

*Lofoten – Vesterålen observatoriet  
– et skritt mot fartøyuavhengighet i  
marine overvåkning?*

**Olav Rune Godø**



**INSTITUTE OF MARINE RESEARCH**  
**HAVFORSKNINGSINSTITUTTET**



# Background and motivation

- Vessel time is costly
- Ship-based observations are vulnerable to time shifts in processes across years
- Ship-based observations typically miss the surface blind zone
- Ship data mixes time and space scale variability
- Want a tool *to observe processes on the spatial and temporal scales on which they occur*

Designed around acoustics sensors

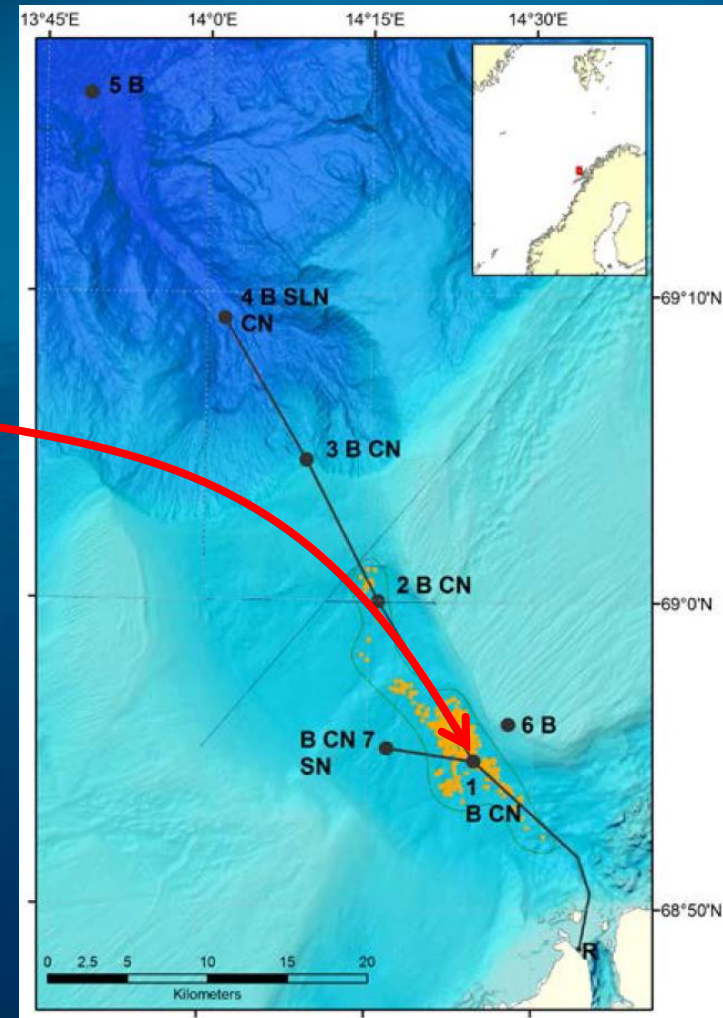
# Observatory objectives

- Demonstrate performance and potential
- Identify important events
- Identify and assess scaling and timing
- Evaluate survey performance
- Challenge:
  - Amount of data for processing and analysis
  - Optimal use requires development of autonomy



# The LoVe observatory

- Cabled observatory
  - Based on conventional sub-sea technology
  - Power delivery
  - Ethernet communication
- One existing node
- Plans to add 6 more nodes (subject to funding)
- All cabled nodes to have echosounders
- Existing node funded by Statoil



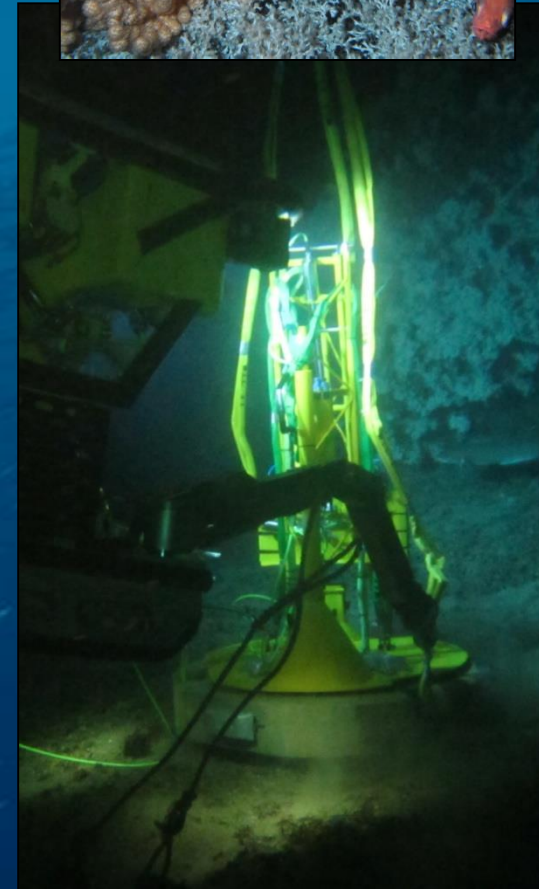
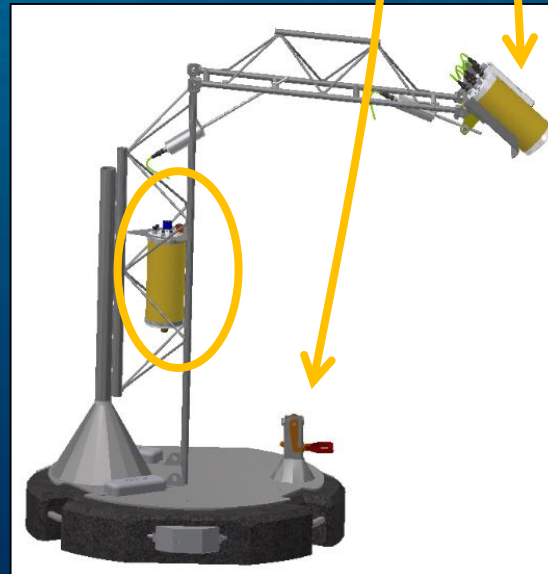
# Node 1

- Vertical echosounder (70 kHz)
- Movable horizontal echosounder (70 kHz)
- Ping every 4 seconds, range resolution 0.75m
- Long range ADCP (200 kHz)



# Node 1: satellite

- Camera, video, flash
- Short range ADCP (600 kHz)
- Hydrophone
- Particle dynamics sensor
- Chlorophyll
- Turbidity
- Pressure
- Conductivity
- Temperature



LoVe has been operational since September 2013

Also includes:

- Wind data from nearby land station
- Quarterly groundtruthing with vessel observations

<http://love.statoil.com>



# We aspire:

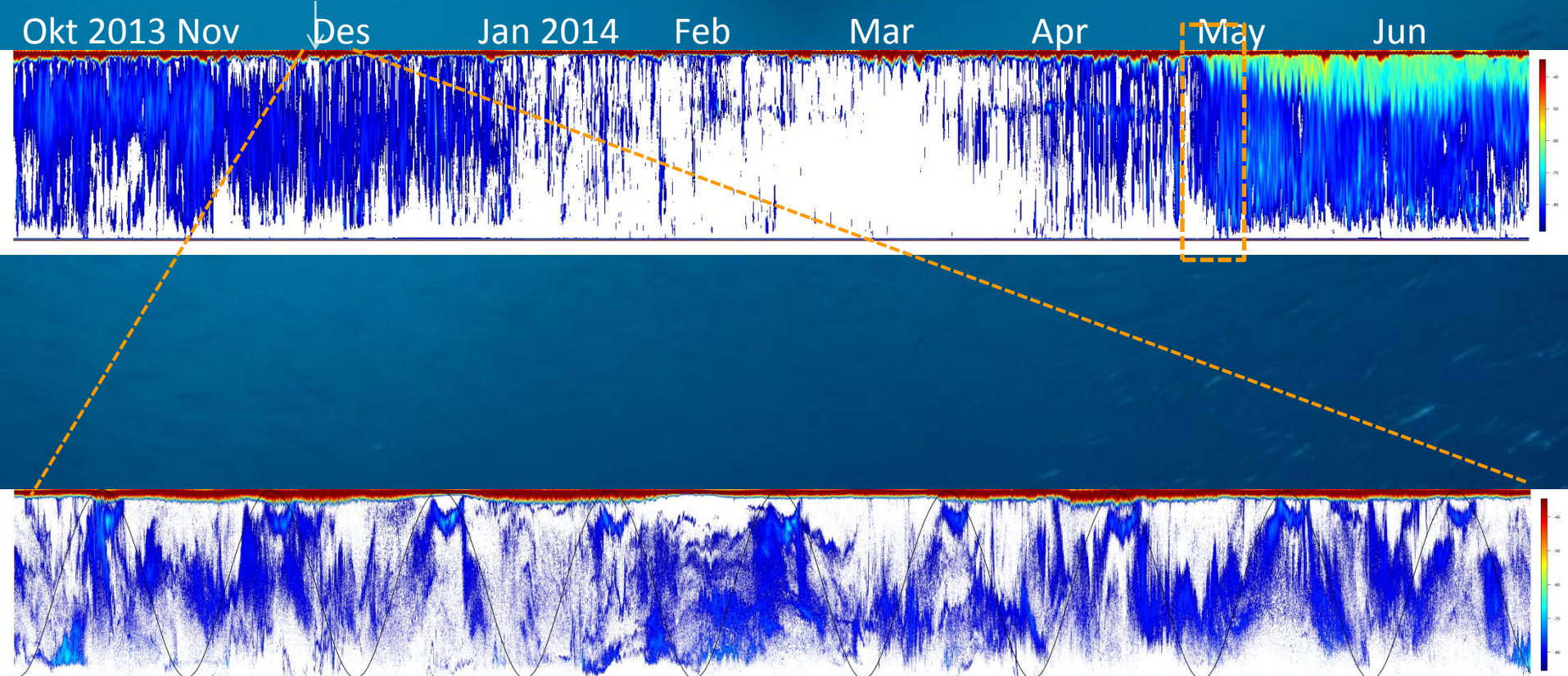
1. Autonomous processing
2. Autonomous sampling
3. Feedback autonomy
4. Commercialisation





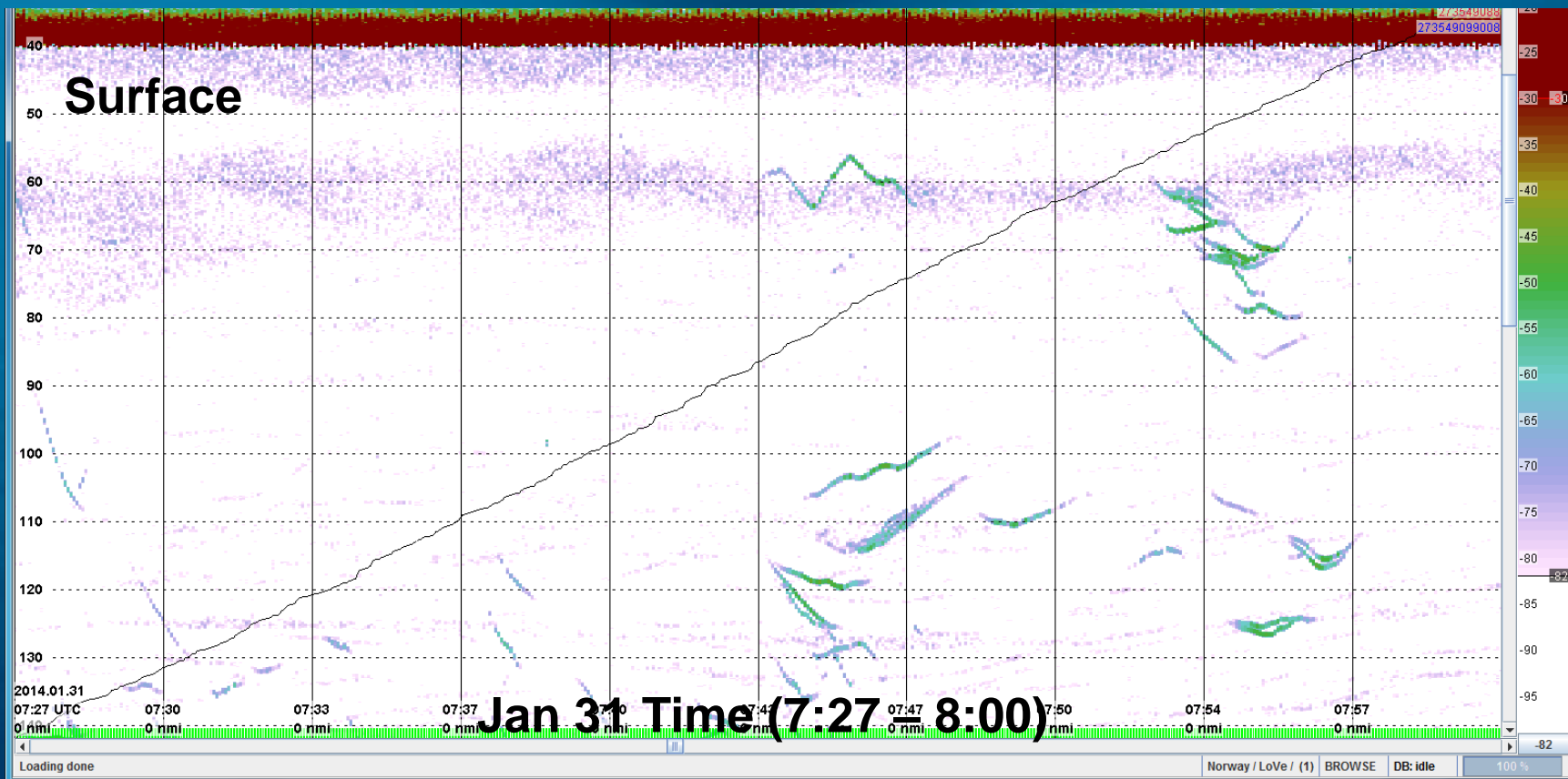
# Story 1: Ecosystem dynamics

9 dagers periode

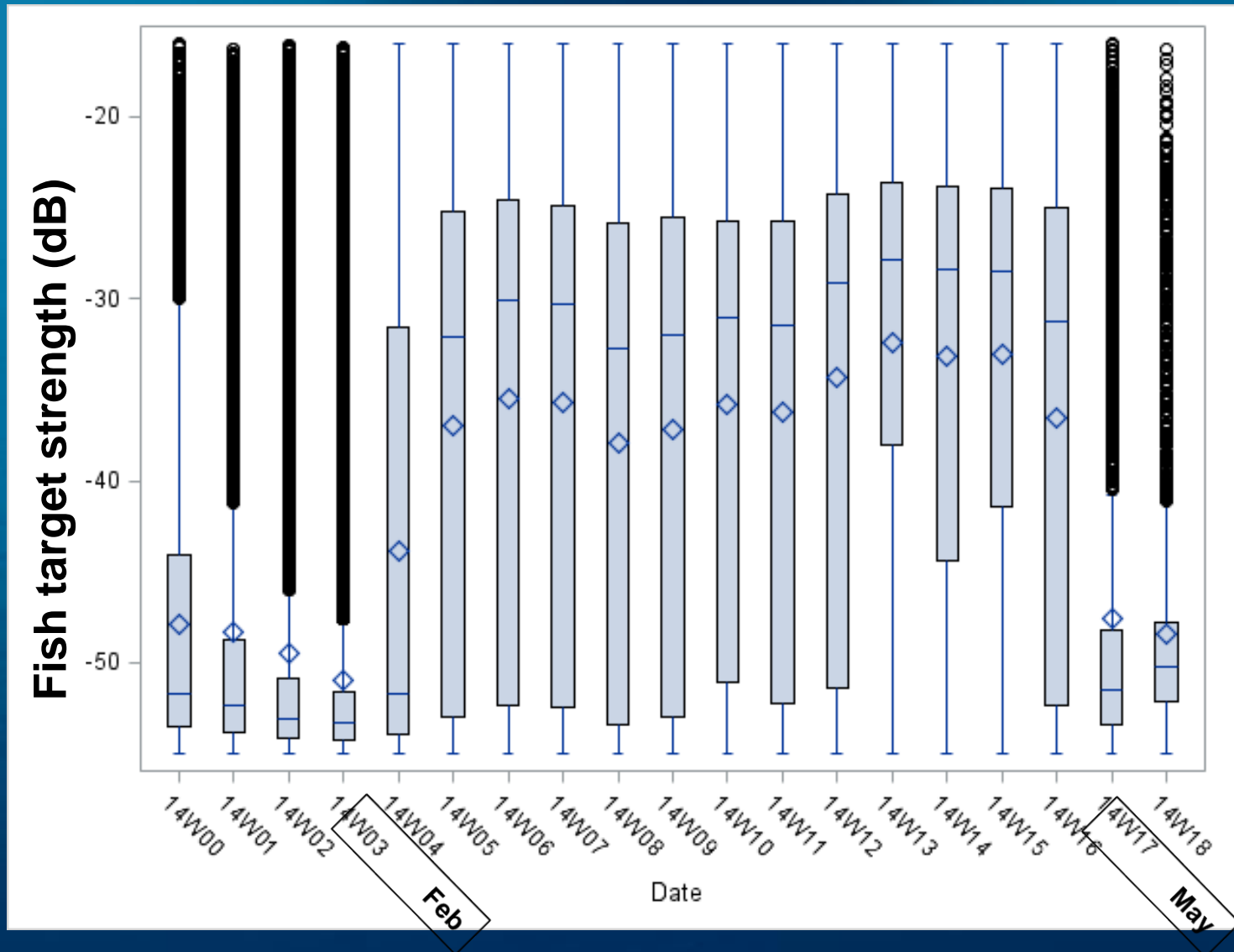


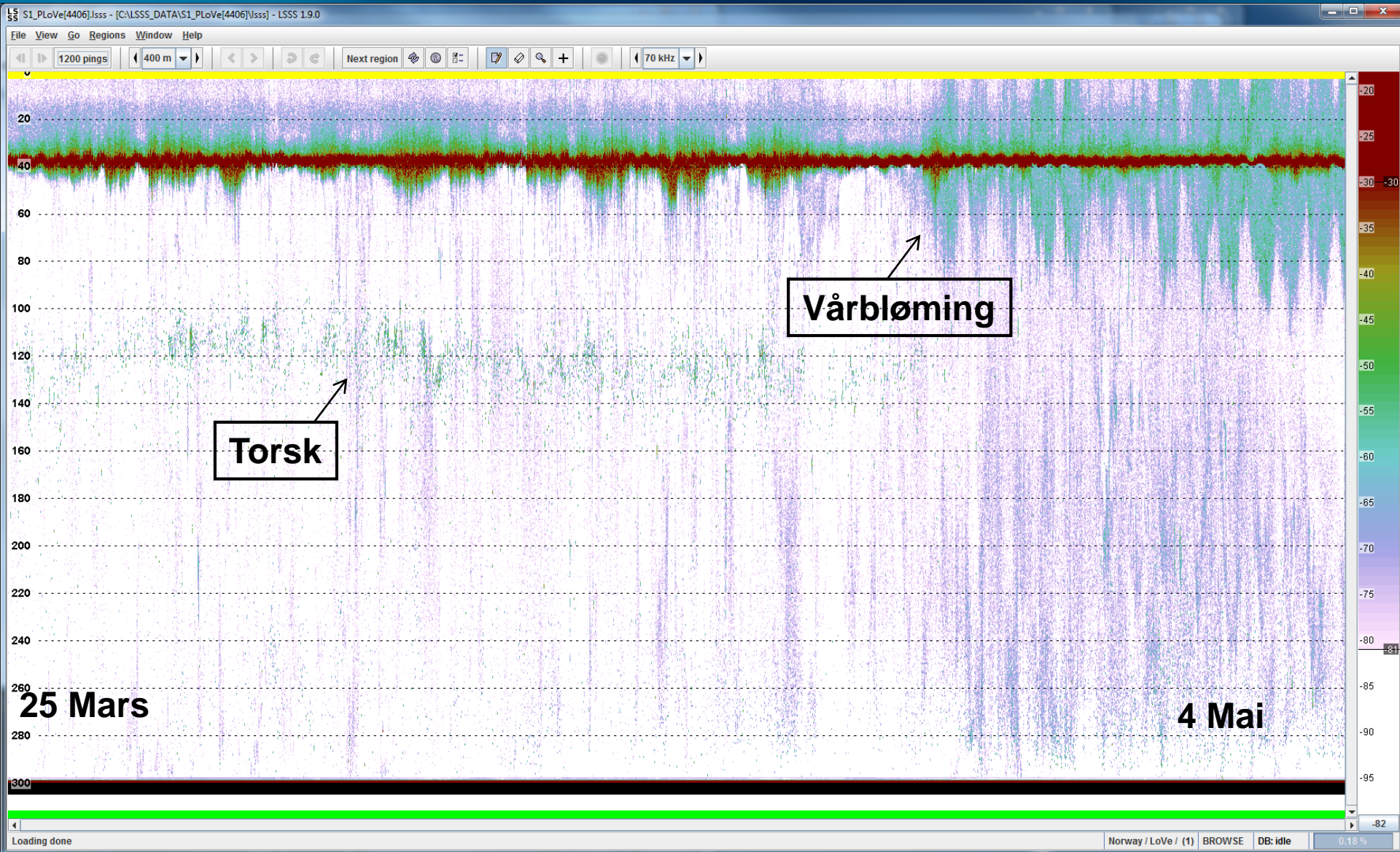
# Story 2: Timing of processes— cod

Depth (140 of 265m)



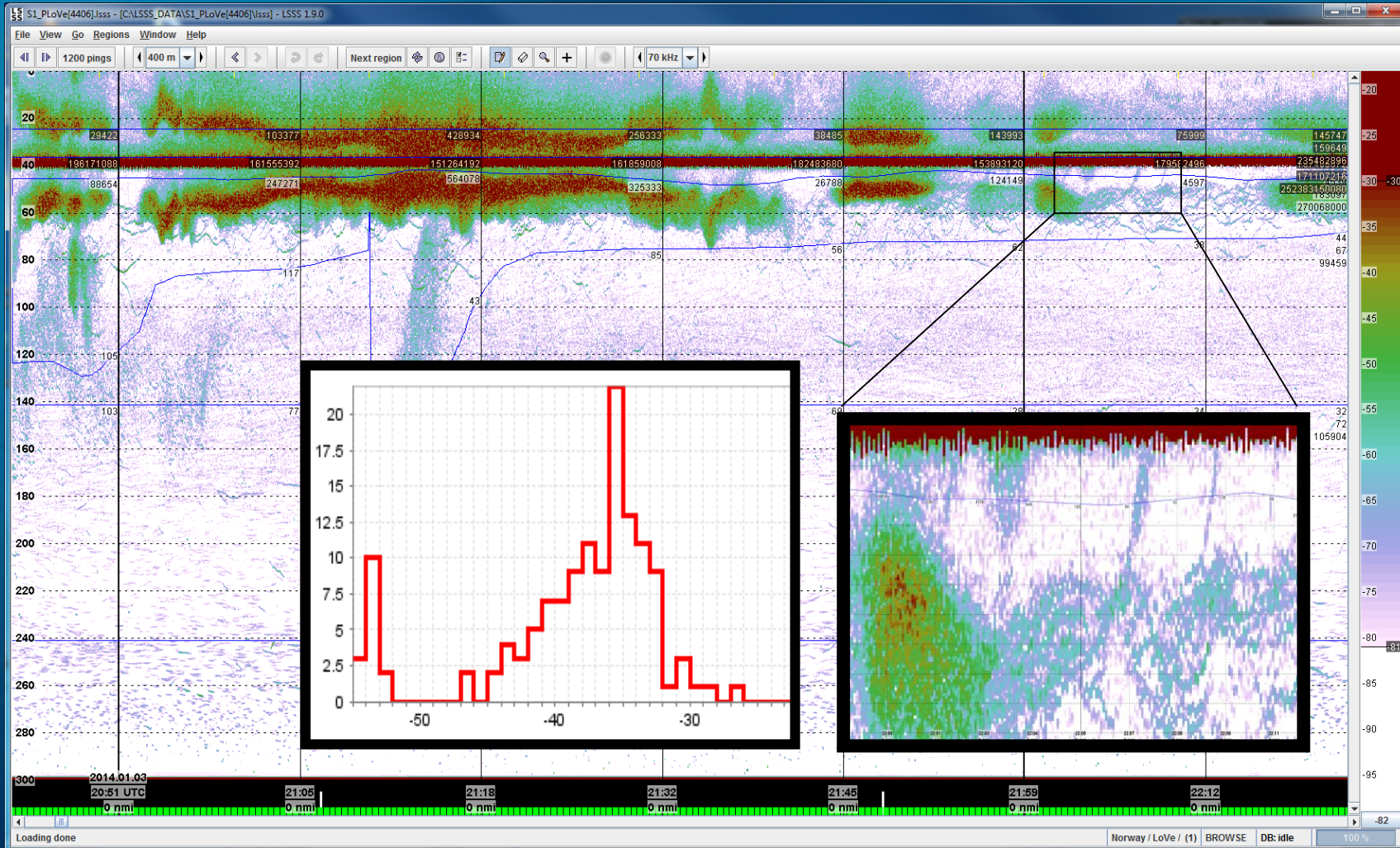
# Story 2: Timing of processes – cod



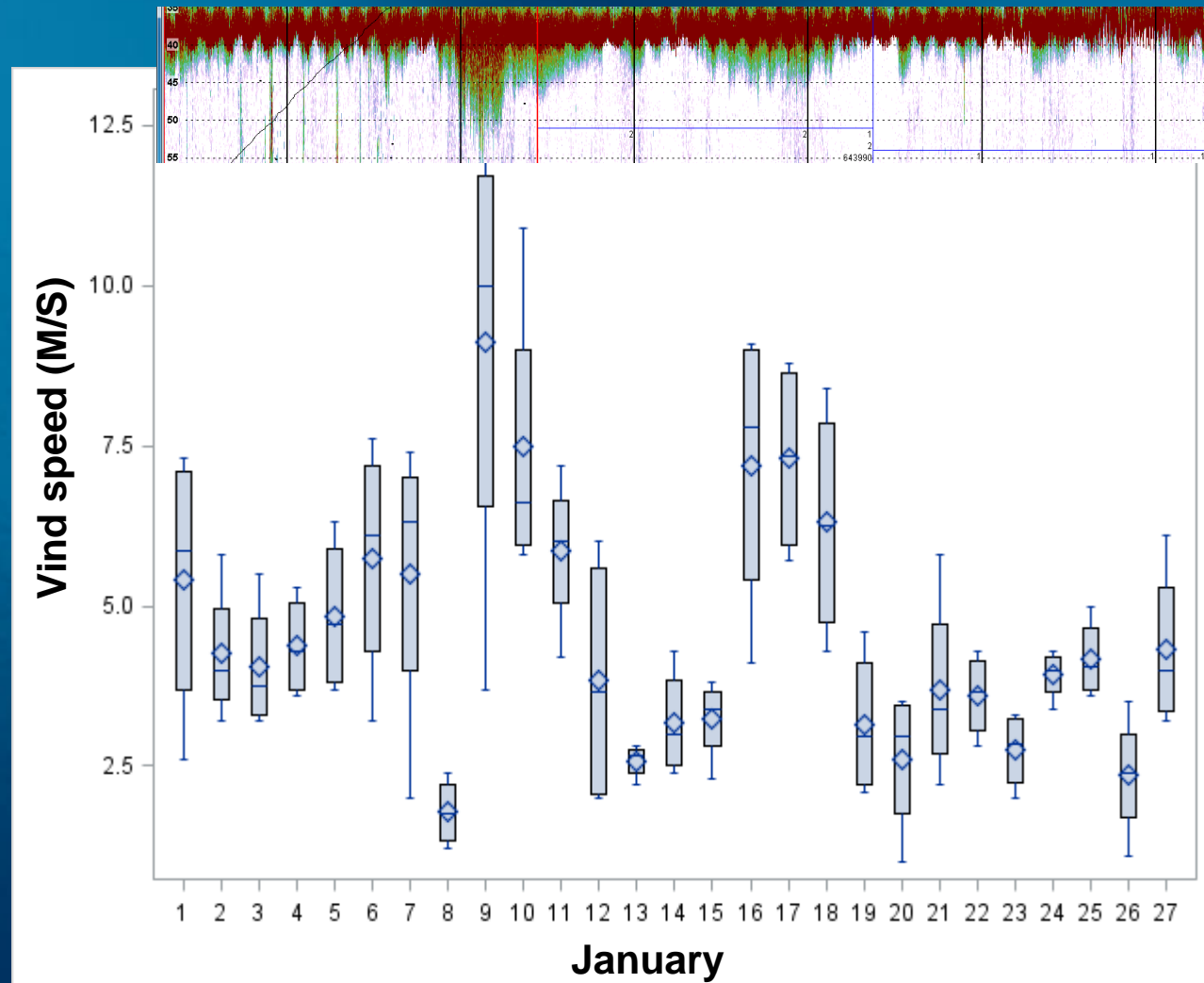


**Spring bloom starts when cod emigrate**

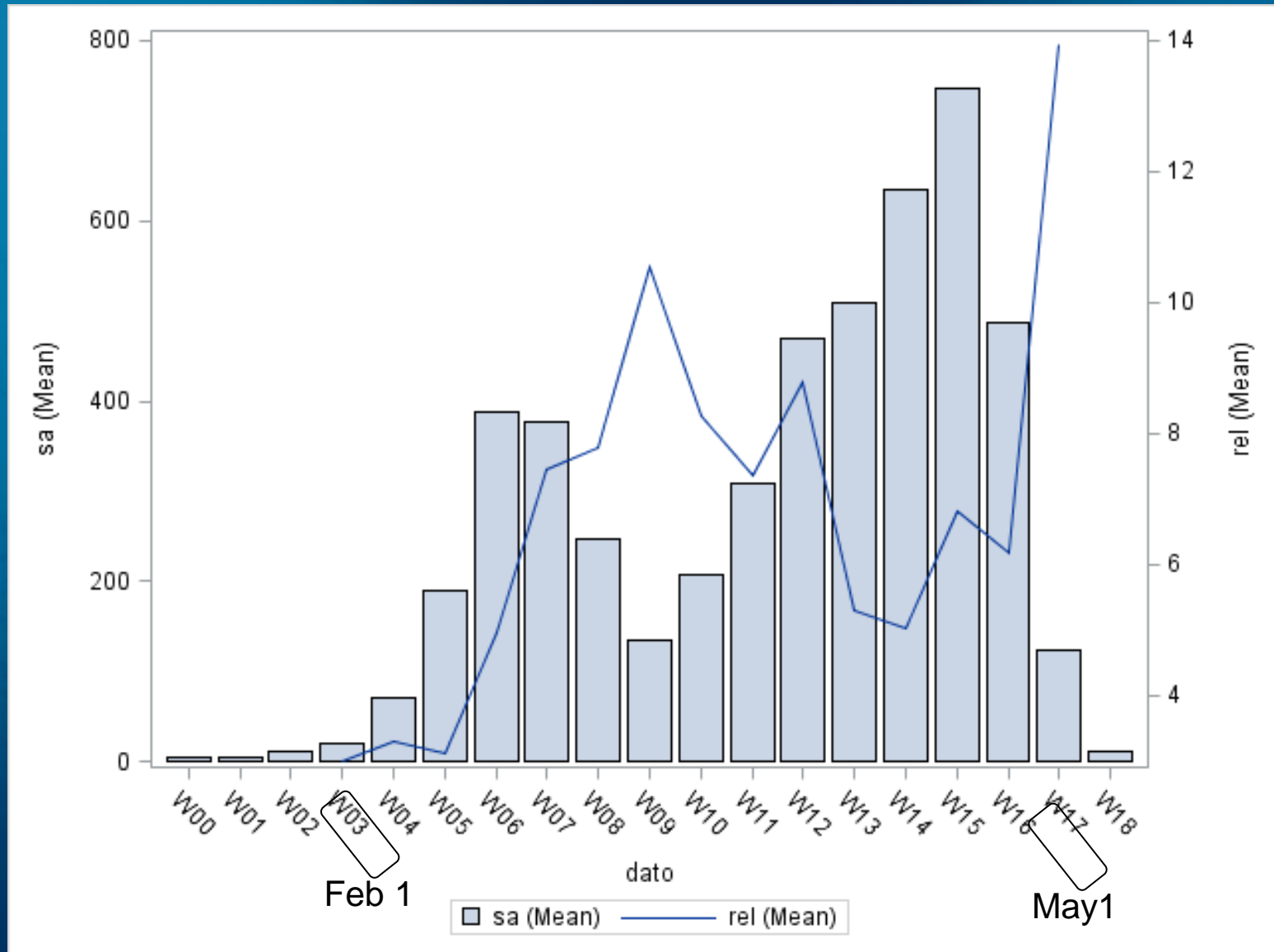
# Story 2 - 3: Herring dynamics and survey performance



# Story 3: Survey performance



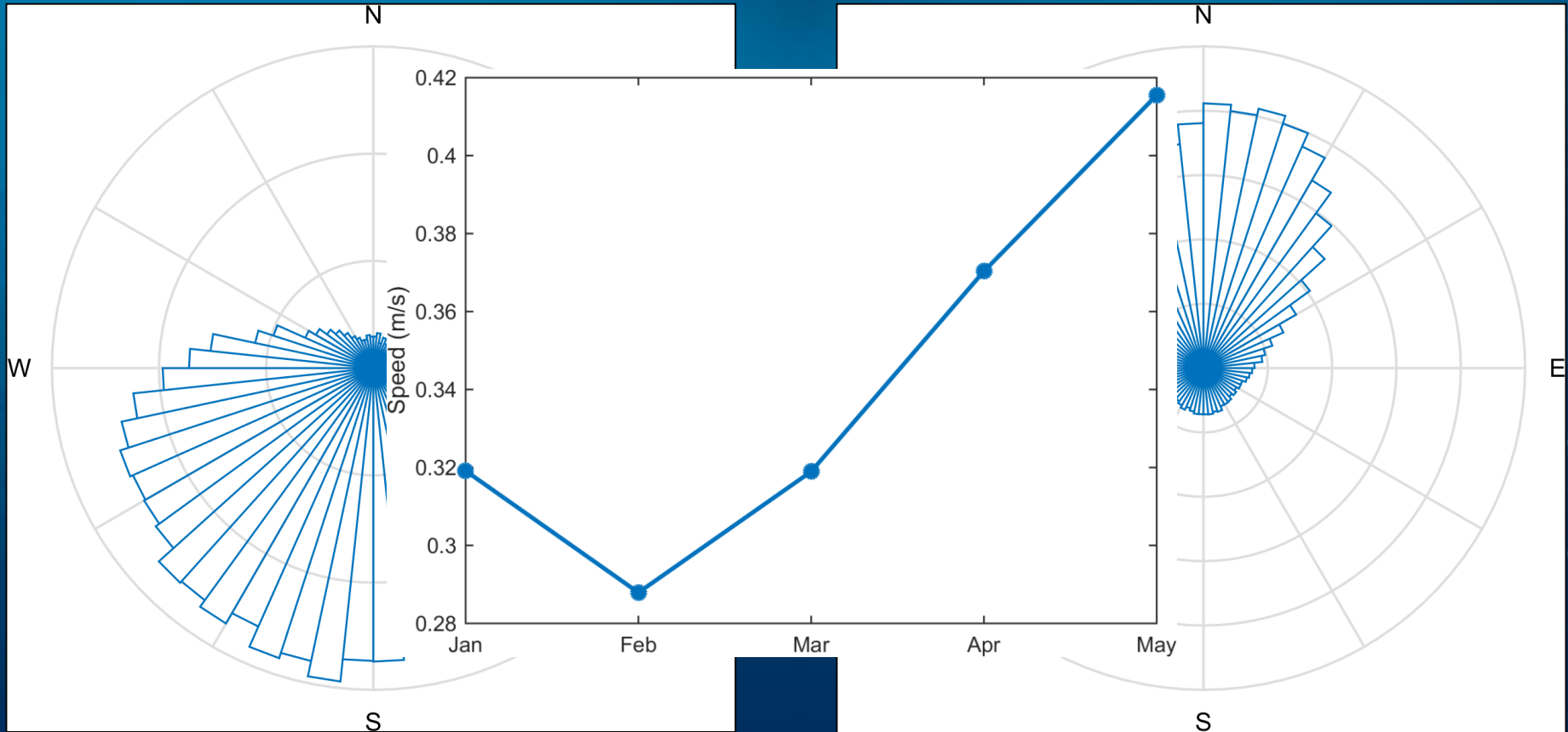
# Story 4: From individuals to the collective



# Migration direction of tracked individual fish

## March

## April

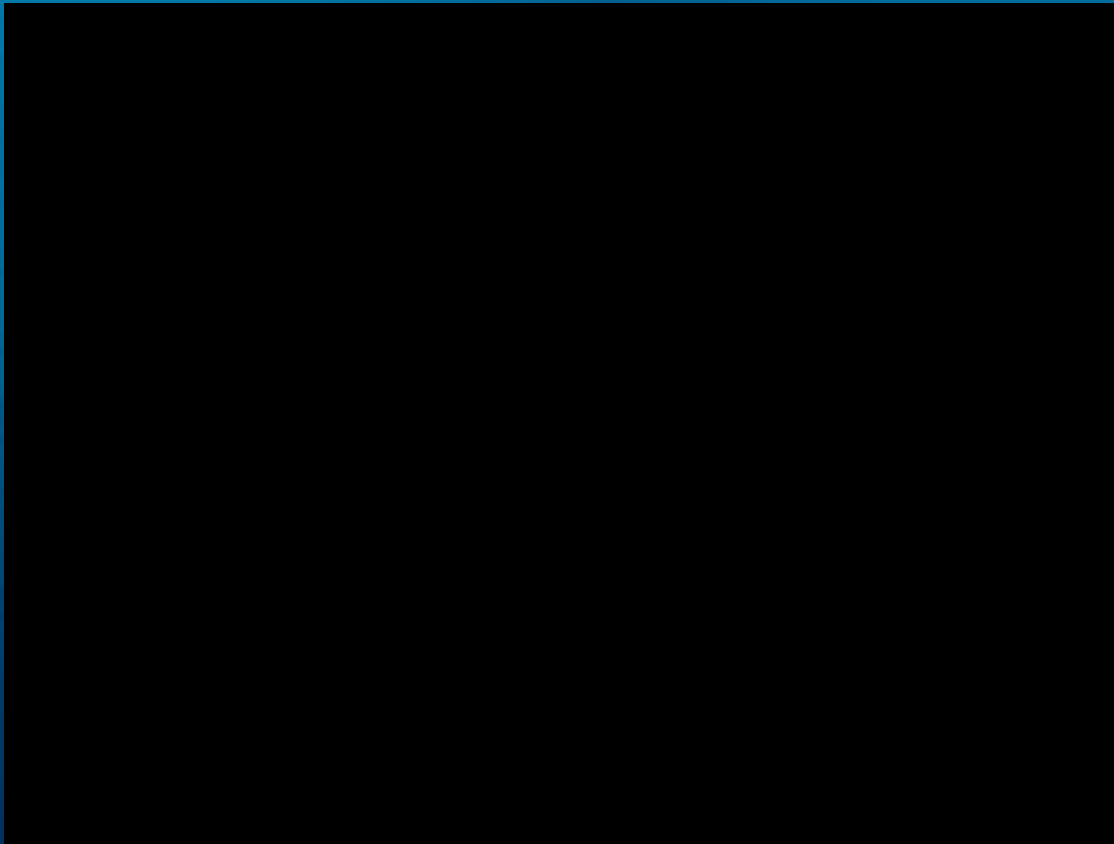




# Bottom habitat monitoring

High temporal resolution

High spatial variability

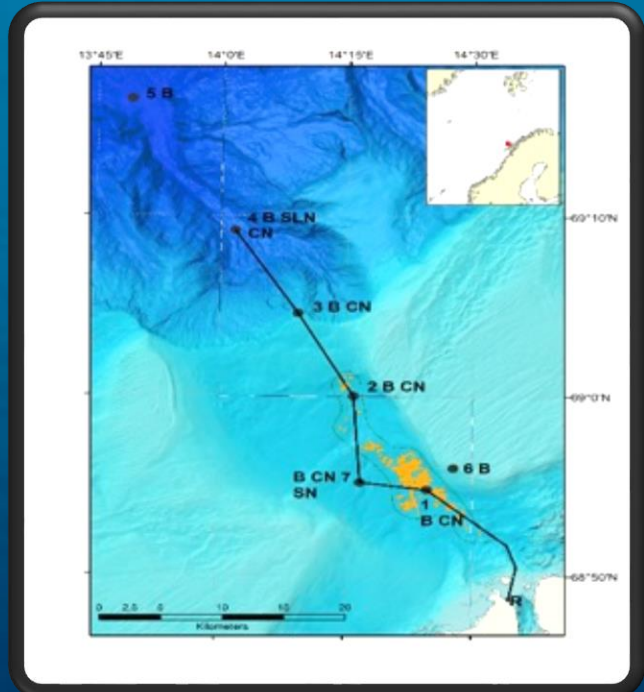




North East view

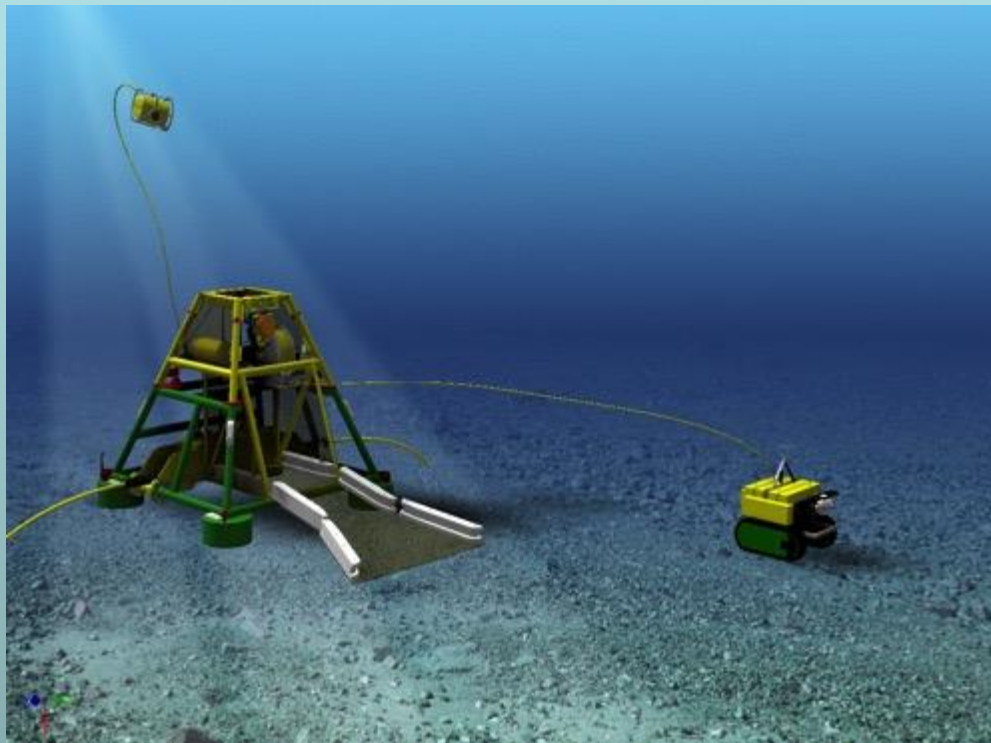


# Extention LoVe 2017



# The Dragon Lingers in the Deep – Chinese Deep Sea Observatories

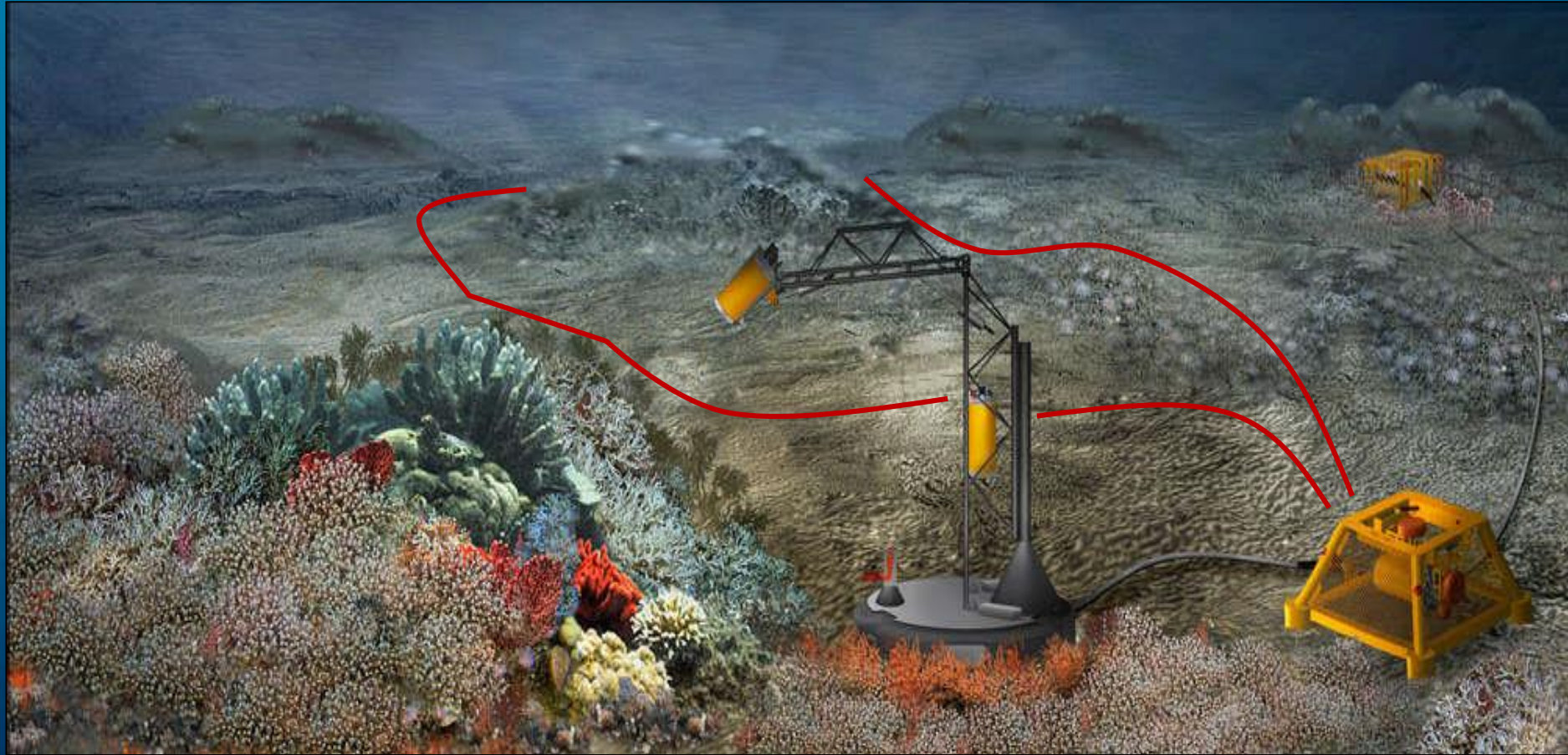
## DraLinDeep



Presentation of  
Research Proposal  
at QNML on  
January 15, 2017



<http://love.statoil.com>



# Conclusion

- Observatories complementary to vessels
- Enhance vessel efficiency
- Replace vessel time occasionally
- Creates new knowledge for models that reduce vessel requirements
- Autonomy crucial



# Acknowledgement

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- Colleagues supporting this presentation
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  - Laurenz Thomsen (Jacob University)

