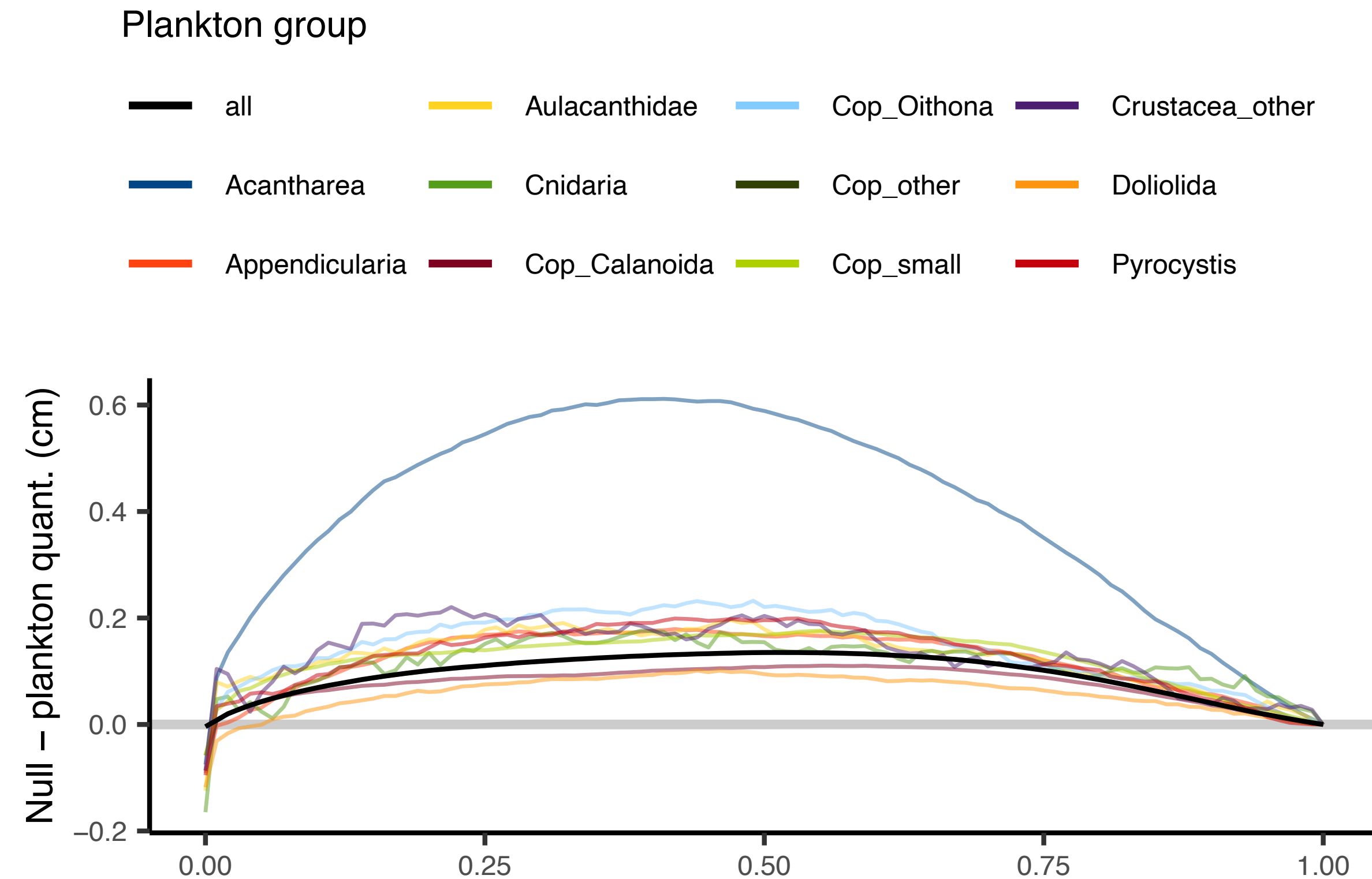
À la fois au sein de chaque groupe (a) et entre les groupes (b)

Sauf Oithona <> Ctephonora : évitement de la **prédation**?

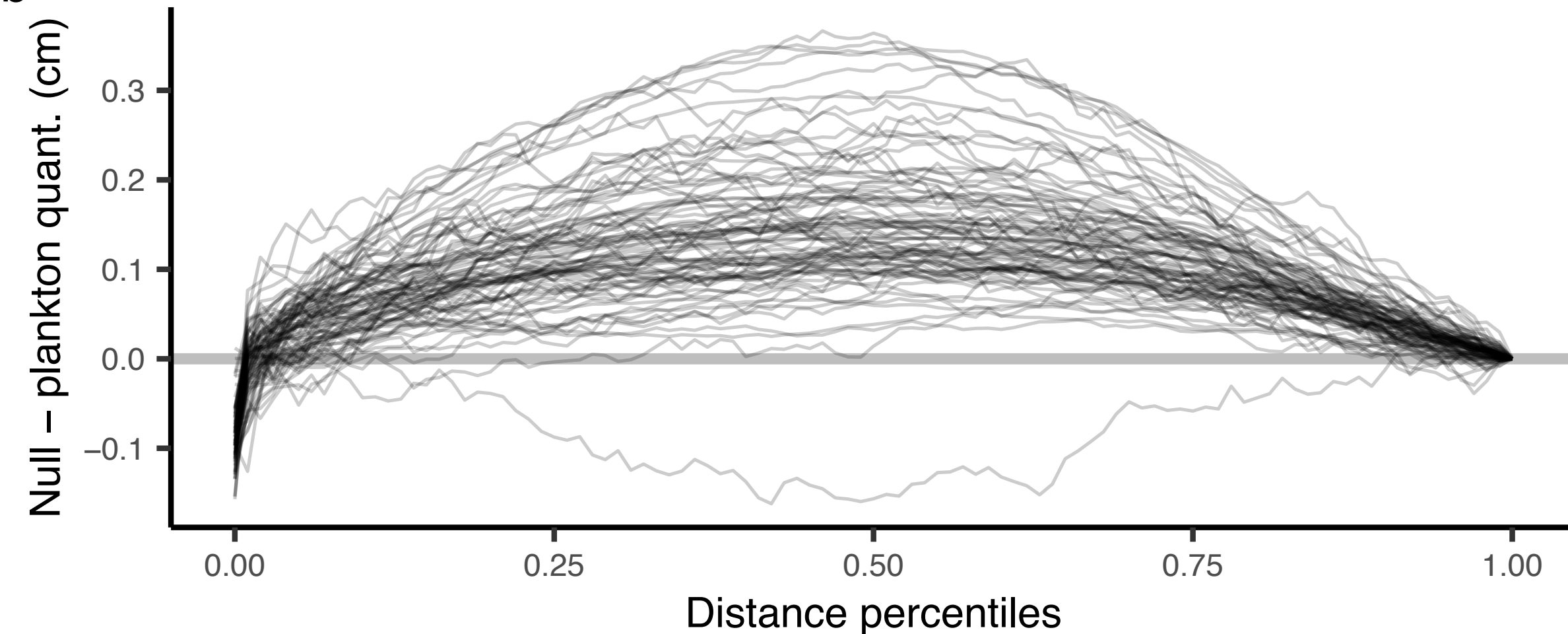
Un simple **modèle d'attraction** (distance 10 cm, déplacement 2 mm) reproduit bien les observations

Le déplacement est réaliste, le champ **sensoriel** est beaucoup **plus grand** qu'attendu

a



b



Grégarité?

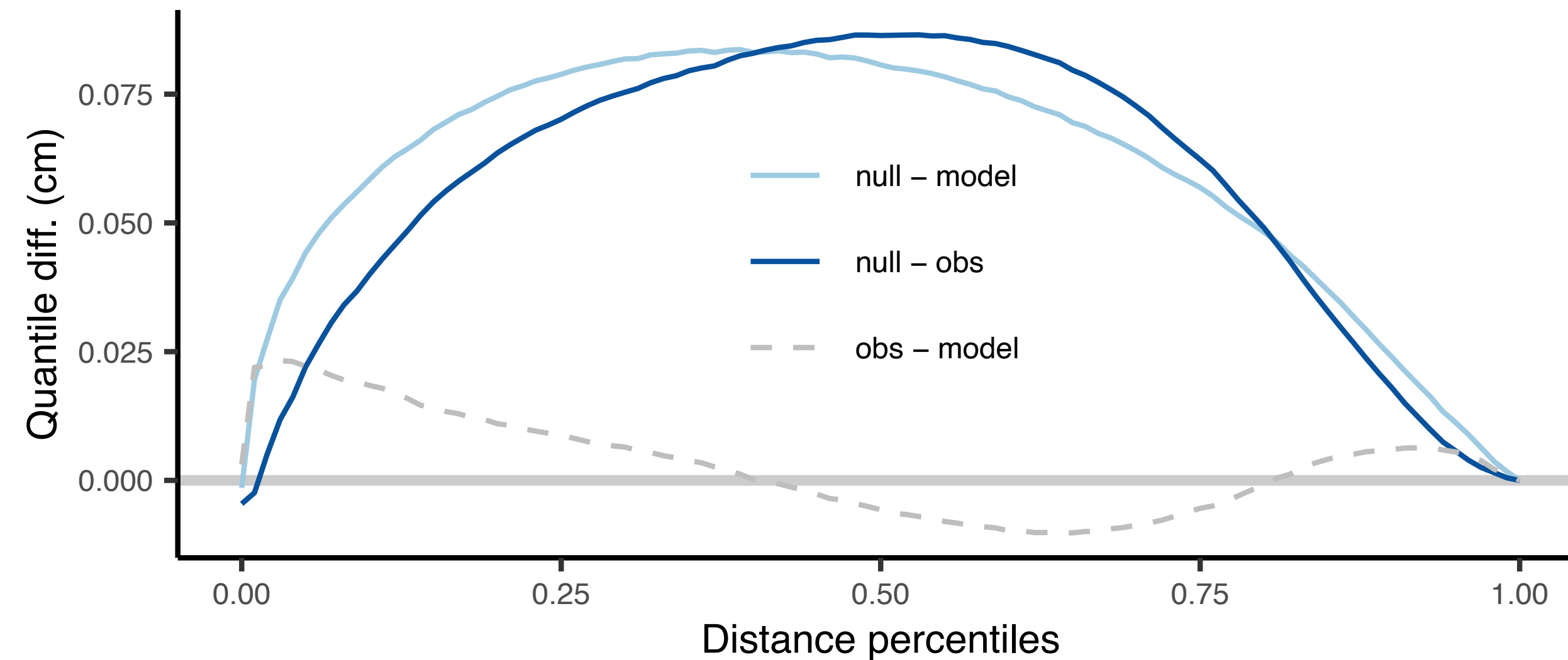
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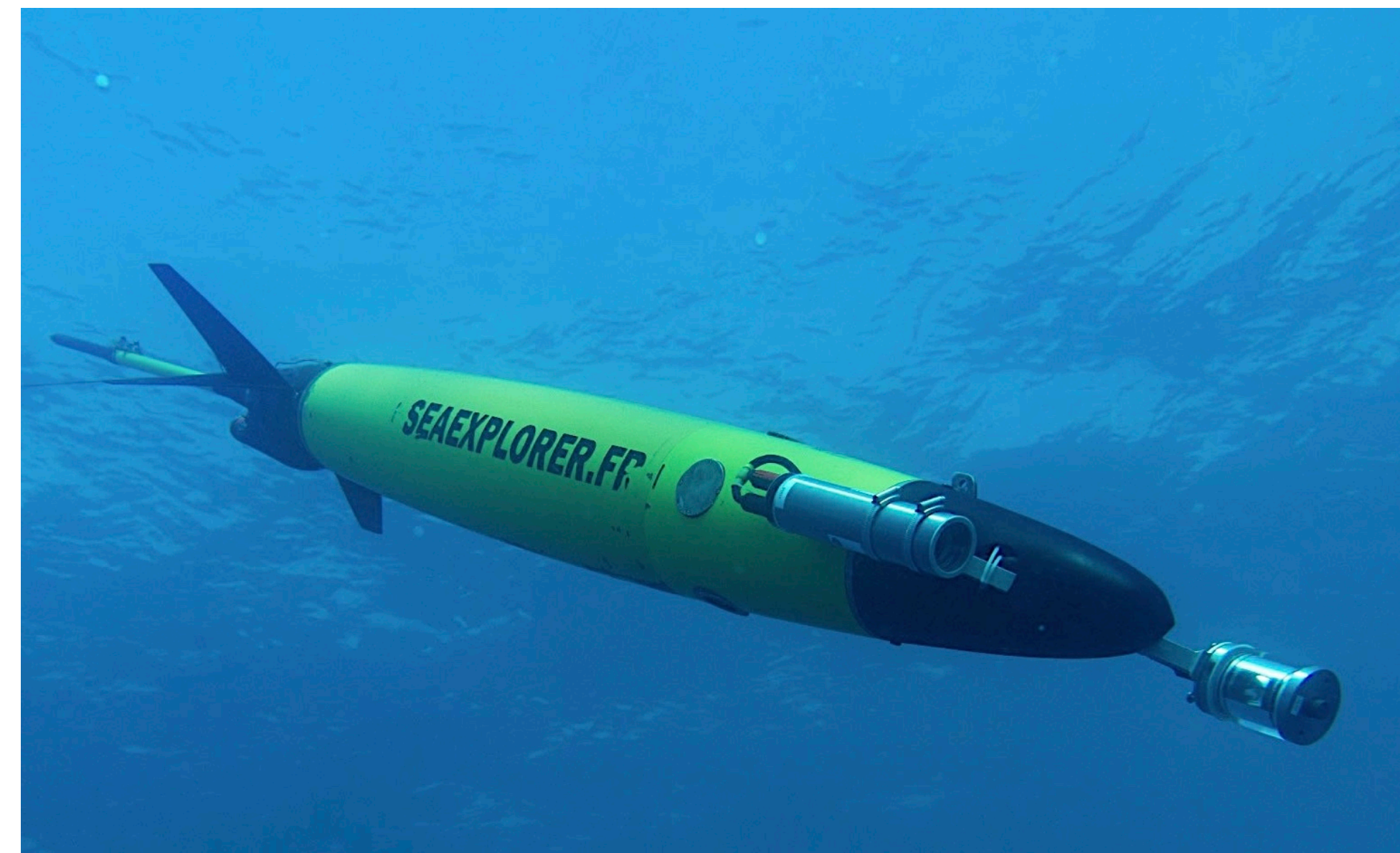
Robots autonomes

“Planeur” sous-marin

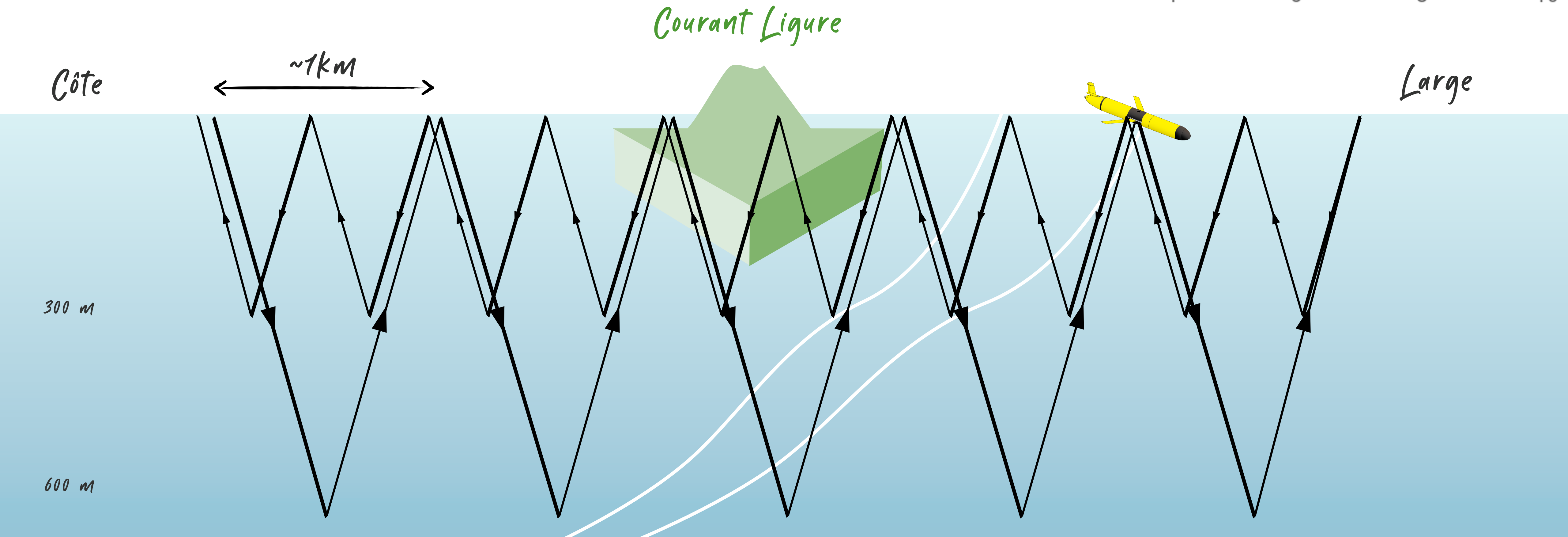
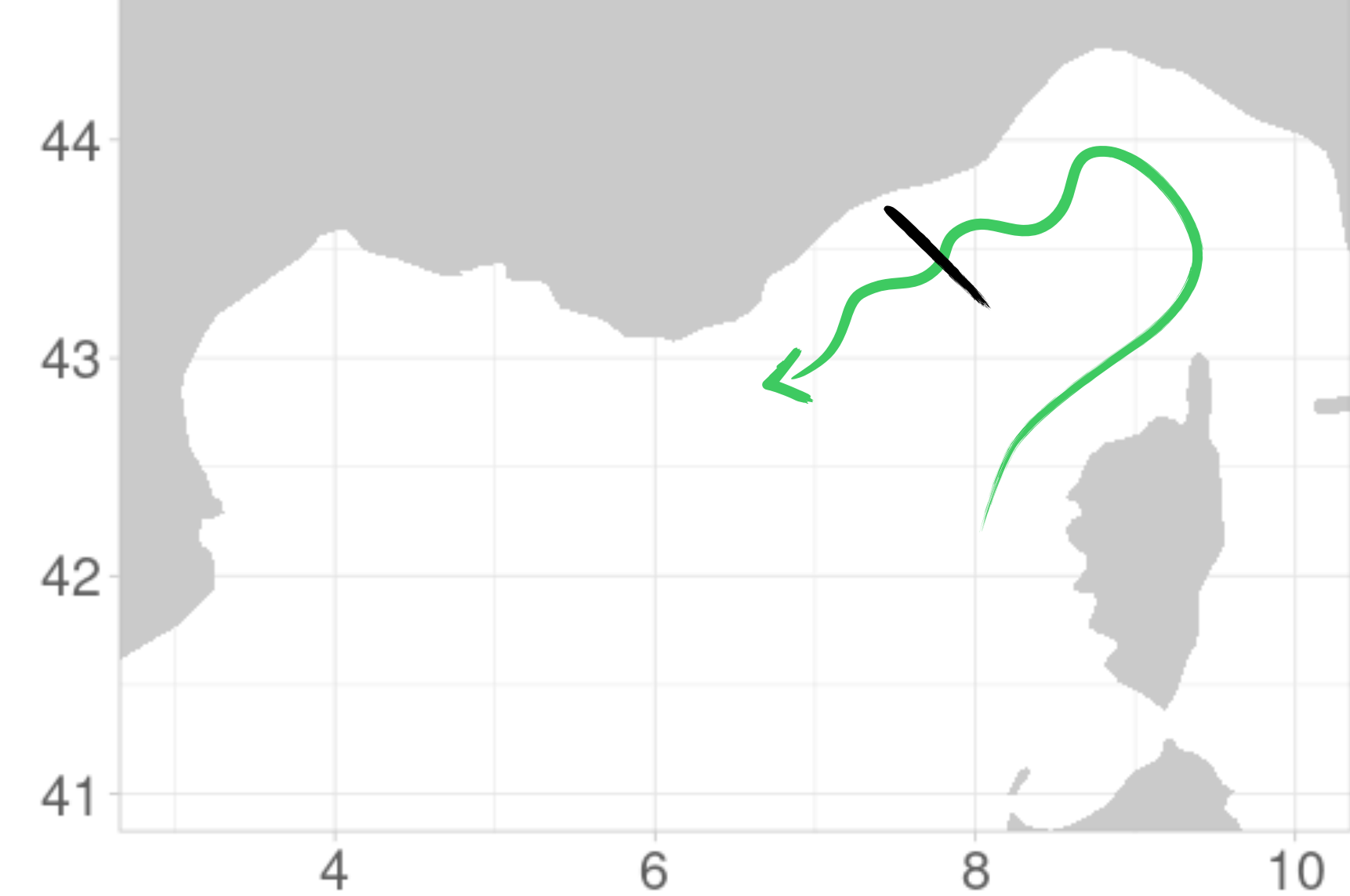
Vole en changeant son
centre de gravité

Télécommandé quand il
revient en surface

Équipé d’une **caméra** à
plancton et particules
marines



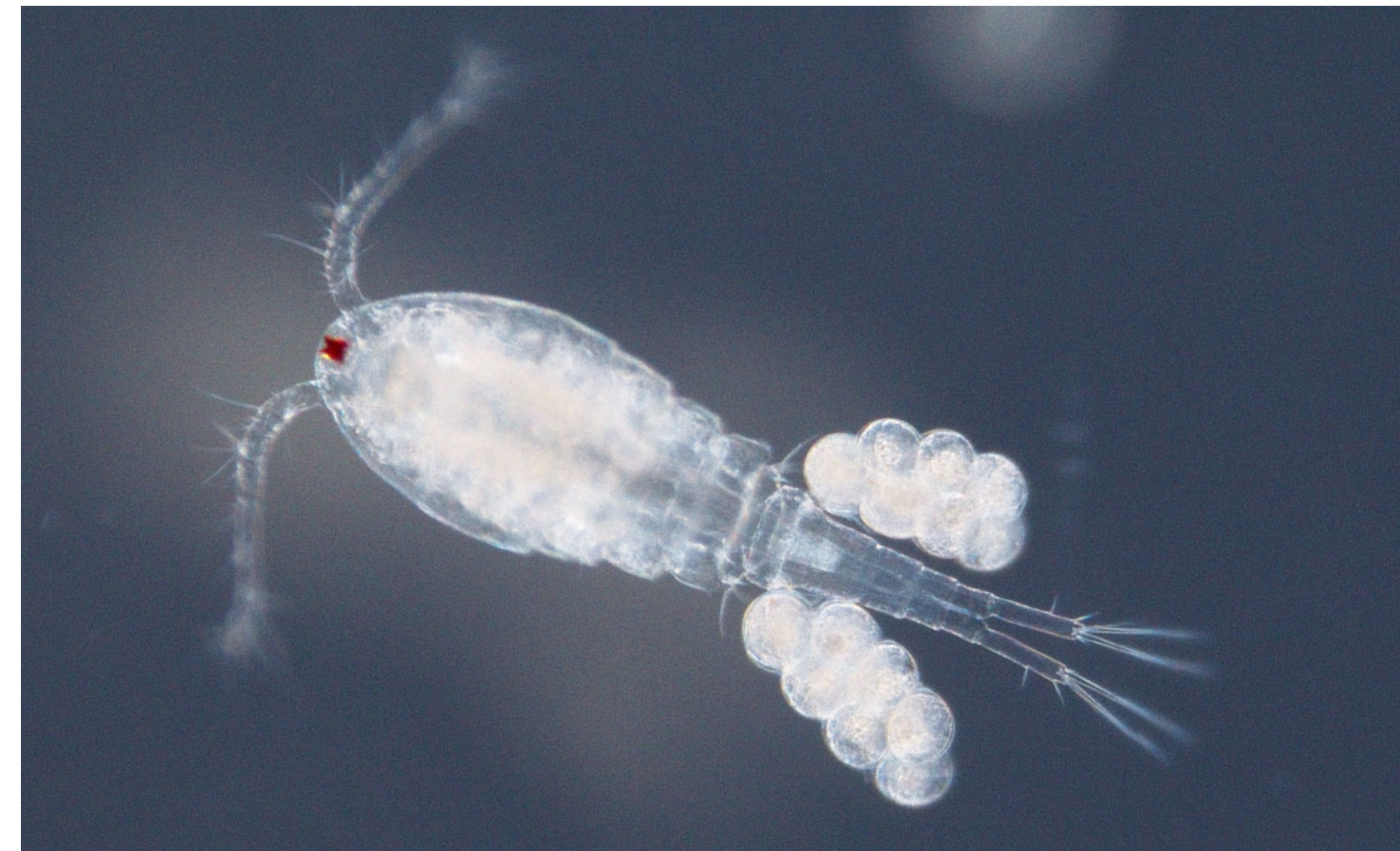
Échantillonnage au travers d'un front



Copépodes

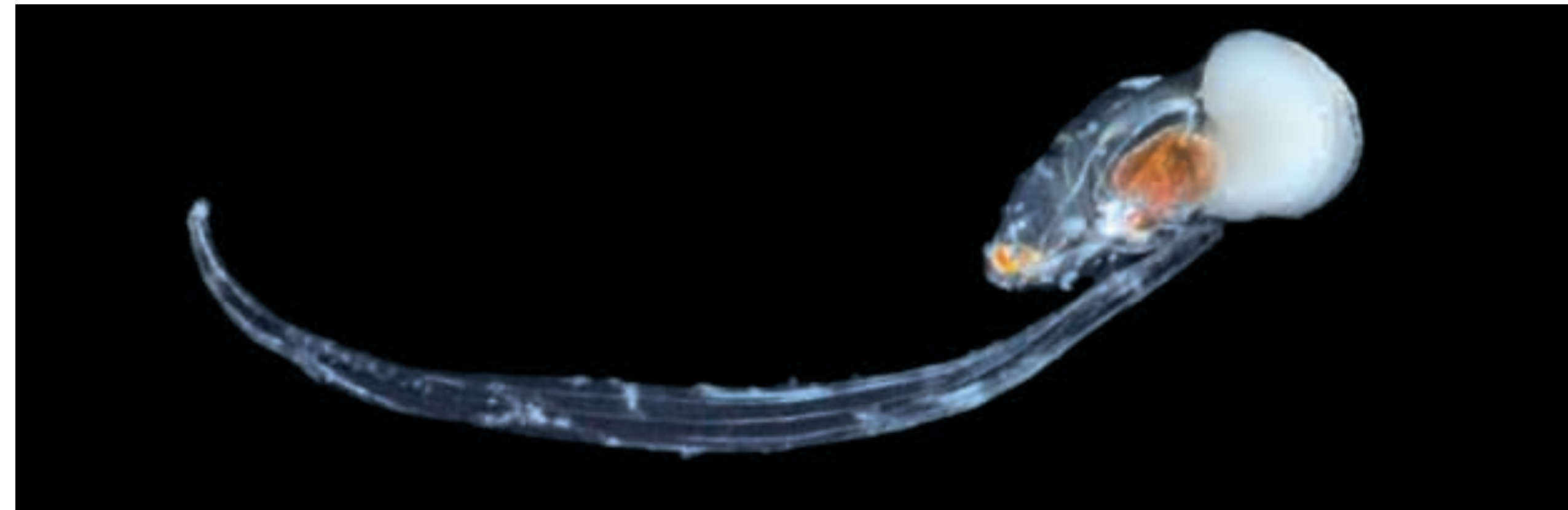
Il y en a 1.34×10^{21}

Leur masse totale
correspond à 400 fois la
masse des humains sur
Terre



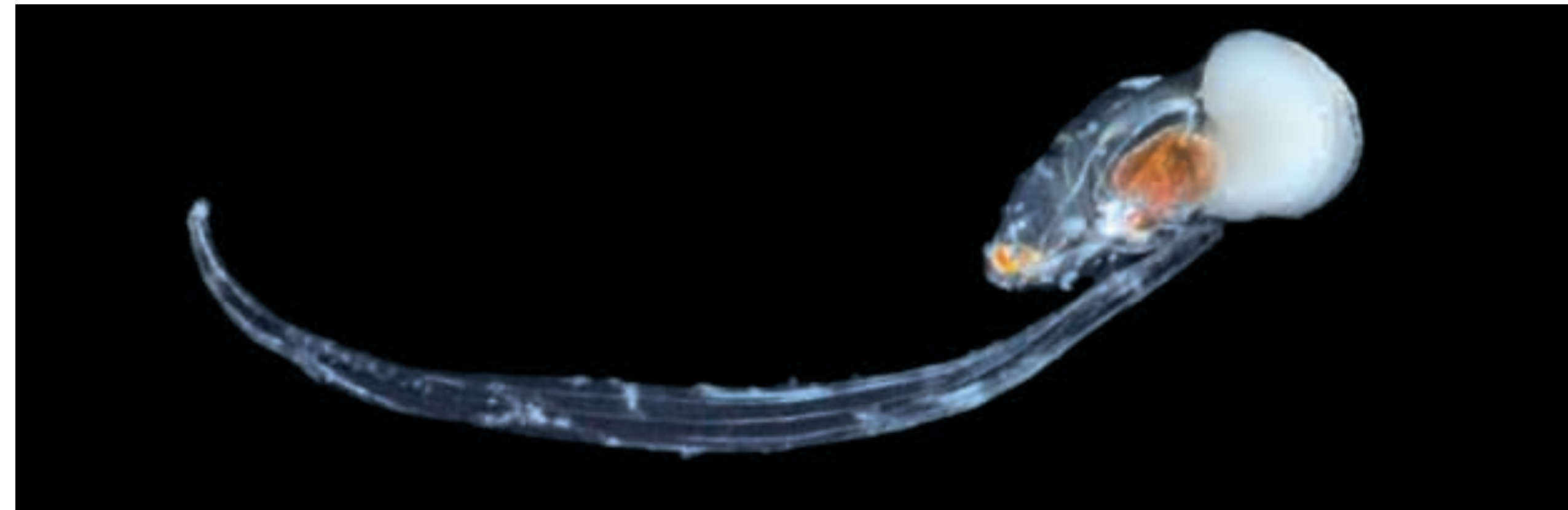
Appendiculaires

Des filtres à plancton jetables



Appendiculaires

Des filtres à plancton jetables



Salpida

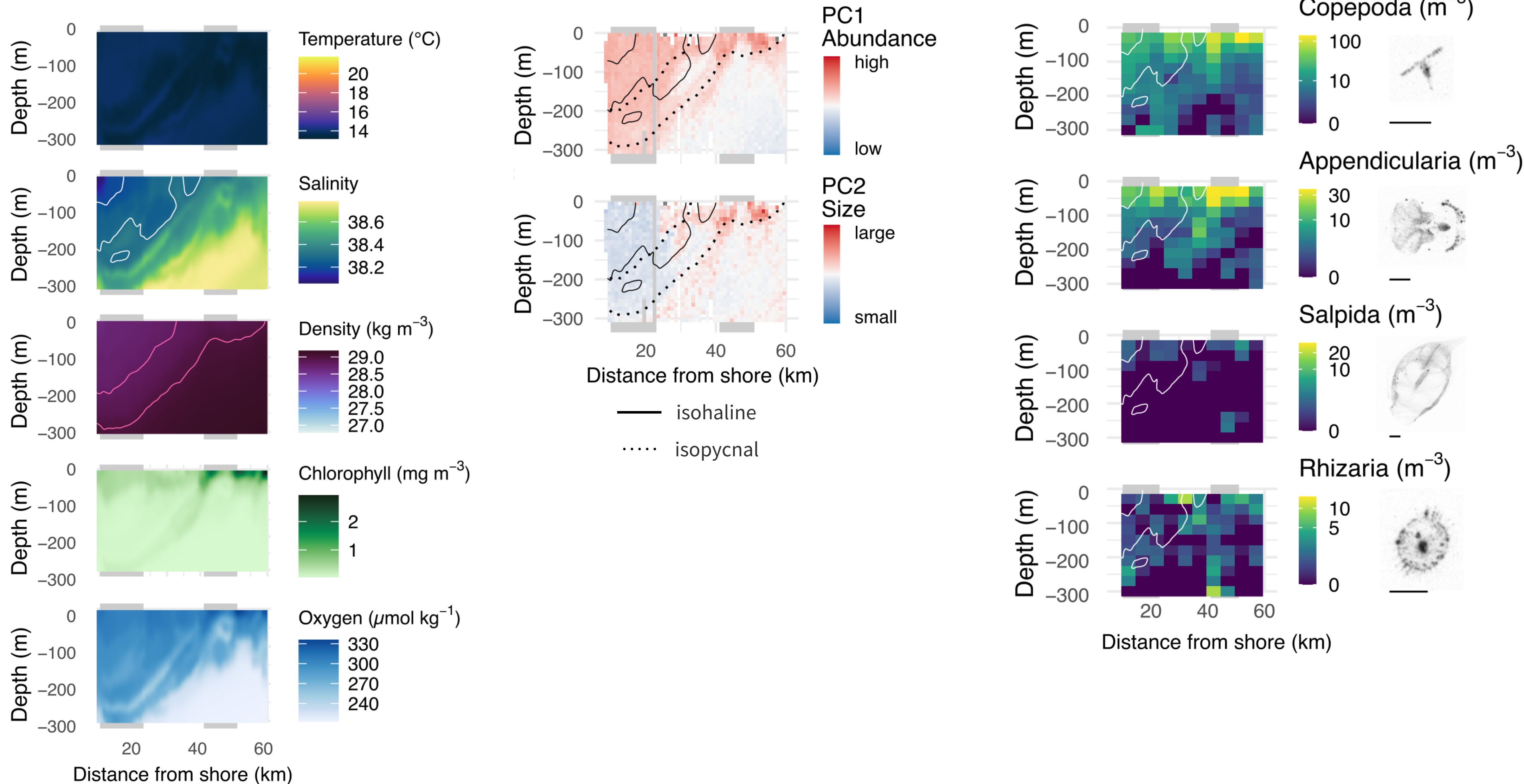
Des aspirateurs coloniaux



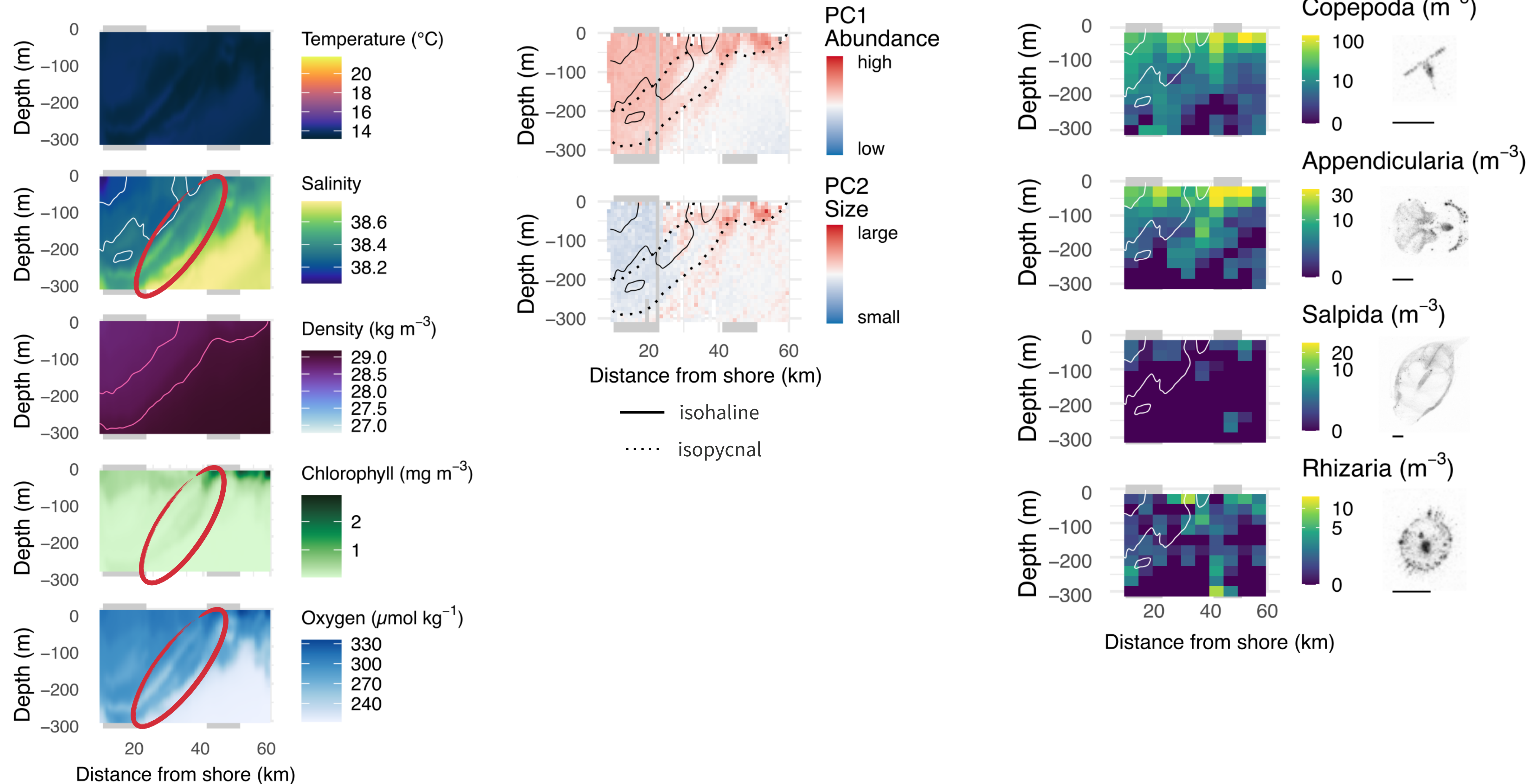
5 mm



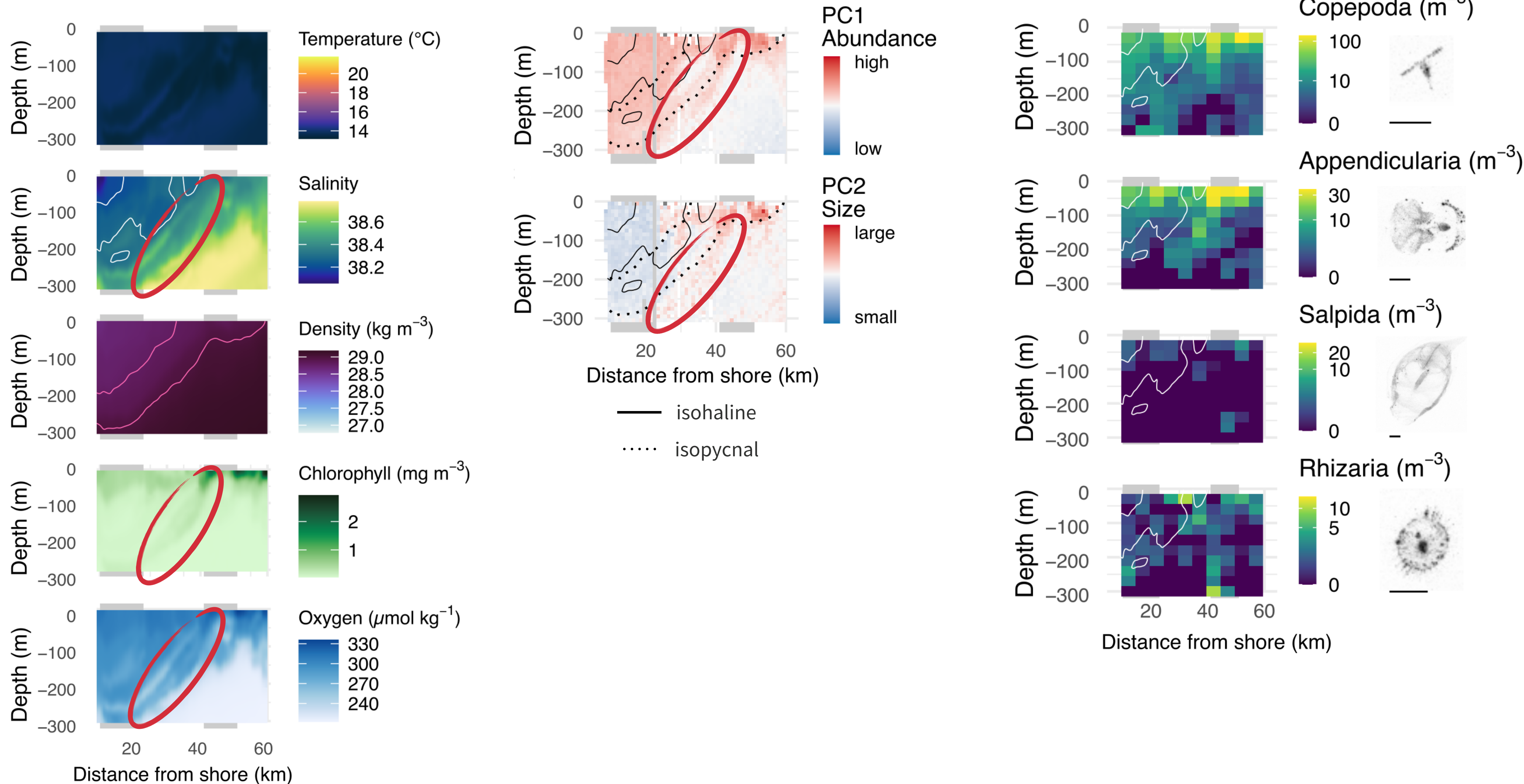
Février: début de l'efflorescence de plancton



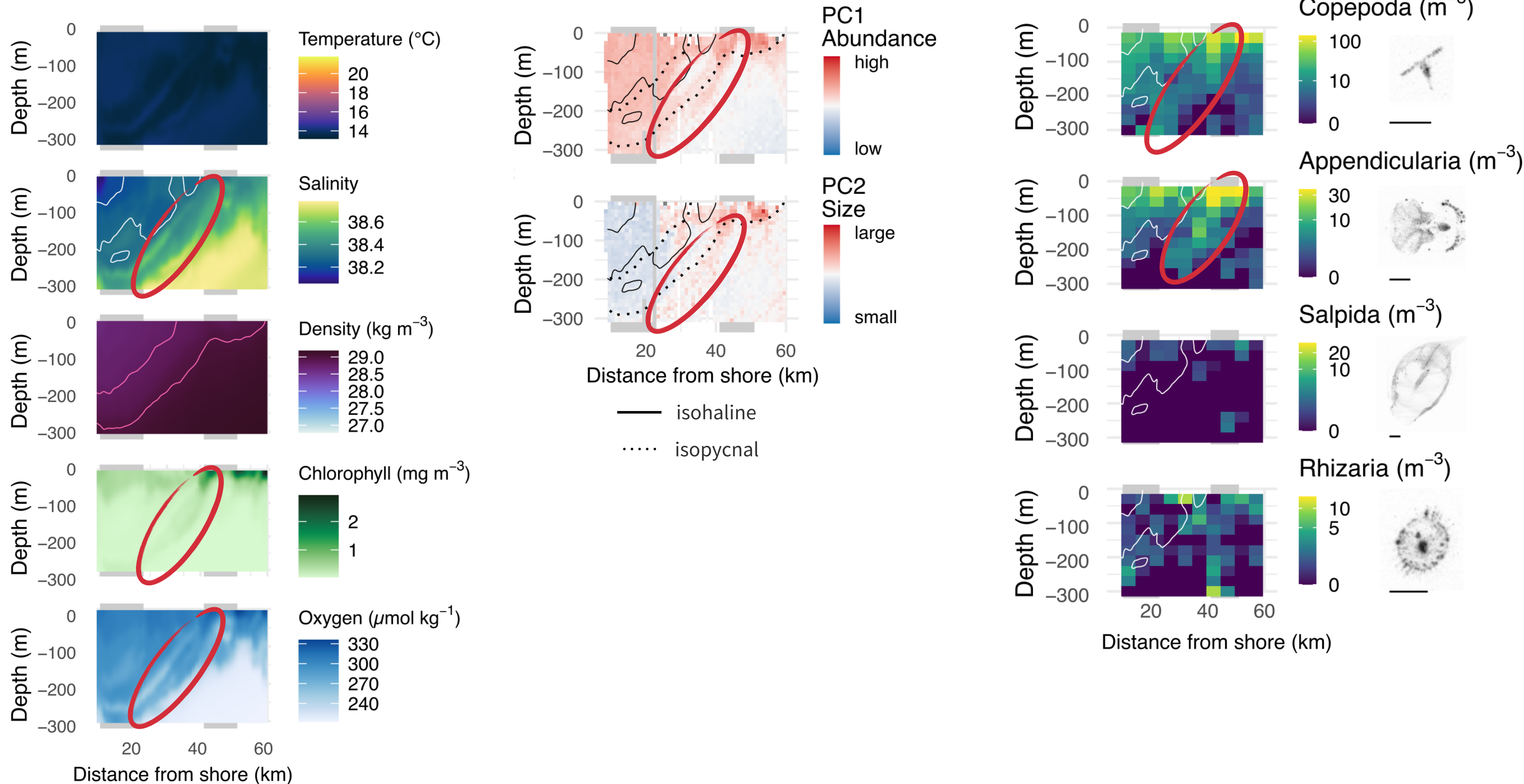
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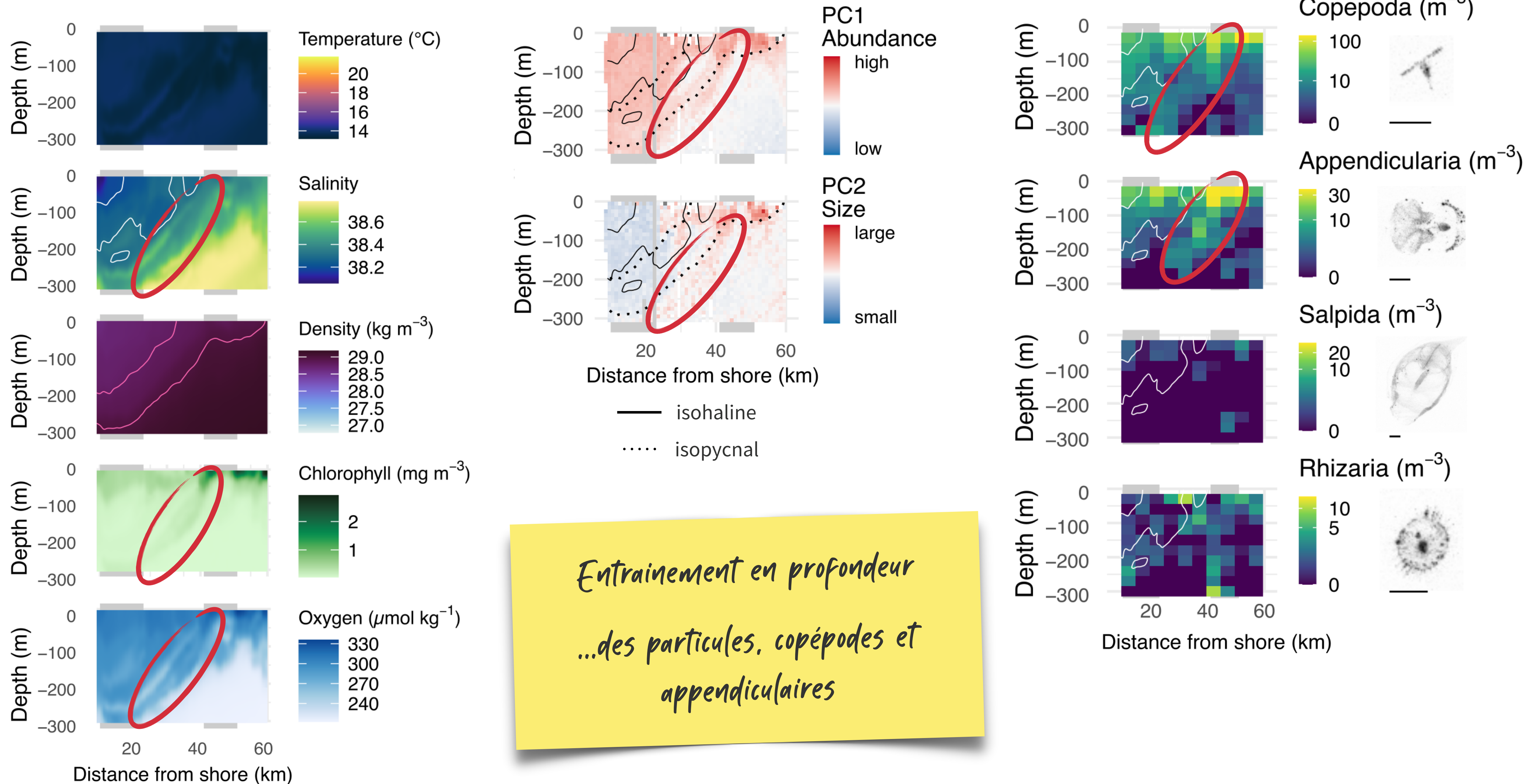
Février: début de l'efflorescence de plancton



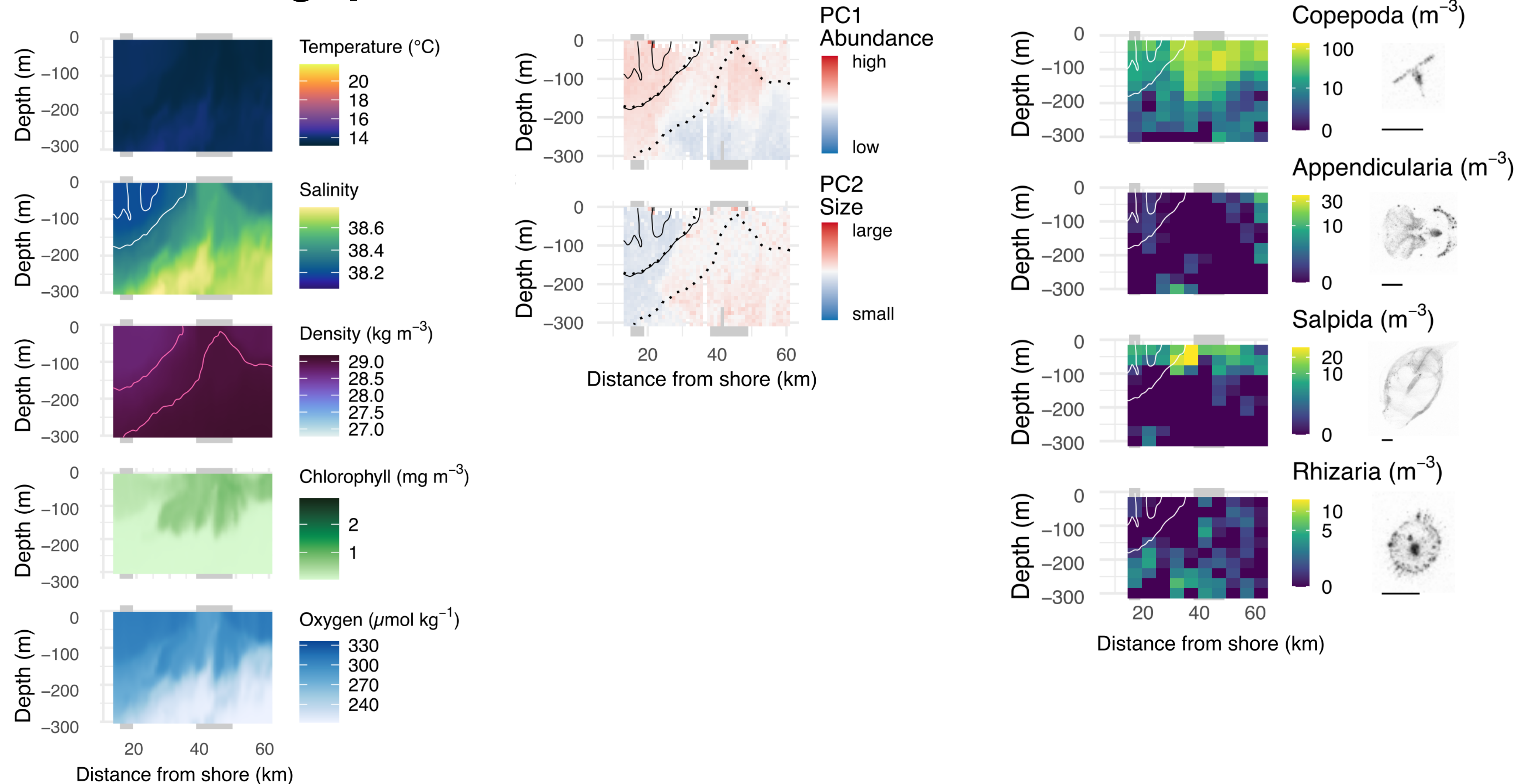
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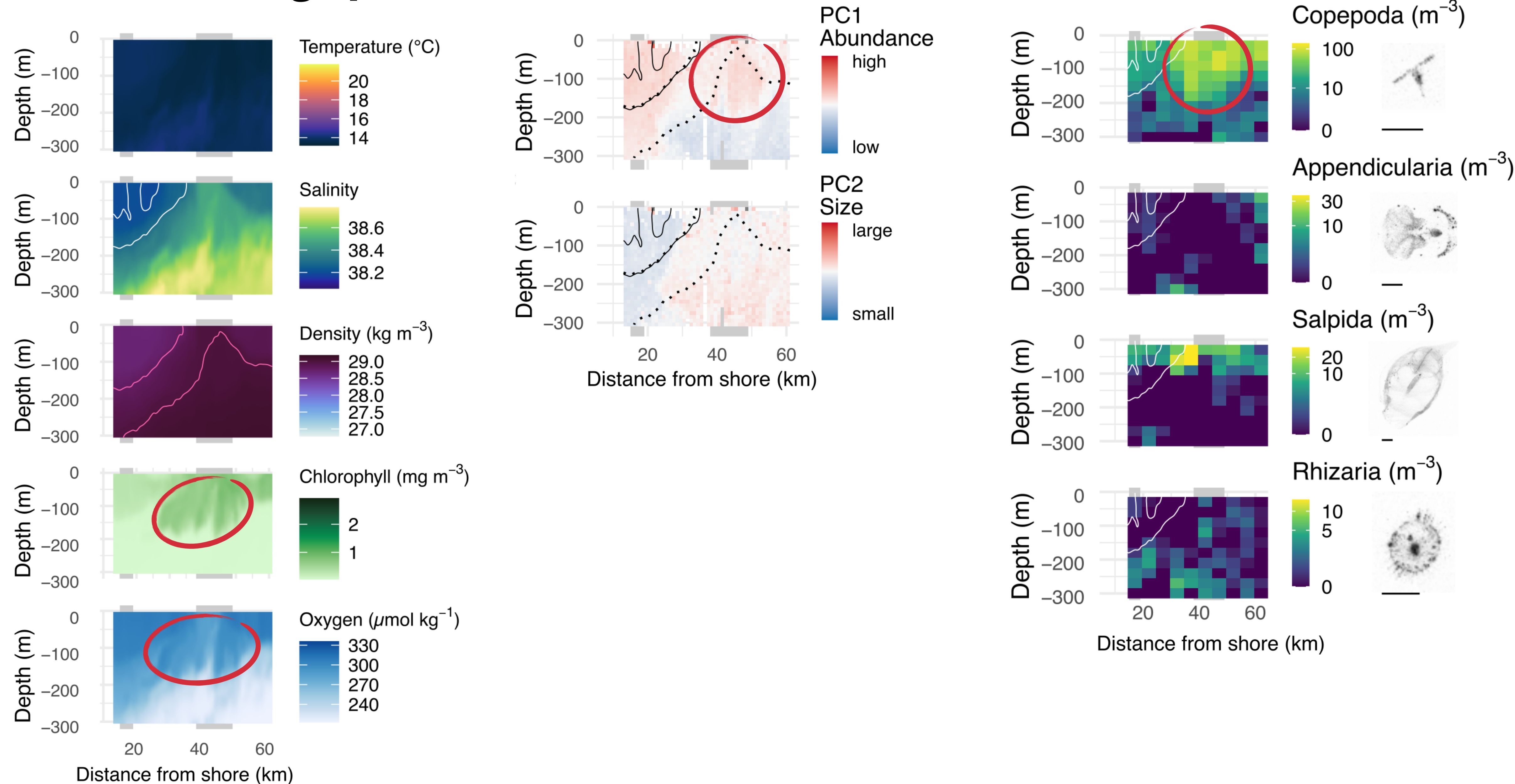
Février: début de l'efflorescence de plancton



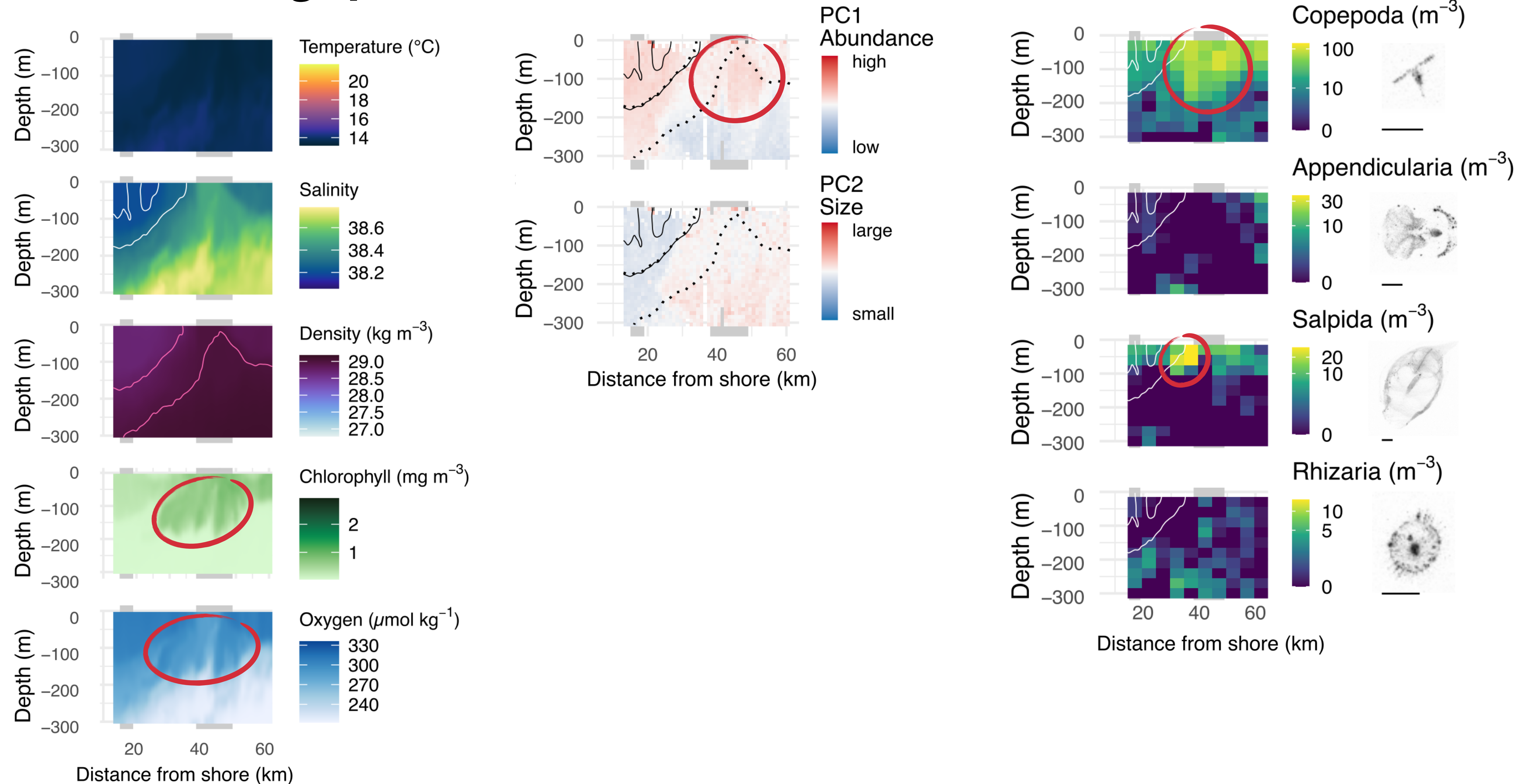
Mars: Mélange par le vent



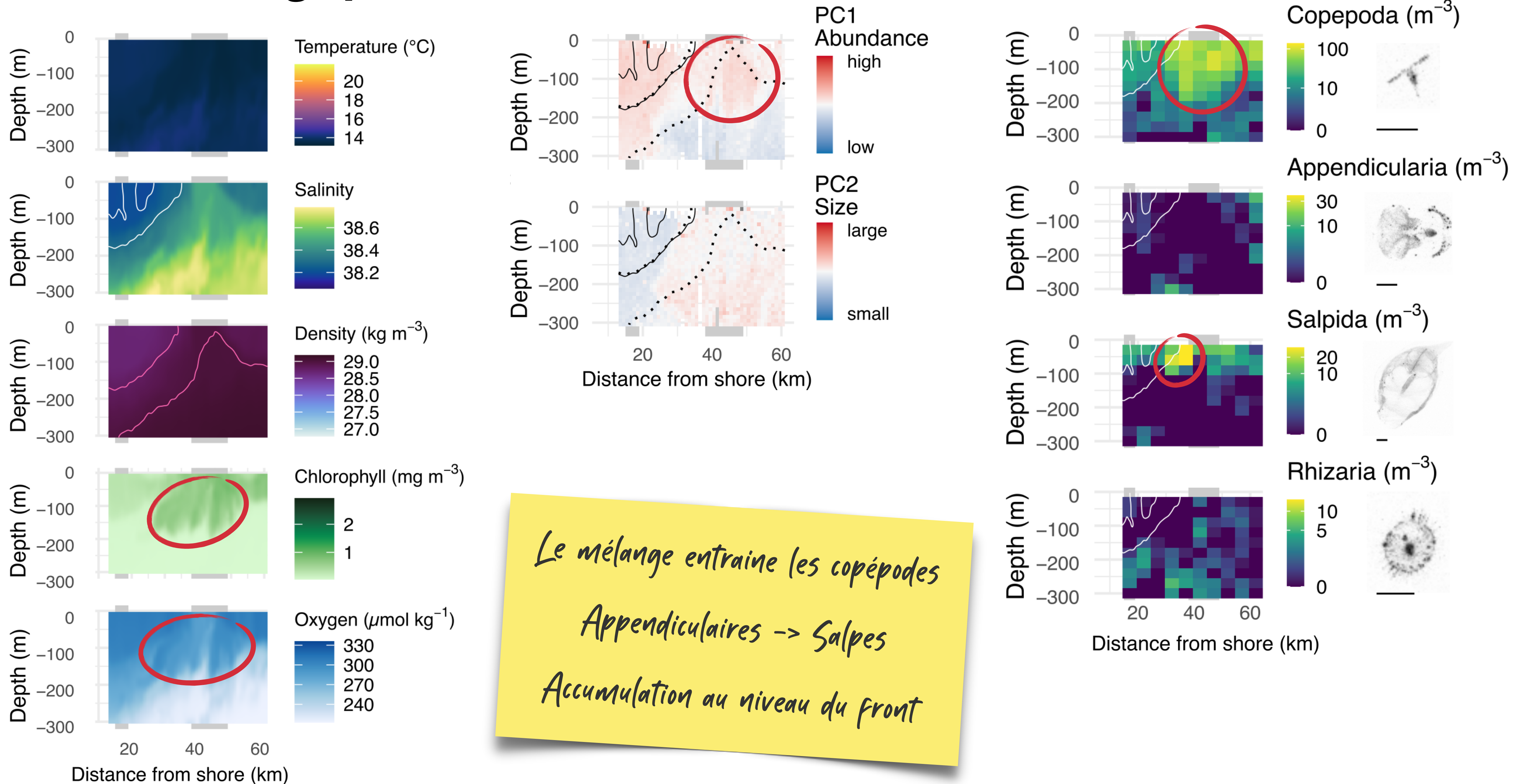
Mars: Mélange par le vent



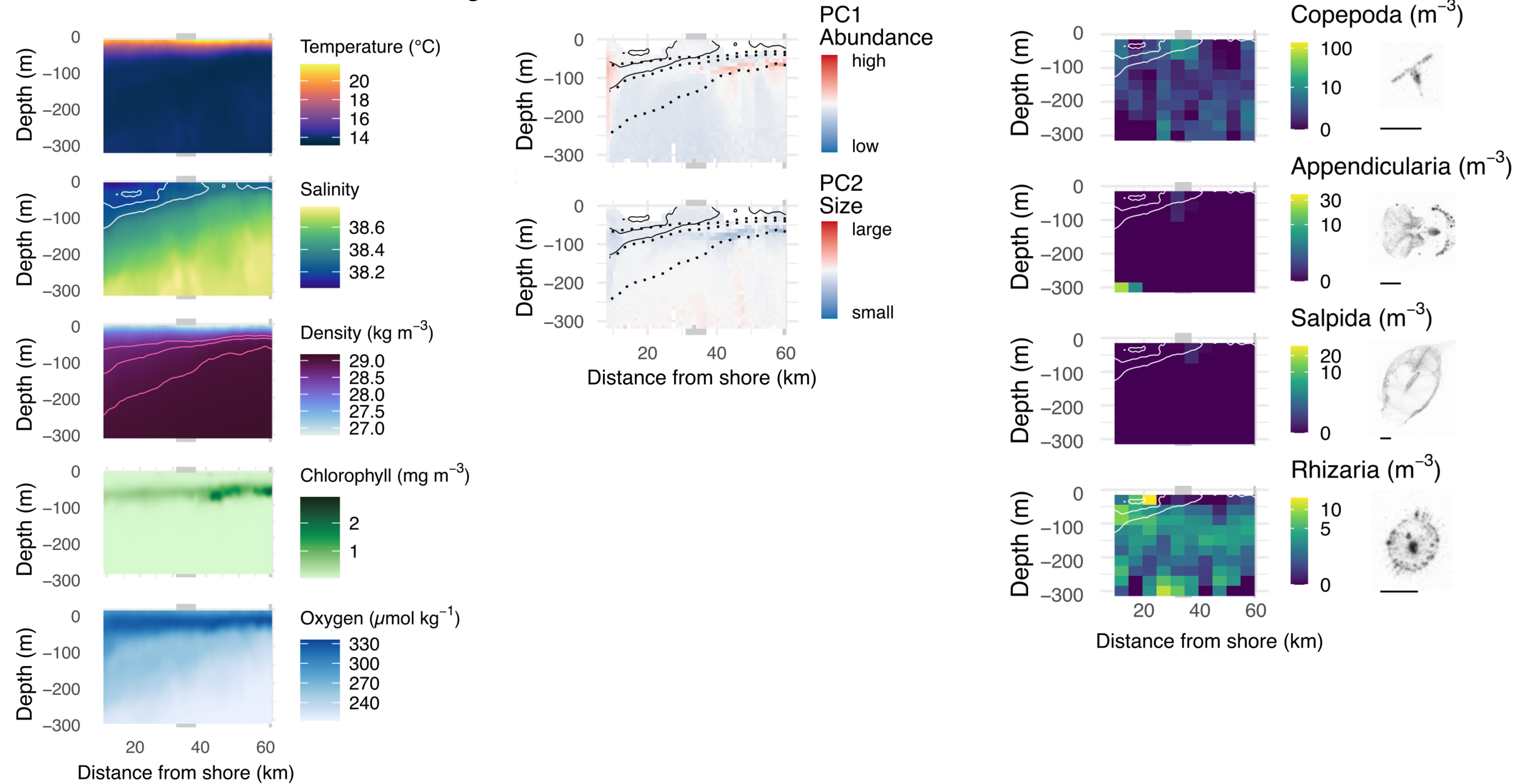
Mars: Mélange par le vent



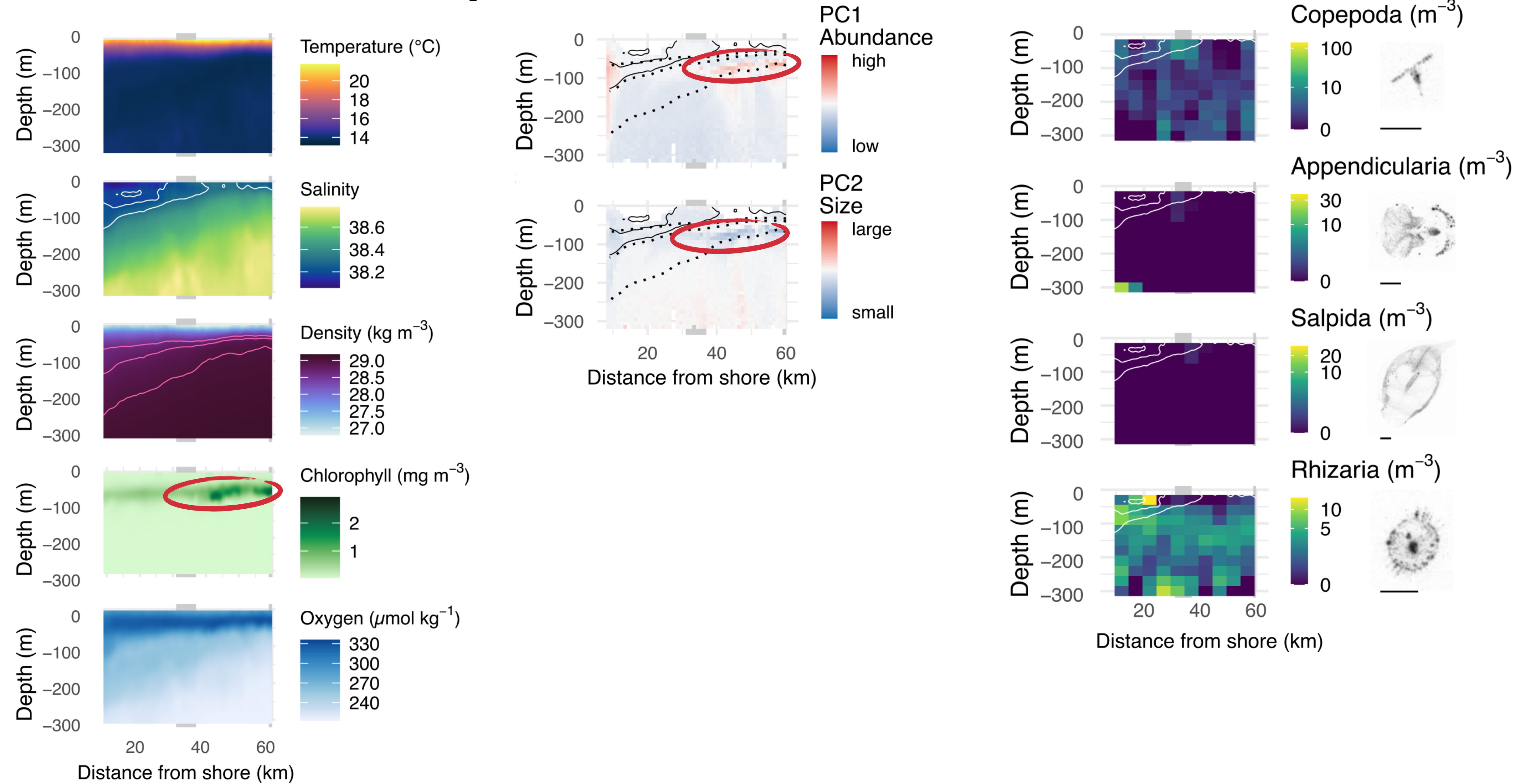
Mars: Mélange par le vent



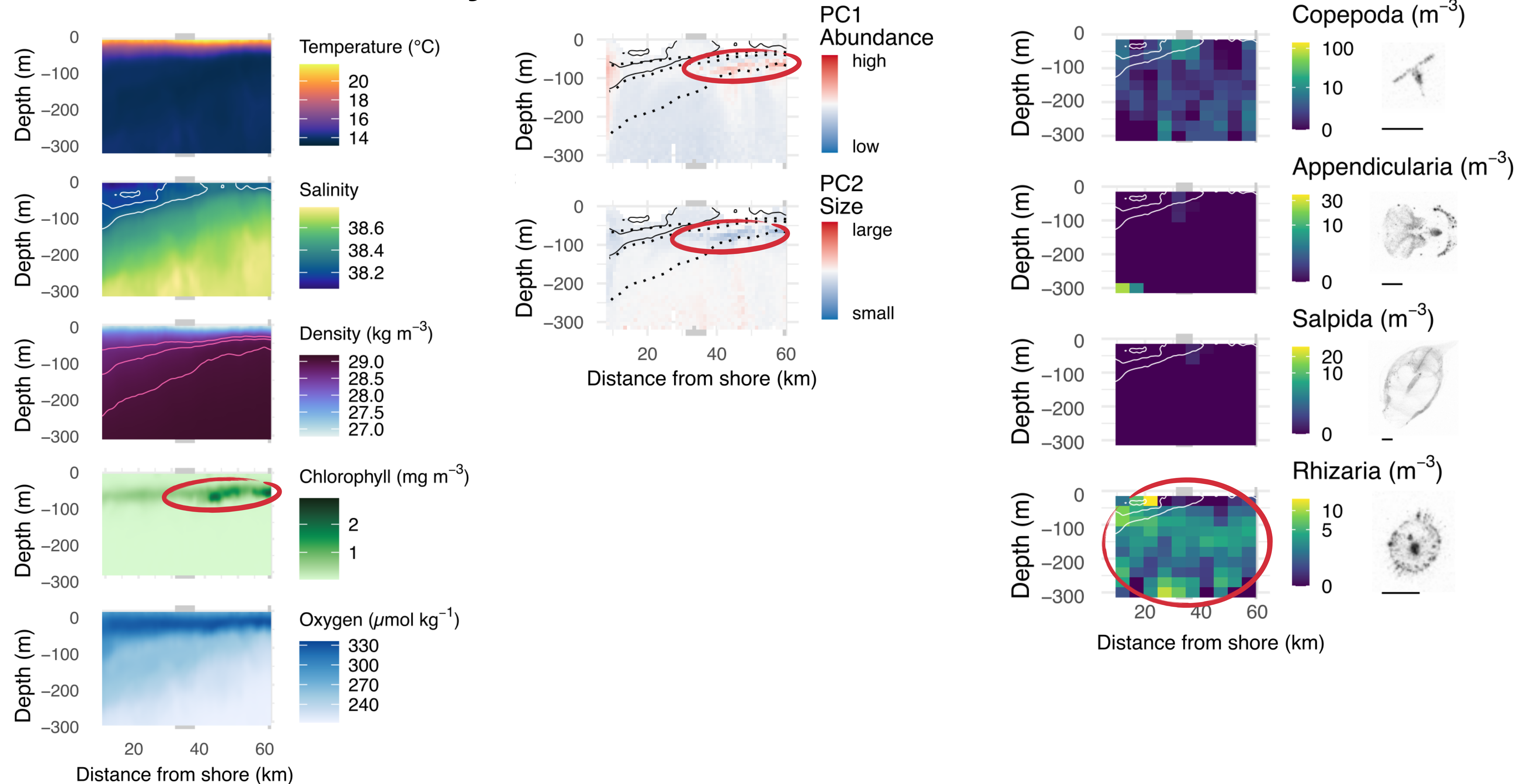
Juin: Une eau “nettoyée”



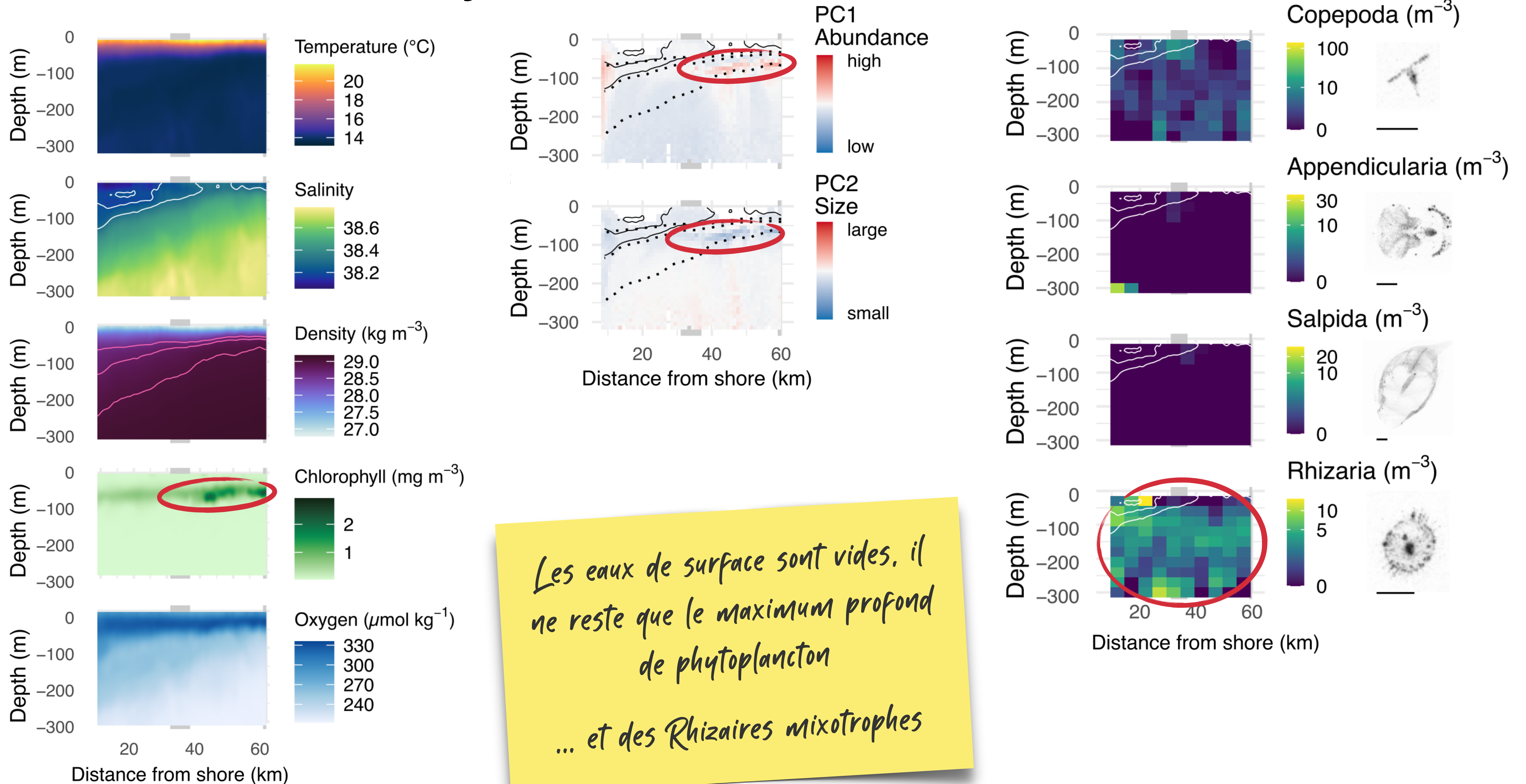
Juin: Une eau “nettoyée”



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*C'est aux fines échelles que les petits organismes
planctoniques interagissent avec leur environnement,
et maintenant nous pouvons les voir !*