Improving a coupled physical-biological ocean model based on a meta-analysis of *Calanus finmarchicus* vertical distribution in relation to environmental variables.

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UiT The Arctic University of Norway

Department of Arctic and Marine Biology

Hobart, 18-03-2024

HATE & LOVE relationship with the super computer that runs the model I use for my PhD

March 2024

Session 16: Improving zooplankton representation in models

UiT The Arctic University of Norway

SFI HARVEST

SINTEF OCEAN

Research Network ARCTOS

ICES-PICES 7th International Zooplankton Production Symposium

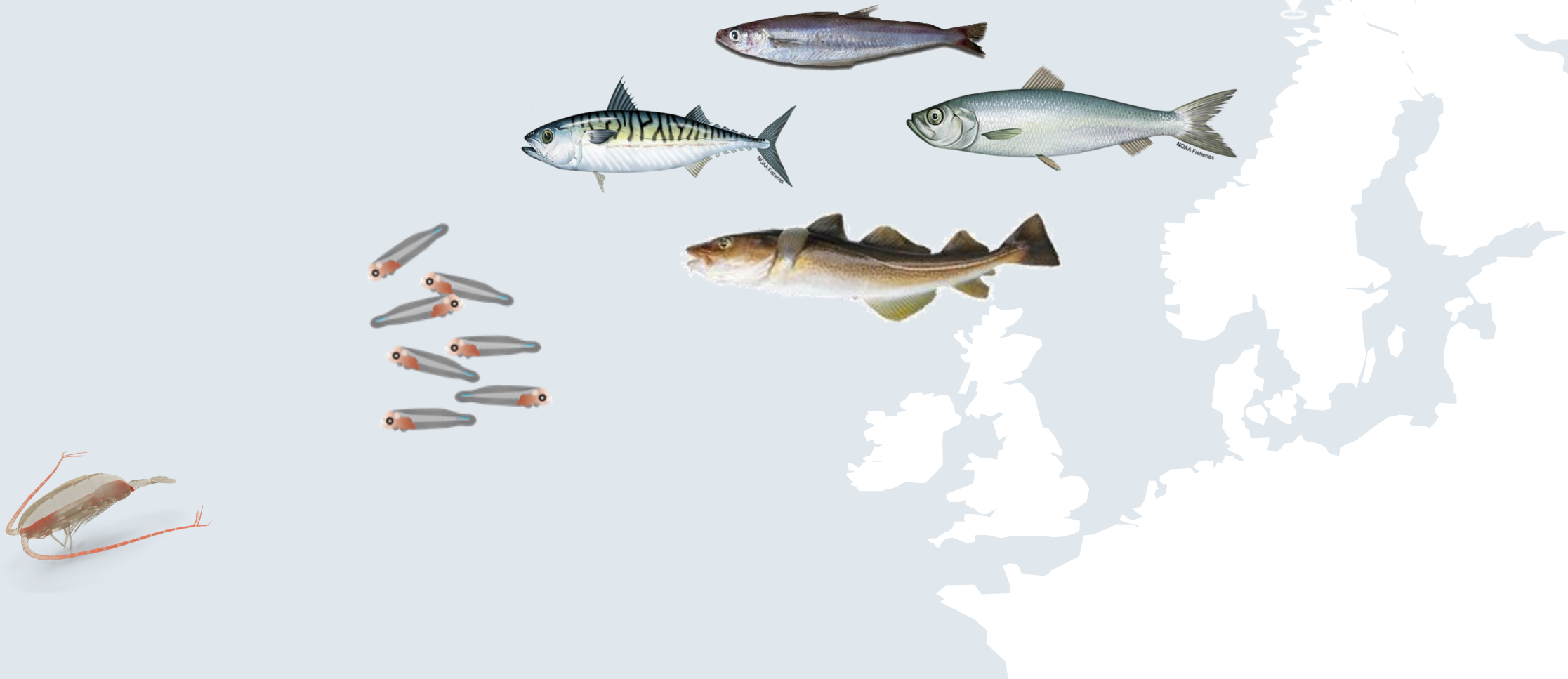
17-22 March, 2024

Hobart, Tasmania

AUSTRALIA

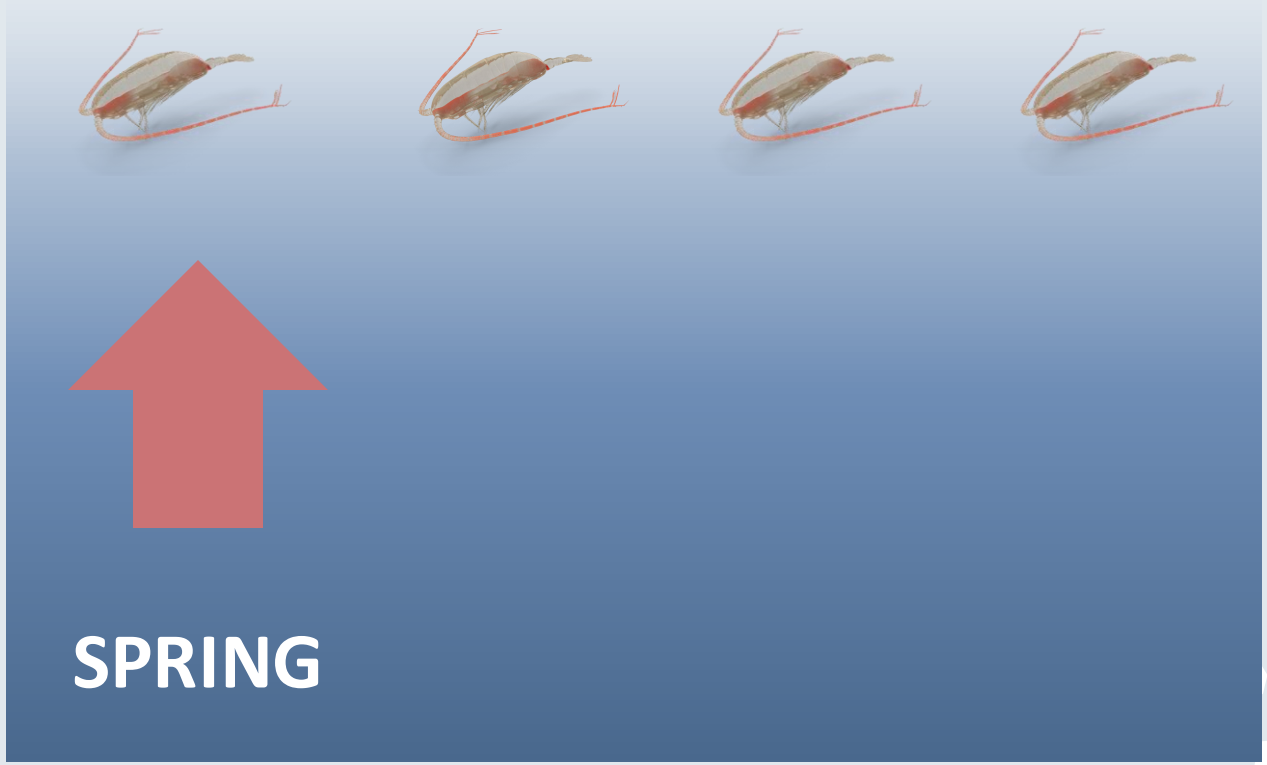
#ZPS7

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



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

SURFACE



BOTTOM

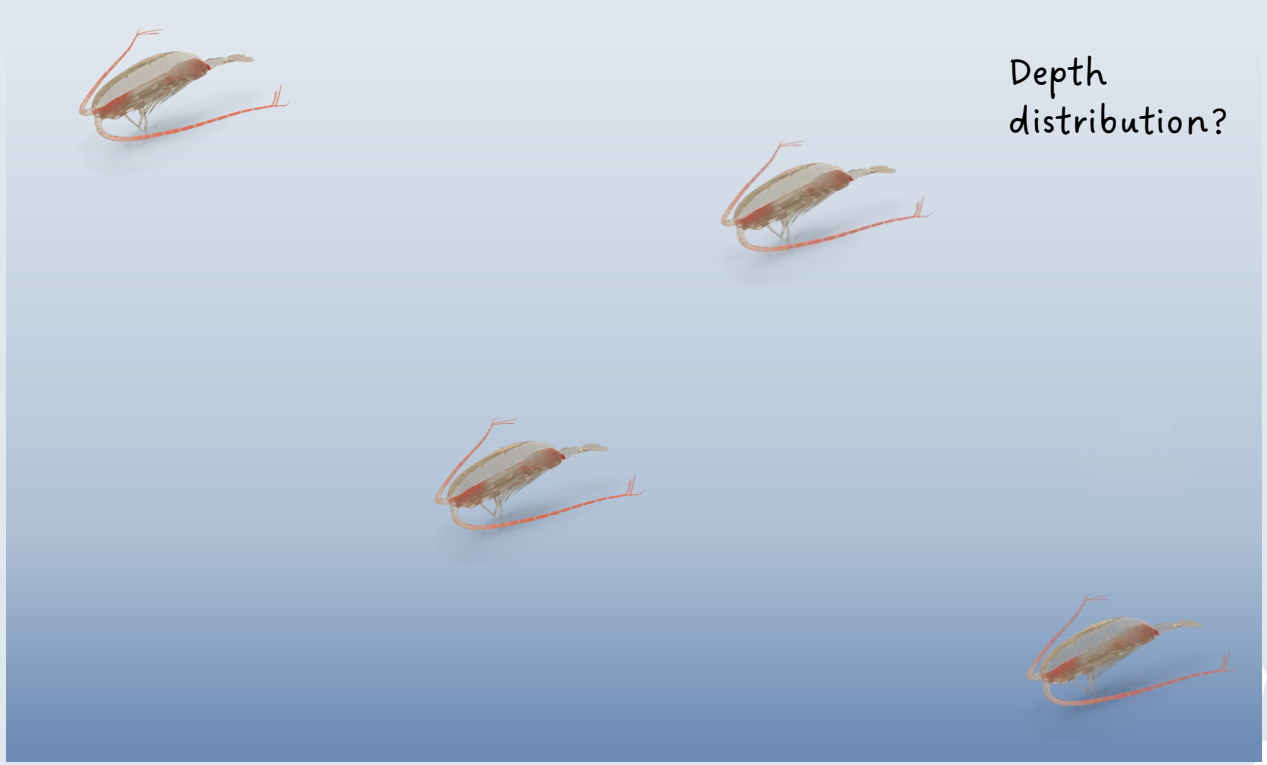
HOW THEY DISTRIBUTE IN YHE UPPER WATER COLUMN?

We need to understand its distribution to model it

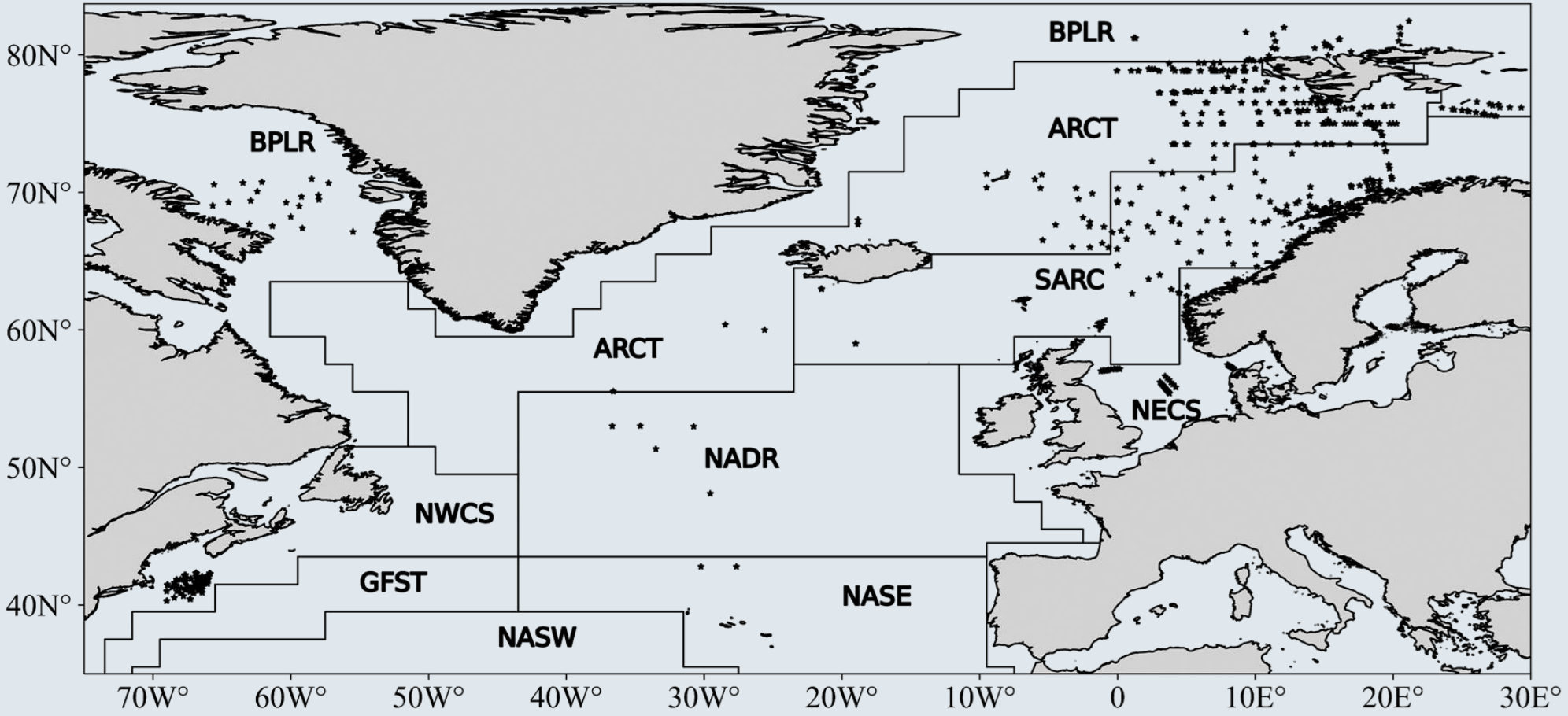
SURFACE →

Upper water column

200 m →



STUDY AREA AND SAMPLING STATIONS



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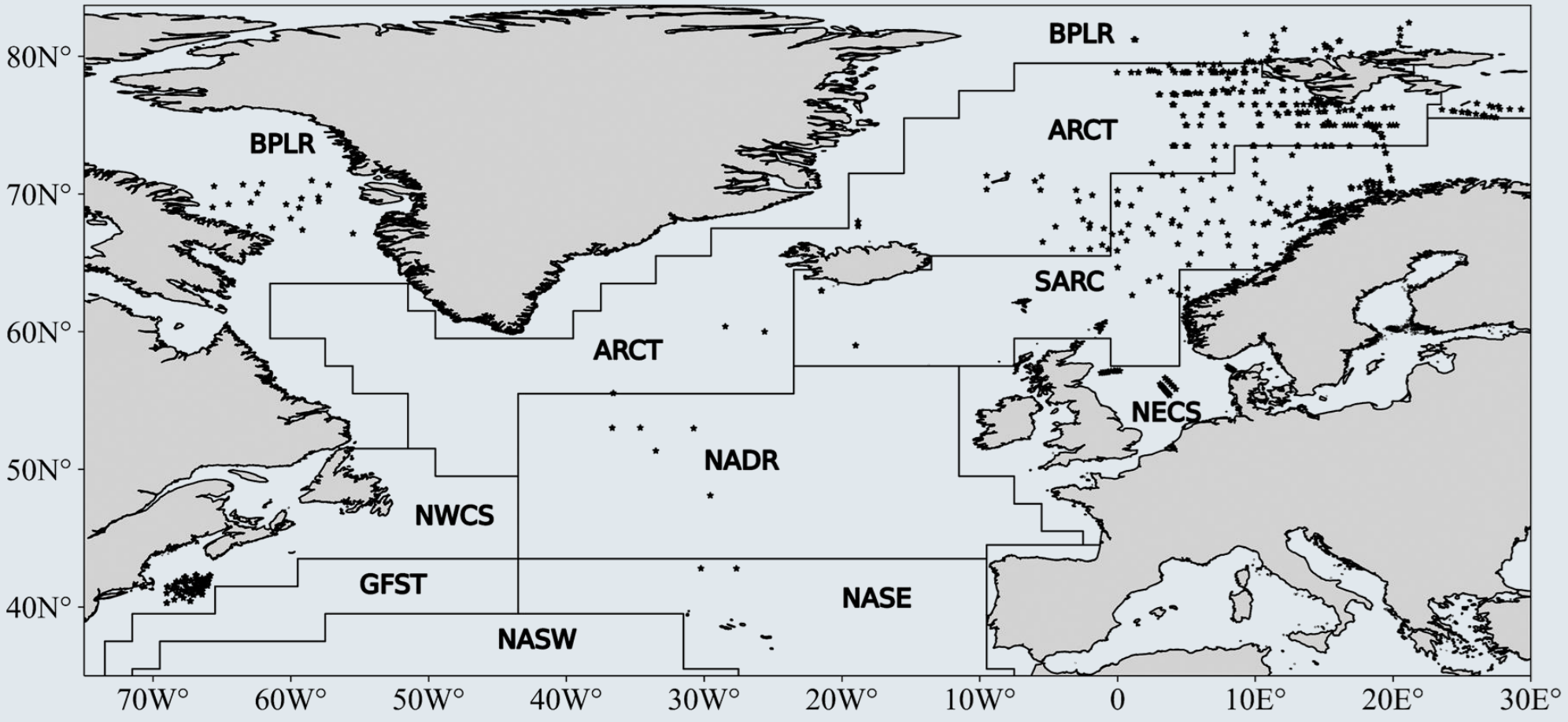
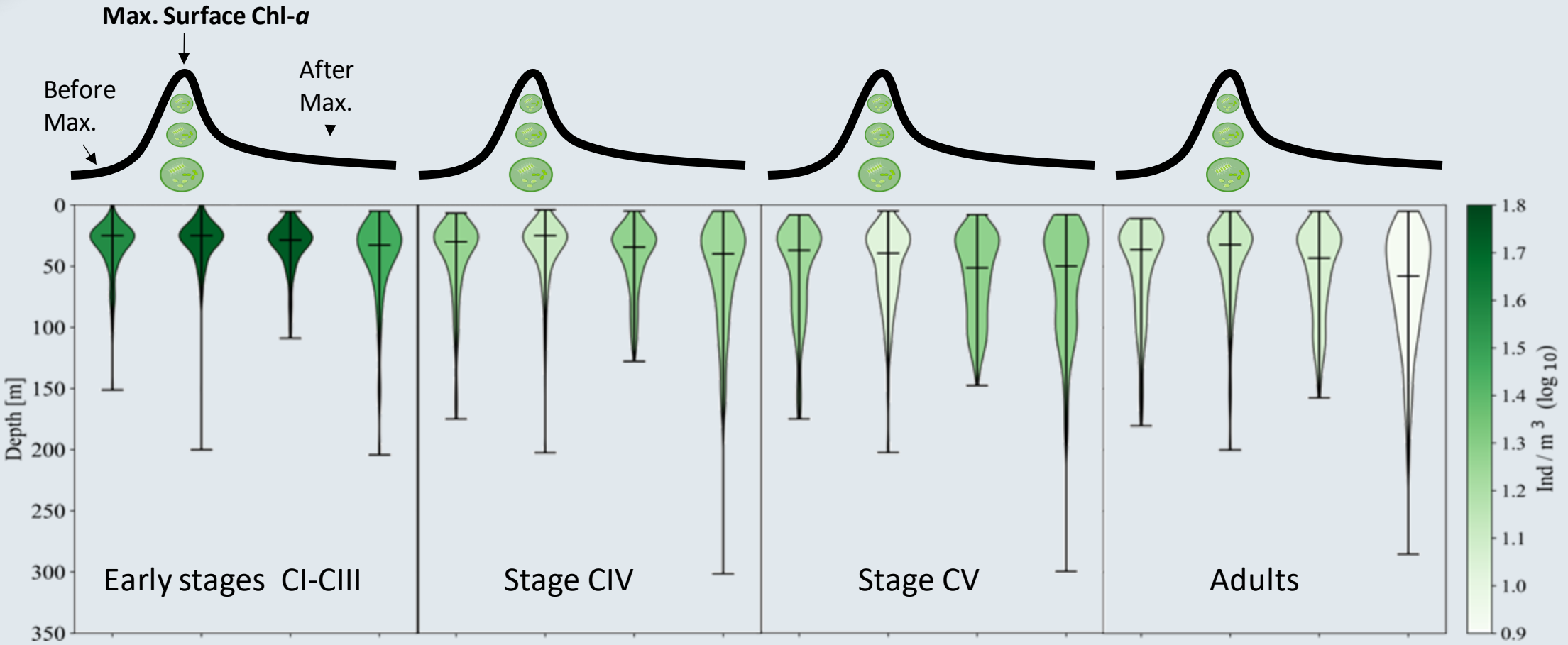


Longhurst's provinces (Longhurst. *et al.*, 1995)

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



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)*

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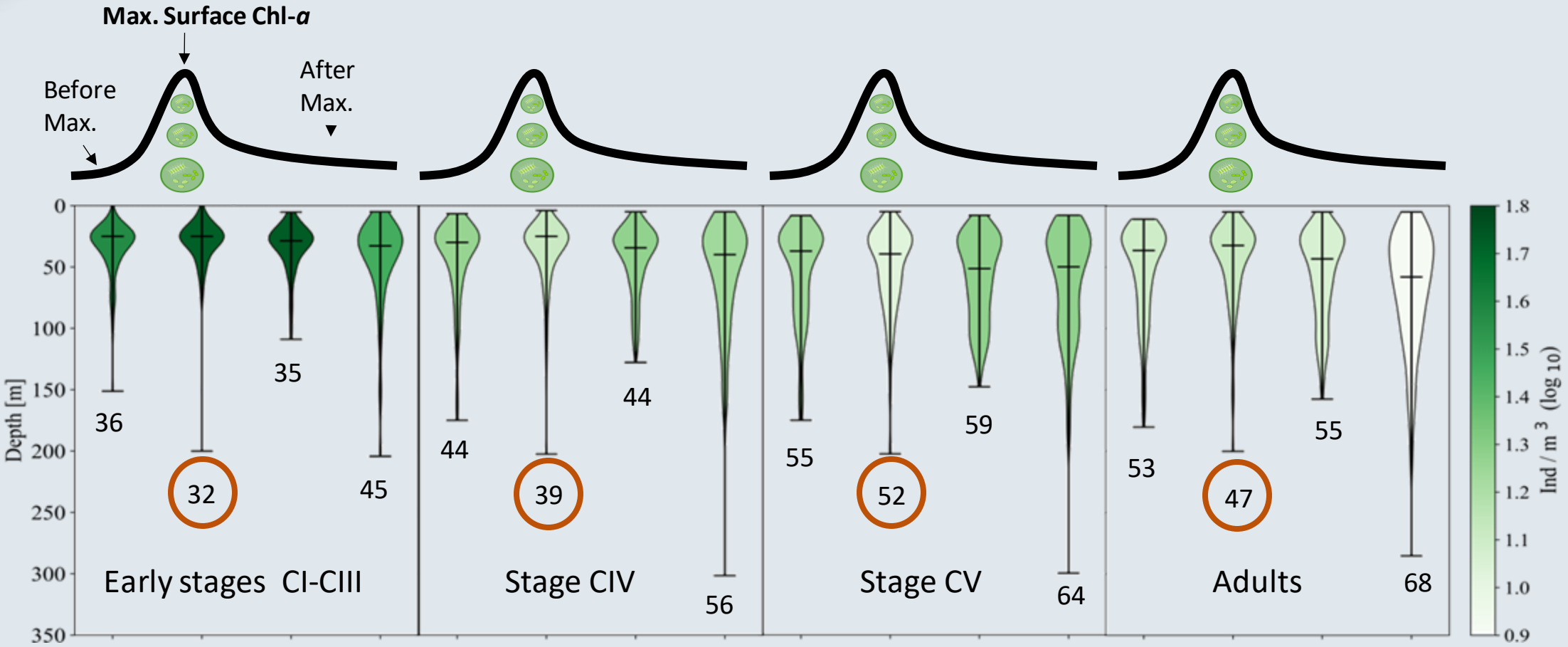

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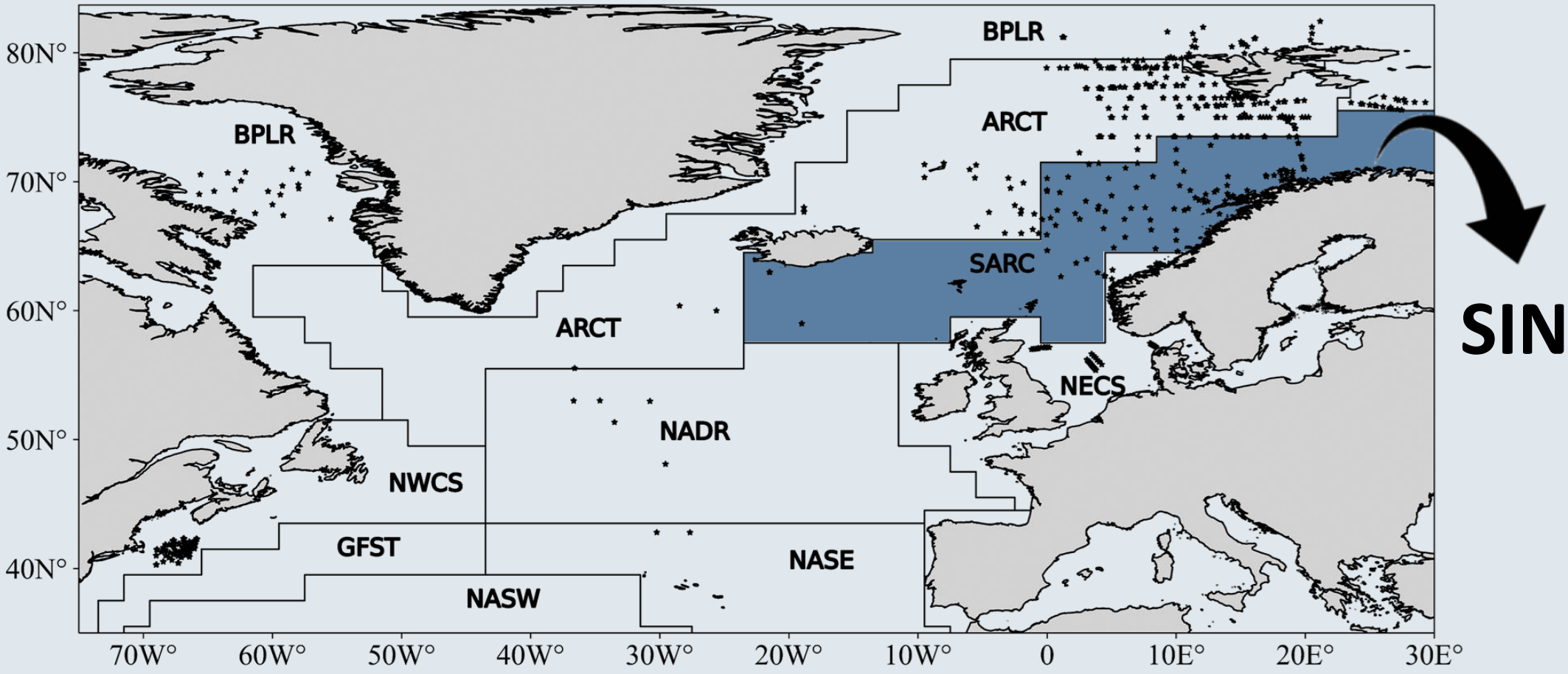
DATA FROM **SARC** REGION



SINMOD

SARC Polar- Atlantic Subarctic province

COUPLED PHYSICAL-BIOLOGICAL OCEAN MODEL

SINMOD

(Slagstad & McClimans, 2005)

Hydrodynamic model

Currents

Temperature

Salinity

Waves

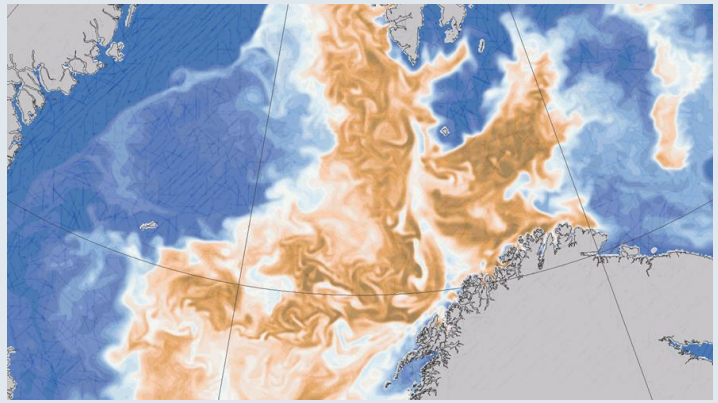
Ice

SWAN Simulating WAves Nearshore

Carbon and oxygen system

Atmosphere – ocean Exchange

Alkalinity, DIC, O_2



Biological models

Detritus, POM

Benthic / sediments

Ecological model

Nutrients

Phytoplankton

Zooplankton

***C. finmarchicus* model**

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

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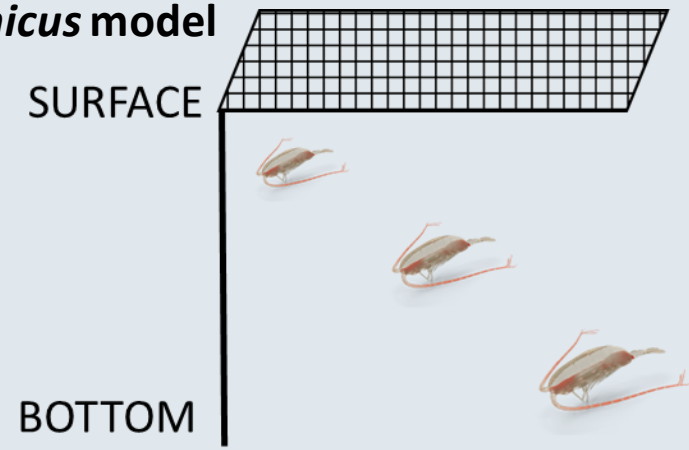
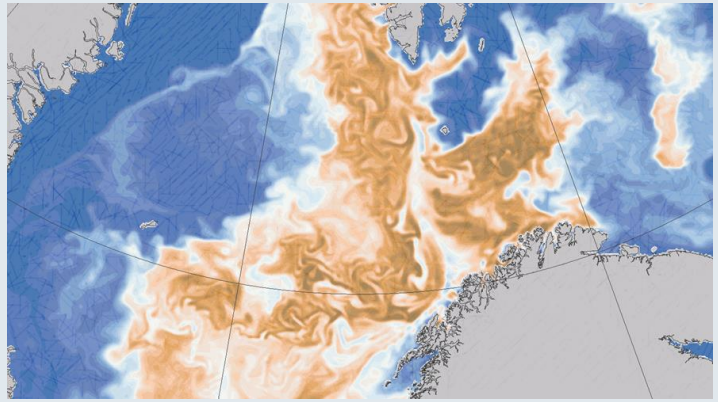
***C. finmarchicus* model**

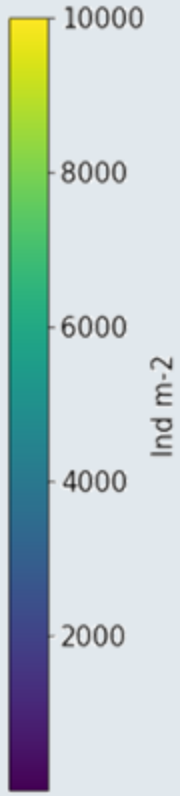


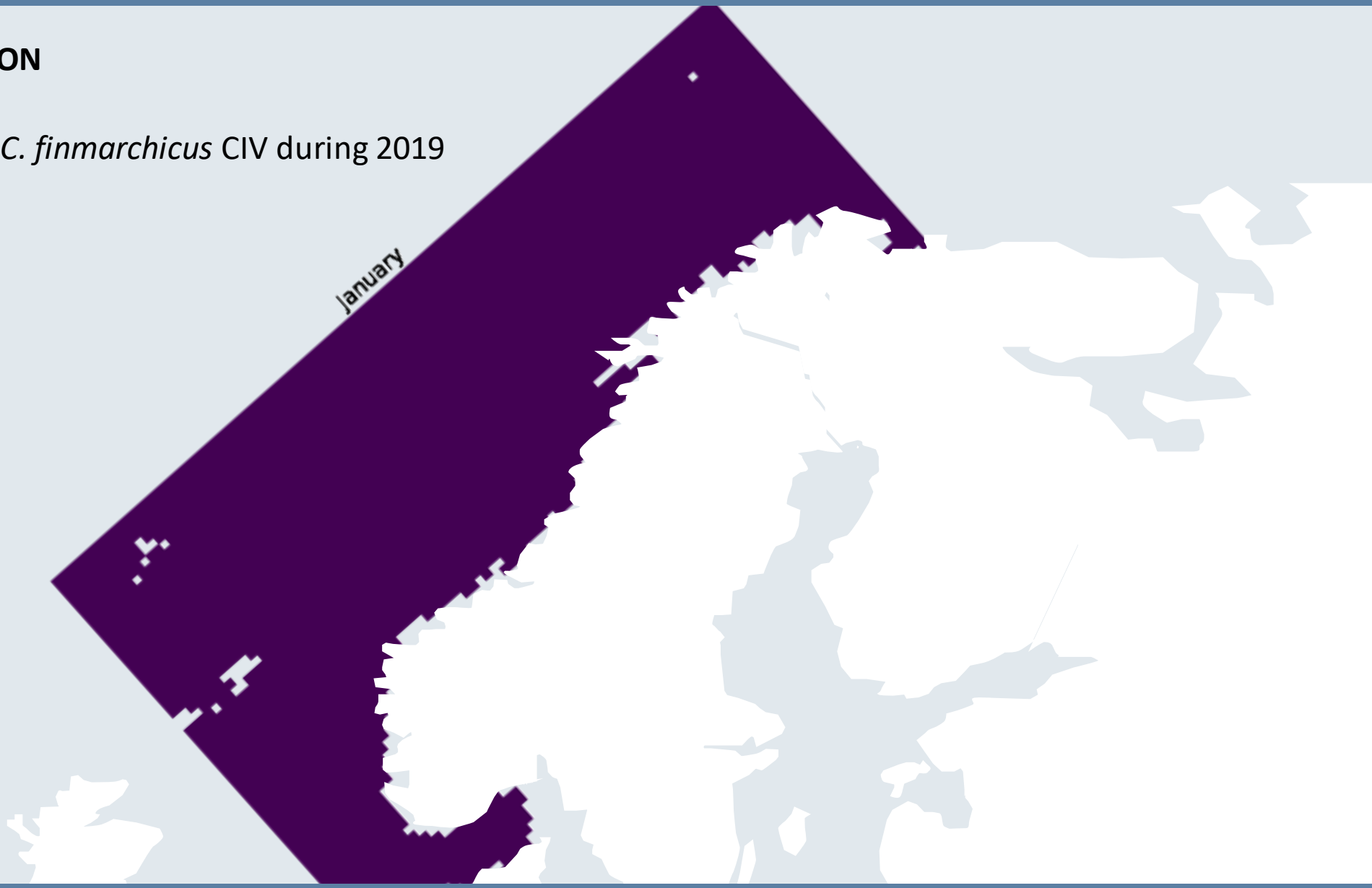


MODEL RESOLUTION

20 Km

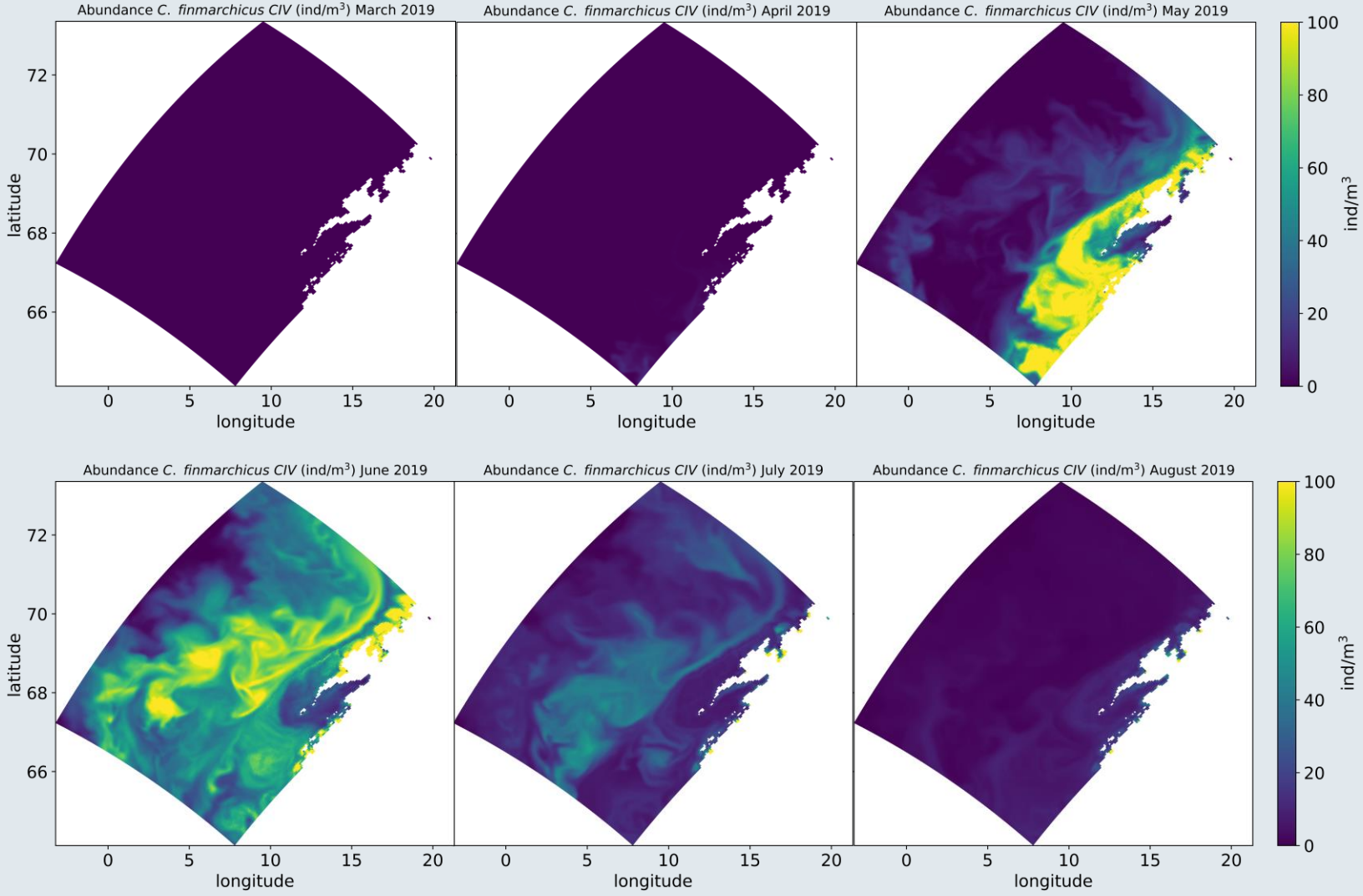
*A*bundance of *C. finmarchicus* CIV during 2019





MODEL RESOLUTION

4 Km



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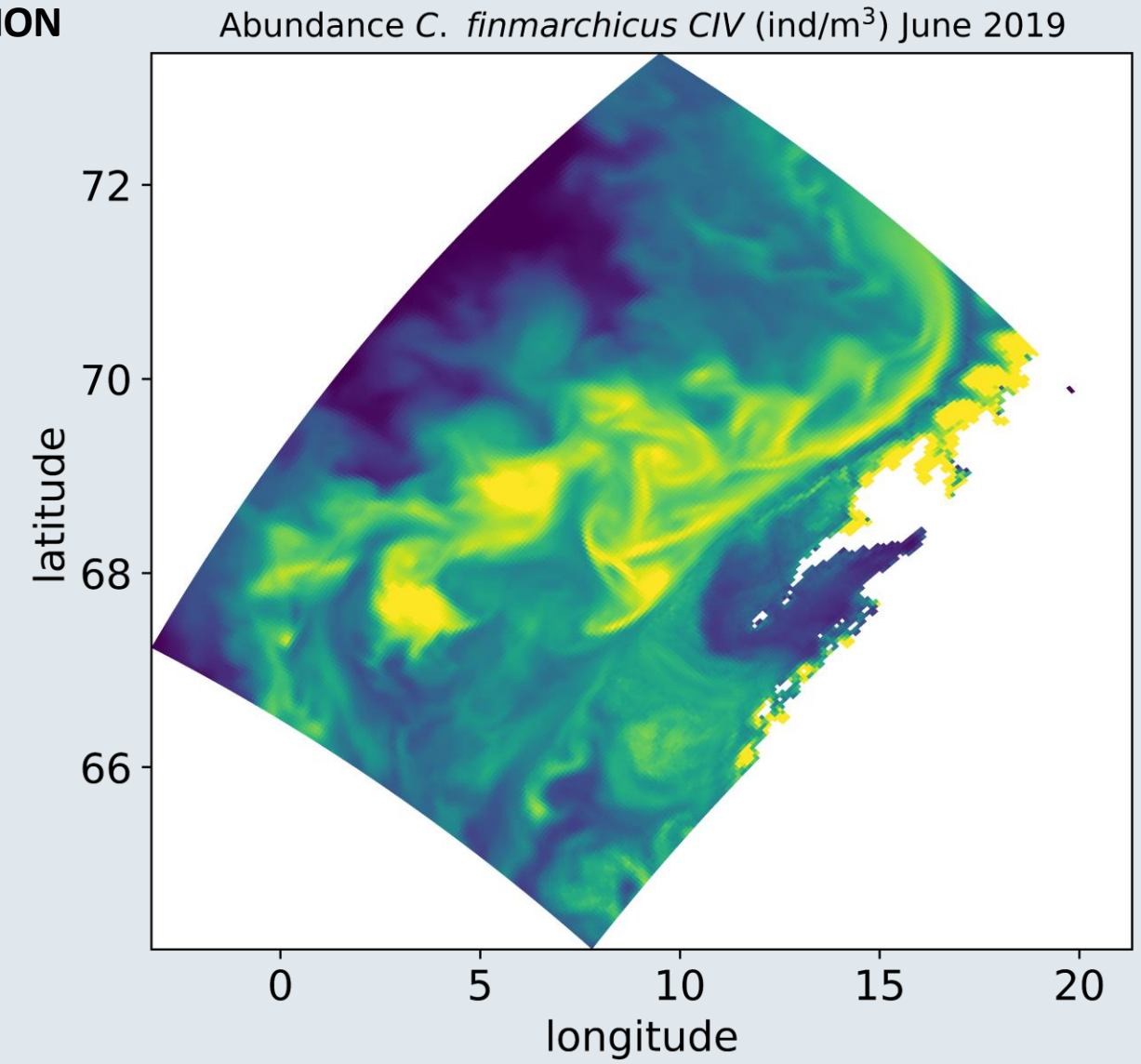

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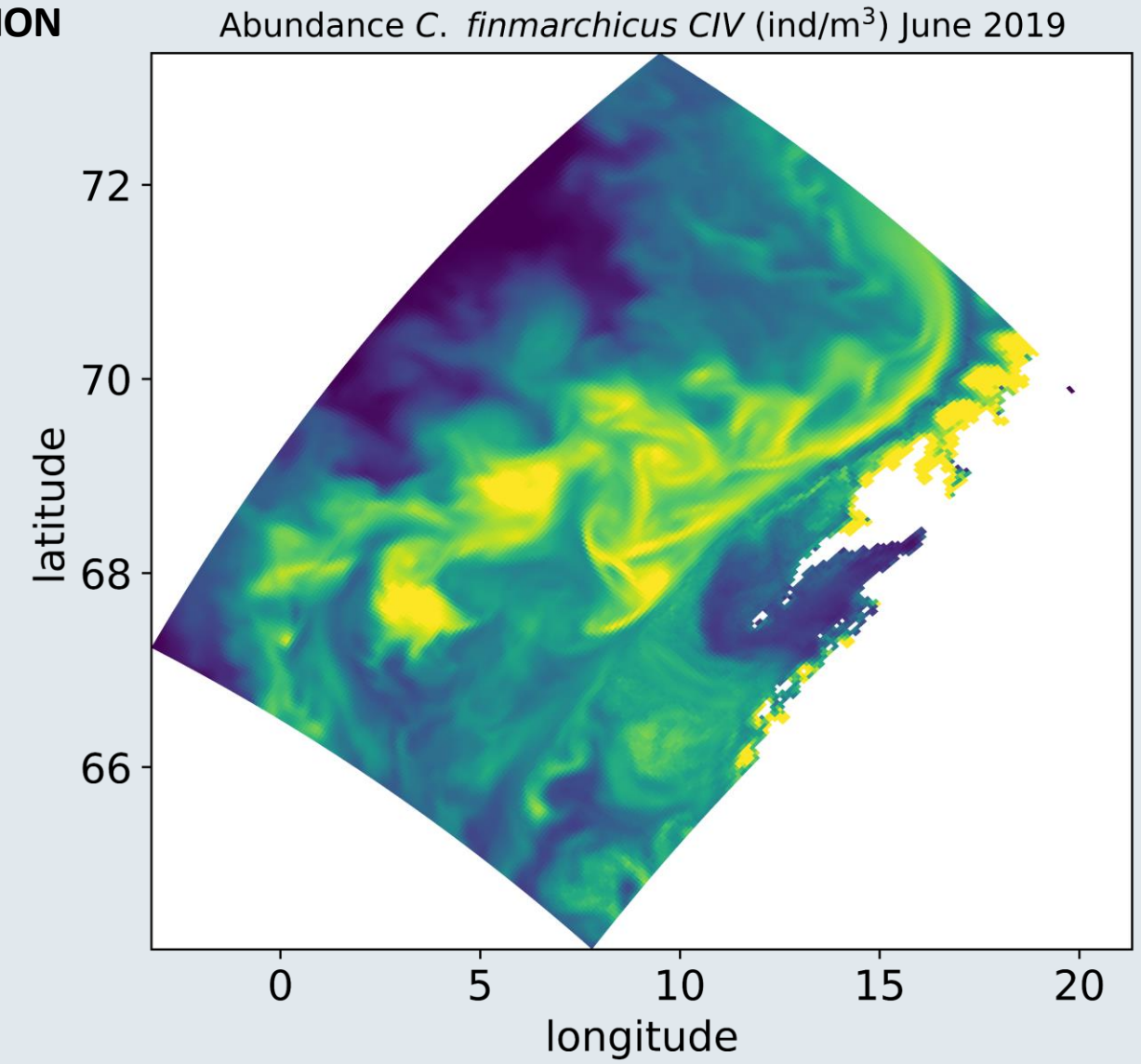
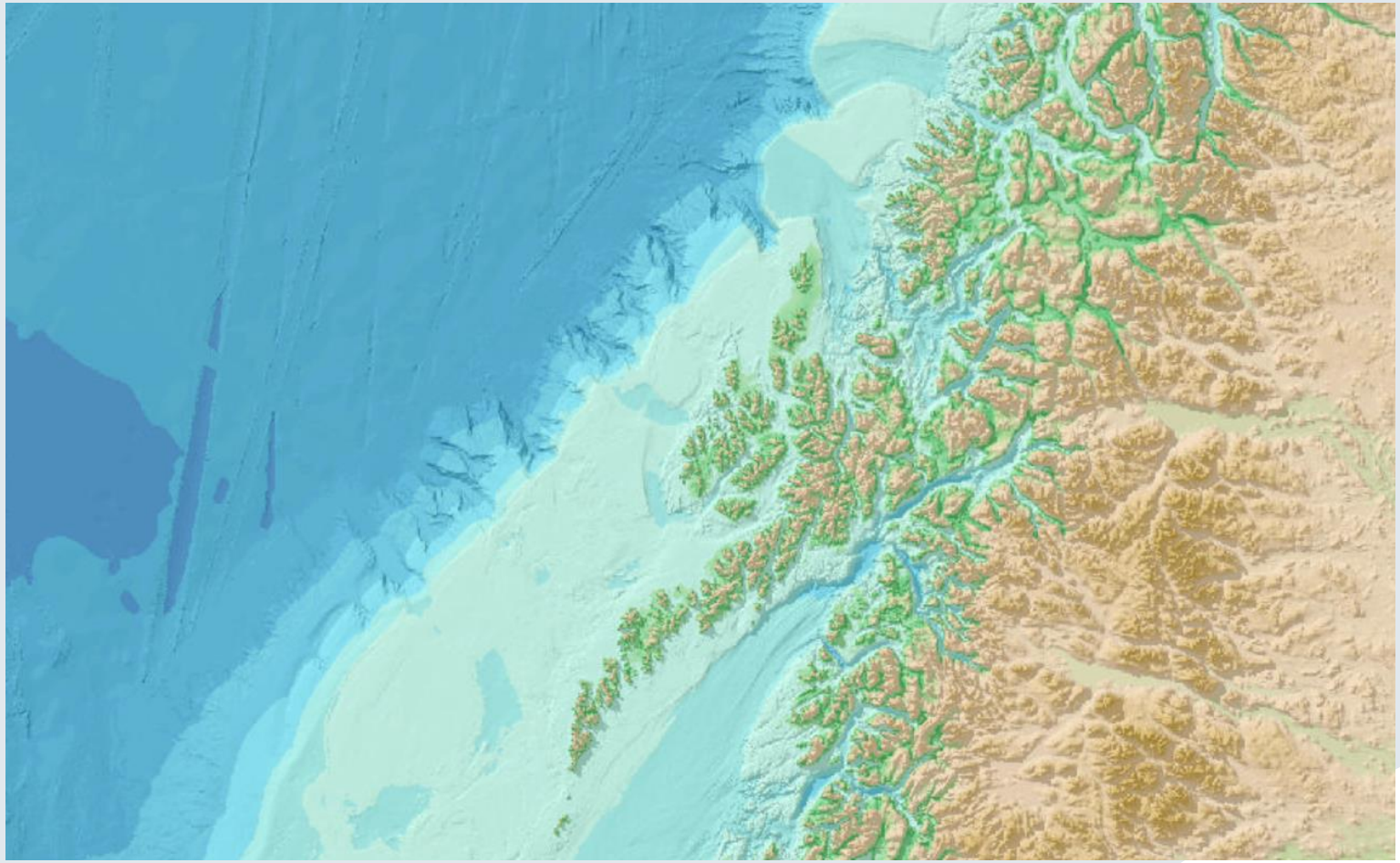


Next step to resolve mesoscale eddies

800 m resolution

WE COLLLECTED DATA FROM **HOLA TRANSECT**



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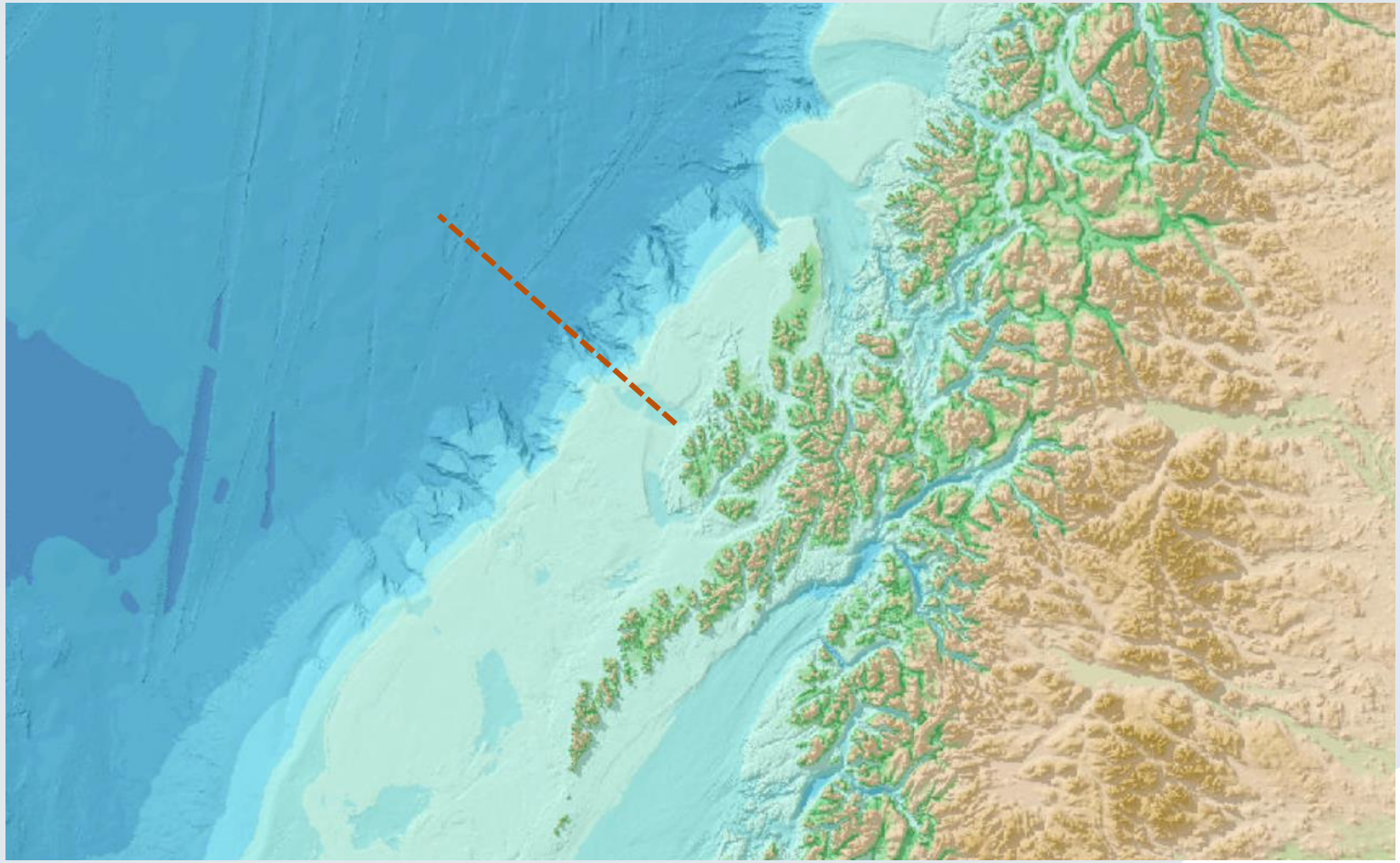
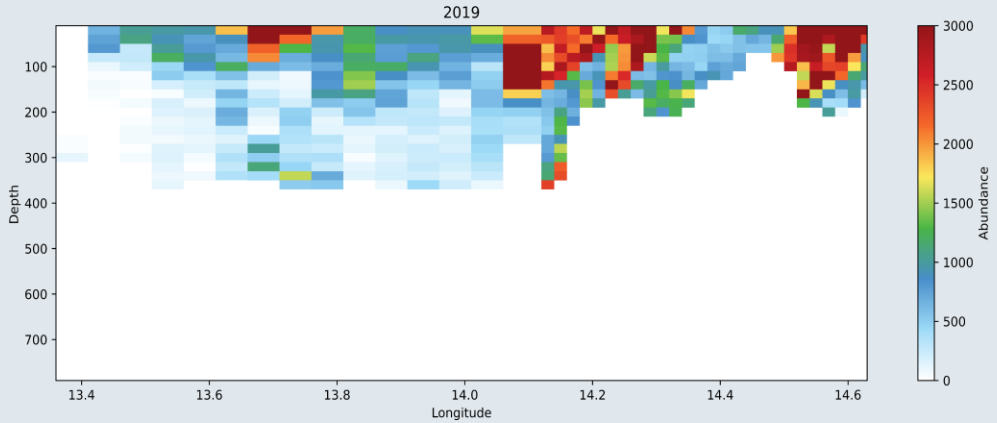
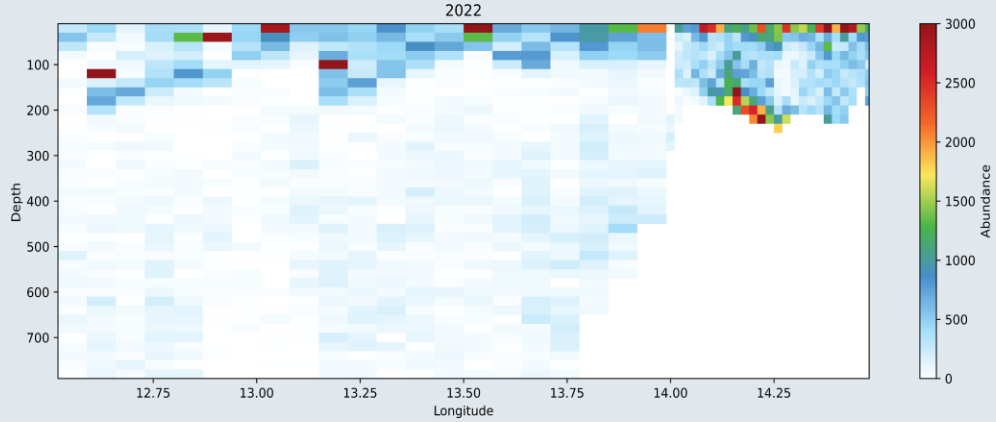
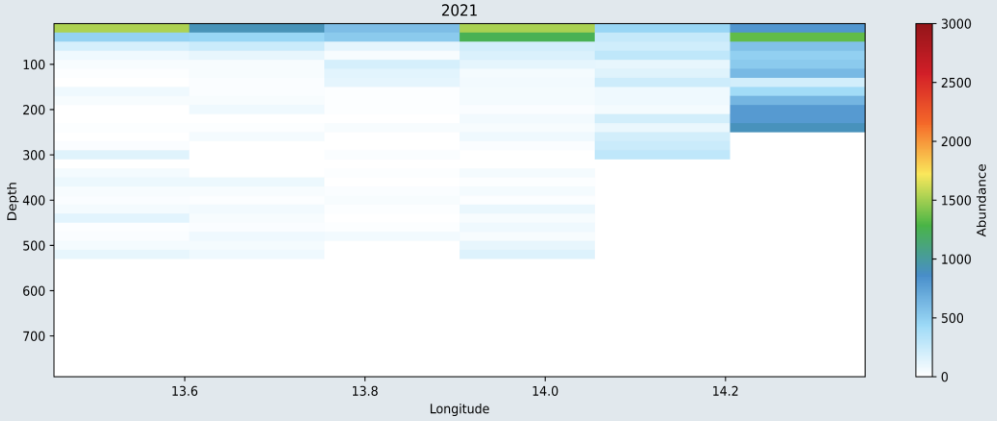


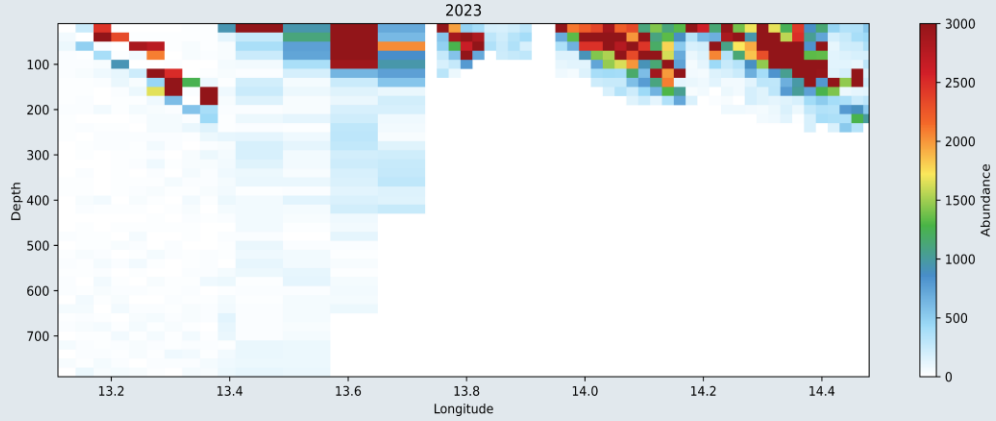
LOPC (LASER OPTICAL PLANKTON COUNTER) TRANSECTS

Open ocean → Coast







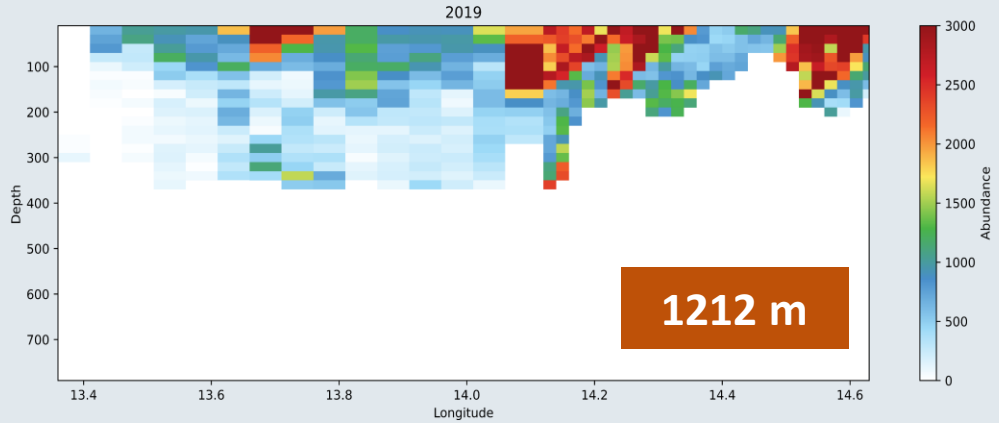


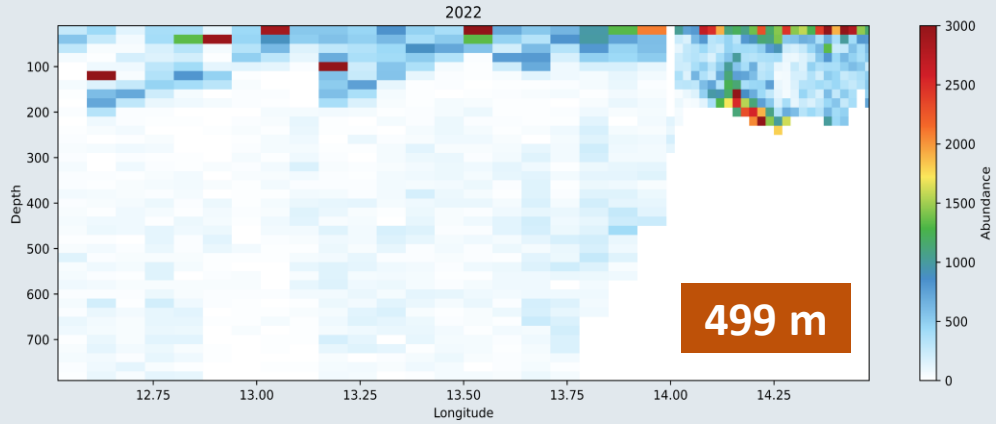
Results from: "*Interannual variability of Calanus spp.* hotspots in the Norwegian Sea" *(Chamorro et al., manuscript in preparation)*

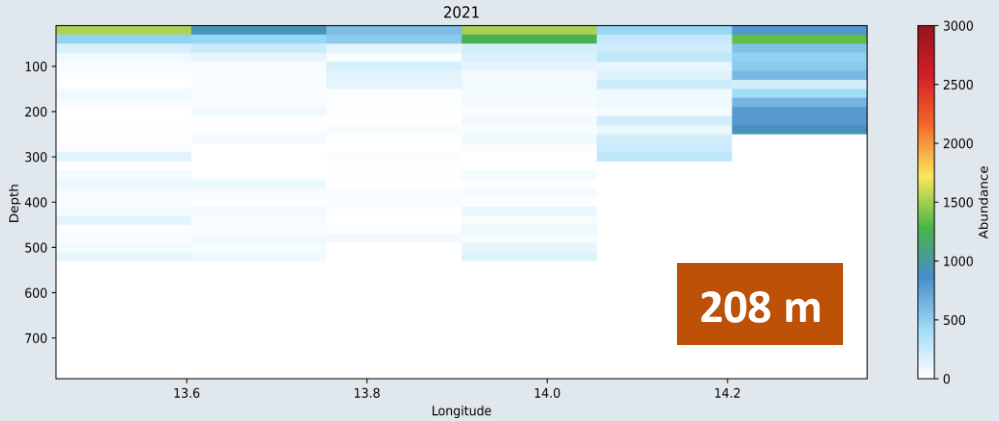
LOPC (LASER OPTICAL PLANKTON COUNTER) TRANSECTS

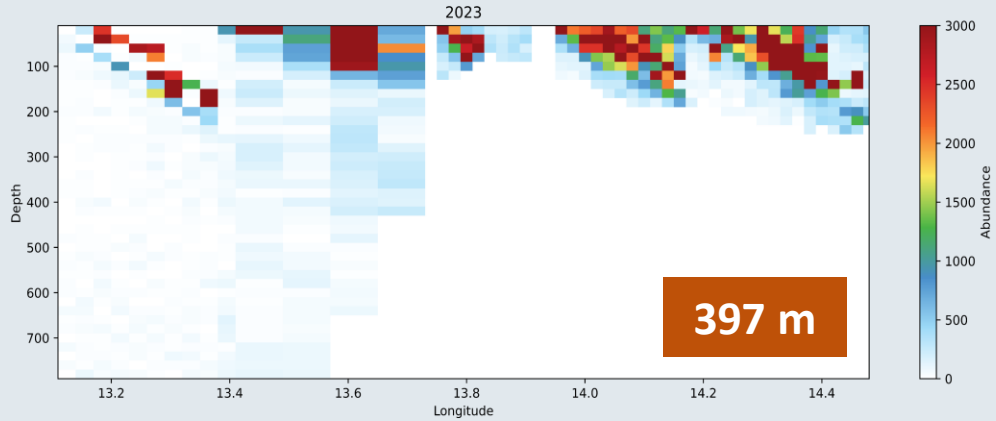
Patch size
Moran Index

Open ocean → Coast









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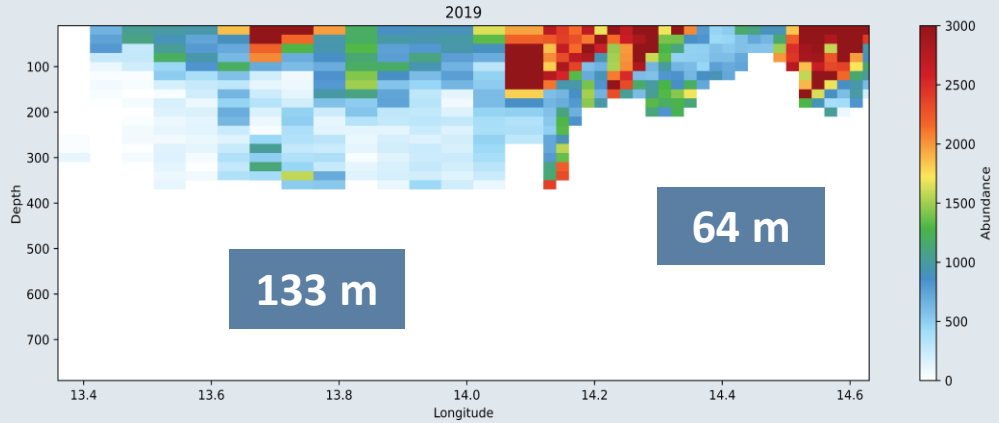
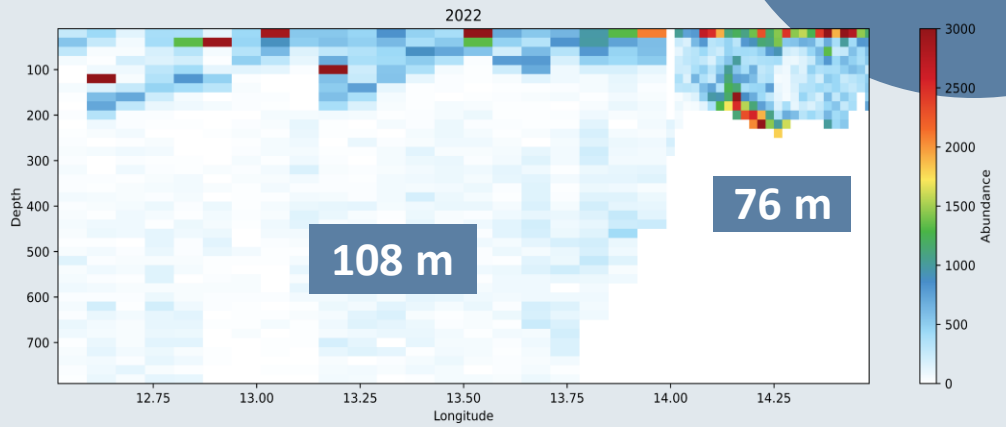
Patch size

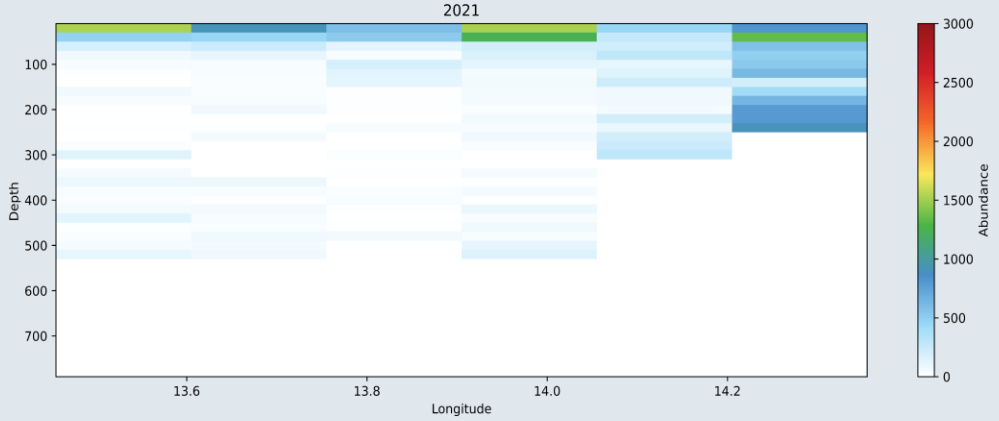
Depth comparaison between open ocean and coastal area

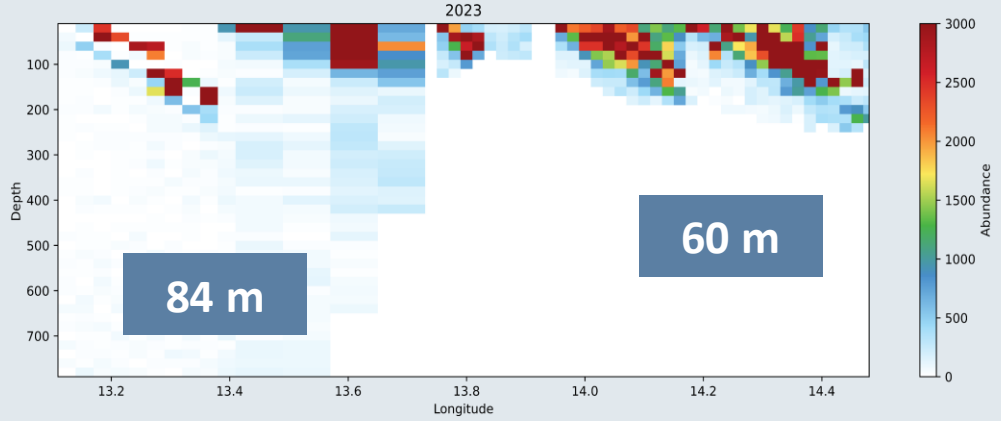
LOPC (LASER OPTICAL PLANKTON COUNTER) TRANSECTS

Open ocean → Coast









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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.**

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

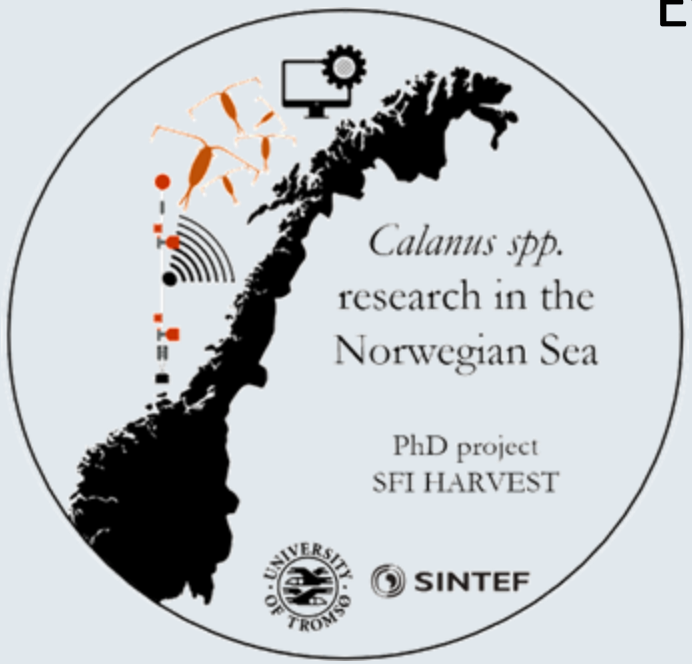
- ***C. finmarchicus* patch size variates along years and study areas.**

THANK YOU FOR YOUR ATTENTION!

Questions? Suggestions? Comments?

Everything is welcome for better research ☺

Eva.c.garrido@uit.no



More about SINMOD

Thanks to my PhD supervisors

Sünnje Basedow (UiT)
Ingrid Ellingsen (SINTEF Ocean)
Kanchana Bandara (Akvaplan-iva)

CONTACT ME ON LINKEDIN
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