Calanus finmarchicus vertical distribution: hotspots detection and model representation.



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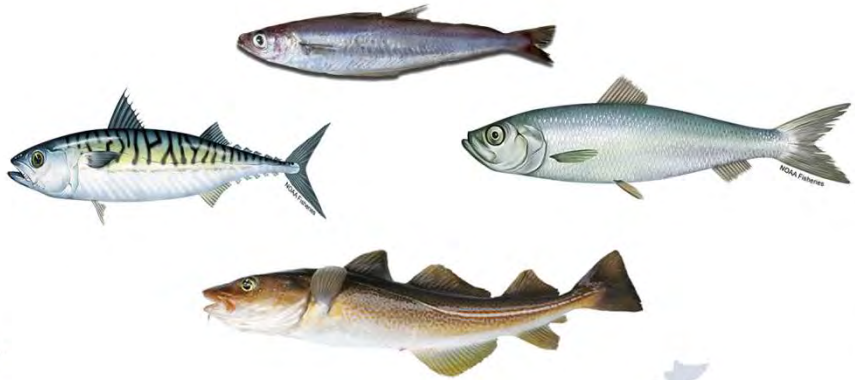
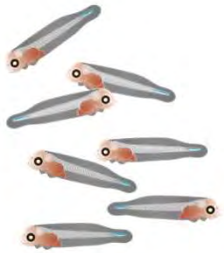
UiT The Arctic University of Norway

SFI HARVEST

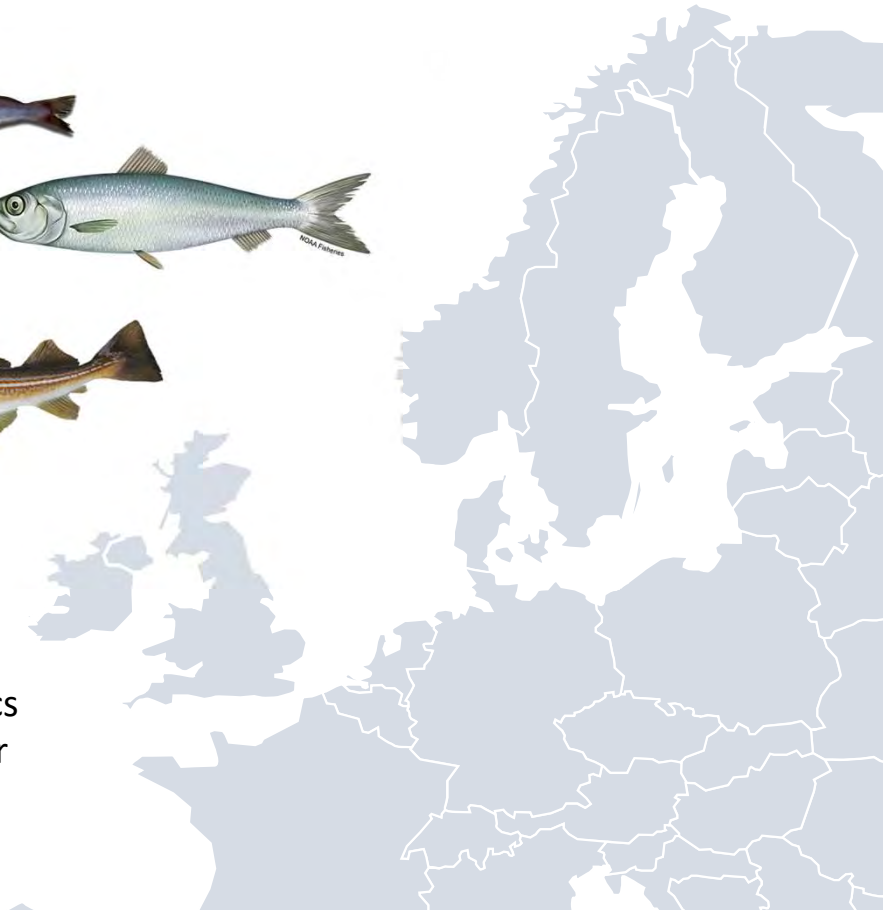
SINTEF OCEAN

C.FINMARCHICUS IS **KEY IN THE MARINE FOOD WEB** OF THE NORTH ATLANTIC



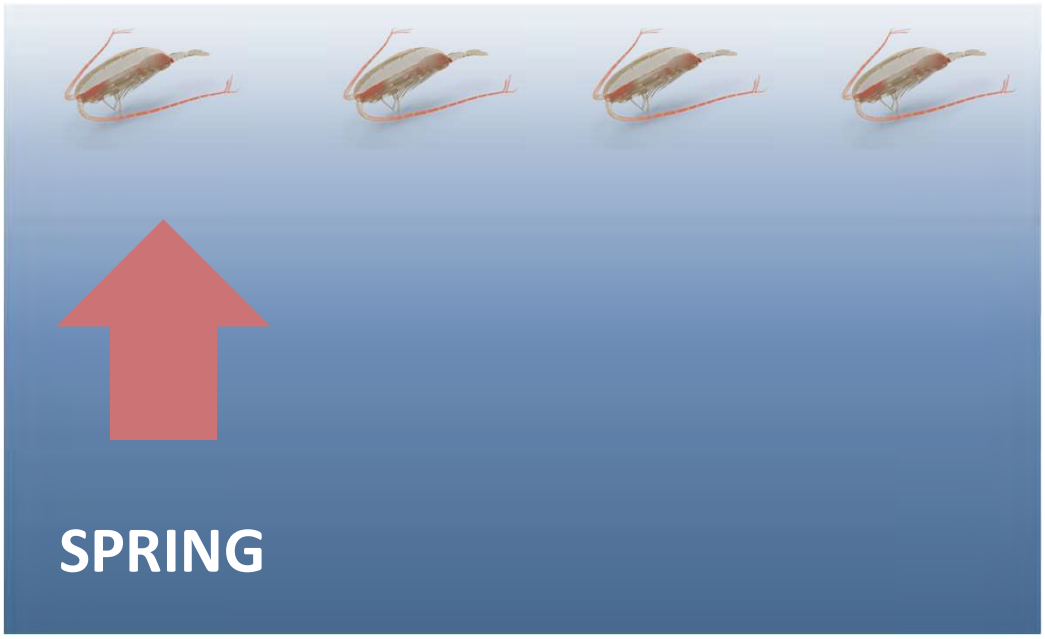


RA2 - Understand and predict ecosystem dynamics to provide information and knowledge needed for sustainable fisheries management and harvesting



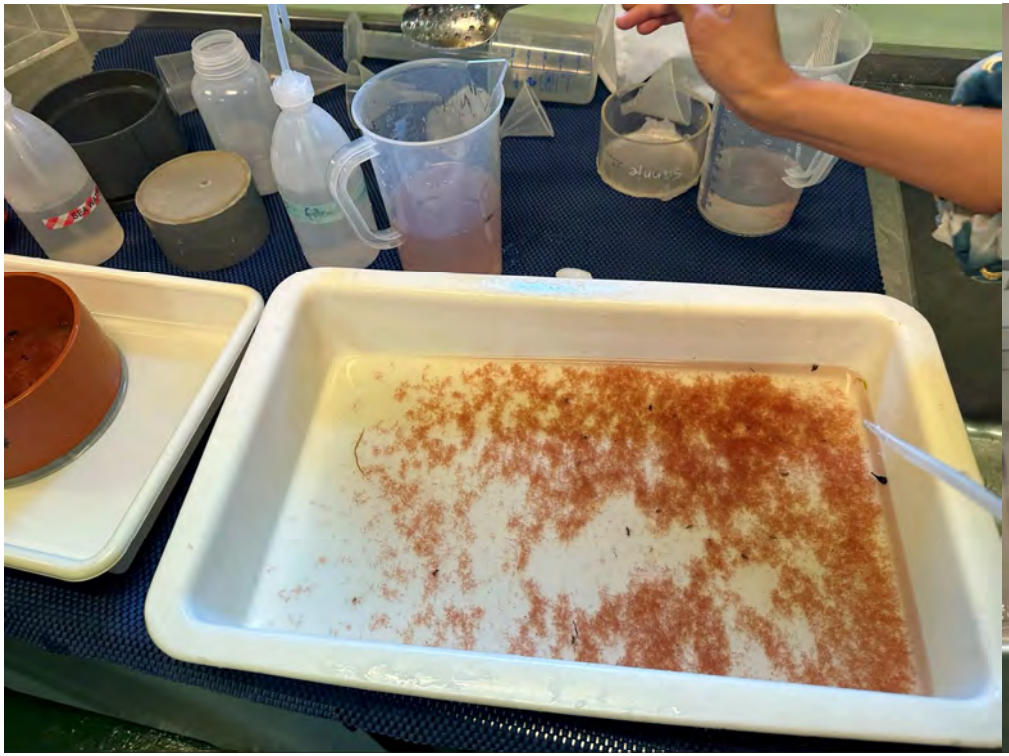
C.FINMARCHICUS *CAMES UP TO THE UPPER WATER COLUMN AFTER OVERWINTERING*

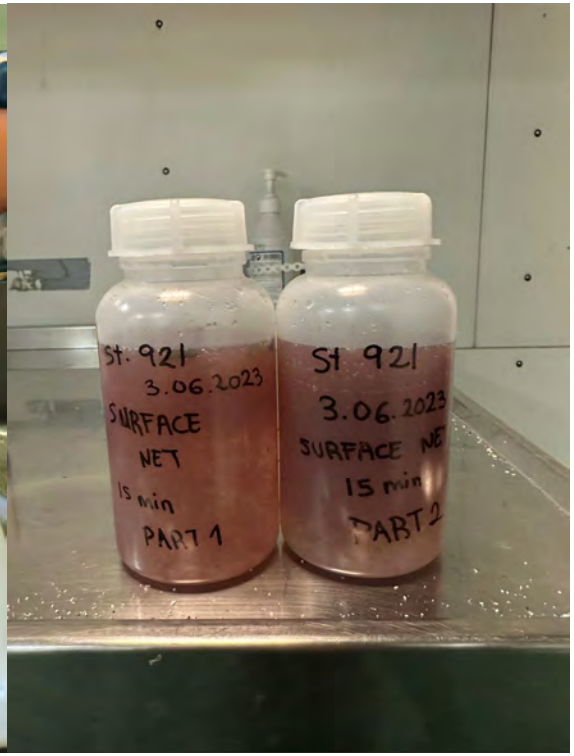
SURFACE →



BOTTOM →

HOW THEY DISTRIBUTE IN YHE UPPER WATER COLUMN?



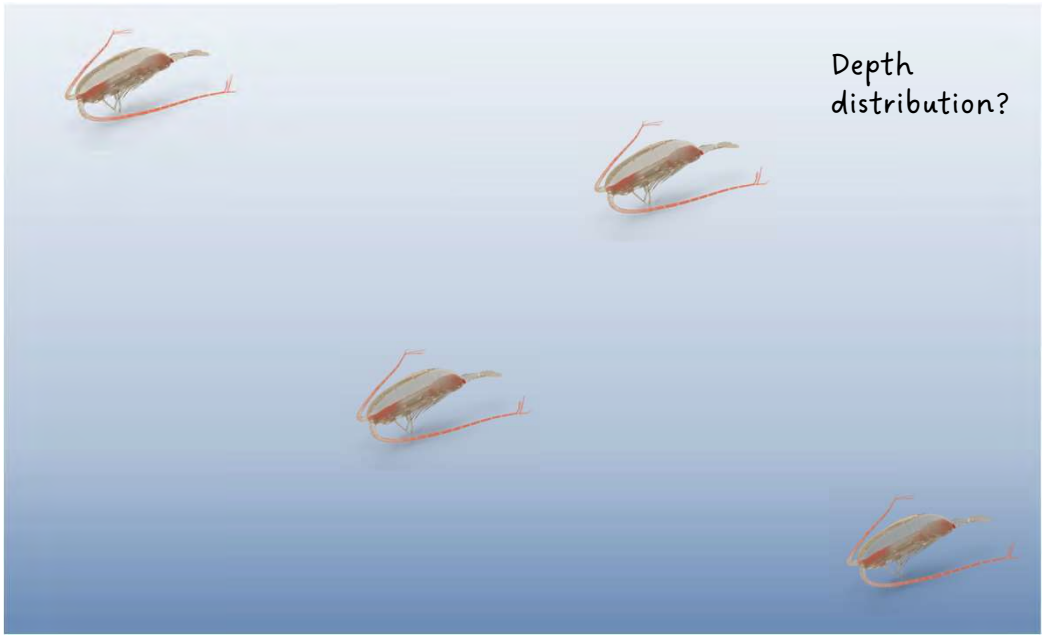


June 2023 – SFI HARVEST cruise onboard RV Helmer Hanssen – LOVE basin

HOW THEY DISTRIBUTE IN YHE UPPER WATER COLUMN?

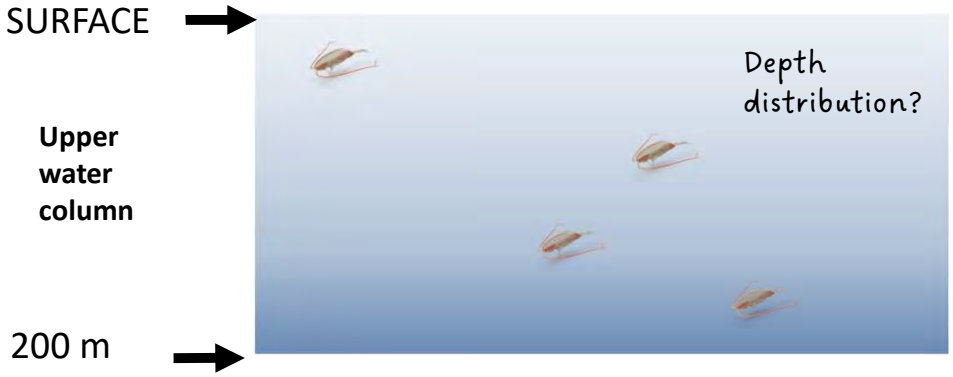
SURFACE →

Upper water column

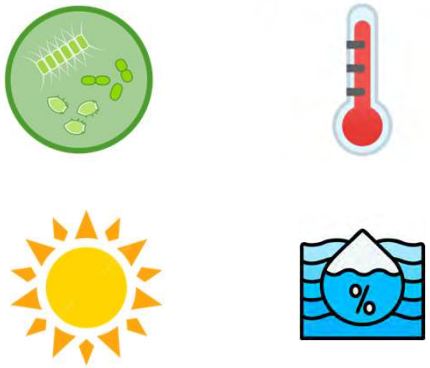


200 m →

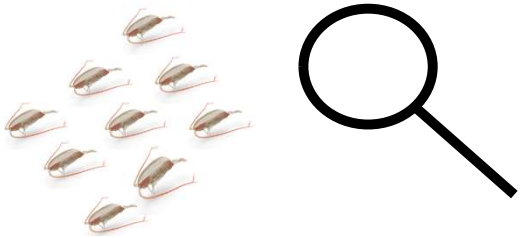
HOW THEY DISTRIBUTE IN YHE UPPER WATER COLUMN?



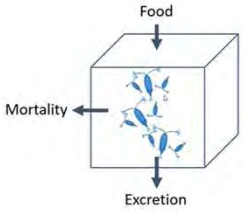
1. Influence of environmental variables?



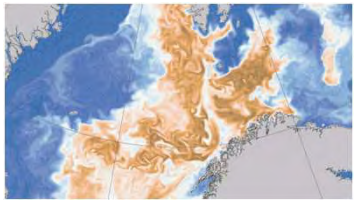
2. Identifying Calanus spp. hotspots



3. Modelling vertical distribution and hotspots



SINMOD

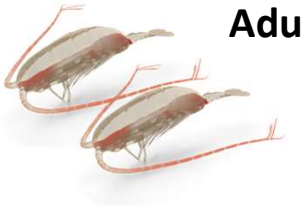


1. Vertical distribution and environmental variables

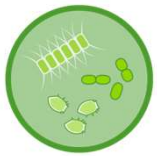
Early stages (CI-CIII)

CIV

CV

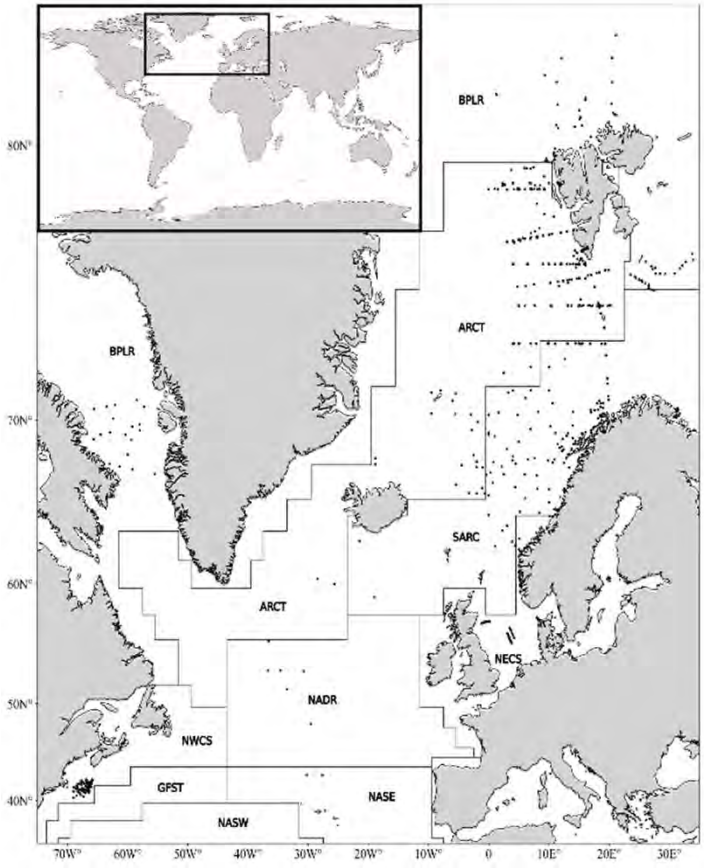


Adults females and males

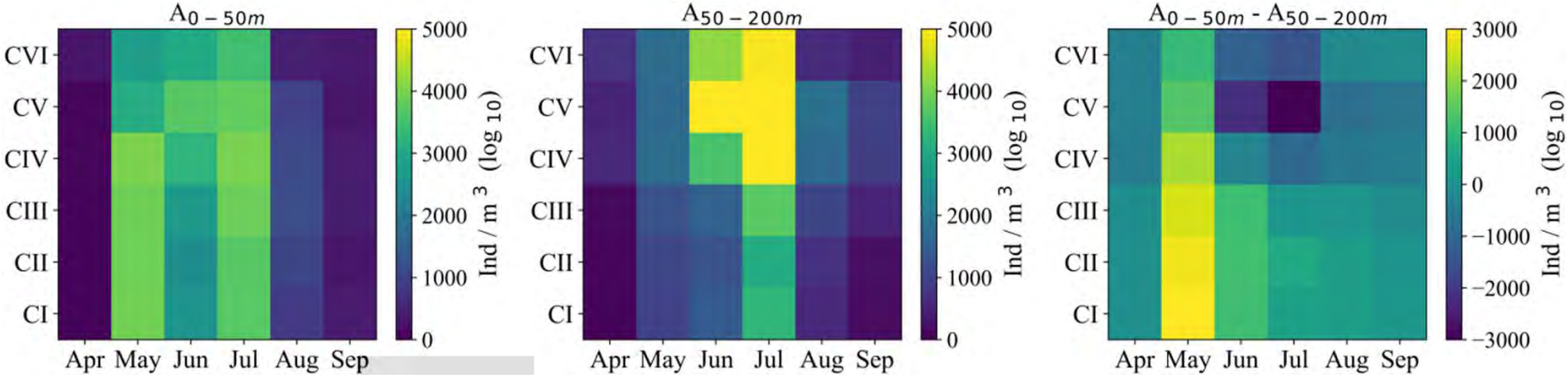


Results from: "Meta-analysis of *Calanus finmarchicus* vertical distribution and its relationship with hydrographic variables in the North Atlantic basin " *(Chamorro et al., manuscript in preparation)*

Longhurst's provinces (Longhurst. *et al.,* 1995)



STAGE ABUNDANCES DURING SPRING AND SUMMER



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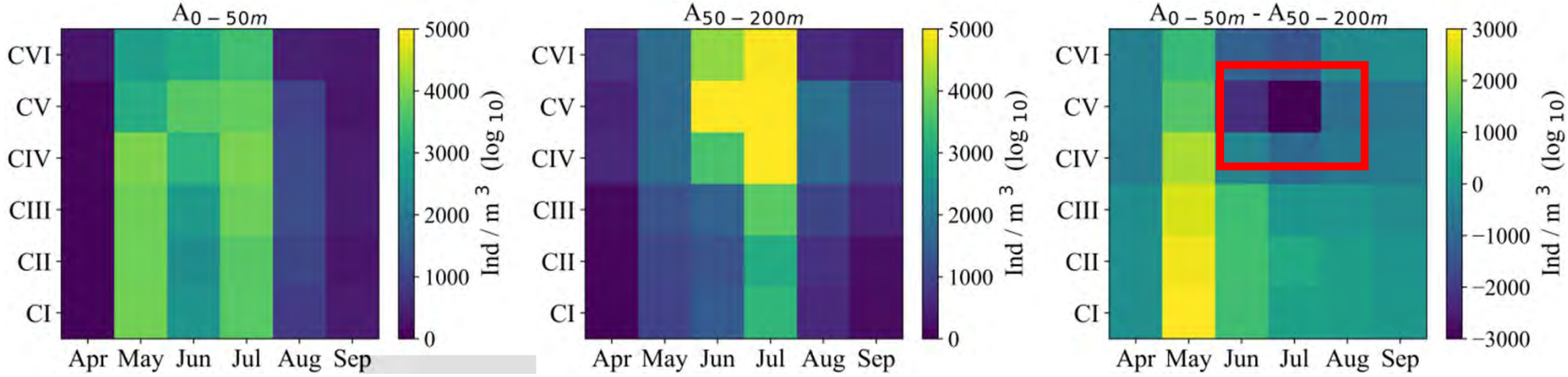
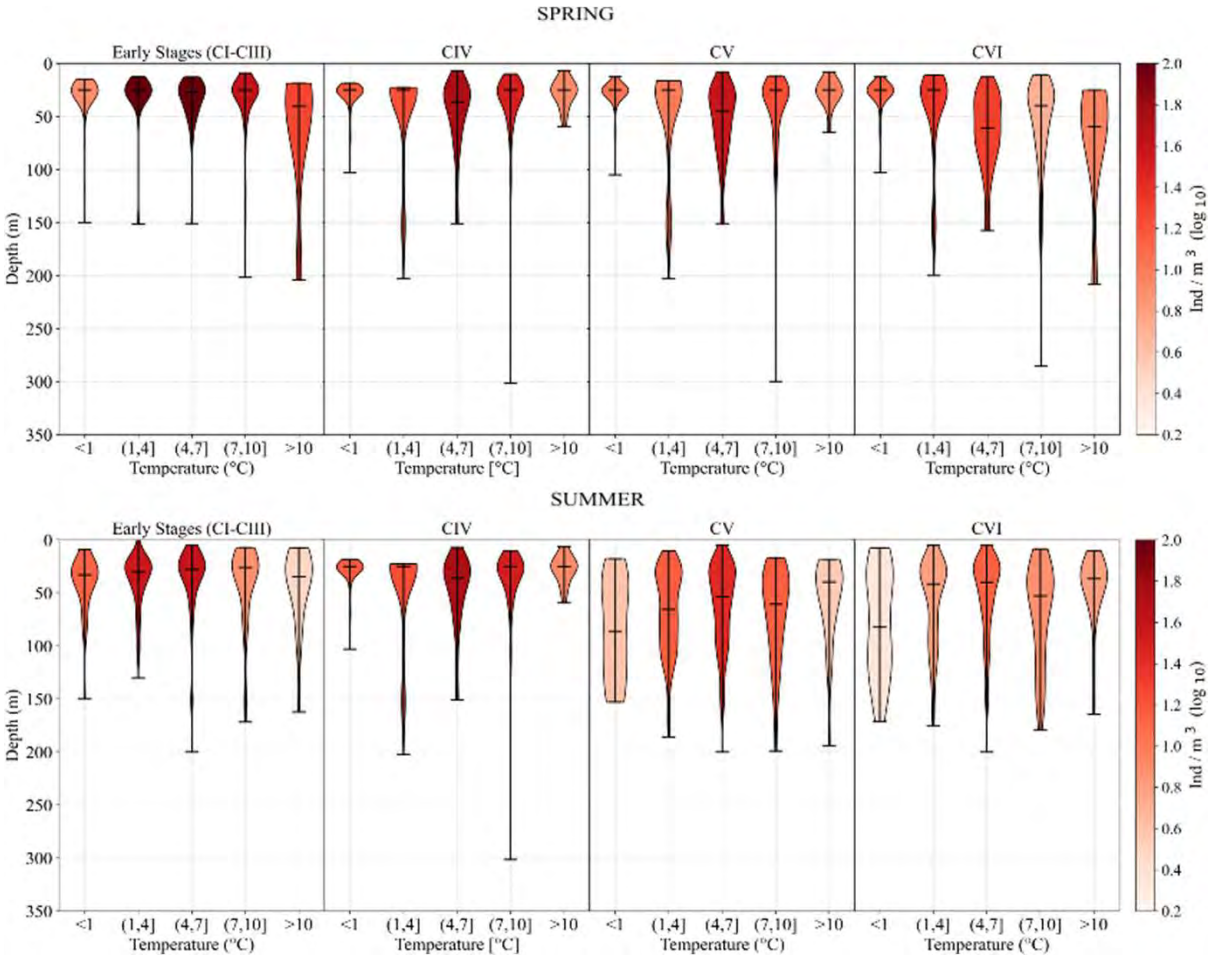


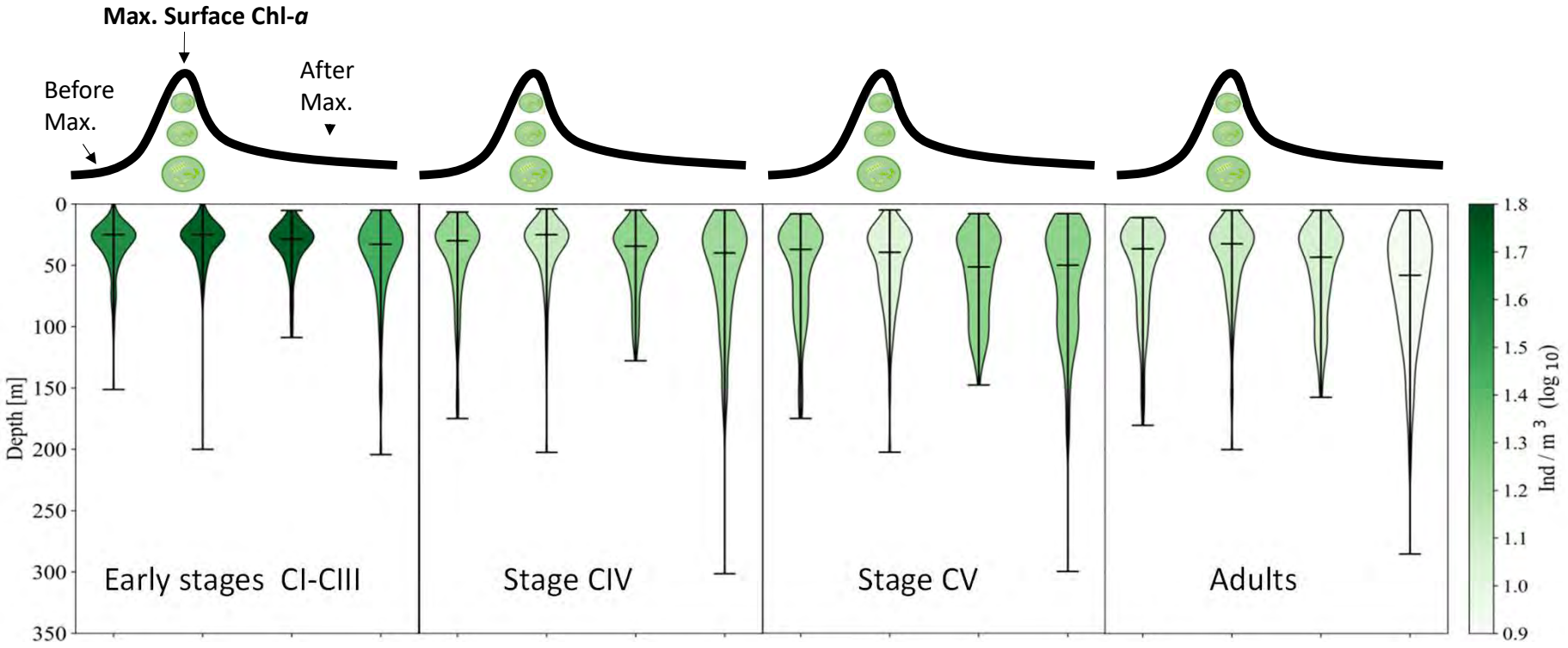
VERTICAL DISTRIBUTION AND TEMPERATURE

COLDER TEMPERATURES ARE ASSOCIATED WITH SHALLOWER DISTRIBUTIONS

WEIGHT MEAN DEPTH VARIABILITY BETWEEN STAGES AND SEASONS

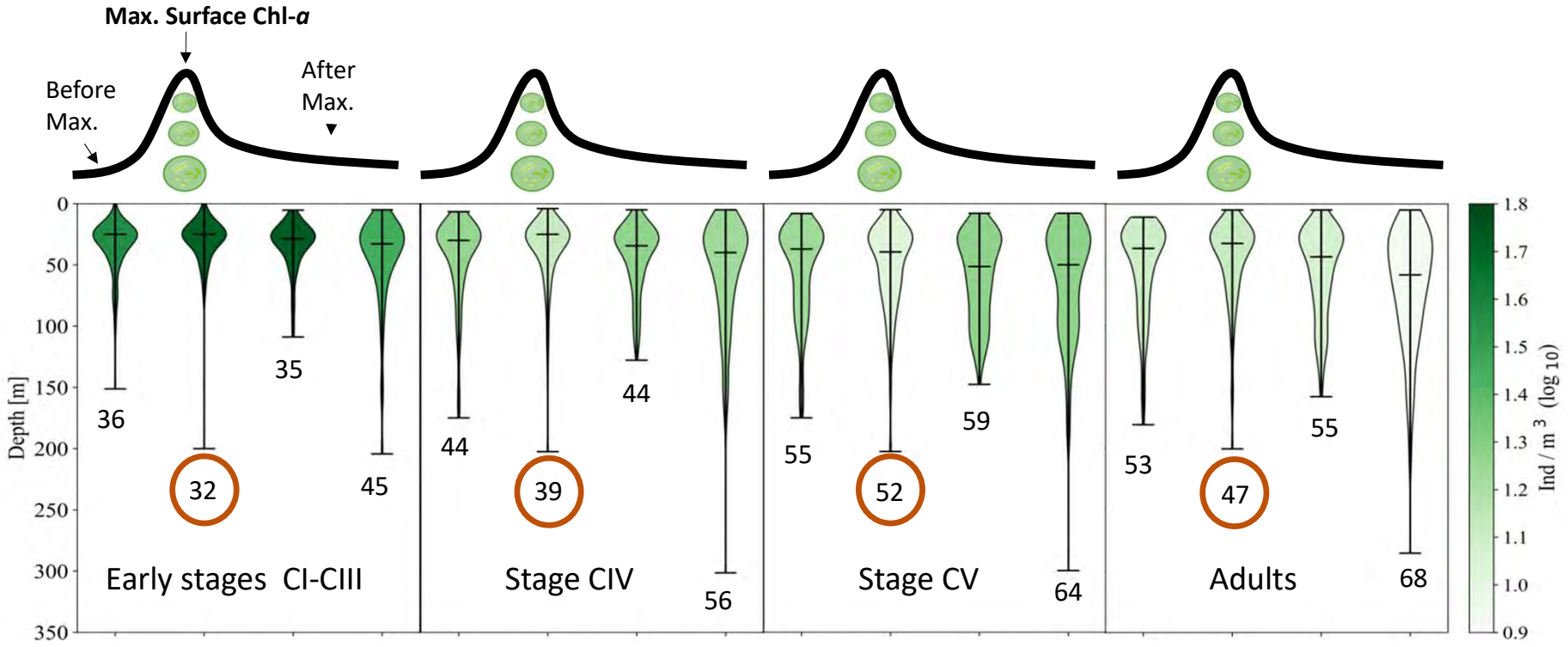


VERTICAL DISTRIBUTION AND CHL-A SURFACE MAXIMUN OF THE SEASON



DURING SURFACE CHL-*A* MAXIMUN *C.FINMARCHICUS* IS CLOSER TO SURFACE

VERTICAL DISTRIBUTION AND CHL-A SURFACE MAXIMUN OF THE SEASON



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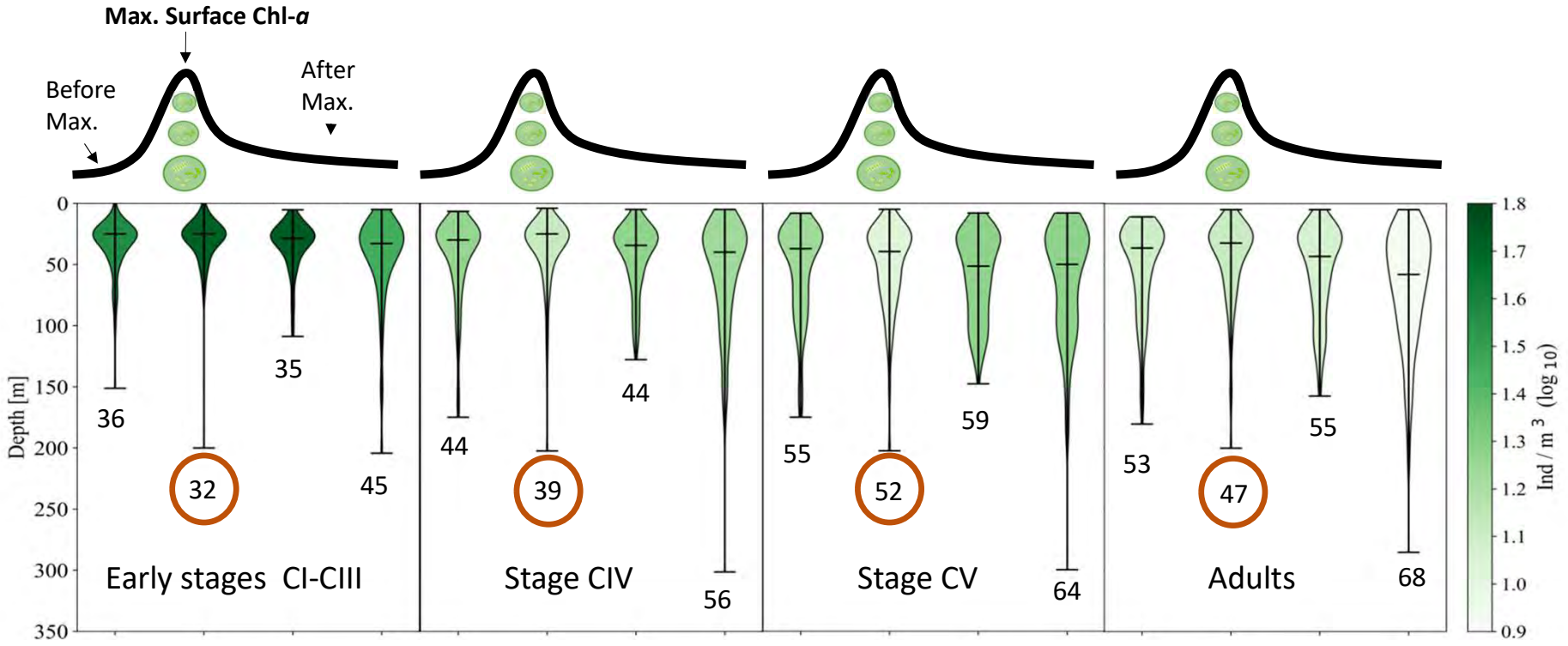

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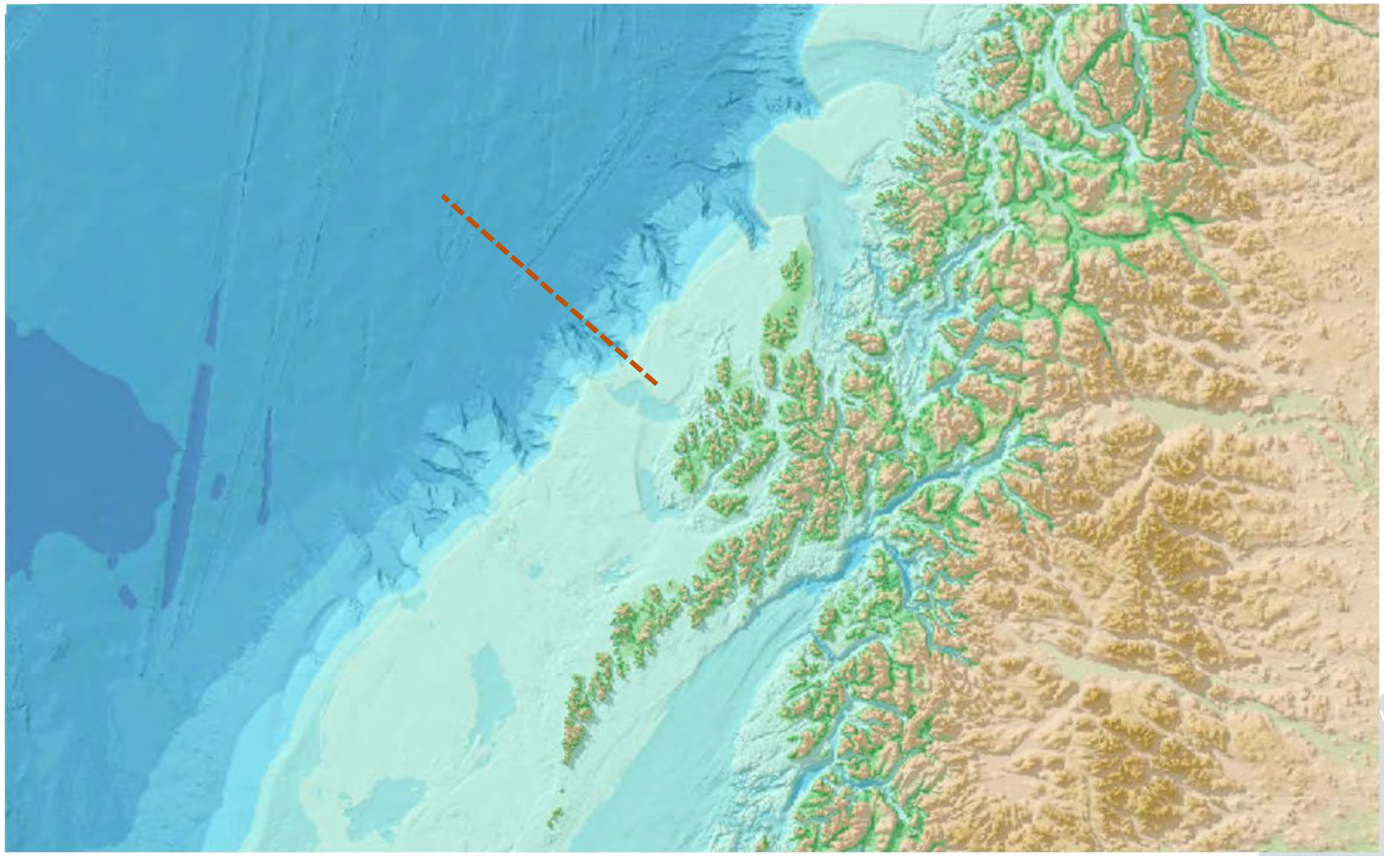
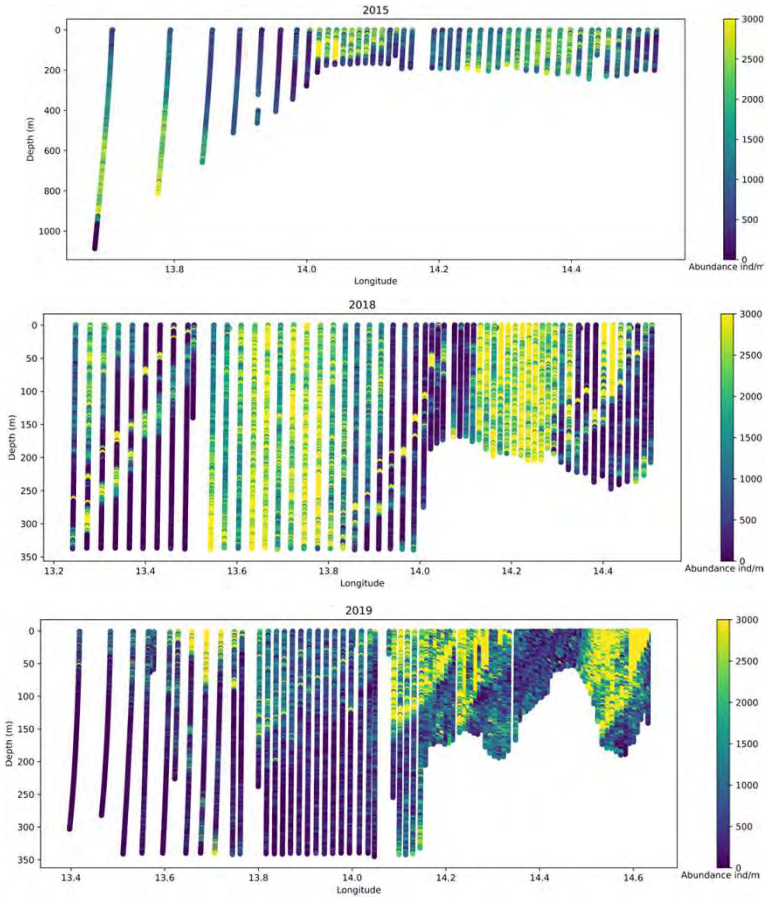
2. Identifying Calanus spp. hotspots

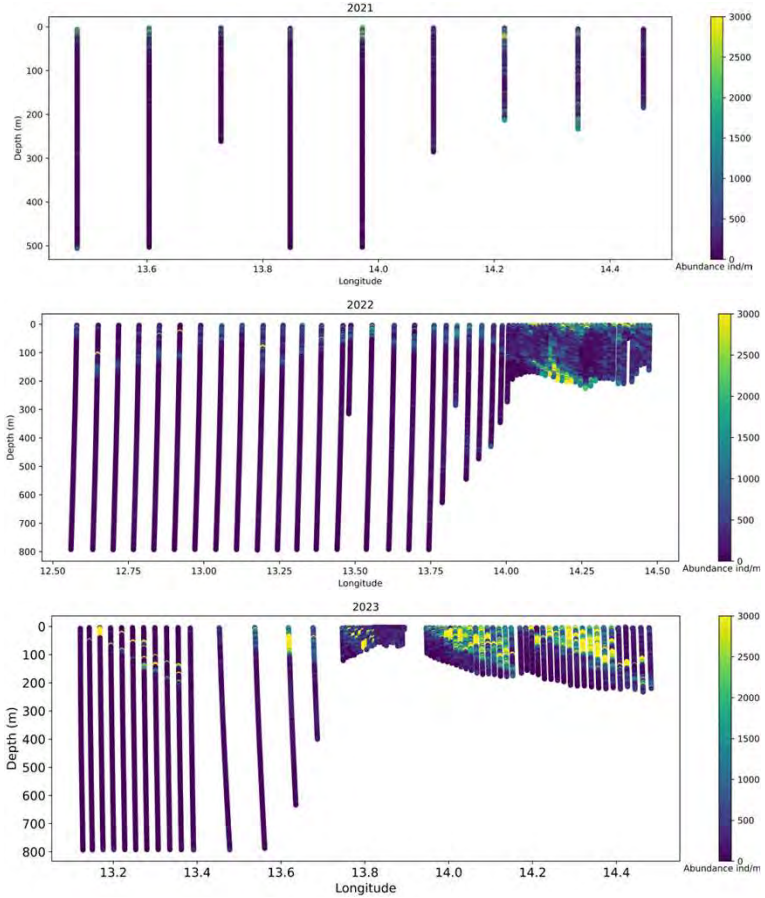
WE COLLLECTED DATA FROM **HOLA TRANSECT**



LOPC (LASER OPTICAL PLANKTON COUNTER) TRANSECTS

Open ocean → Coast



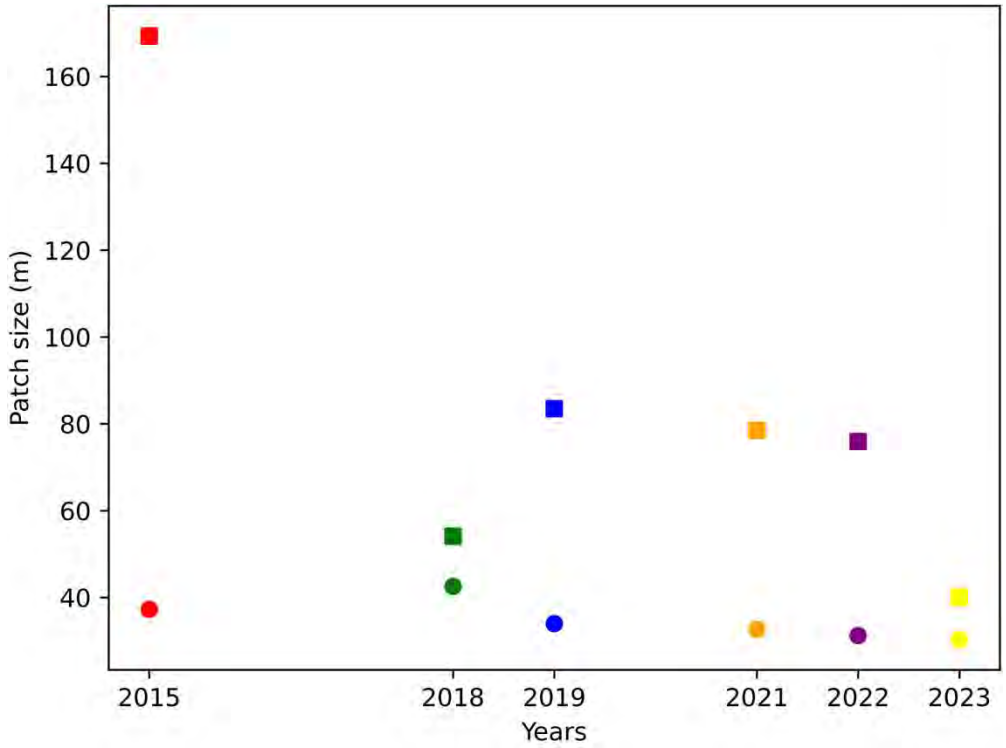


LOPC (LASER OPTICAL PLANKTON COUNTER) TRANSECTS

Open ocean ■ → Coast ●

INTERANUAL VARIABILITY

SMALLER PATCHES AT THE COASTAL AREA



Patch size
Moran Index

Patch size
Depth comparaison between openocean and coastal area

Results from: "*Interannual variability of Calanus spp.* hotspots in the Norwegian Sea" *(Chamorro et al., manuscript in preparation)*

Patch size

Moran Index

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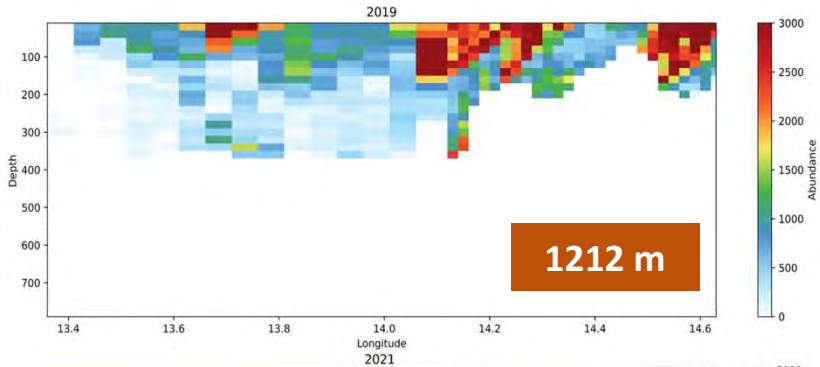

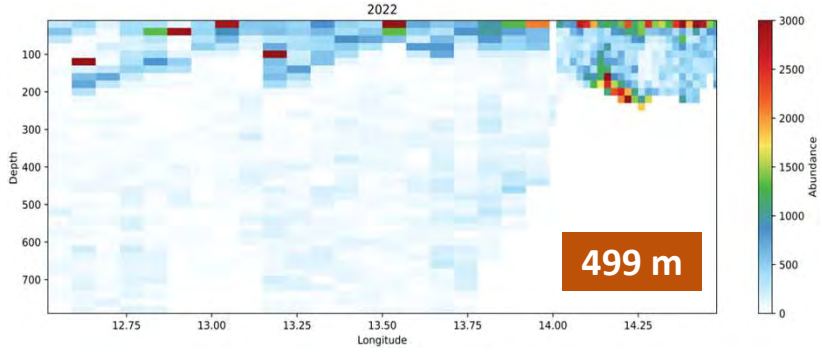

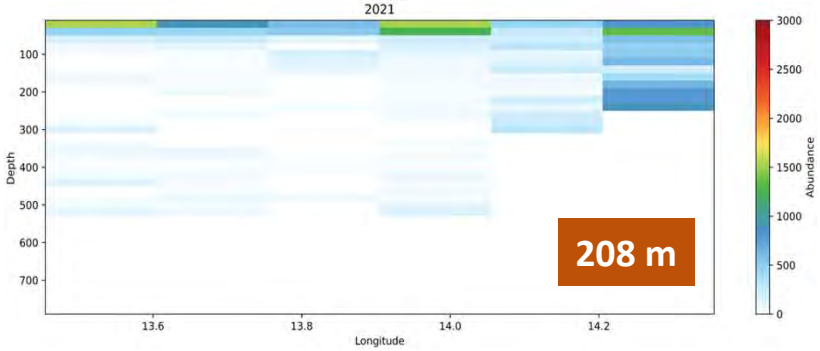

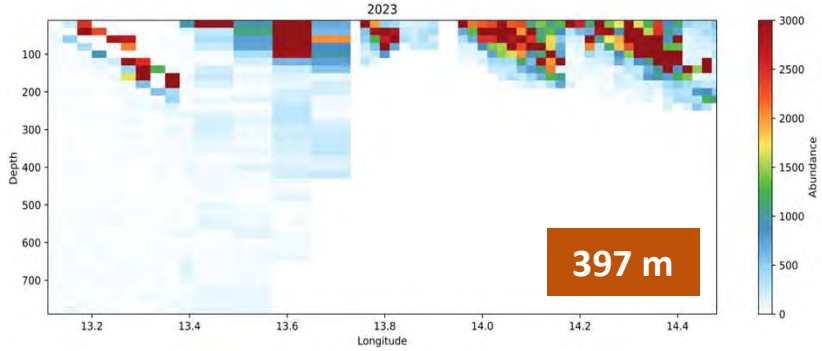

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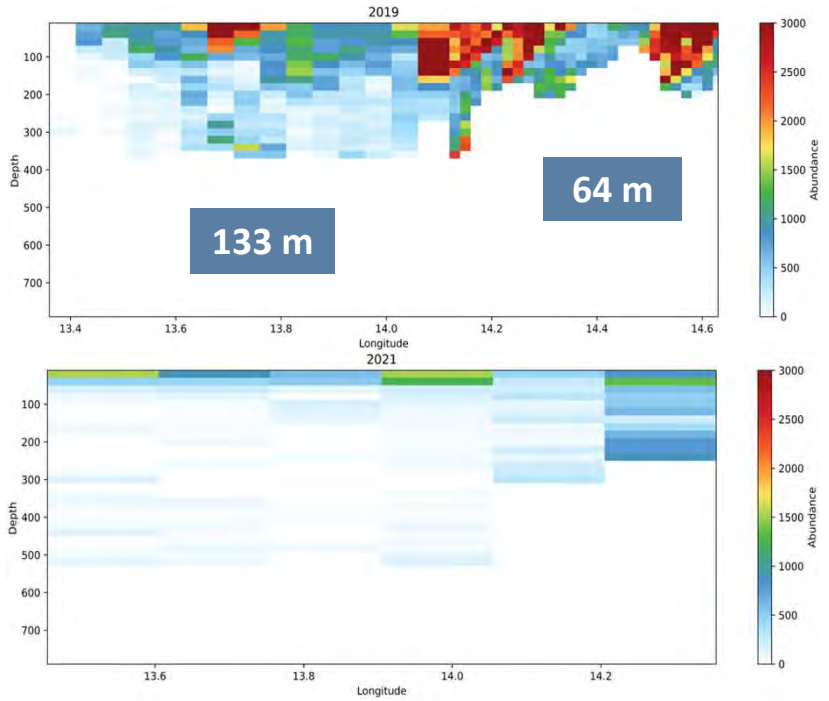
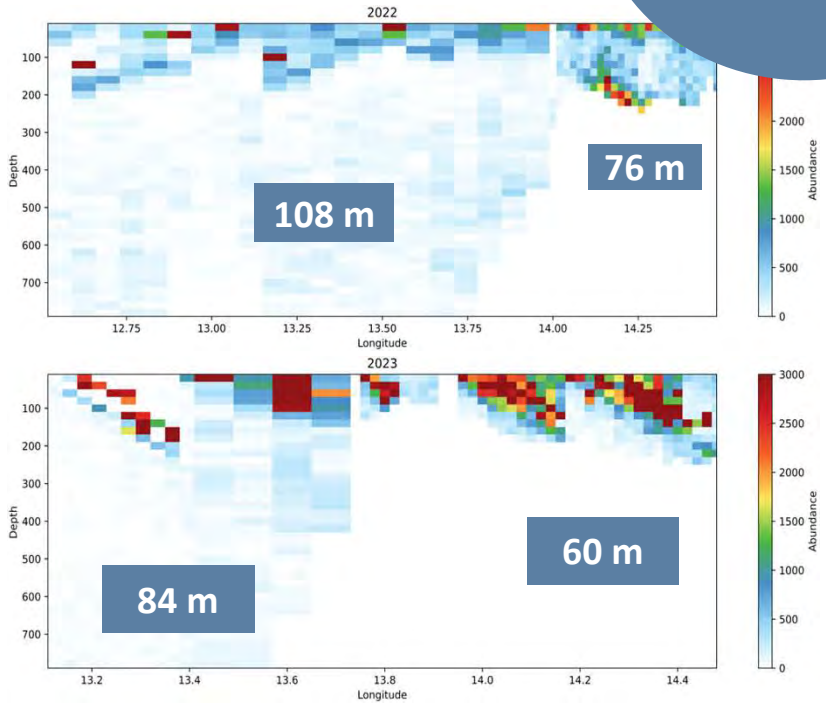




Results from: "*Interannual variability of Calanus spp.* hotspots in the Norwegian Sea" *(Chamorro et al., manuscript in preparation)*

3. Modelling vertical distribution and hotspots

COUPLED PHYSICAL-BIOLOGICAL OCEAN MODEL

Hydrodynamic model

Currents

Temperature

Salinity

Ice

SWAN
Simulating WAves Nearshore

Carbon and oxygen system

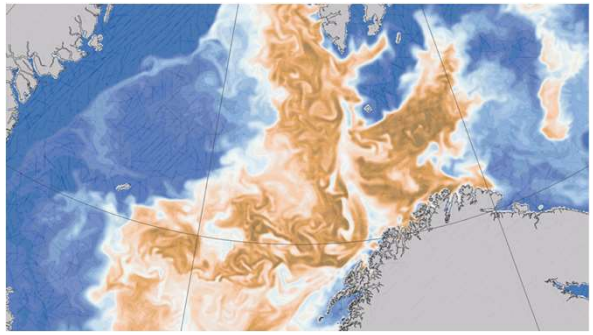
Atmosphere – ocean Exchange

Alkalinity, DIC, O_2

SINTEF OCEAN

SINMOD

(Slagstad & McClimans, 2005)



Biological models

Detritus, POM

Benthic / sediments

Ecological model

Nutrients

Phytoplankton

Zooplankton

***C. finmarchicus* model**

(Alver, M. O. et al., 2016)

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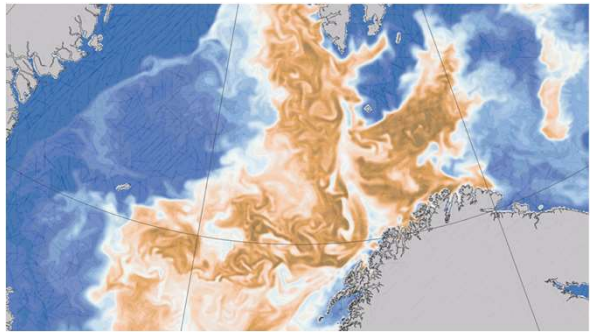

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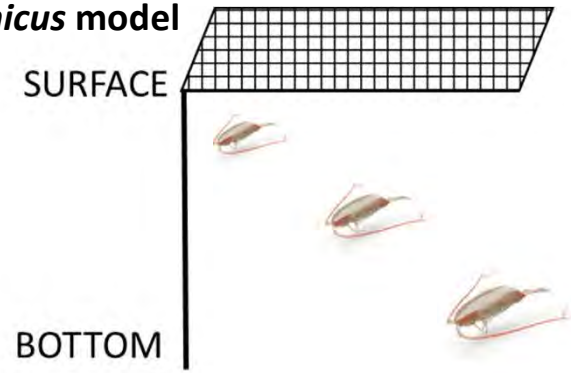
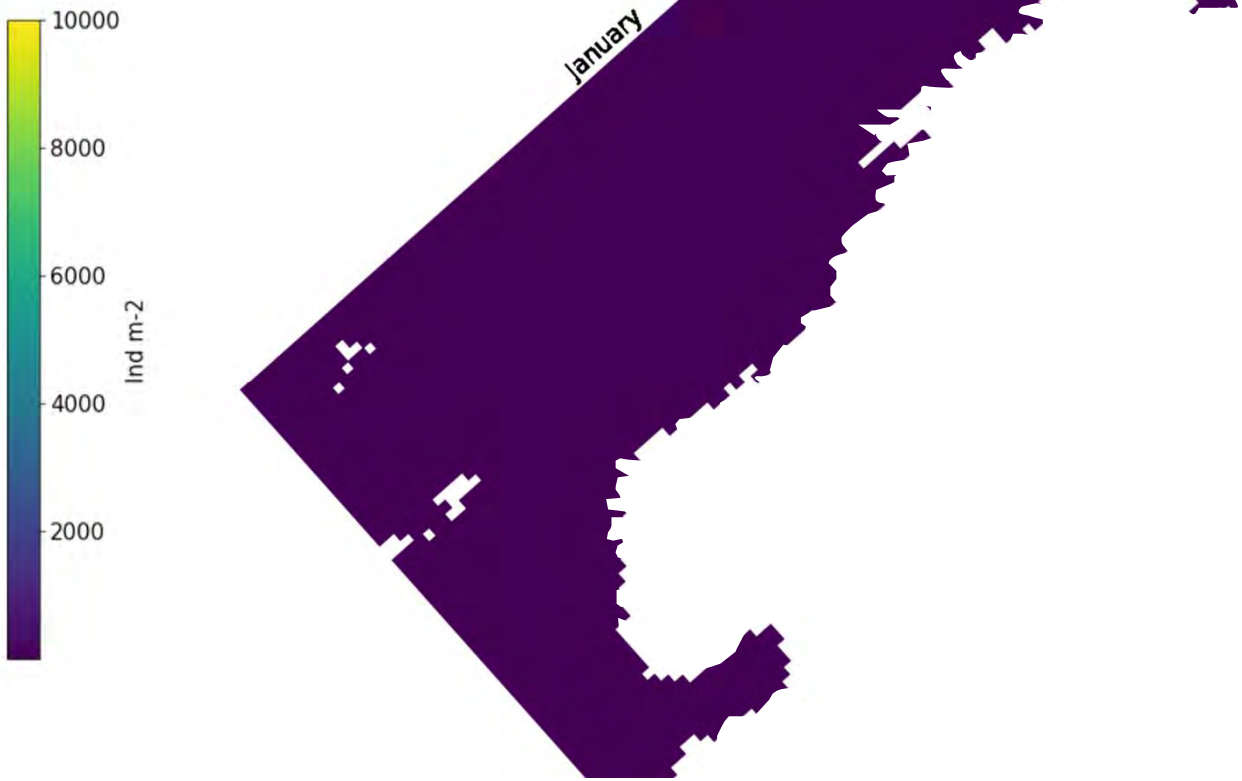


MODEL RESOLUTION

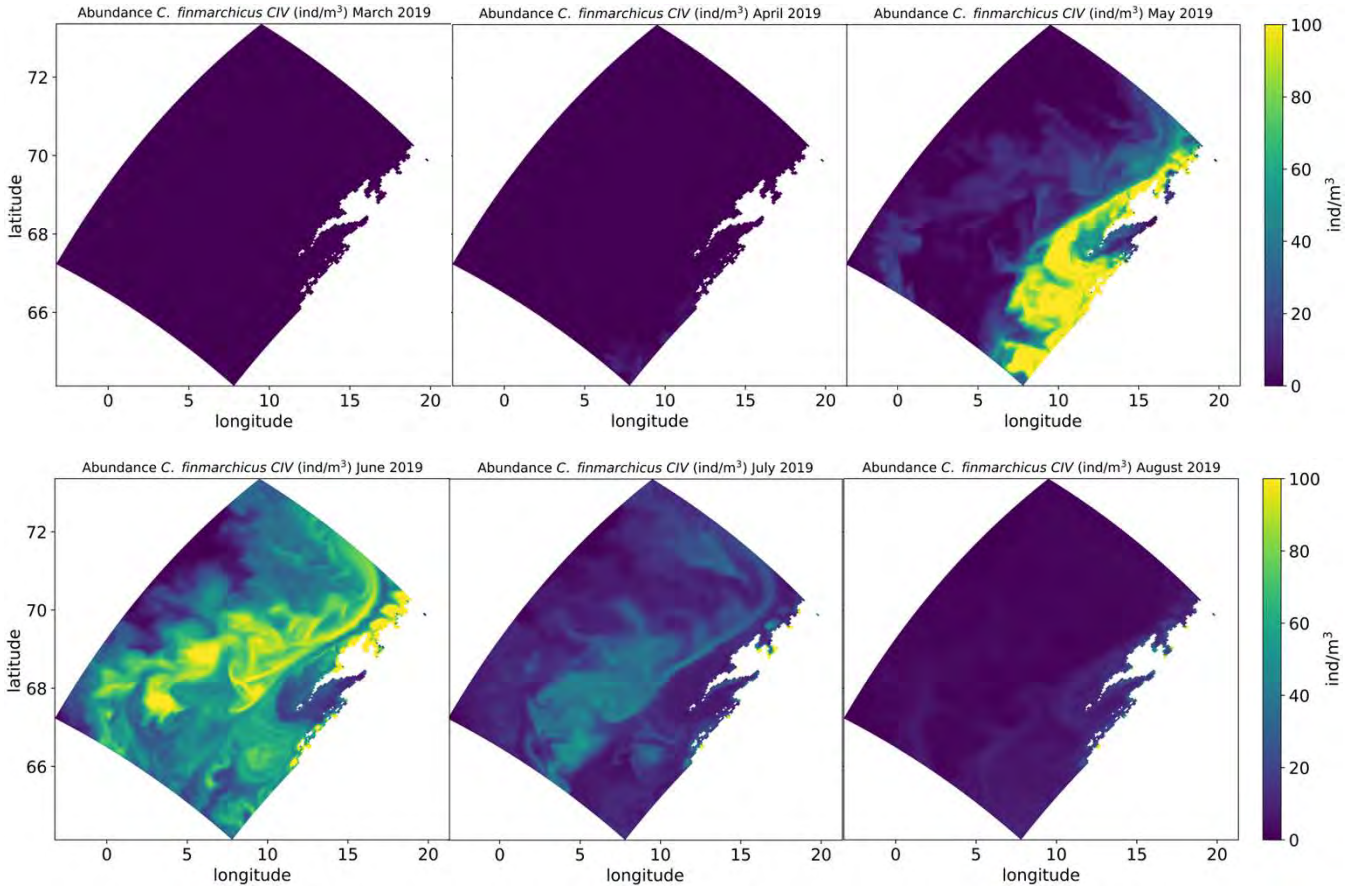
20 Km

*A*bundance of *C. finmarchicus* CIV during 2019



MODEL RESOLUTION

4 Km



MODEL RESOLUTION

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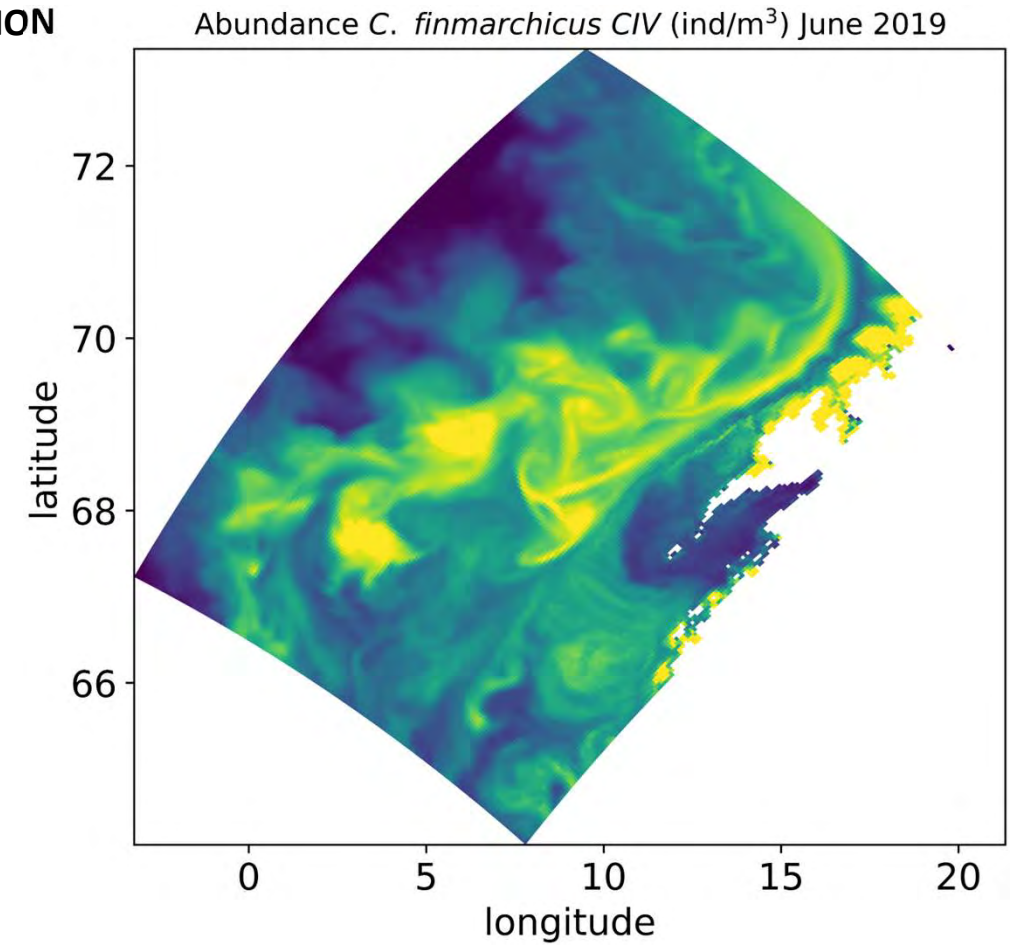

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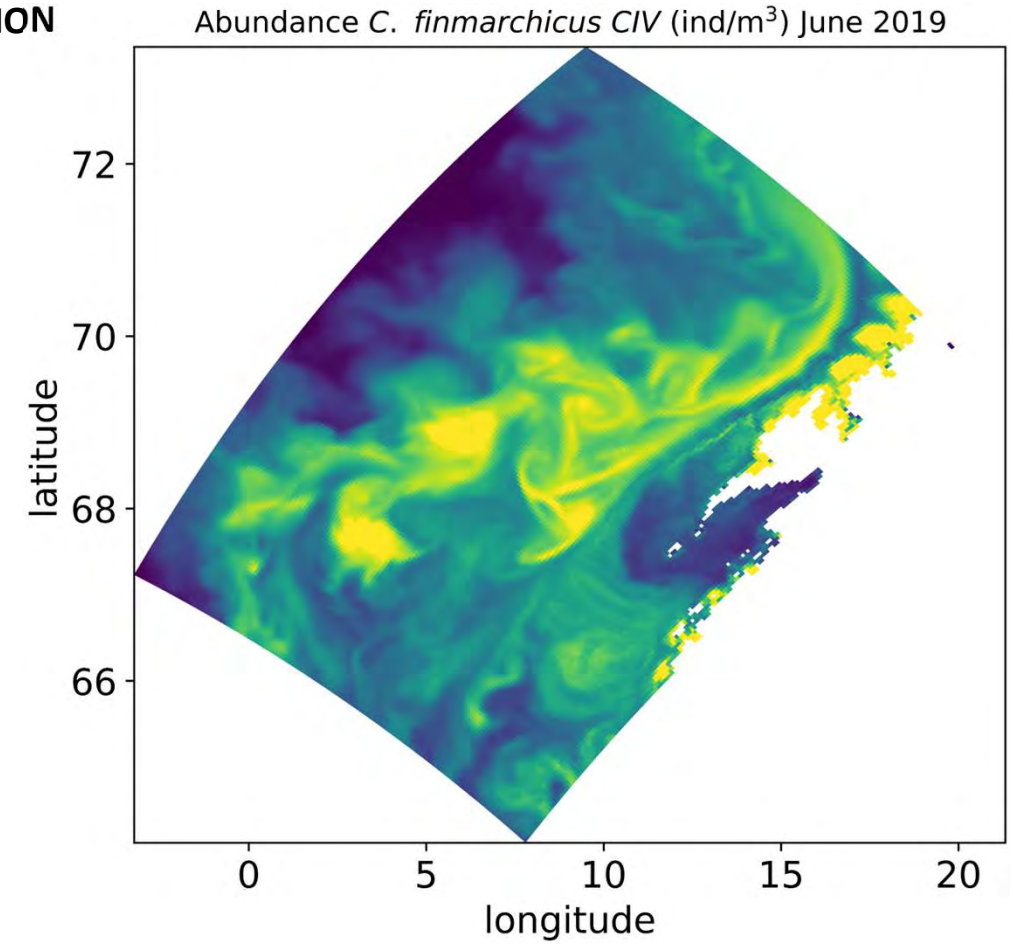

Next step to resolve mesoscale eddies

800 m resolution

CONCLUSIONS

- **Depth distribution of *C. finmarchicus* in the upper water column is associated with the developmental stage, the time of year, and specific environmental factors.**

- ***C. finmarchicus* patch size variates along years and study areas.**

- **Model resolution according to research objectives is crucial to obtain accurate results.**

THANK YOU FOR YOUR ATTENTION!

More about
SFI HARVEST

More about
SINMOD

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eva.c.garrido@uit.no

LINKEDIN
EVA CHAMORRO GARRIDO

Project supported by SFI HARVEST