Synergy for Characterisation of 3D Eddy Structures

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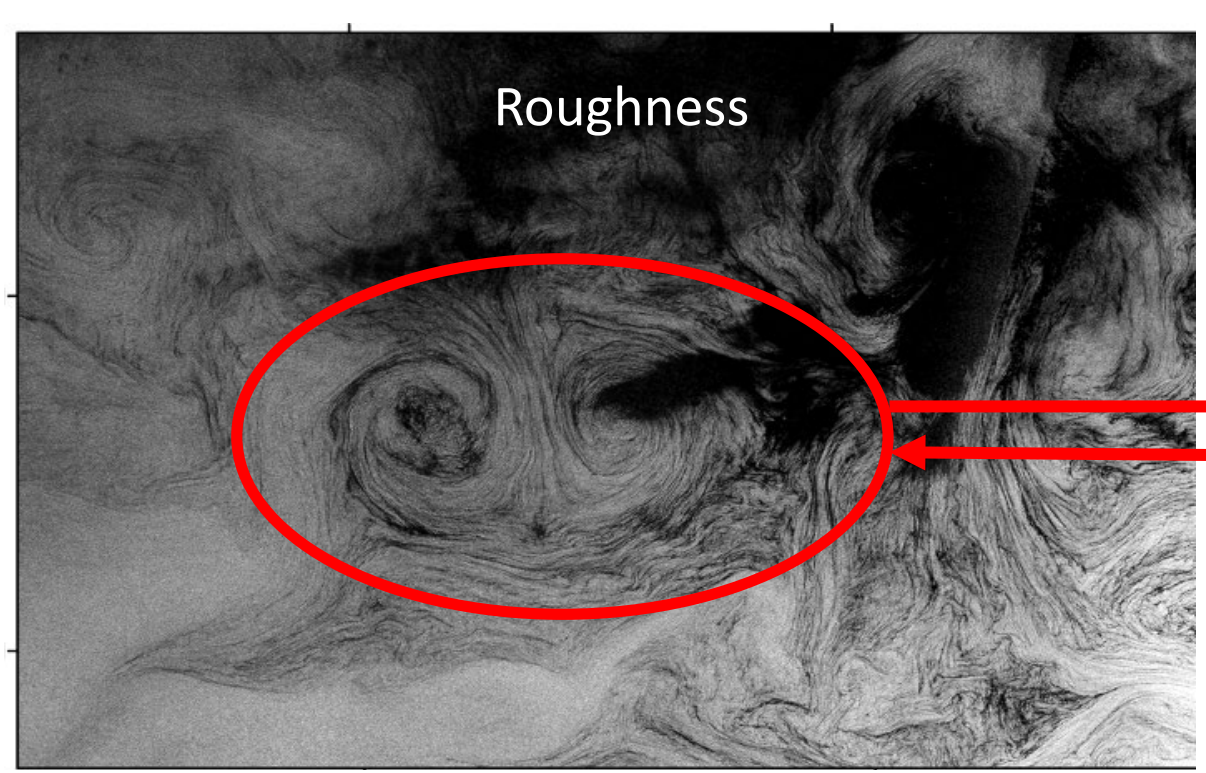
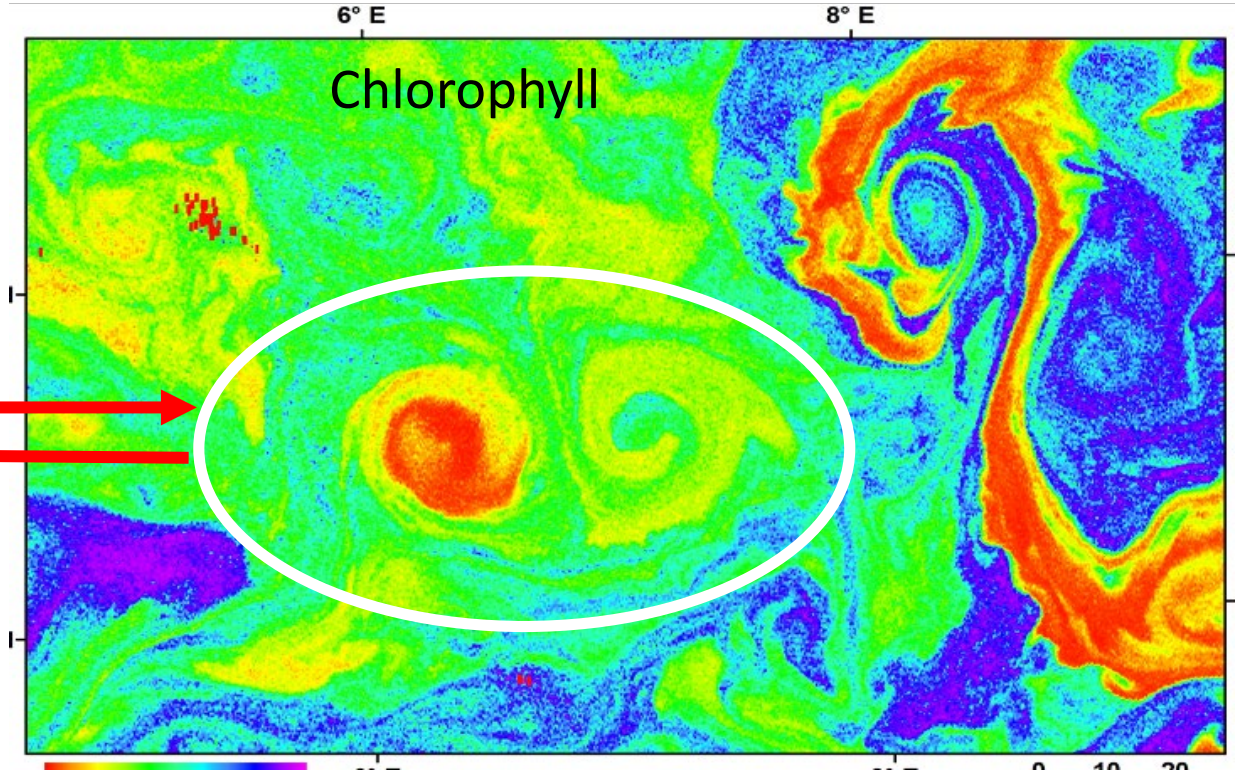


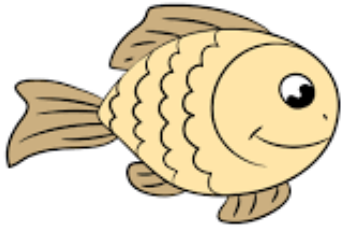


Eddies are more than the “Weather” in the Ocean

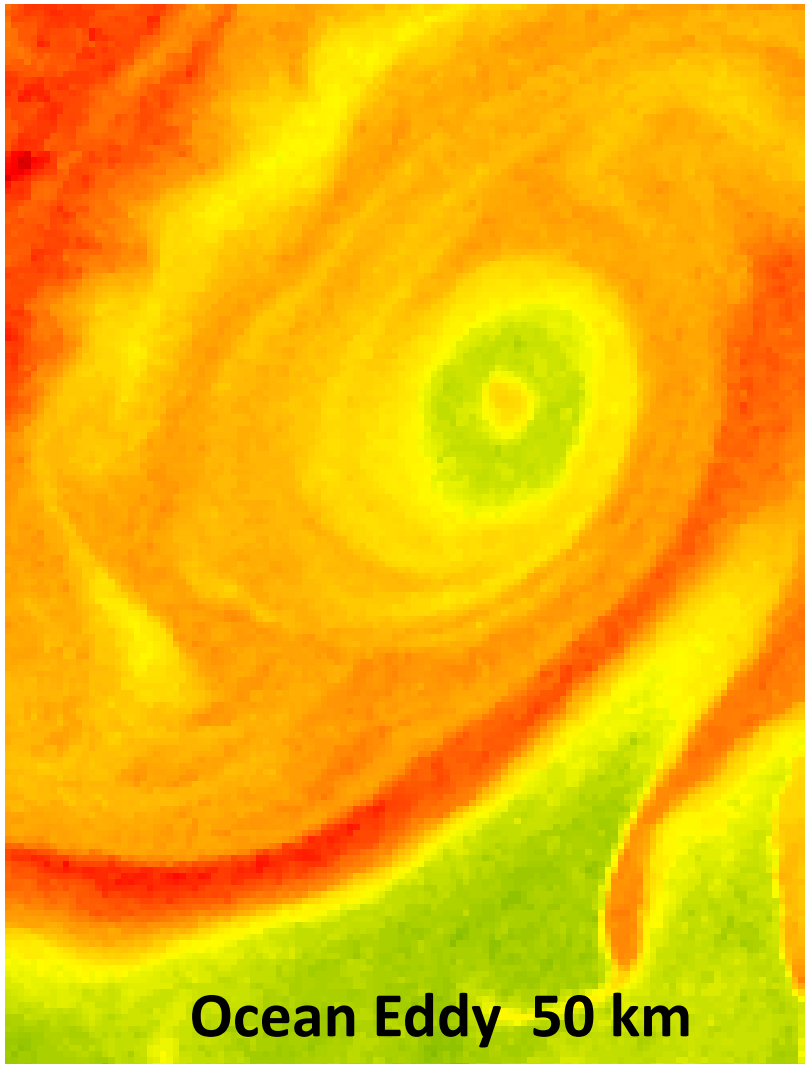
- Horizontal scale: 50 to 100 km
- Vertical extent: ~ 1000 m
- Duration: > 30 days

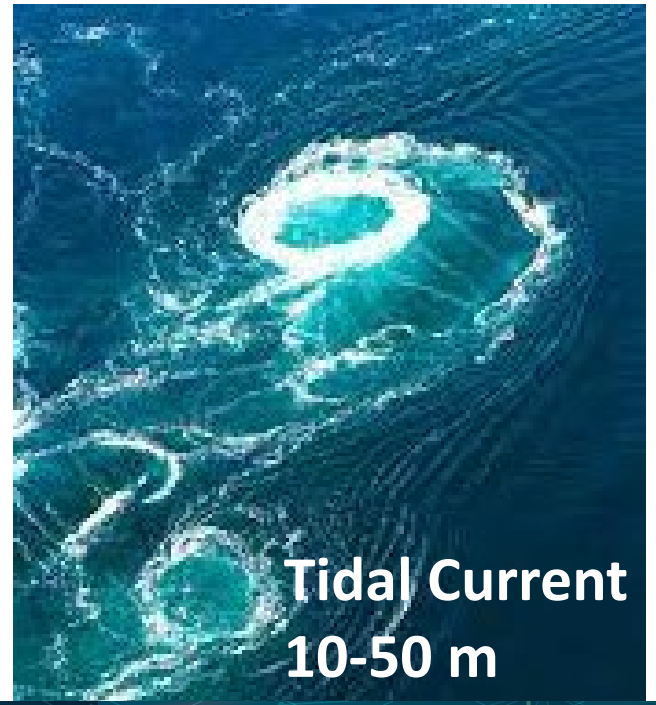
Maintain sharp gradients in:

- Horizontal & vertical currents
- Temperature
- Salinity
- Neutrients
- Phytoplankton (& zoo-plankton)

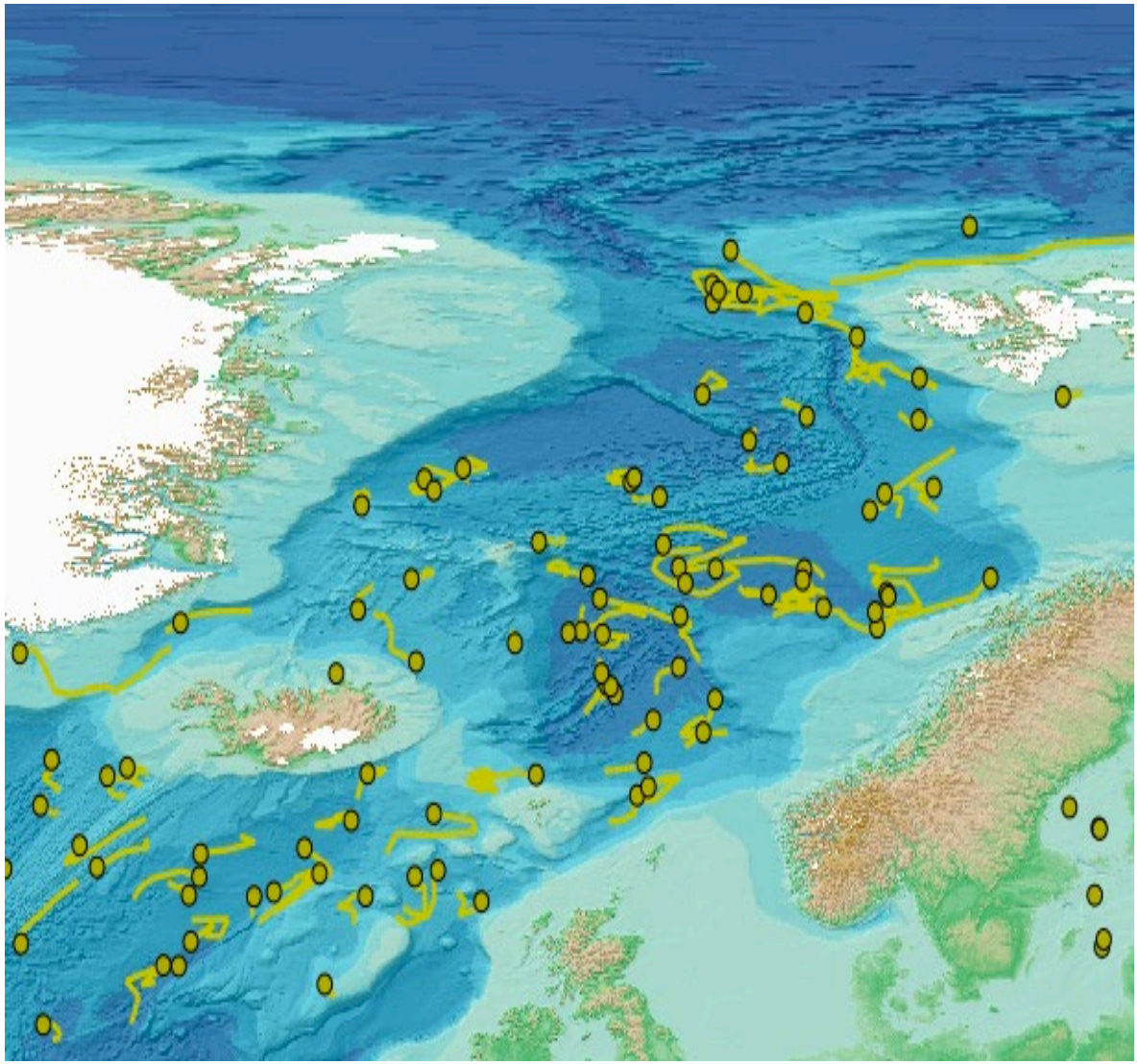


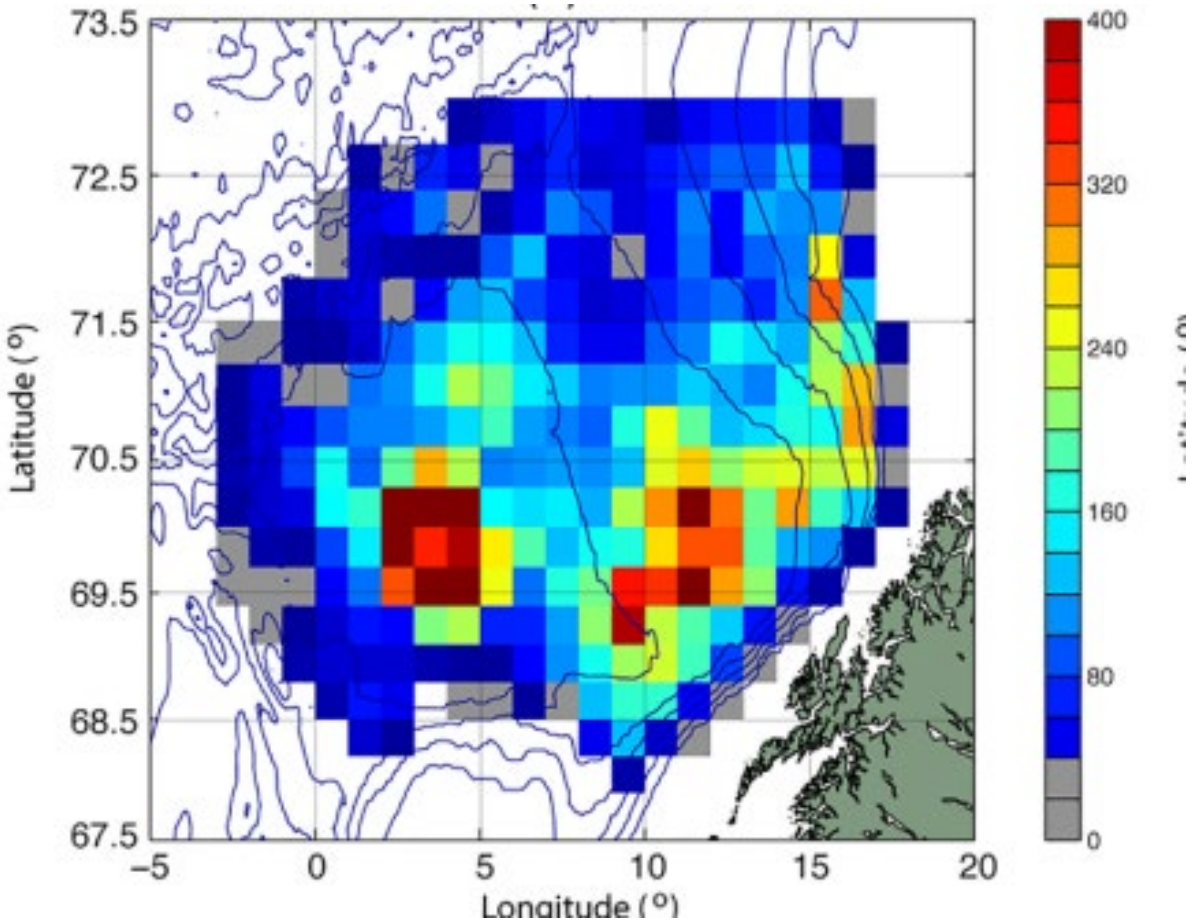
What does fish know about eddies?





Lofoten Basin: A Paradise for Eddies

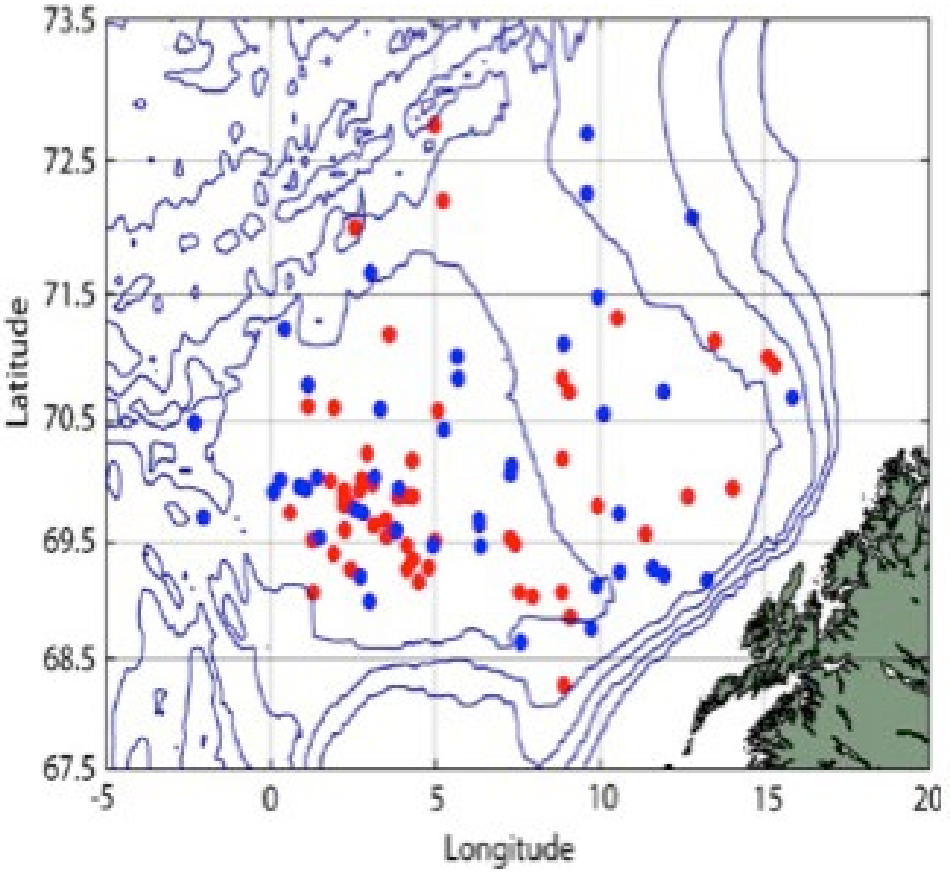


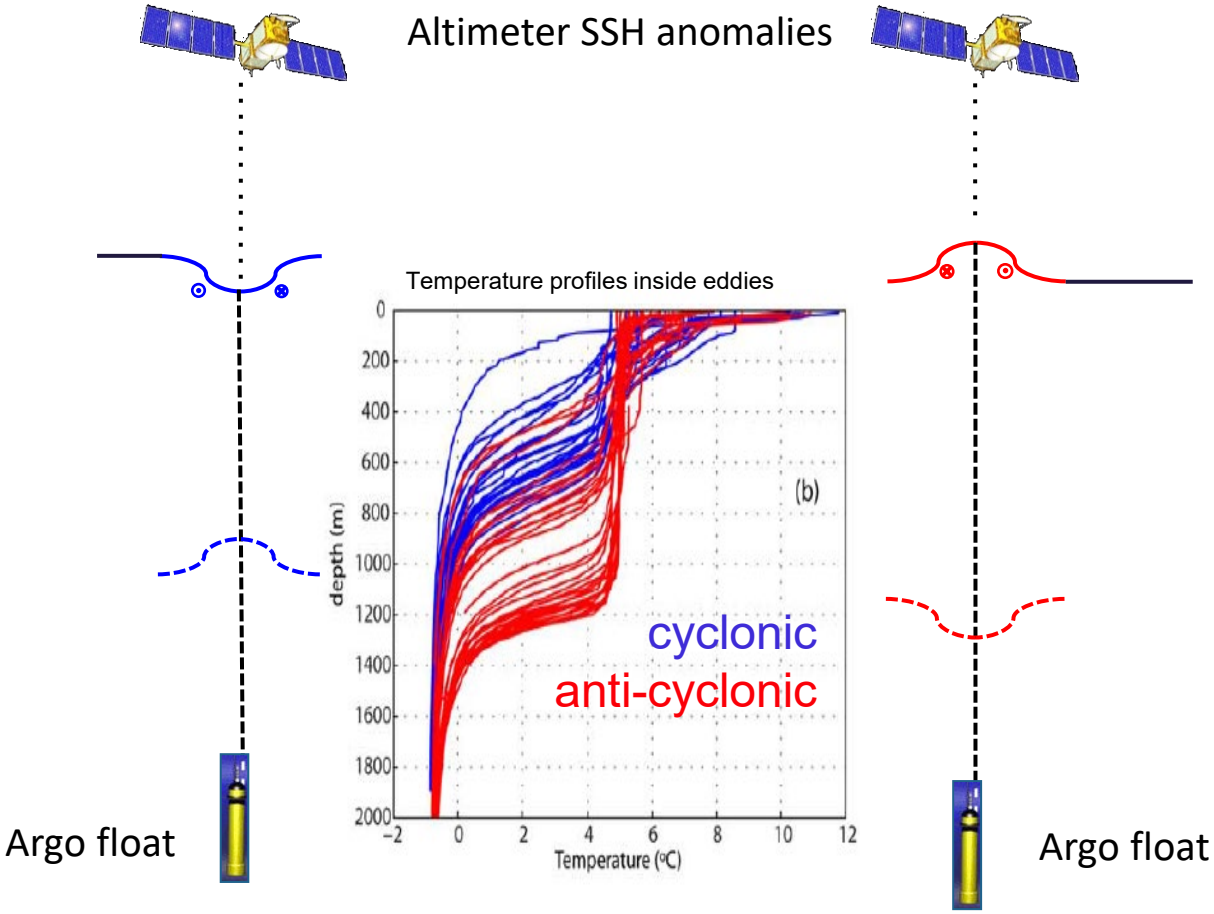


Anticyclones 1993-2018

(Raj et al., 2020)

Lofoten Basin eddies from space to 2000 m below surface





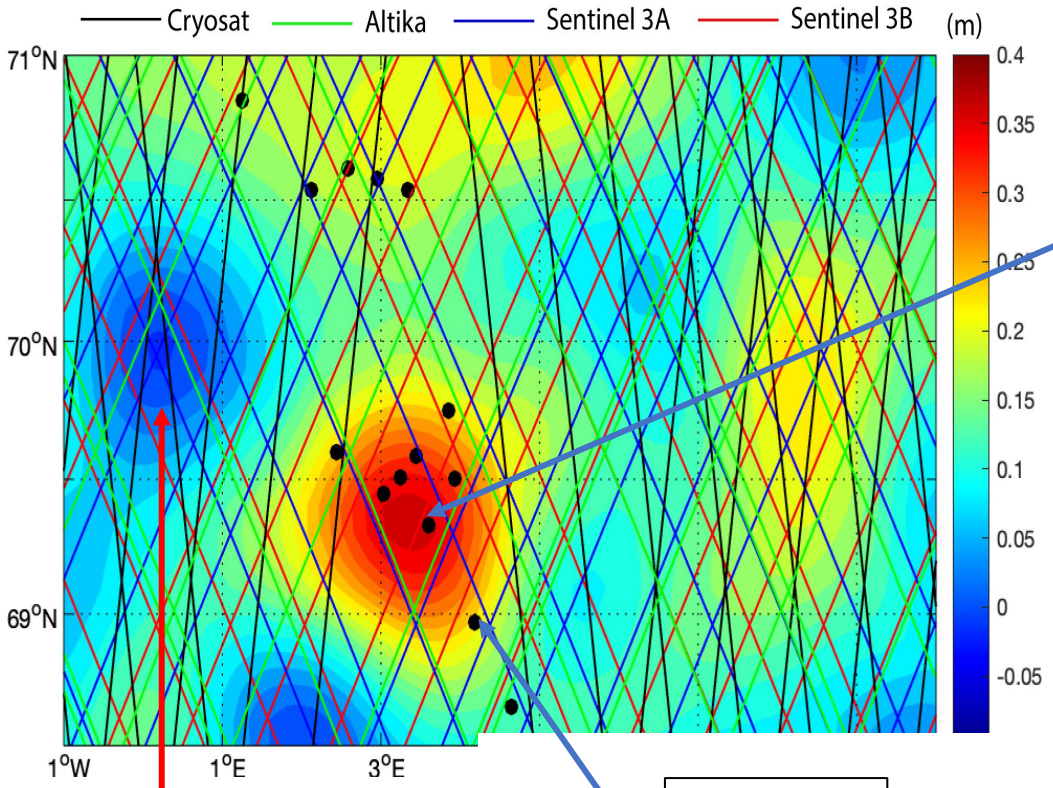
● : Cyclones

● : Anticyclones

Blue: Cyclones

Red: Anticyclones

SSH from altimetry colocated with Argo-floats marked

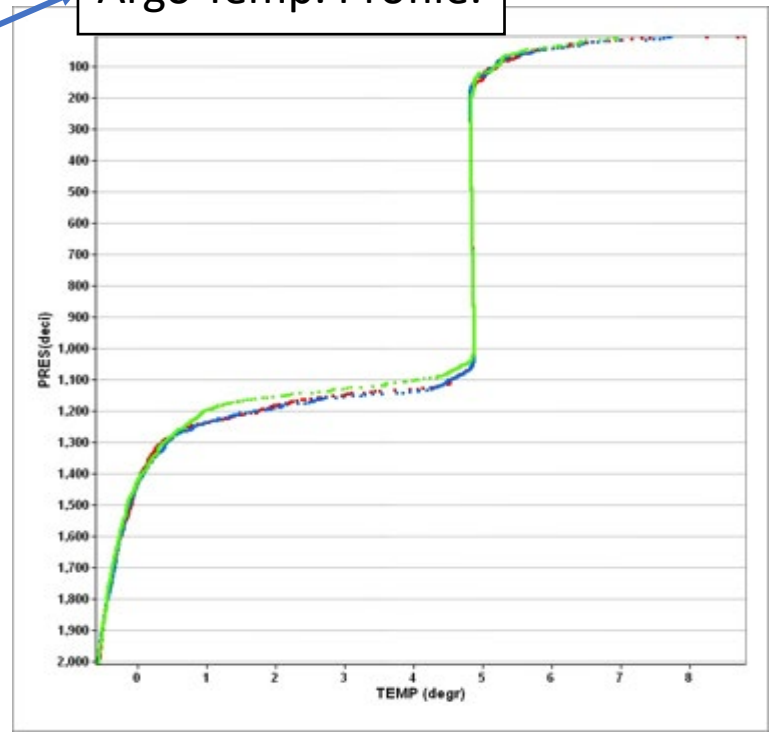


O m

100O m

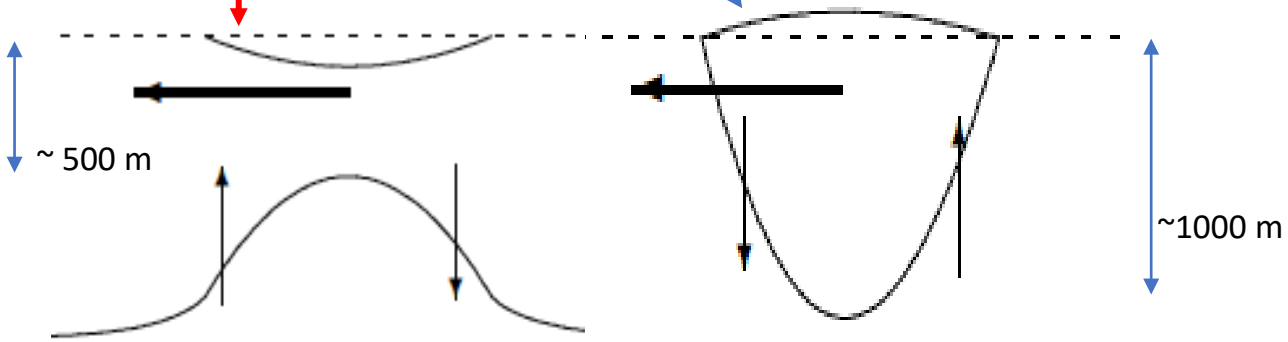
200O m

Argo Temp. Profile.

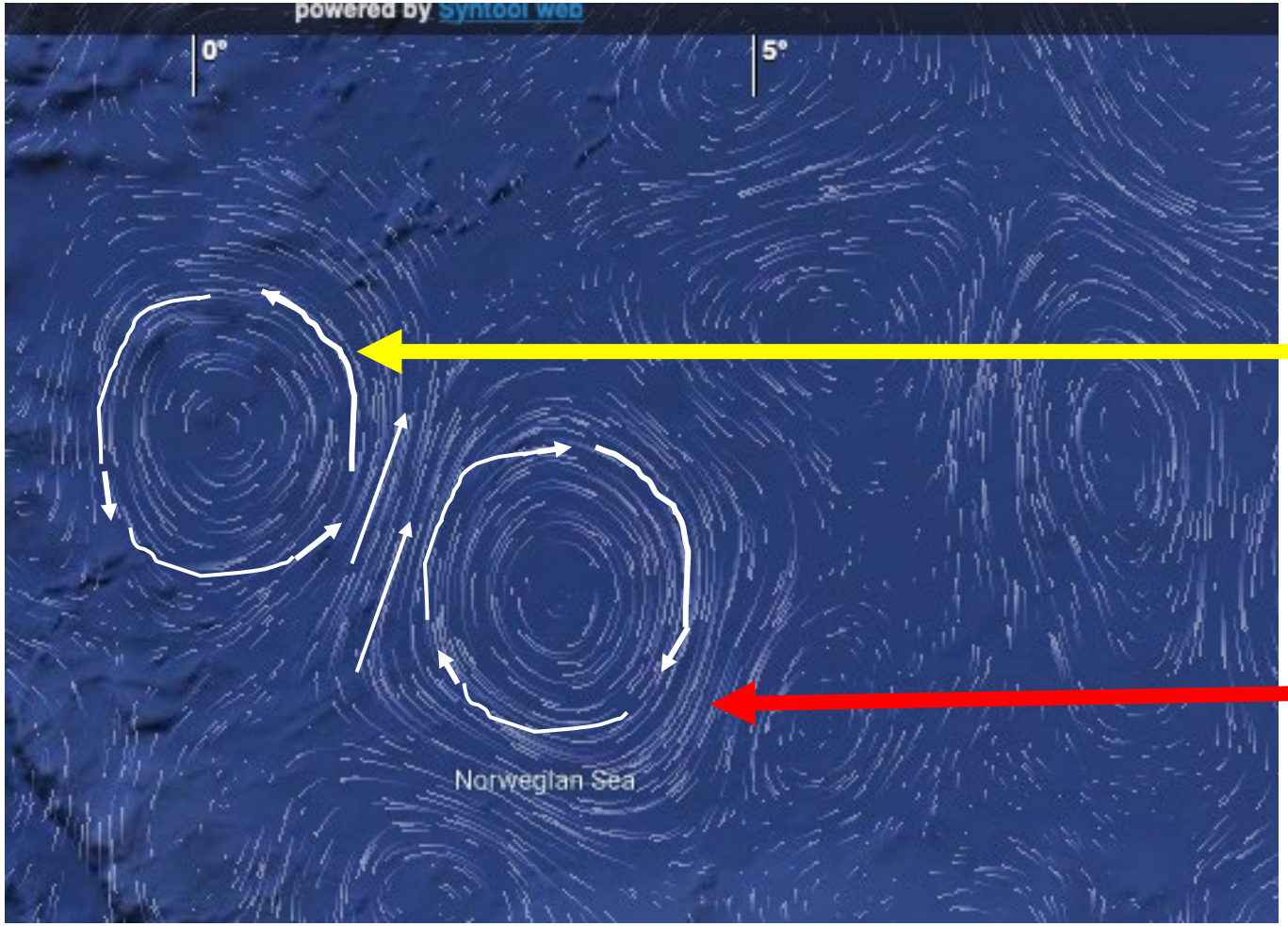


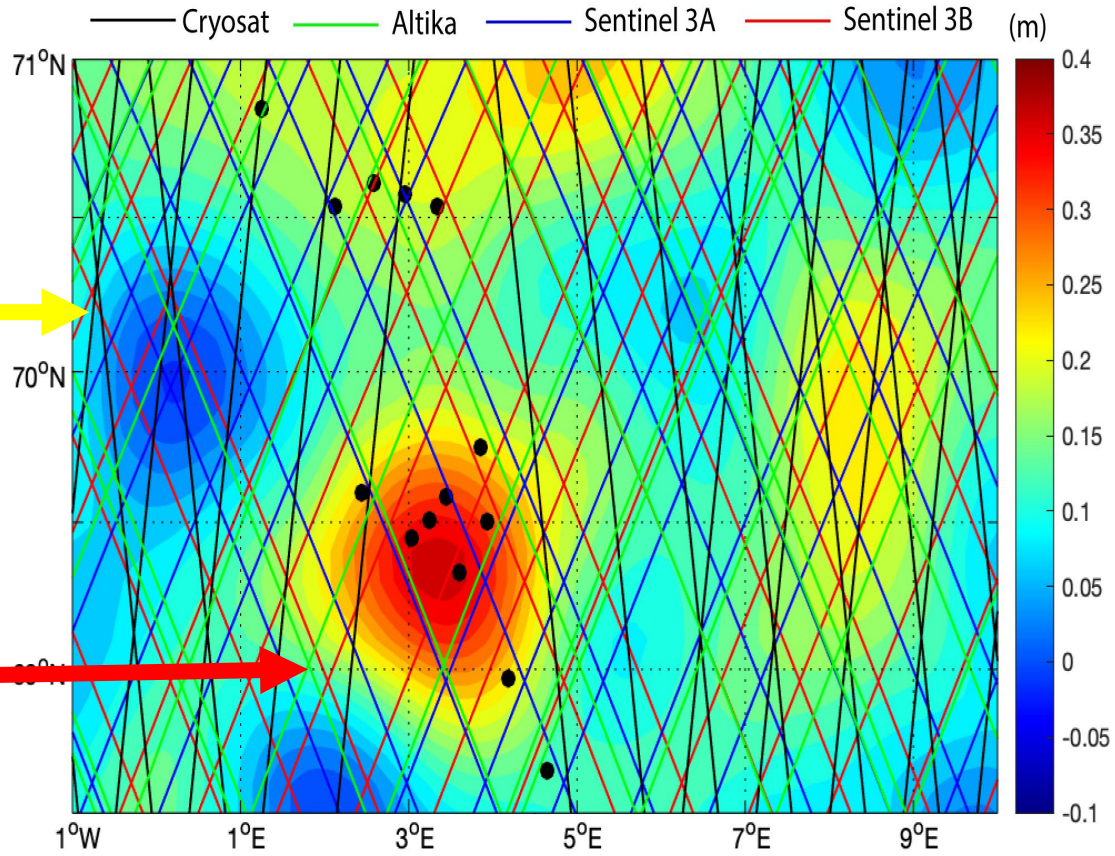
Cyclone

Anticyclone



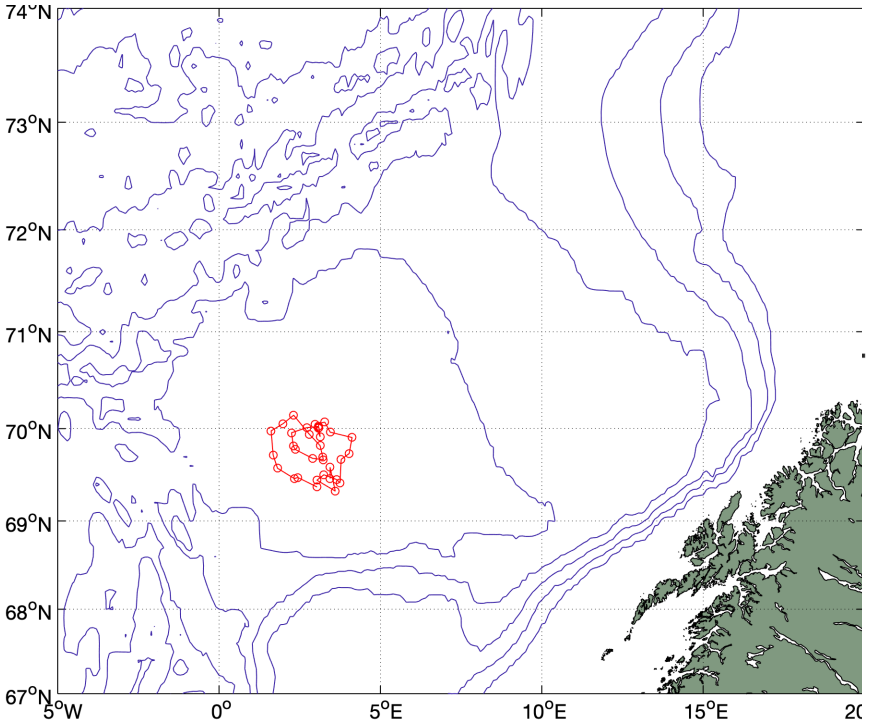
Sea Surface Height change and Surface Current response



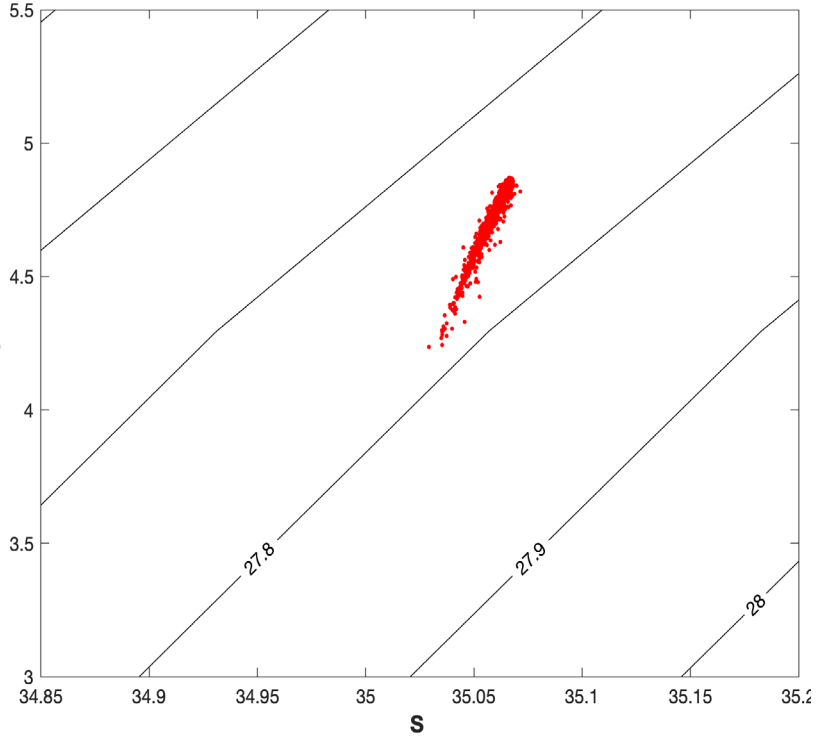


Altimeter tracks over 10 days

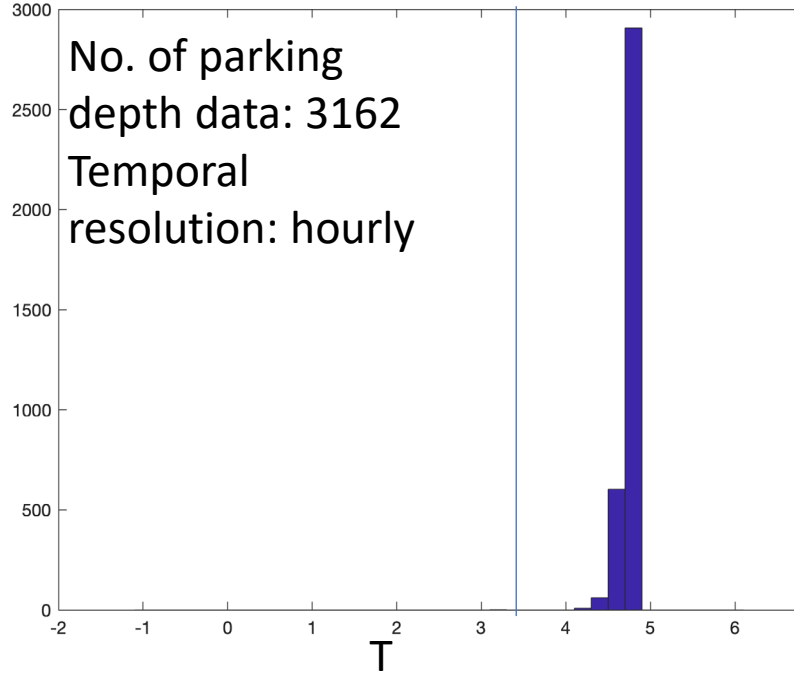
TS-data at parking depth for Argo float trapped within anticyclonic eddy

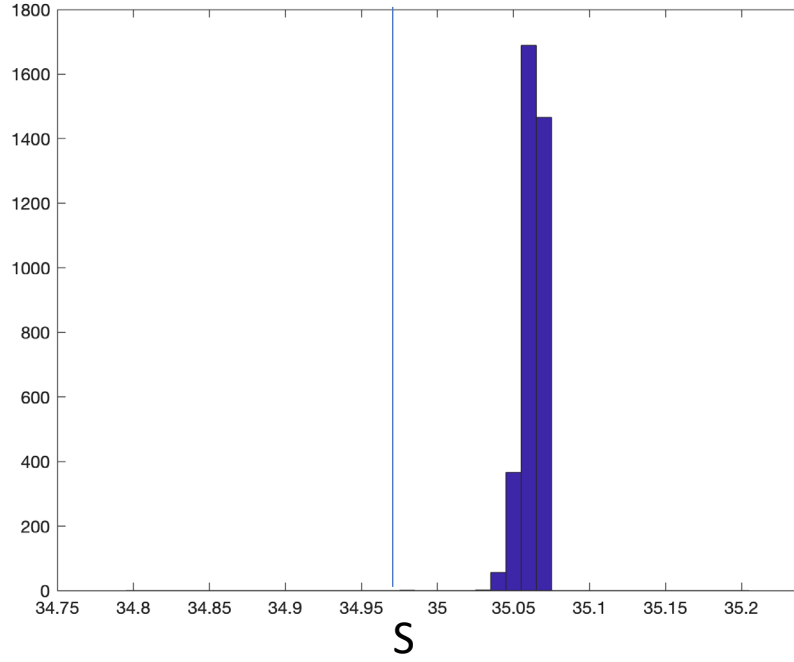


Drift at parking depth 1022 m
Time period: 2 June 2020 - 8 Nov 2020

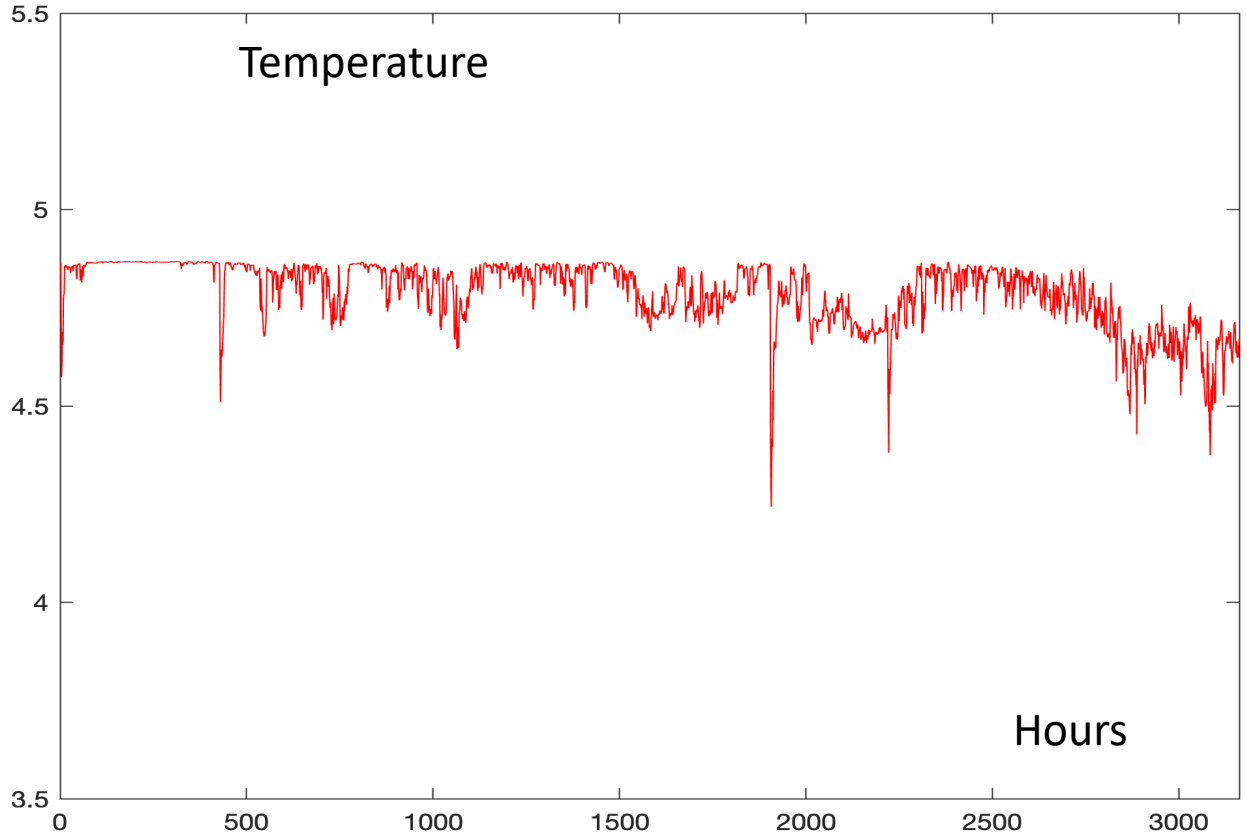


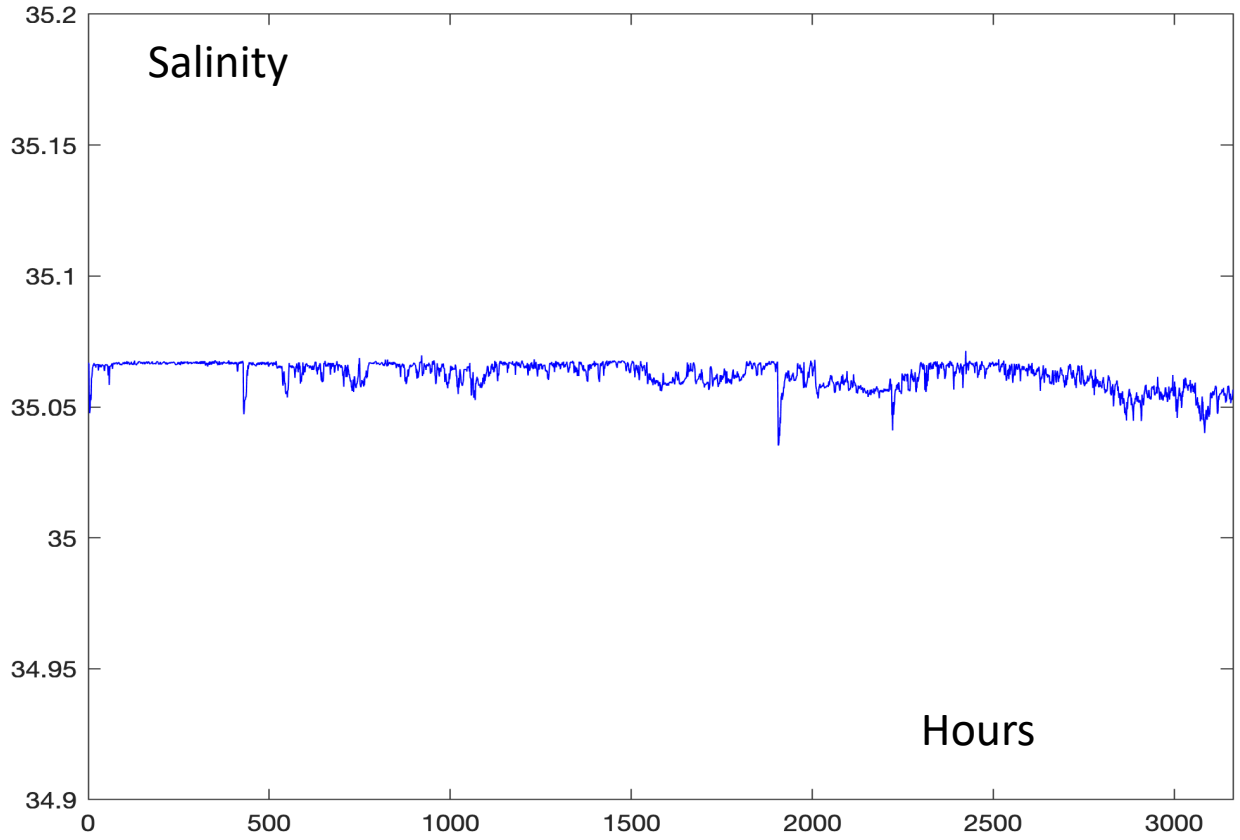
T-S Diagram





Temporal evolution of temperature and salinity at 1000 m

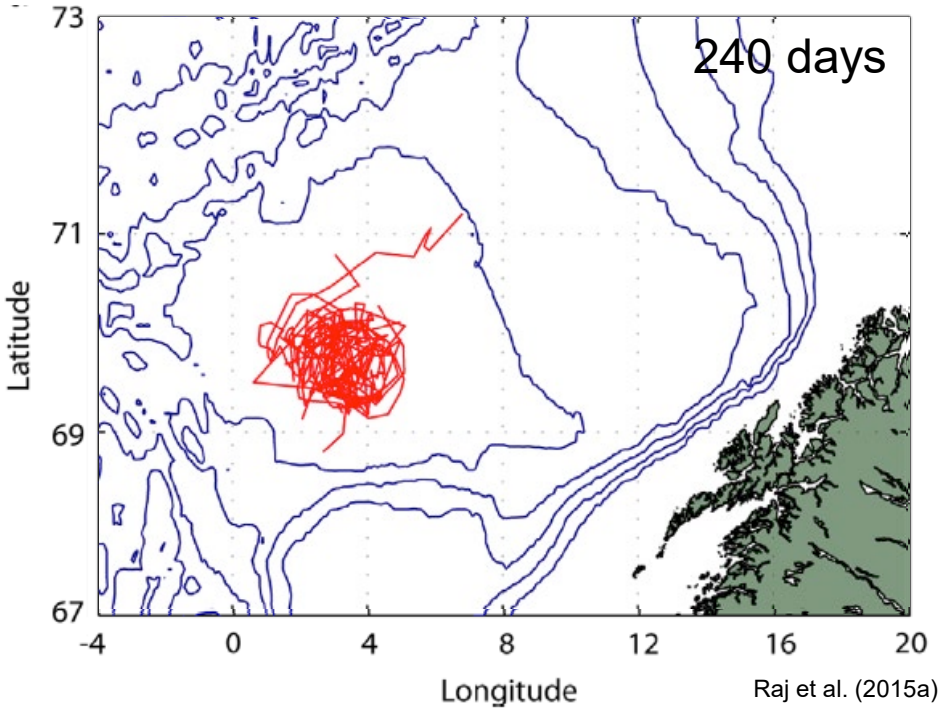




Time period: 2 June 2020 - 8 Nov 2020

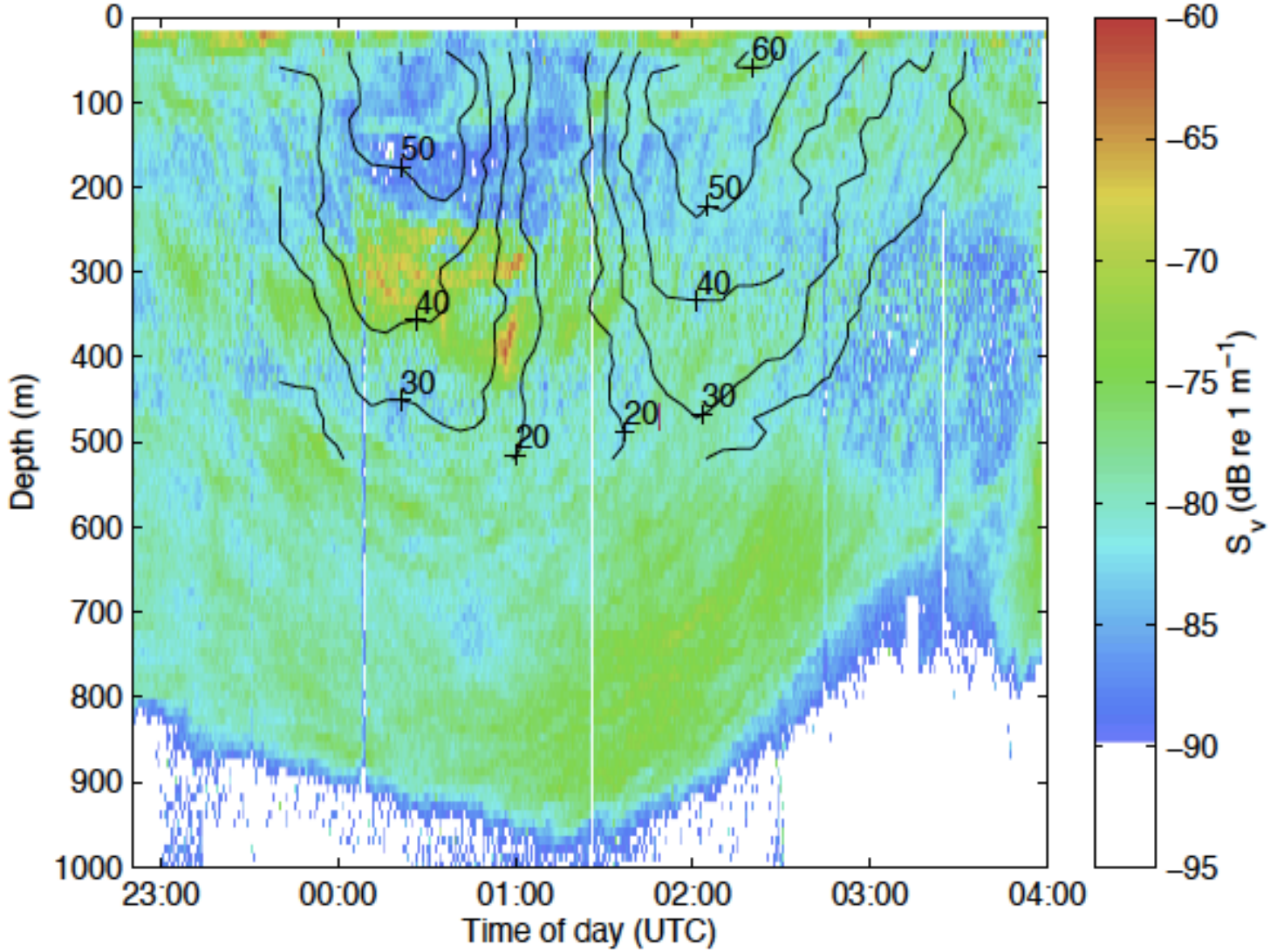
How long do the eddies live?

Tracking eddies



Raj et al. (2015a)

How do they influence biology?



Lofoten Basin - Paradise for Eddies - Natural Laboratory

The Eddies influence:

- Transport of warm water to the Arctic
- CO2 uptake and acidification
- Upper layer dynamics
- Wave-current interaction
- Ecosystem
- Transport of fish eggs and larvae
- Trapping of microplast

Impact/Application:

Climate
Ocean health
Process studies
Ship-routing
Fishery
Fishery
Environmental monitoring

Benefit from combined use of satellite sensor synergy, Argo floats, models and AI/ML