IMPROVING OUR UNDERSTANDING OF COASTAL MARINE ECOSYSTEMS- RESULTS FROM ENTICE

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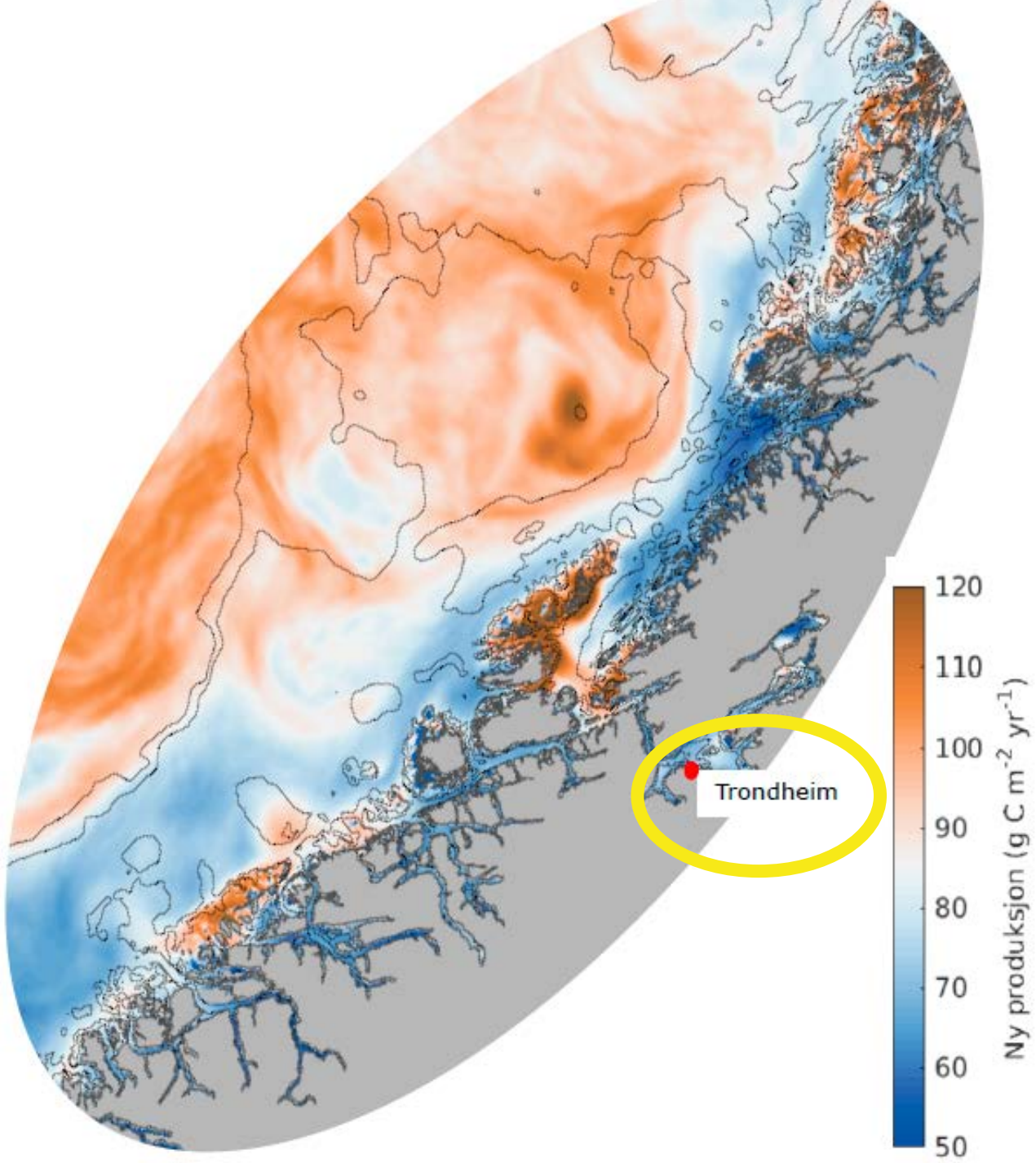
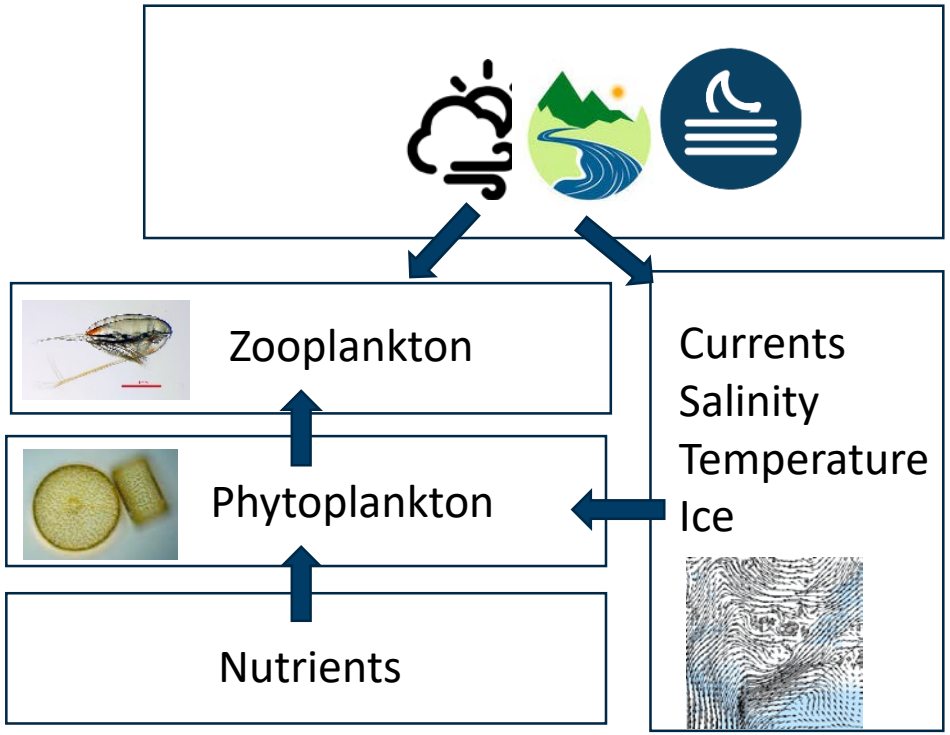
Background- harvestable production

Results from SINMOD show

- Variability in primary production along the coast
- Elevated production in some areas

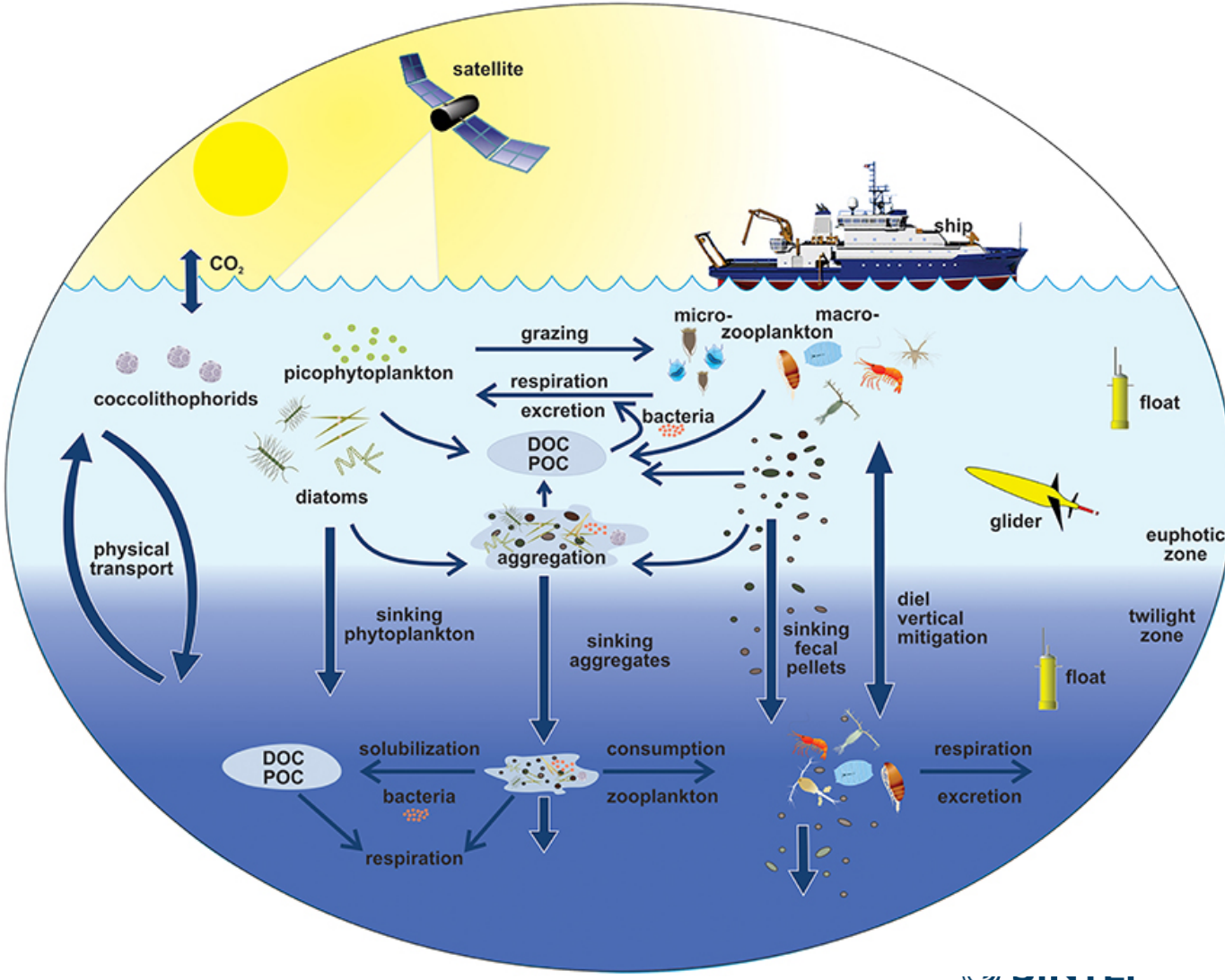


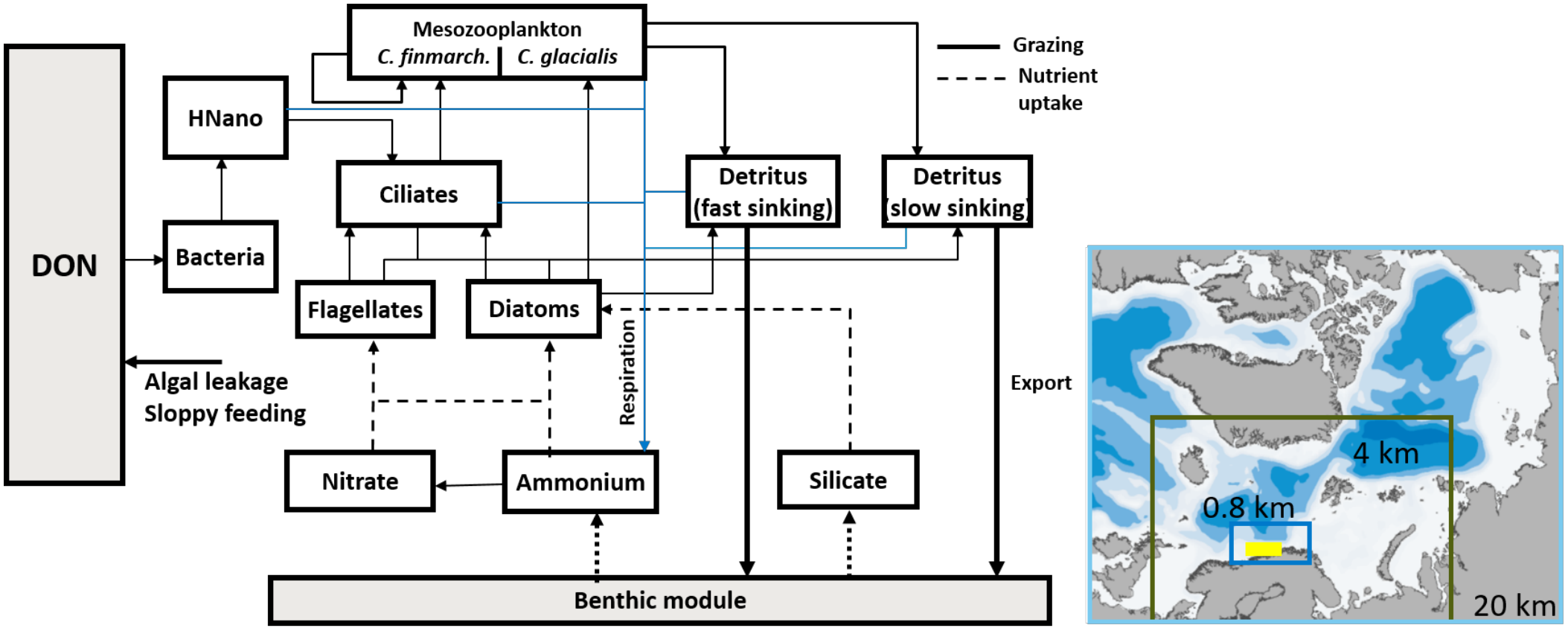


Ecological model

Hydrodynamic model

www.sintef.no/sinmod




Mesozooplankton
C. finmarch.
C. glacialis
Grazing
Nutrient uptake
HNano
Ciliates
Detritus (fast sinking)
Detritus (slow sinking)
DON
Bacteria
Flagellates
Diatoms
Respiration
Export
Algal leakage
Sloppy feeding
Nitrate
Ammonium
Silicate
Benthic module
4 km
0.8 km
20 km

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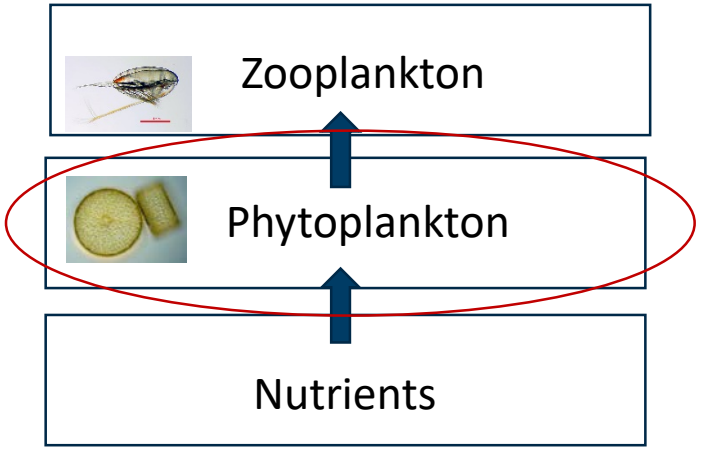
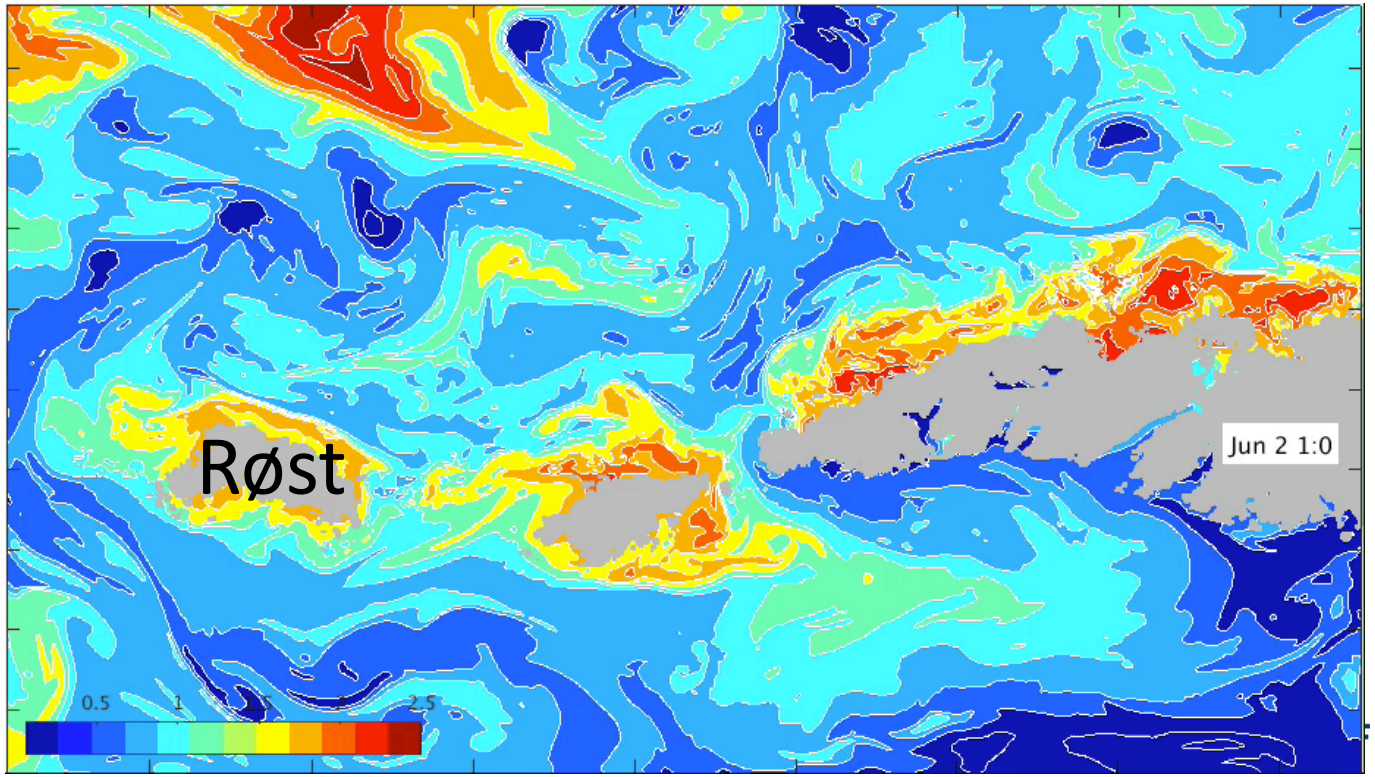
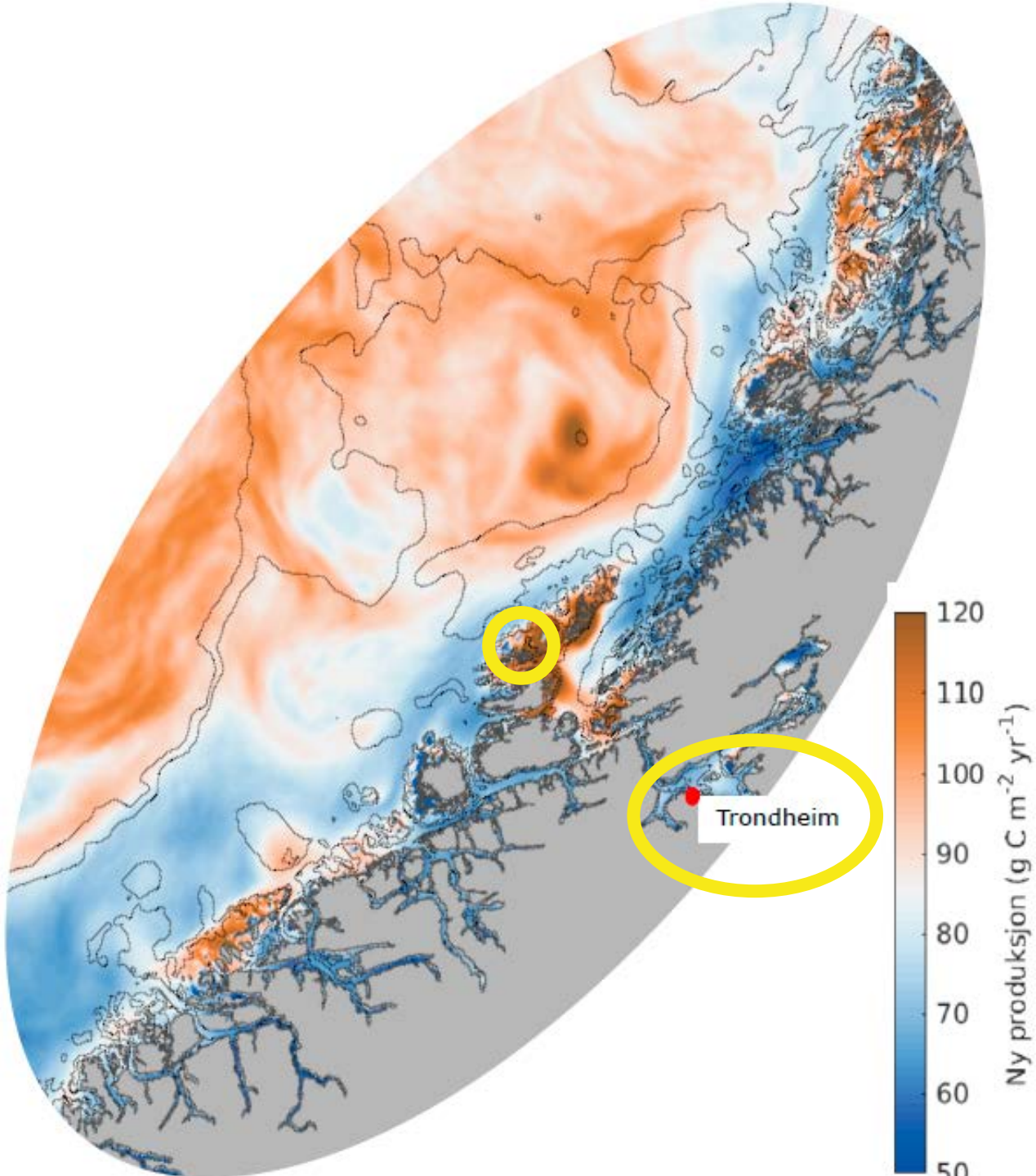
Concentration of phytoplankton

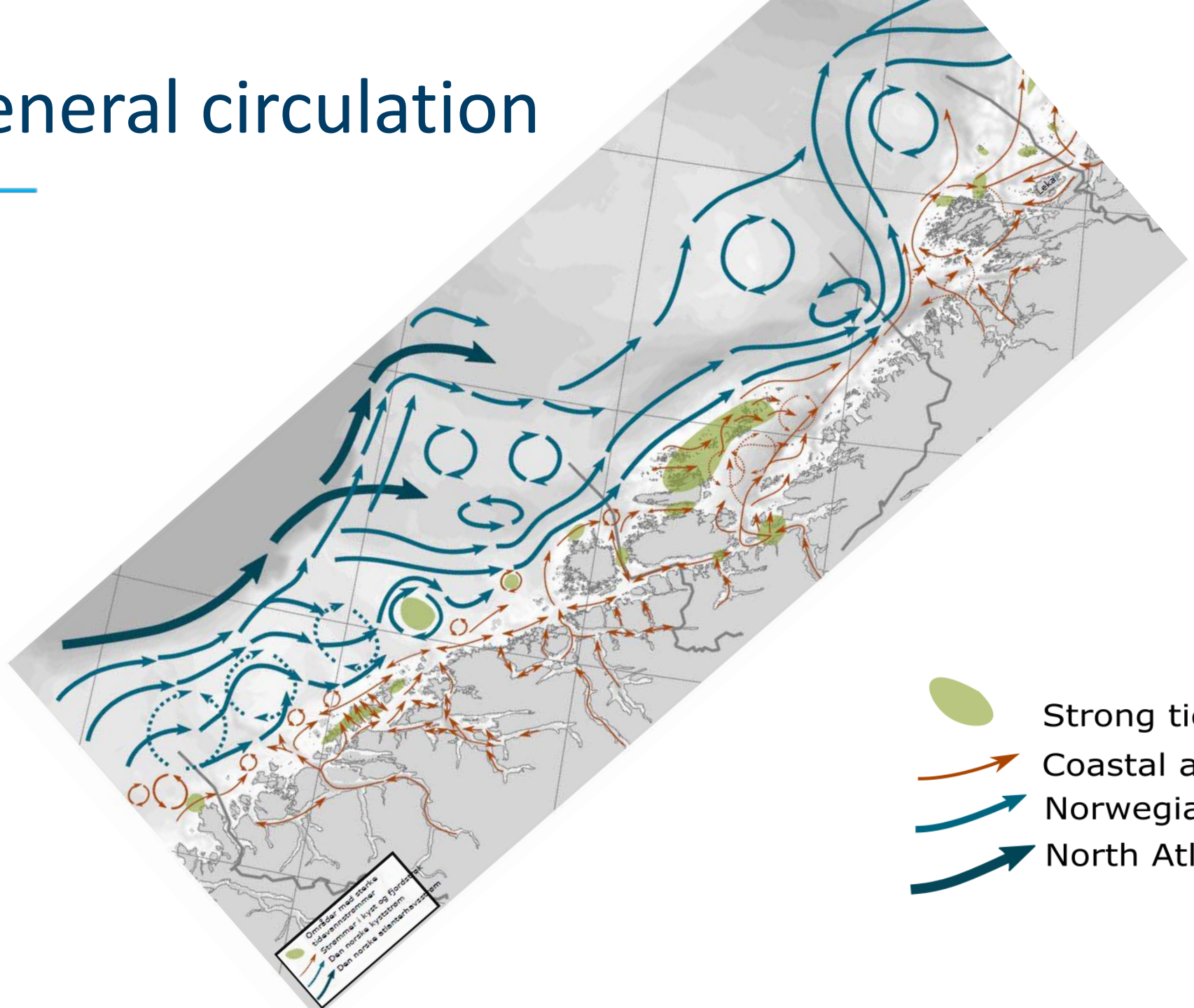
Variability a result of growth, respiration, grazing and advection






Trondheim
120
110
100
90
80
70
60
50
Ny produksjon (g C m^{-2} yr^{-1})

General circulation



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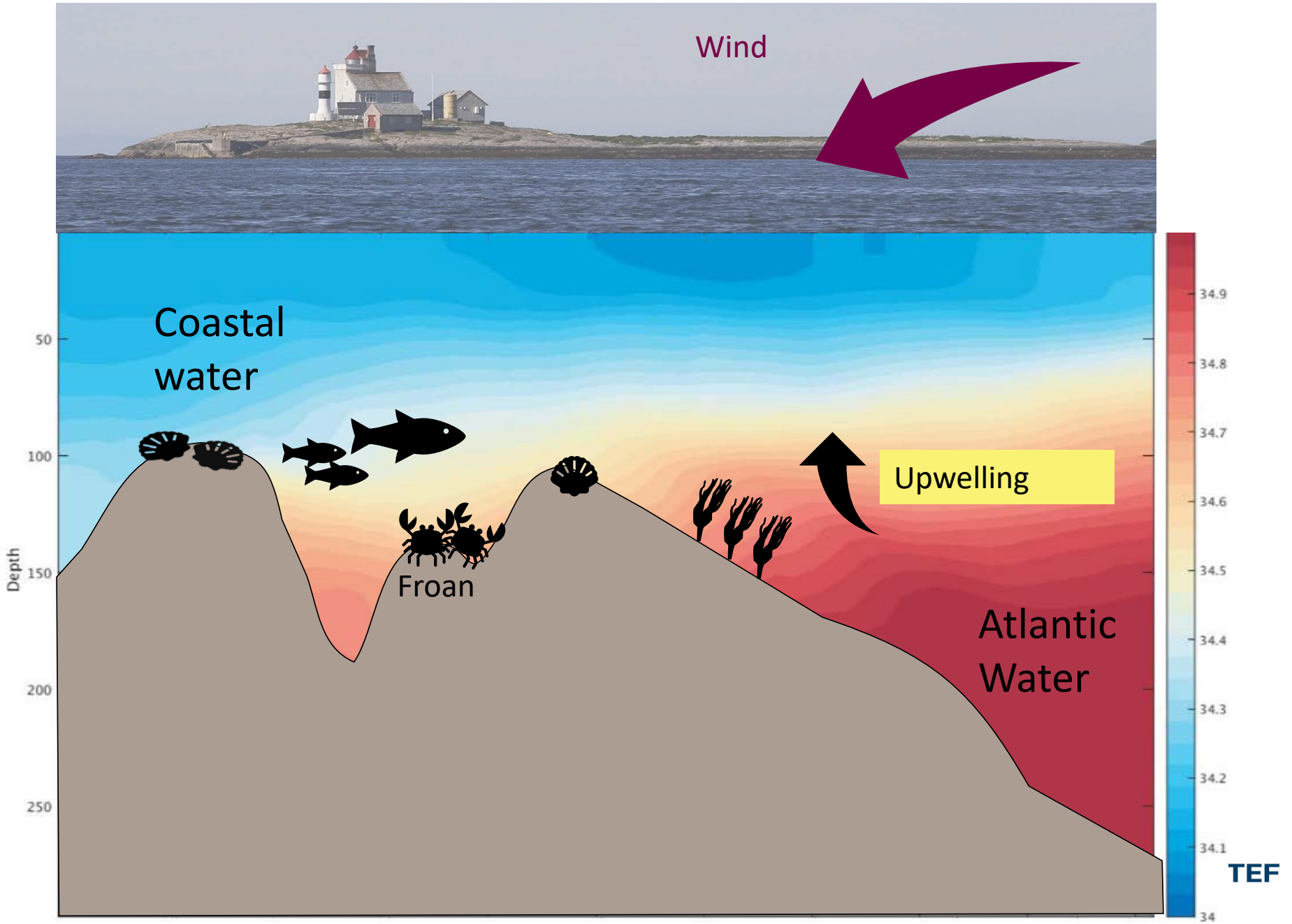
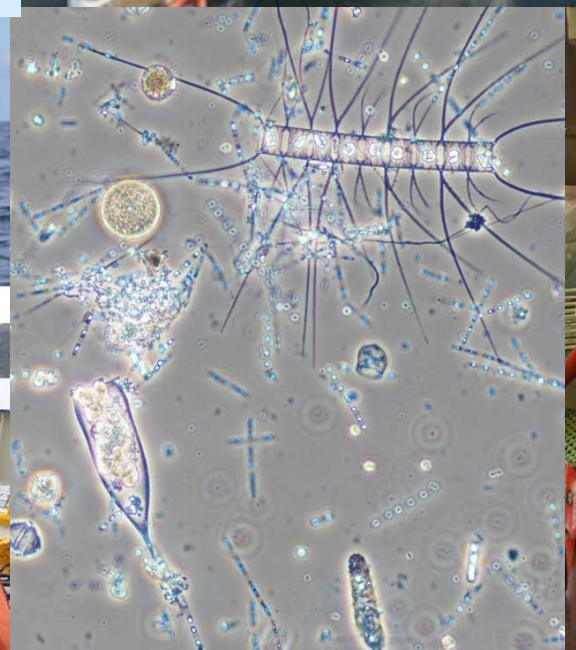
Hypothesis-original



Field activities

Mausund fieldstation

Weekly sampling
Buoy
Intensive 1 week field work



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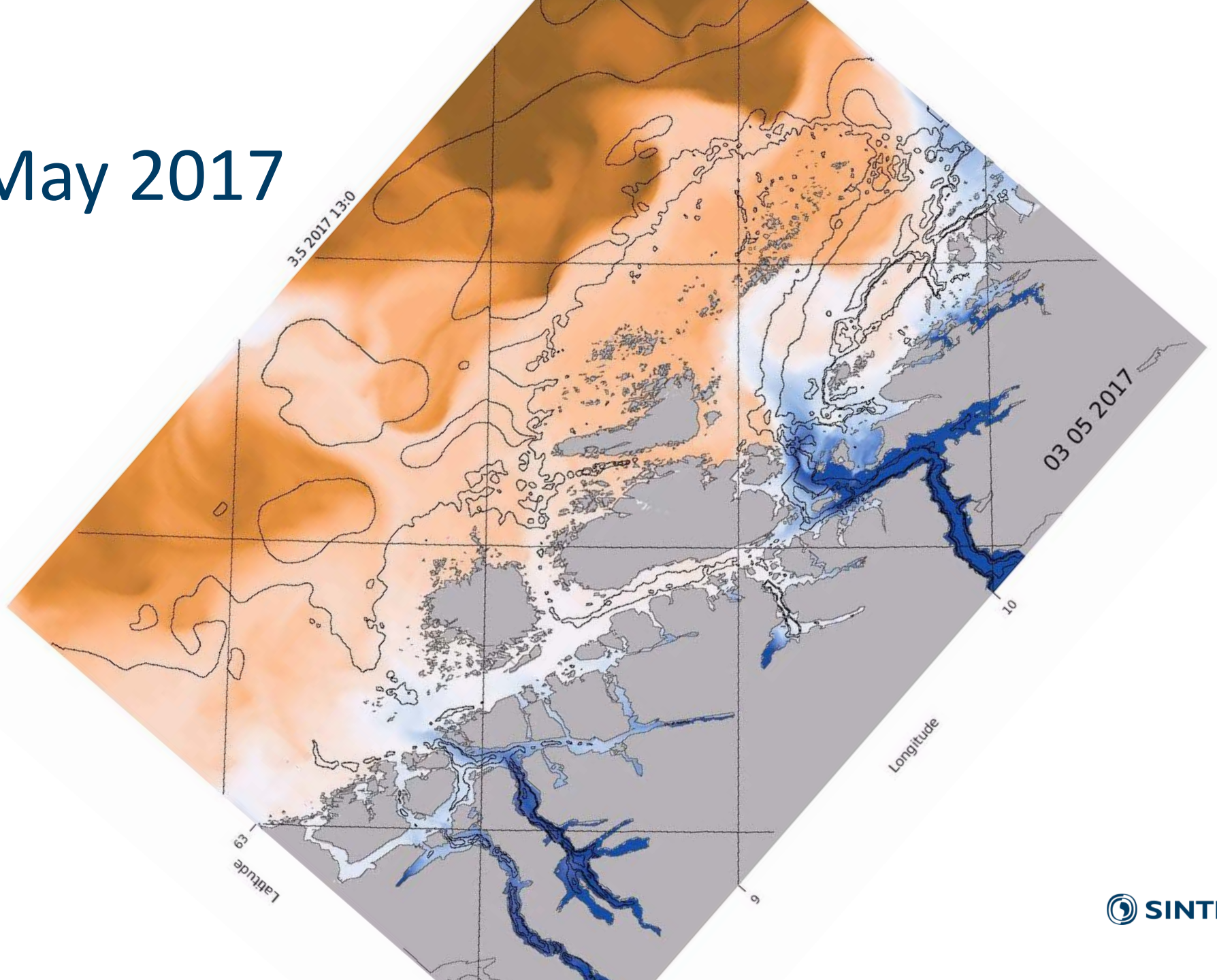
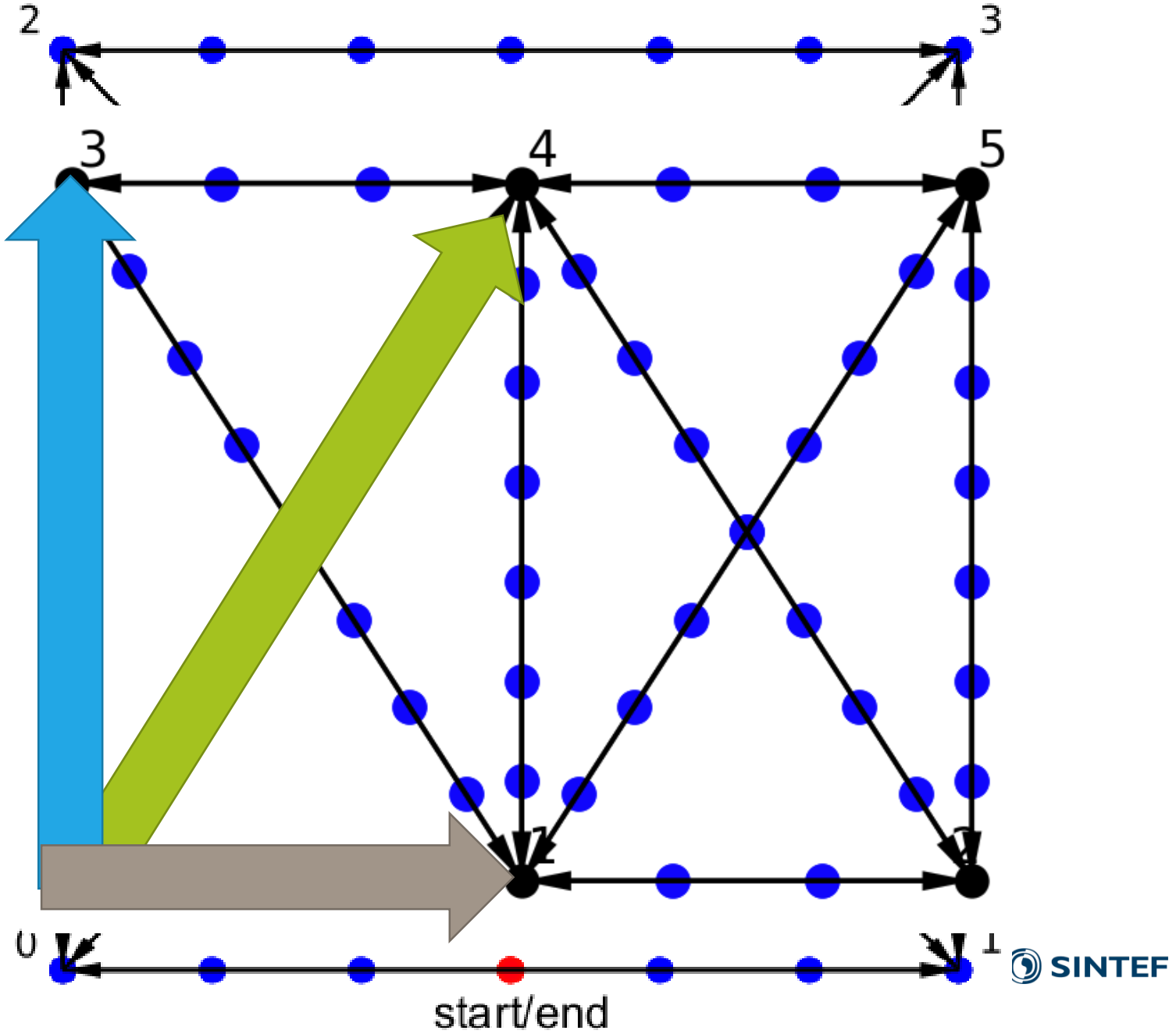
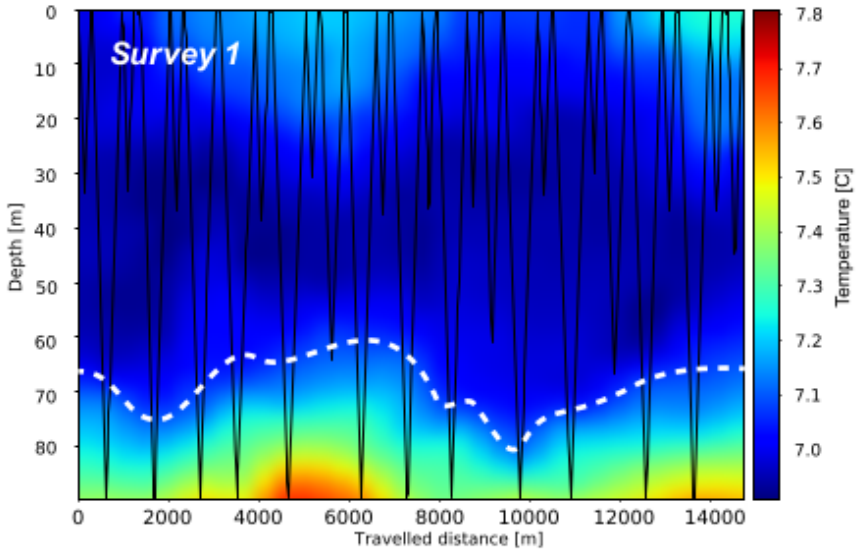
Salinity- May 2017

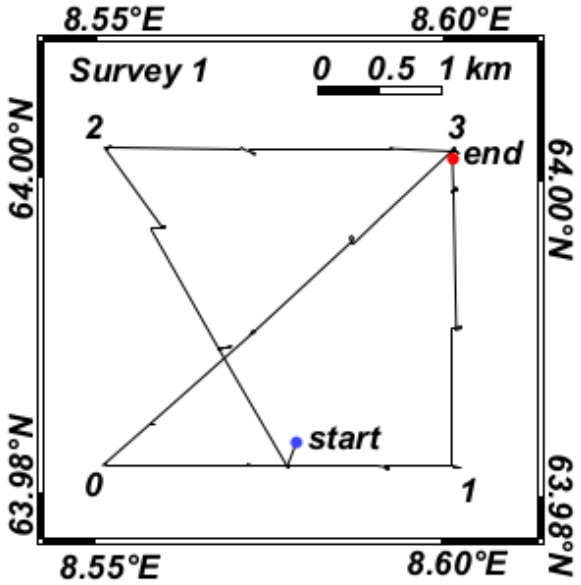


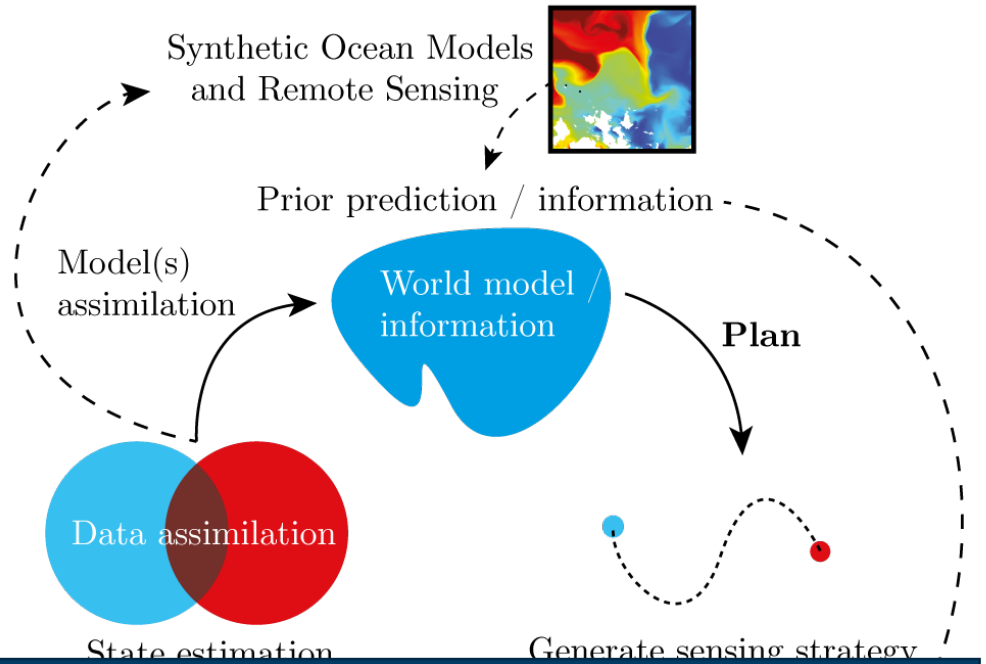
PhD Candidate Trygve Olav Fossum

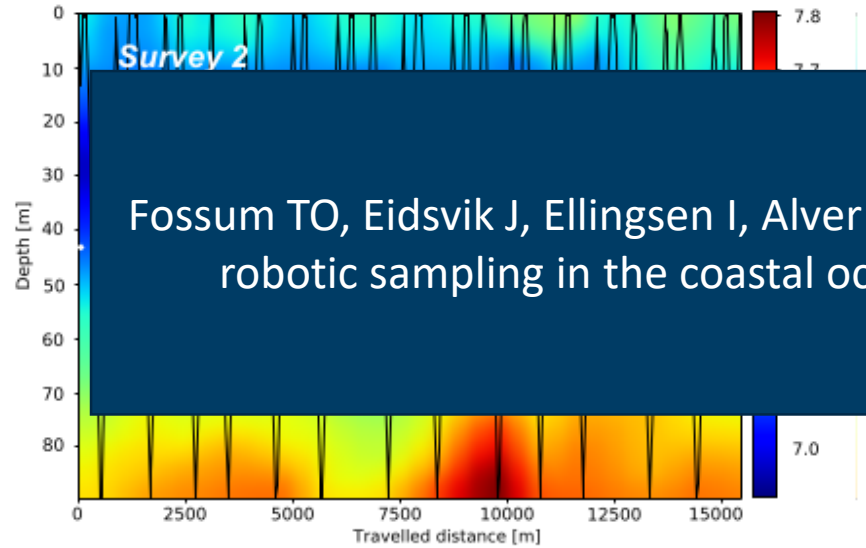


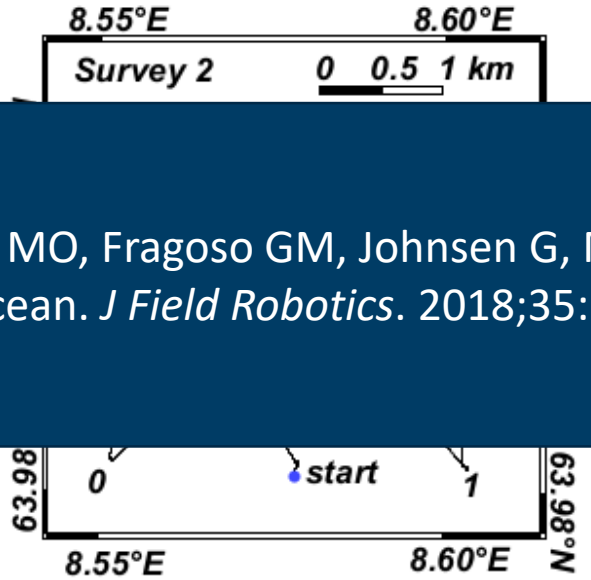
Research projects using Gaussian Processes – The ENTiCE project











Fossum TO, Eidsvik J, Ellingsen I, Alver MO, Fragoso GM, Johnsen G, Mendes R, Ludvigsen M, Rajan K. Information-driven robotic sampling in the coastal ocean. *J Field Robotics*. 2018;35:1101–1121. https://doi.org/10.1002/rob.21805

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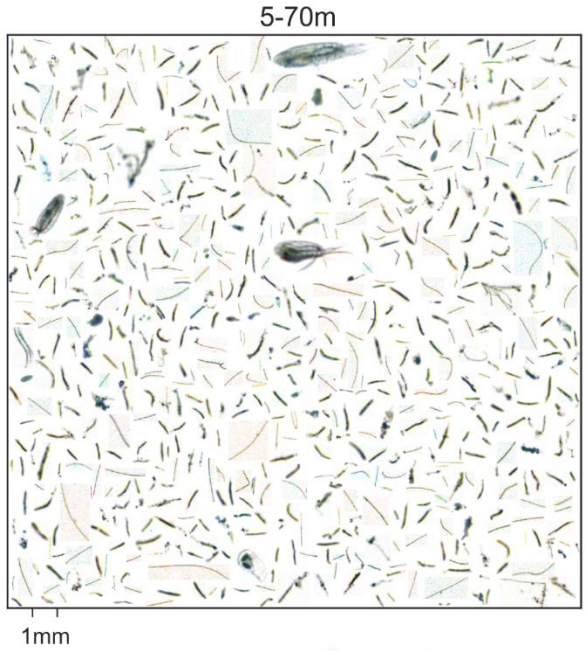
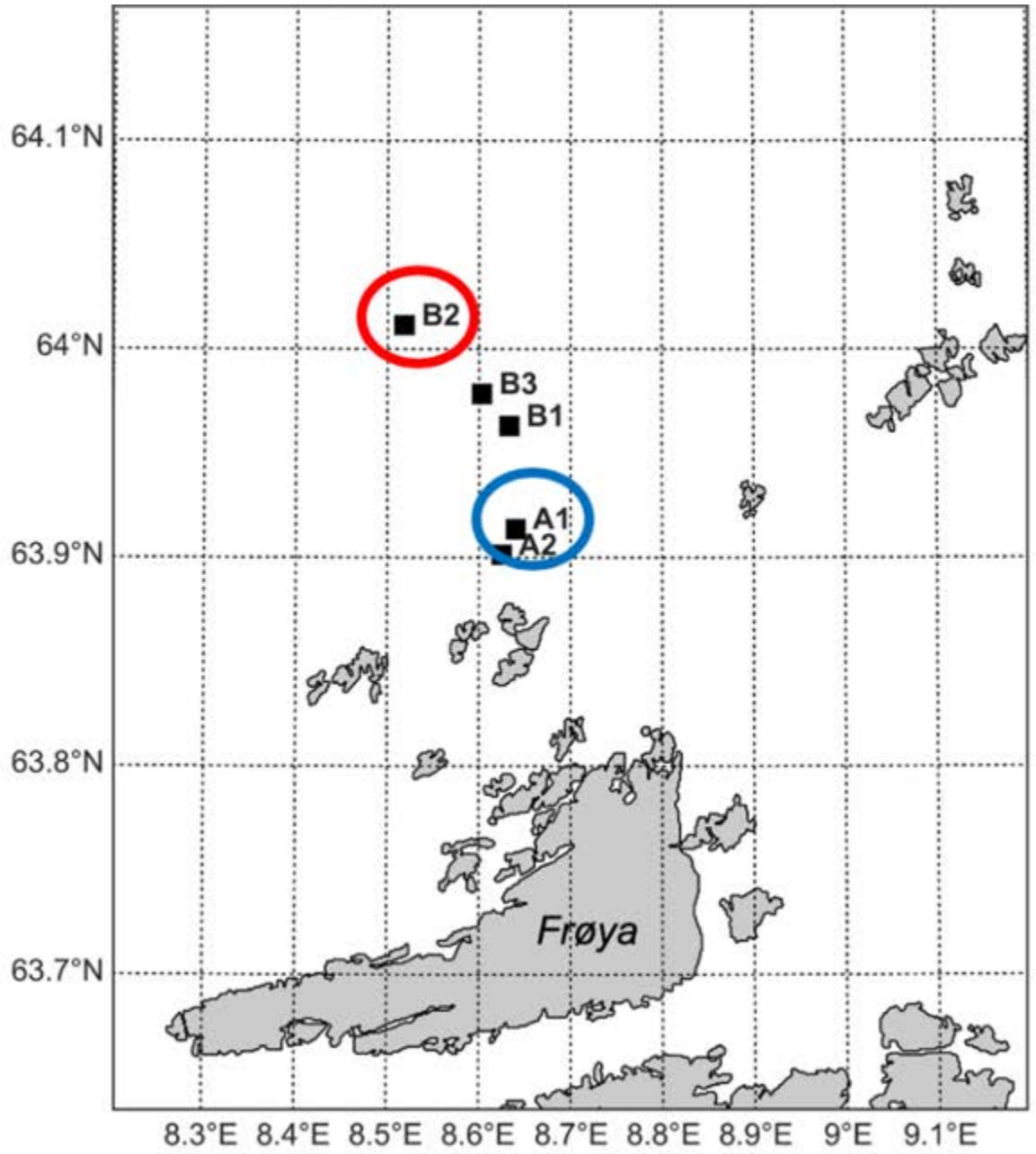
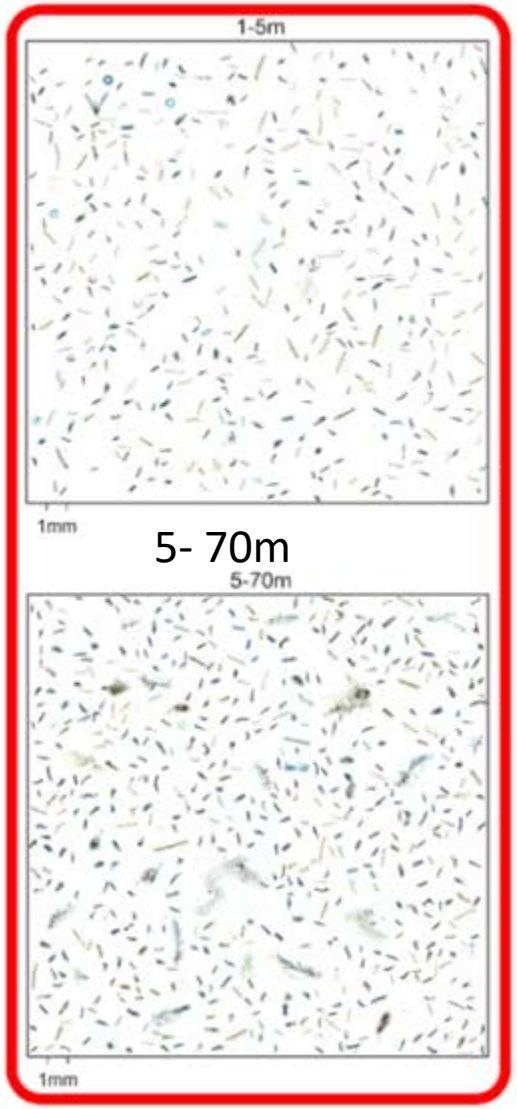


Particle spectrum

Machine learning used to identify diatoms chains and copepods


64.1°N
64°N
63.9°N
63.8°N
63.7°N
B2
B3
B1
A1
A2
Frøya
8.3°E 8.4°E 8.5°E 8.6°E 8.7°E 8.8°E 8.9°E 9°E 9.1°E

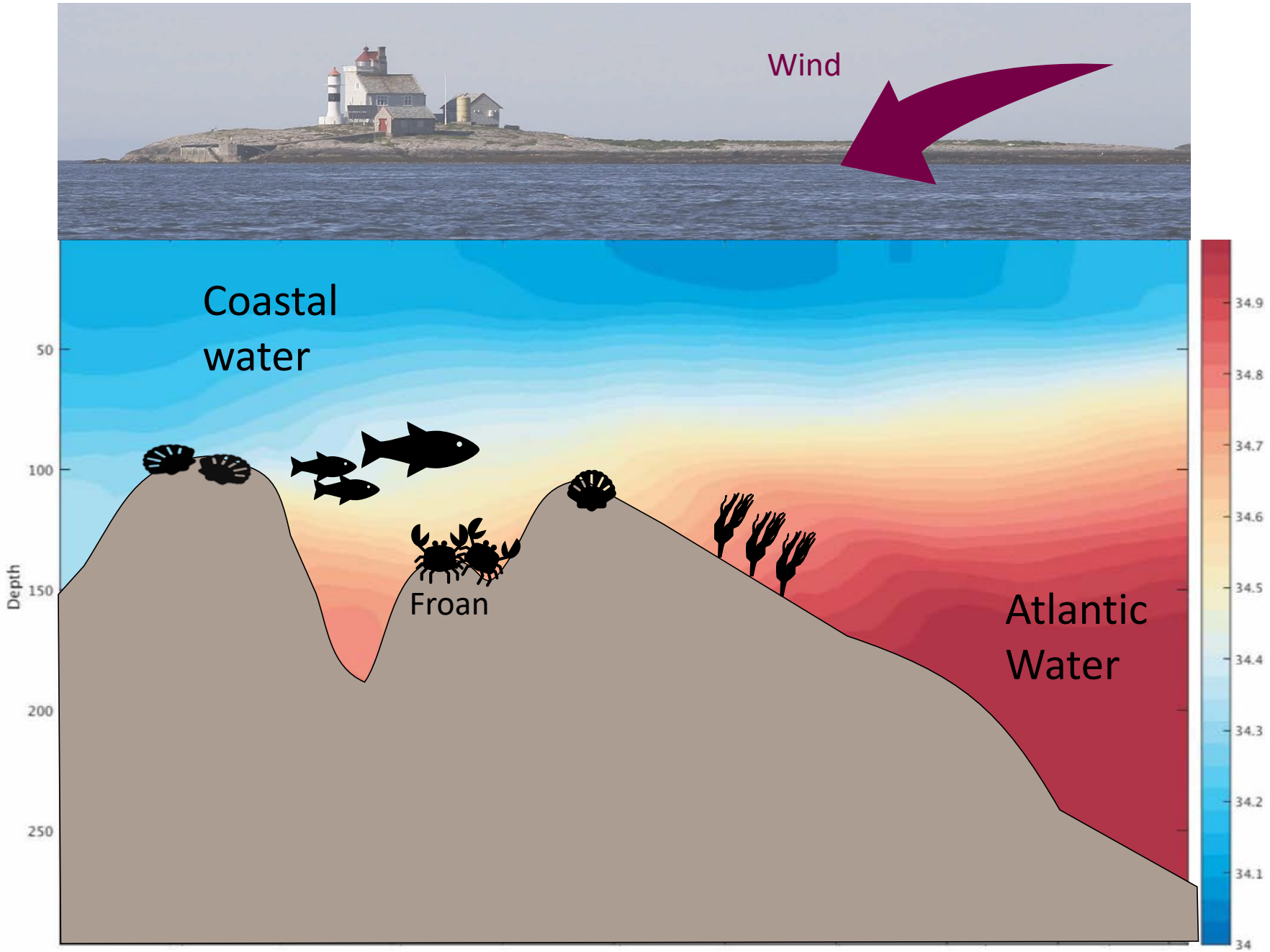
1-5m


1-5m
1mm
5- 70m
5-70m
1mm

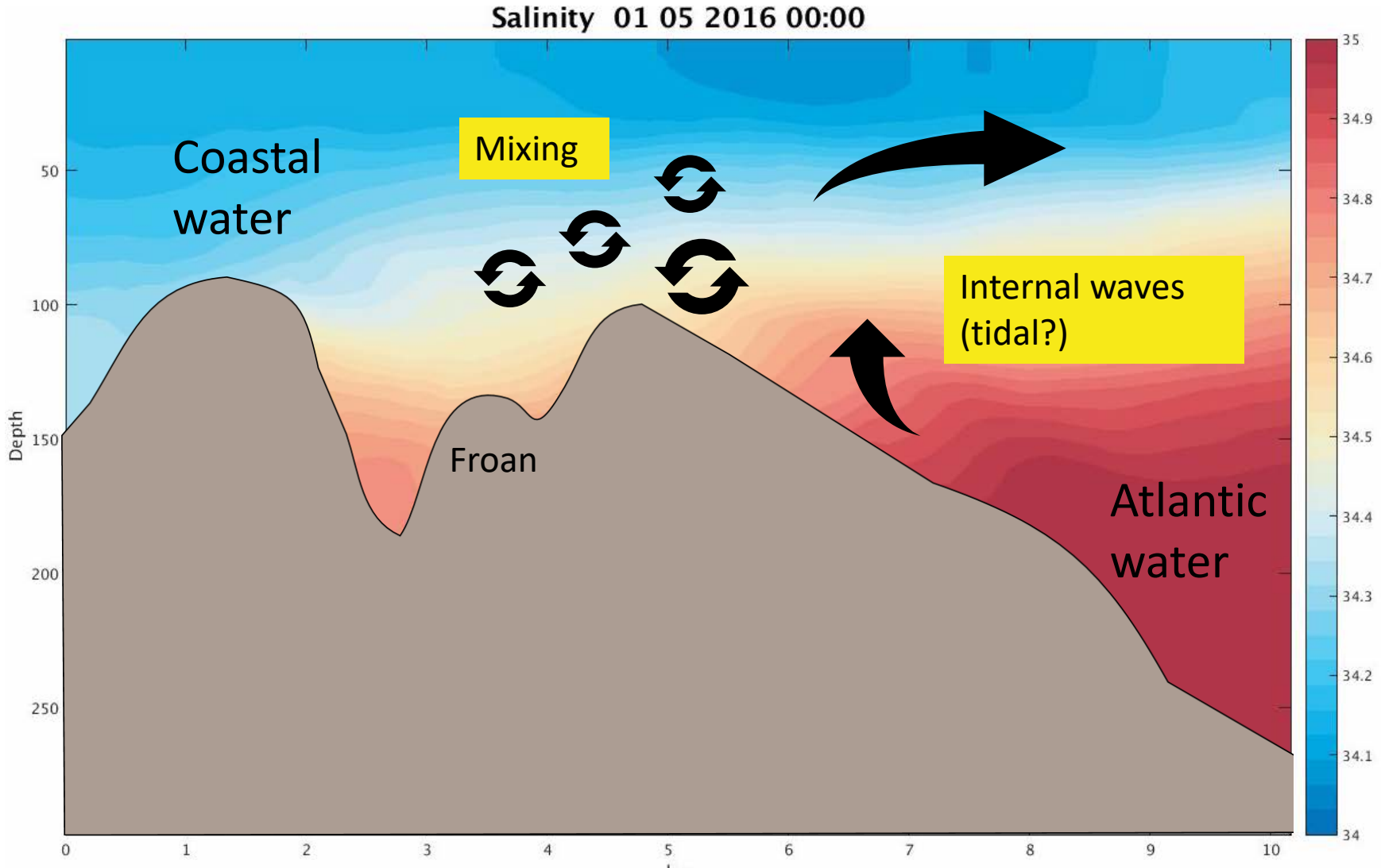
1-5m
1mm
1mm

1mm

EF

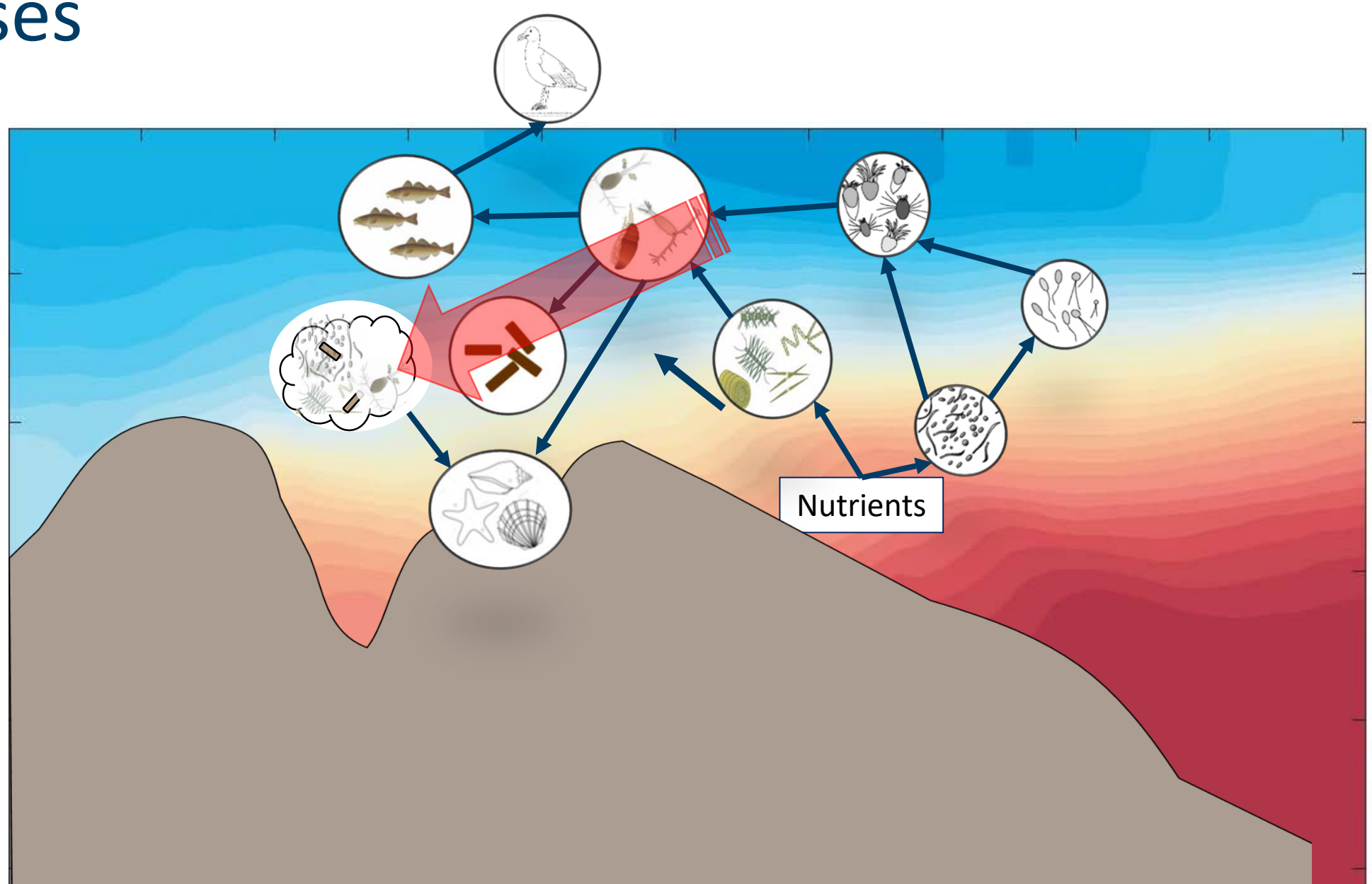

Wind
Coastal water
Froan
Atlantic Water
Depth
50
100
150
200
250
34.9
34.8
34.7
34.6
34.5
34.4
34.3
34.2
34.1
34

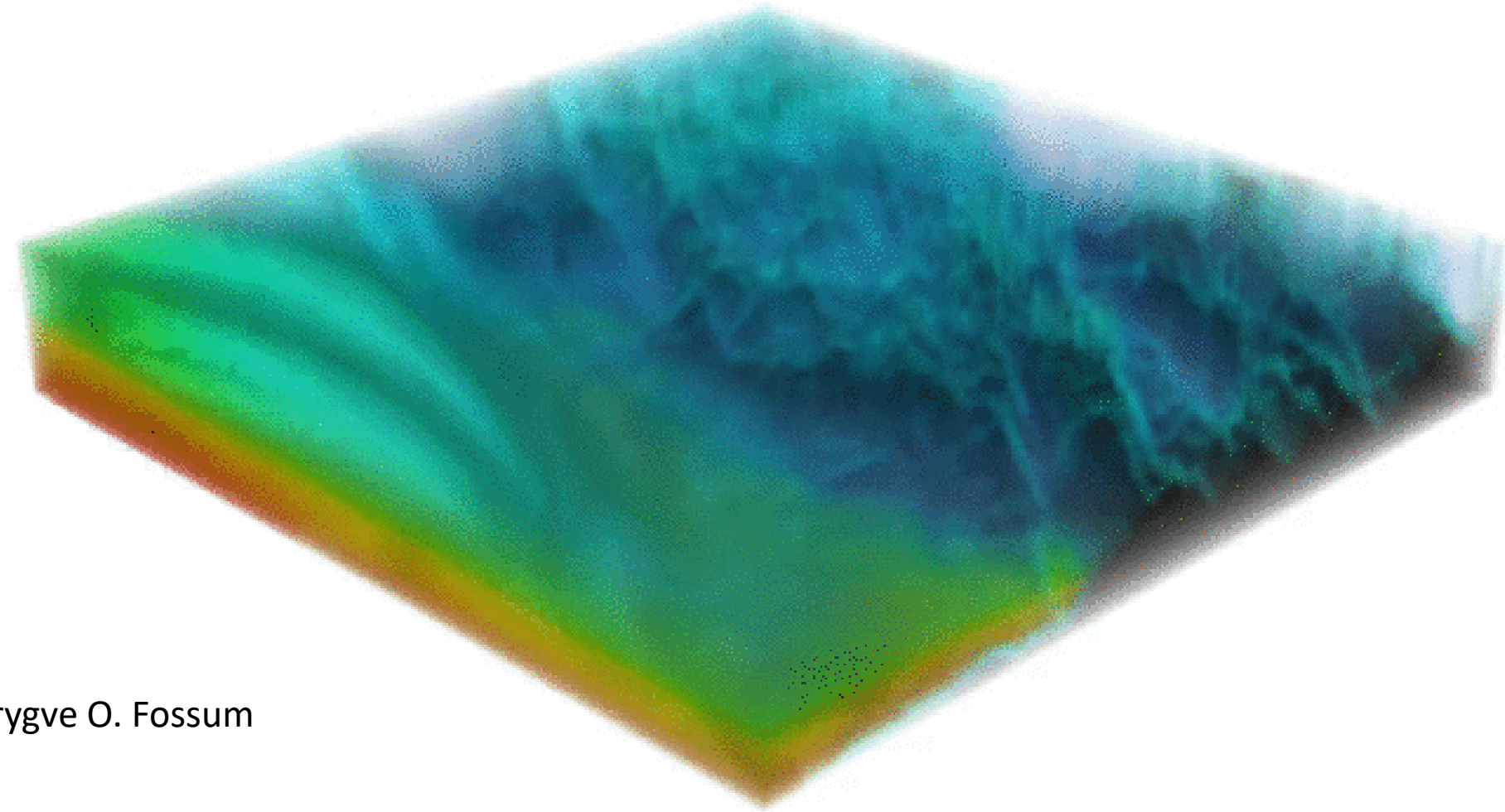
Hypothesis-revised



TEF

Coupled biological and physical processes





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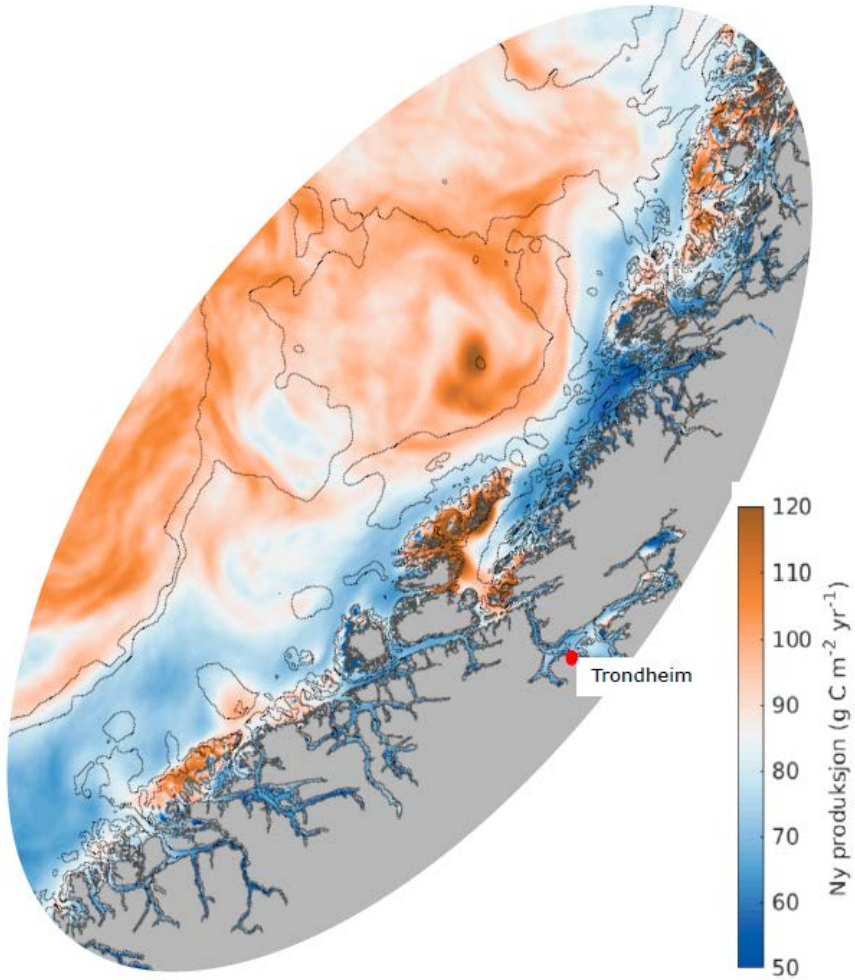
Summary

- The methods developed can detect, track, and map ocean phenomena in ways that are not possible using conventional approaches
- Increased knowledge of how physical processes impacts on ecosystem structure and functioning



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