# Sensorteknologi for styring av trengeprosessen

## Løst og fast om eksiterende teknologi – inspirasjon til debatt

**Frank Reier Knudsen**
**SIMRAD**

KONGSBERG

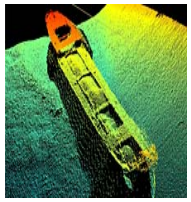
# KONGSBERG Maritime Subsea

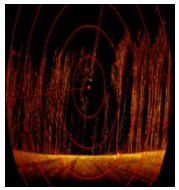
# KONGSBERG Maritime Subsea Division

**Kongsberg Maritime Subsea**

- Camera
- UNAV
- Hydrography / Naval
- GeoAcoustics
- Mesotech
- KUTI
- Hydroid
- HUGIN
- Fishery
  - Simrad Spain









# KM SIMRAD fishery

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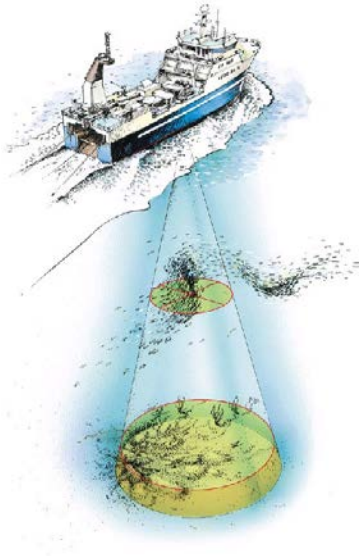
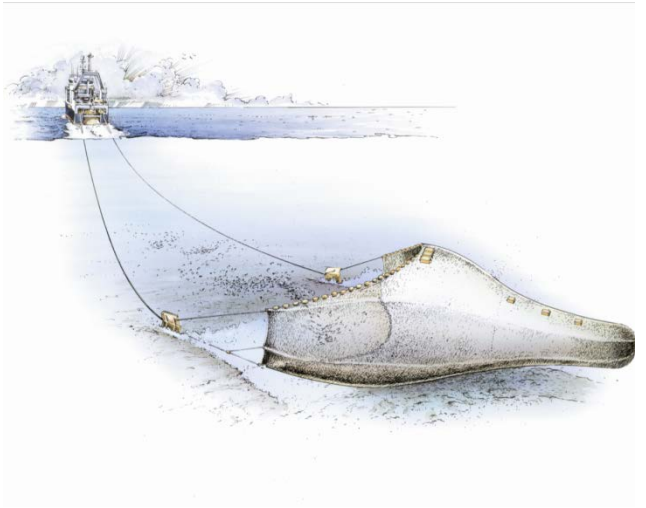
Echosounders



Sonar

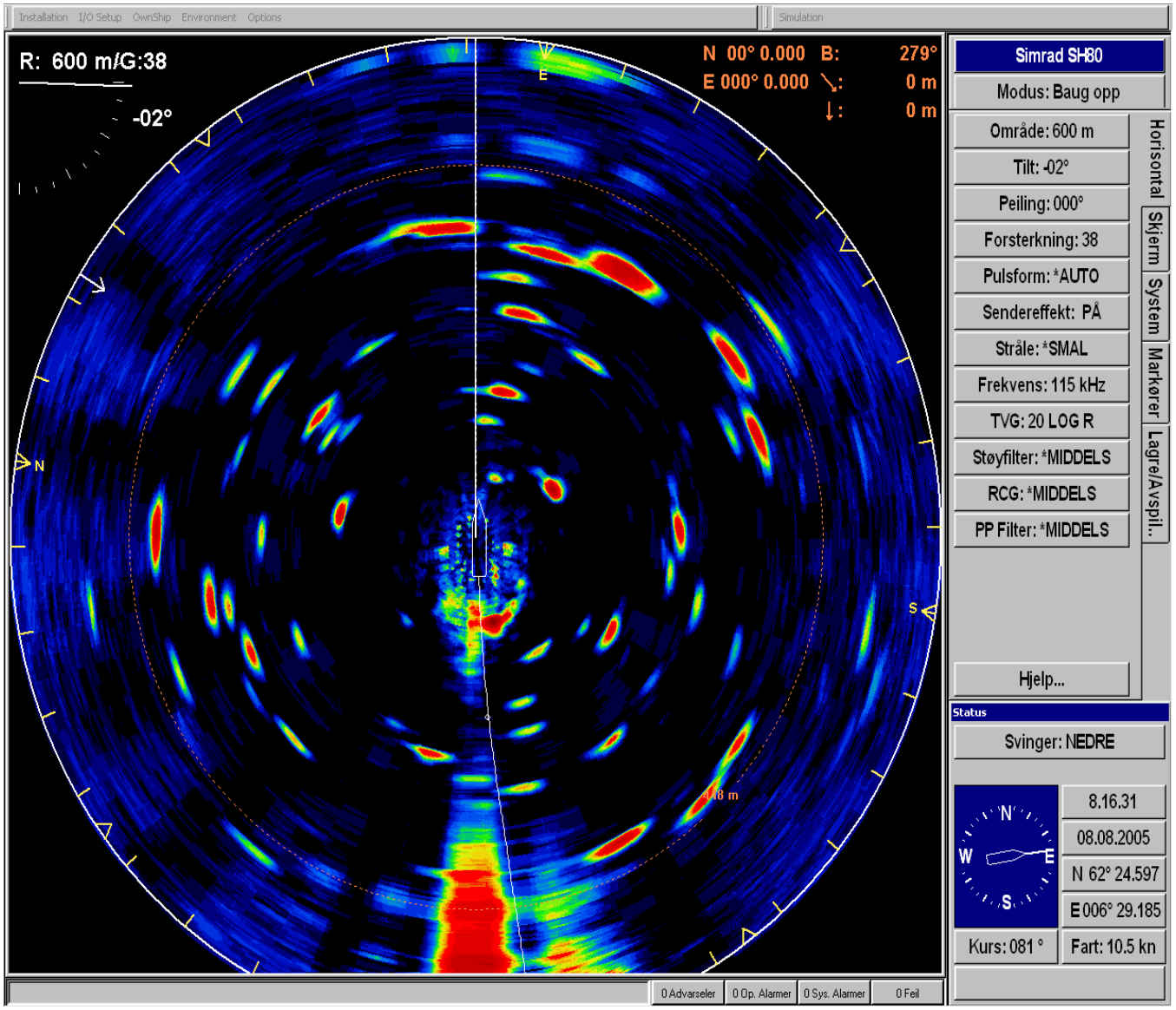
Trawl instruments



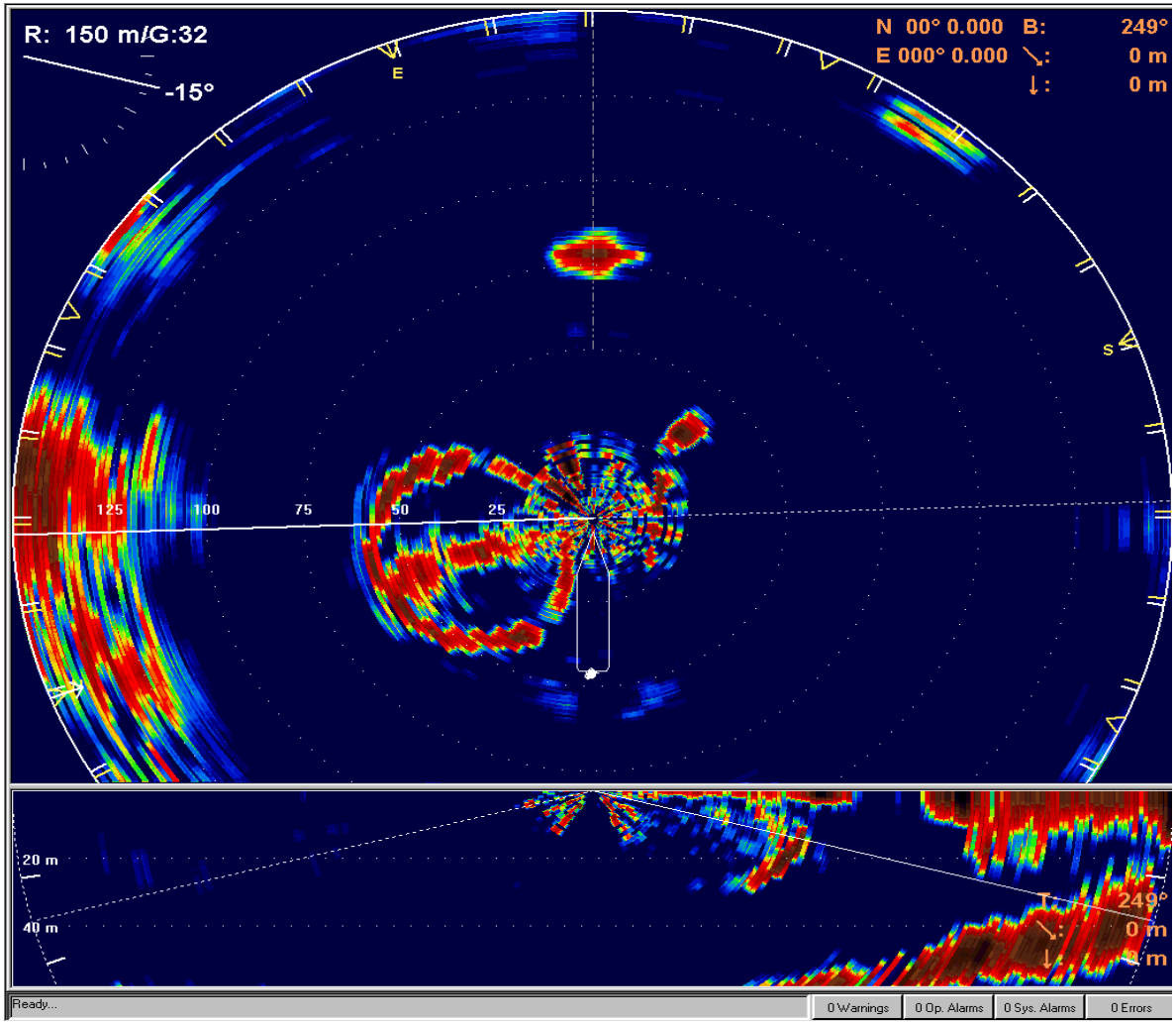
Established 1947

World leading manufacturer of acoustic instrumentation for fisheries and fisheries research

# Sonar image of herring schools



# Tuna in cage


R: 150 m/G:32
-15°
N 00° 0.000 B: 249°
E 000° 0.000 ↘: 0 m
↓: 0 m
E
S
125
100
75
50
25
20 m
40 m
249°
0 m
0 m
Ready...
0 Warnings
0 Op. Alarms
0 Sys. Alarms
0 Errors

# Catch monitoring

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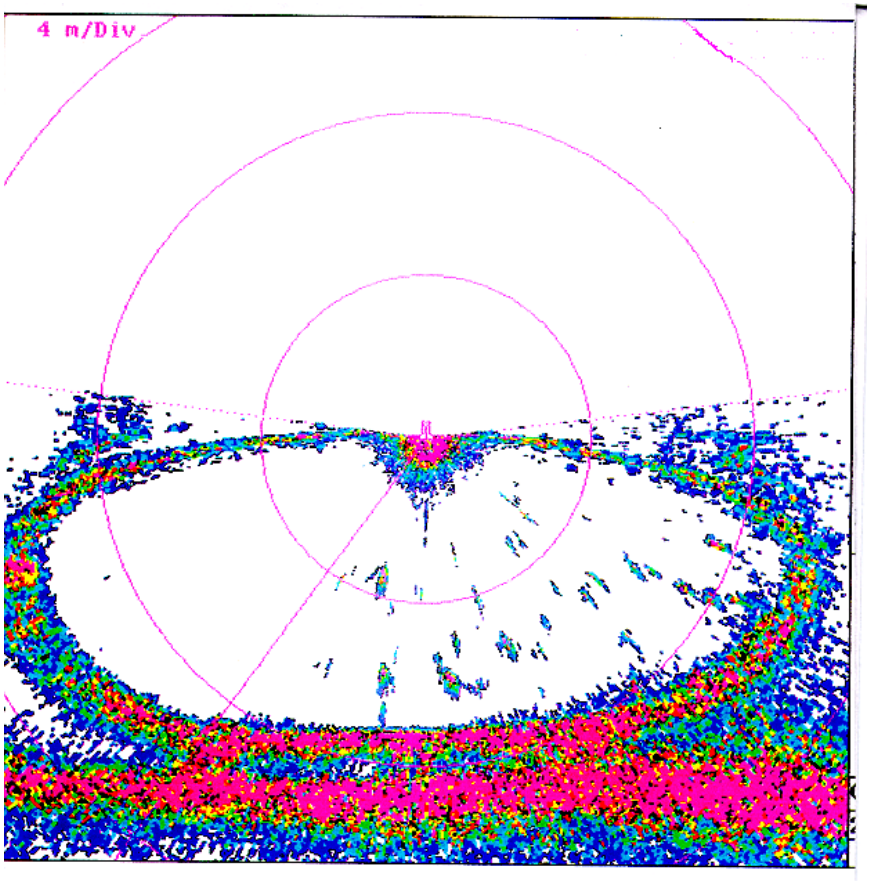

# Multibeam sonar (MS70)

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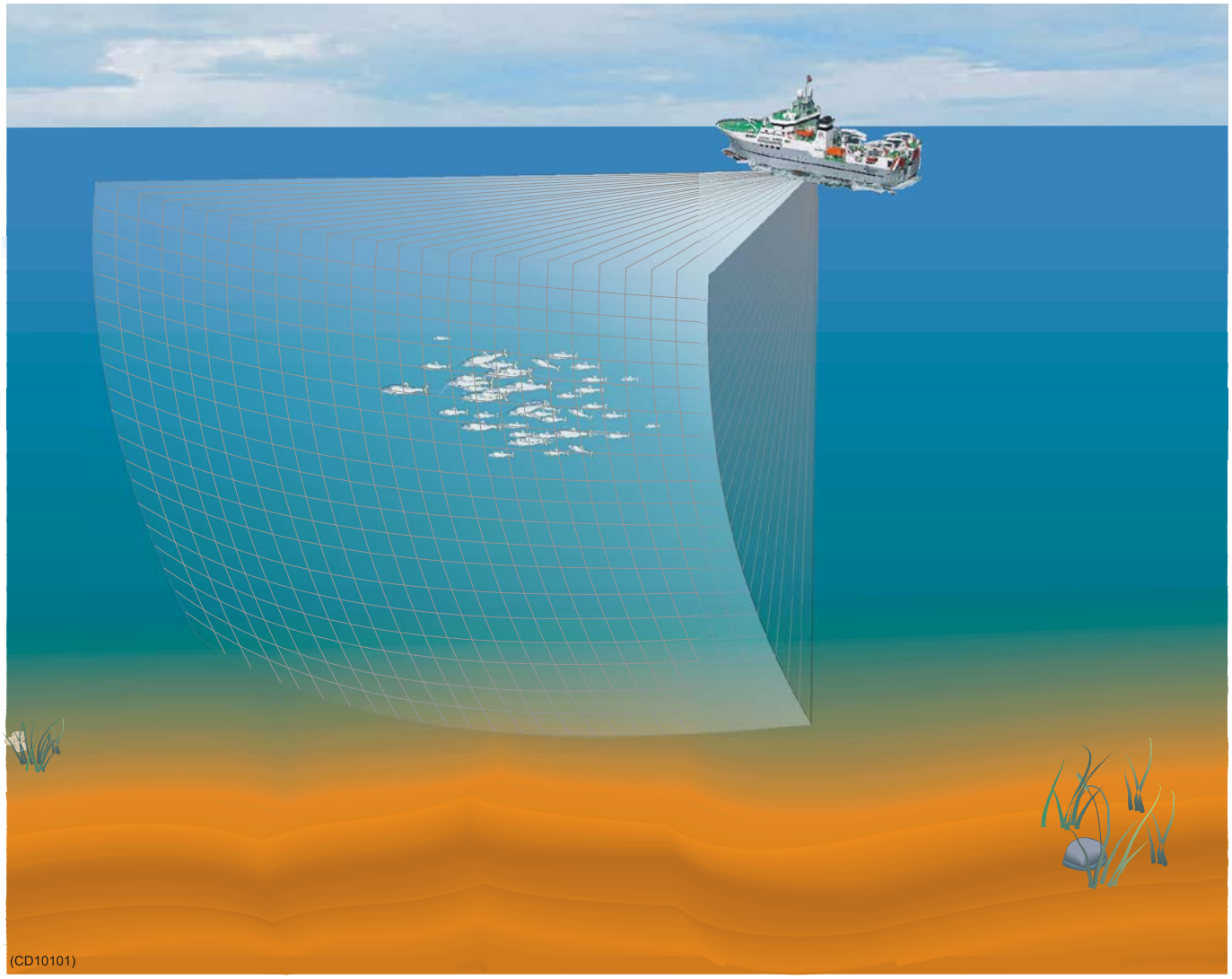
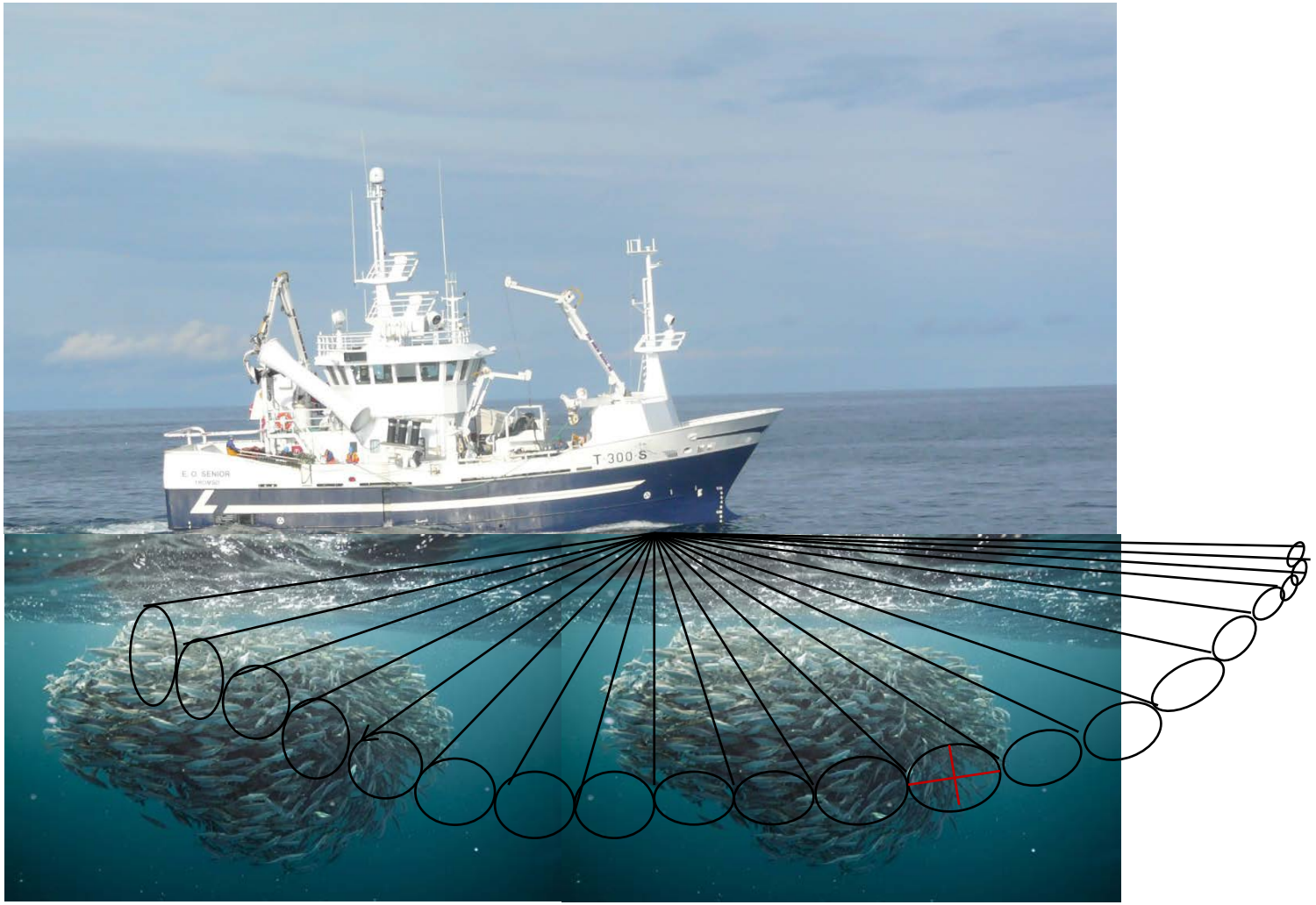
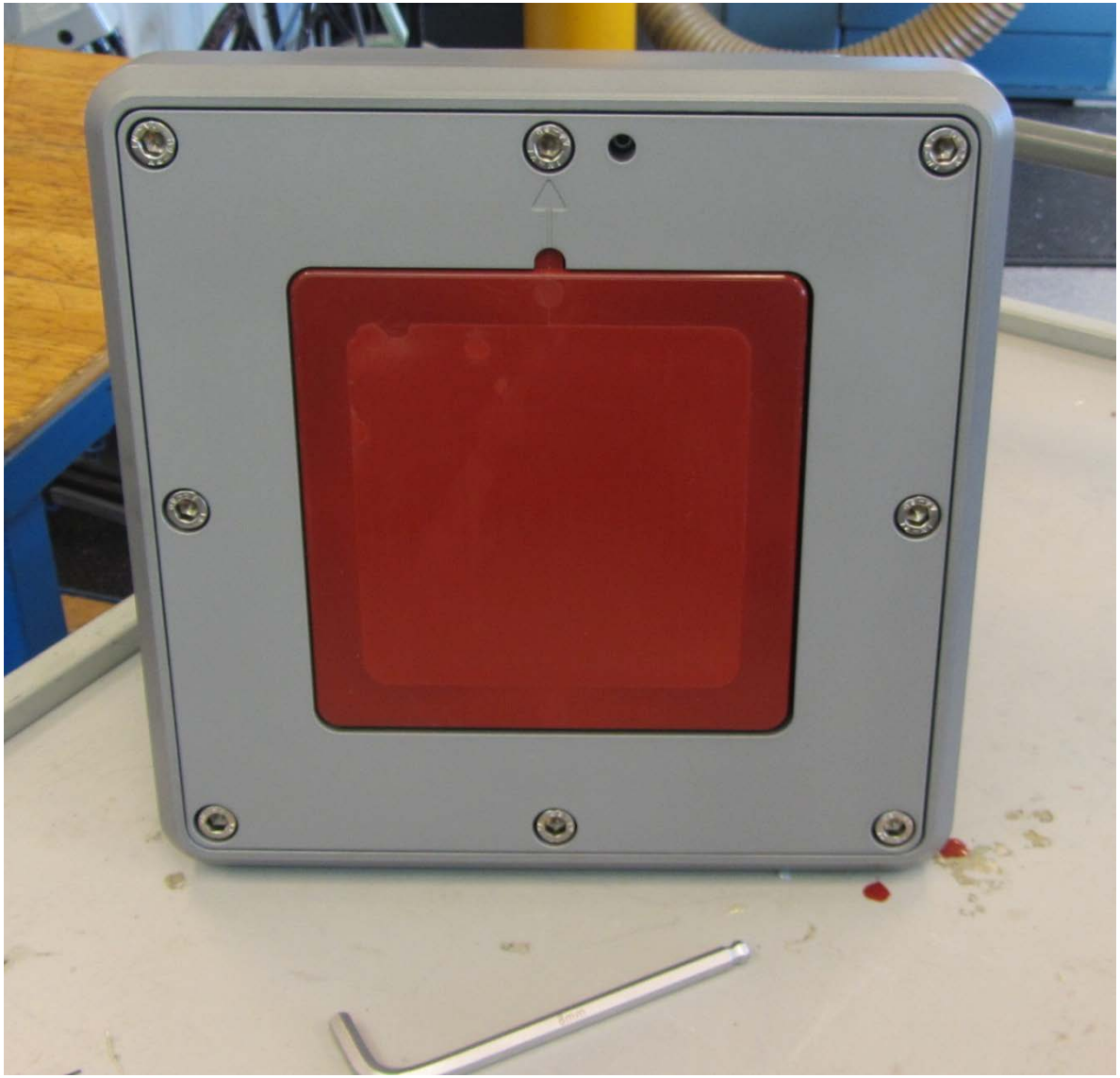
IMR
Norway



# SN90 horizontal coverage sector



# SN90 transducer



# Underwater positioning

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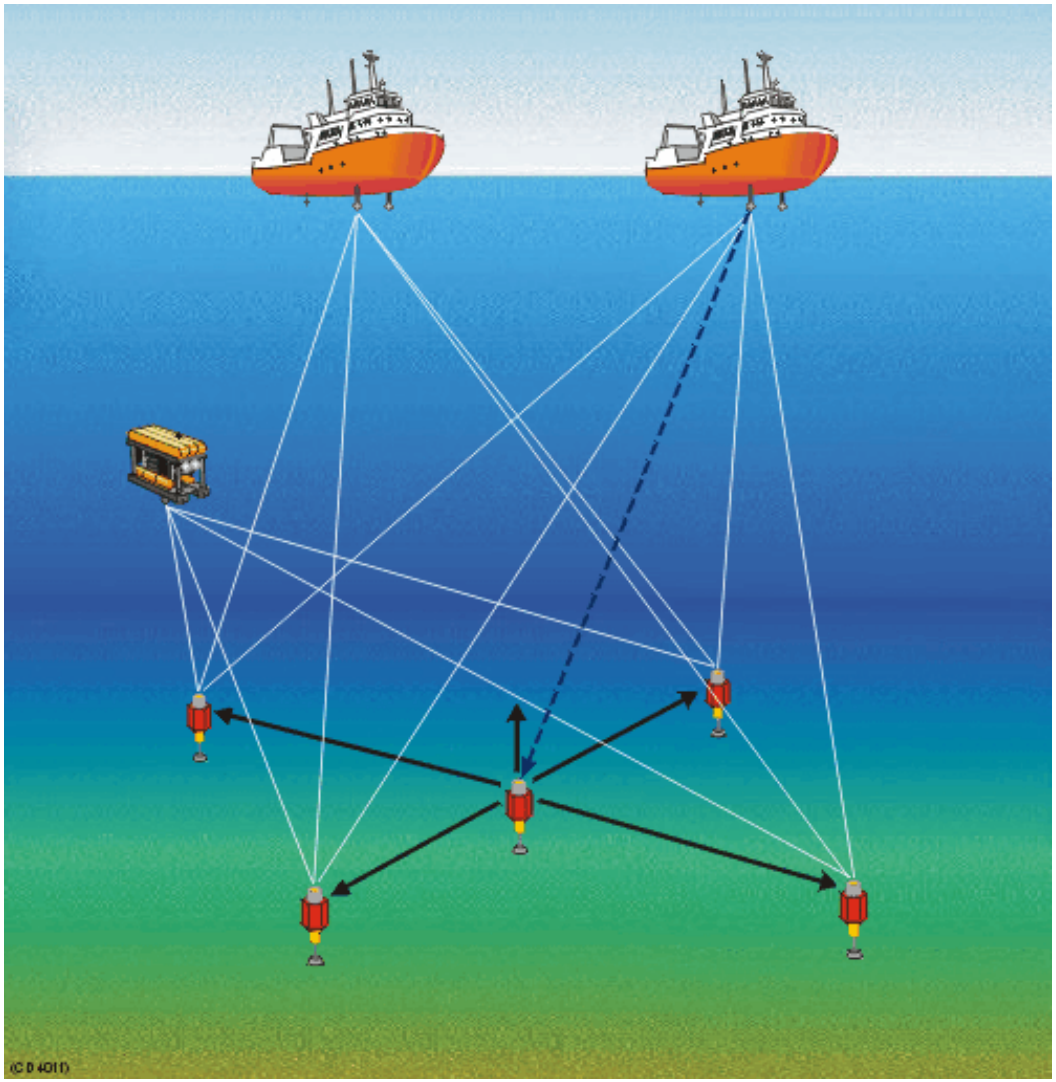
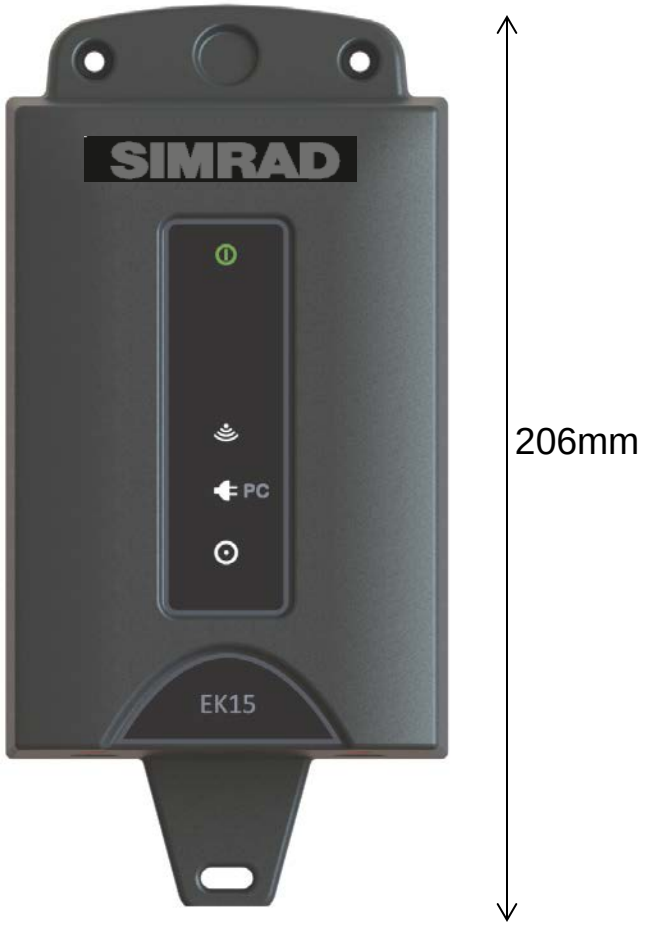


# EK15 – a small low power echosounder

- Low power (1.2 W)
- Both 12V and AC
- Small
- Splash proof (IP66)
- Raw data storage
- Calibration
- Ethernet based
- Third party software support
- Up to 15 units simultaneously
- Simultaneous or sequential transmission
- 200 kHz operating frequency
- Standard transducer beam width 26°
- Other transducers are optional (9 and 5°)
- Wireless



# Sea cage monitoring – Ewos Innovation

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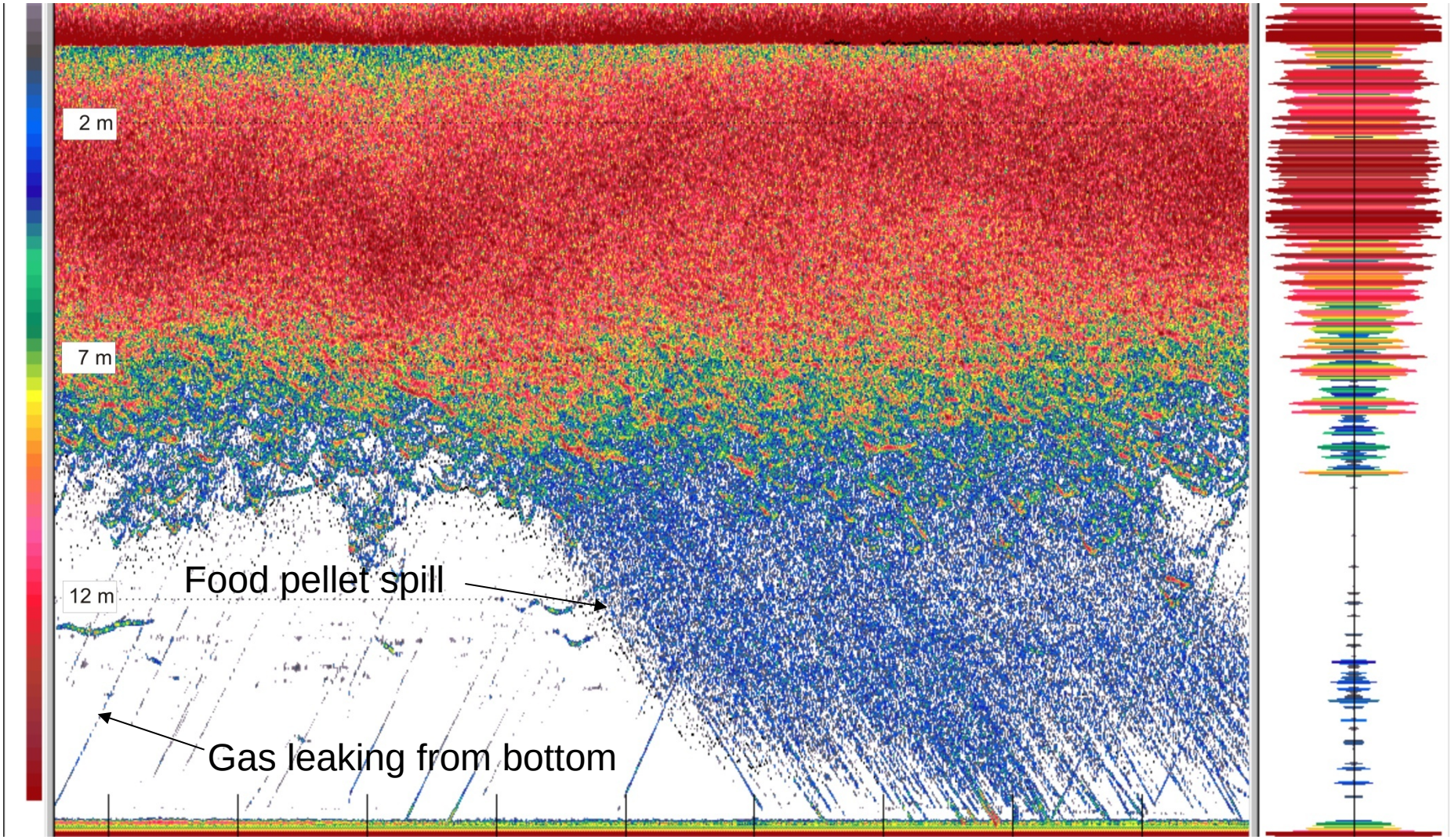
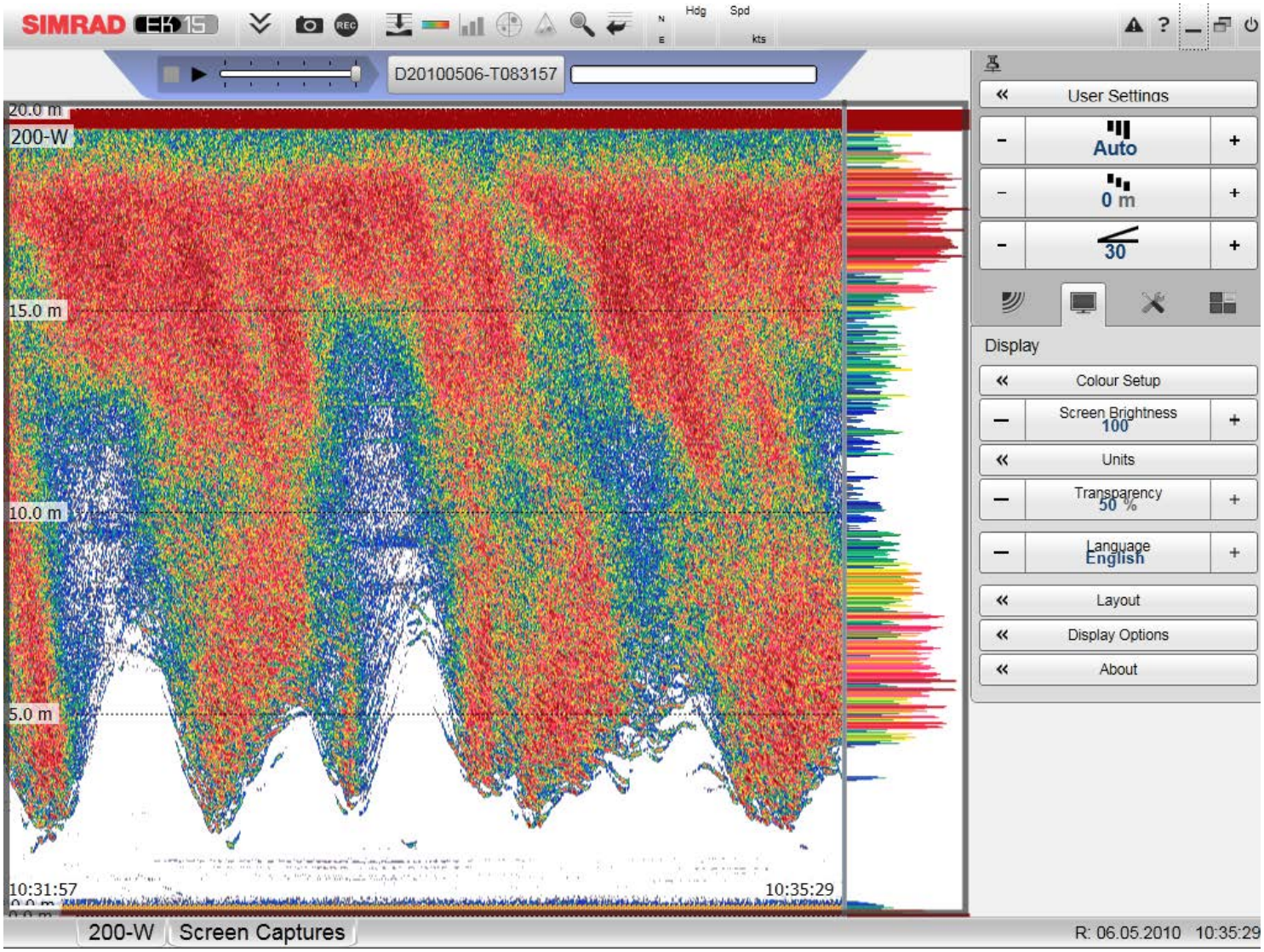
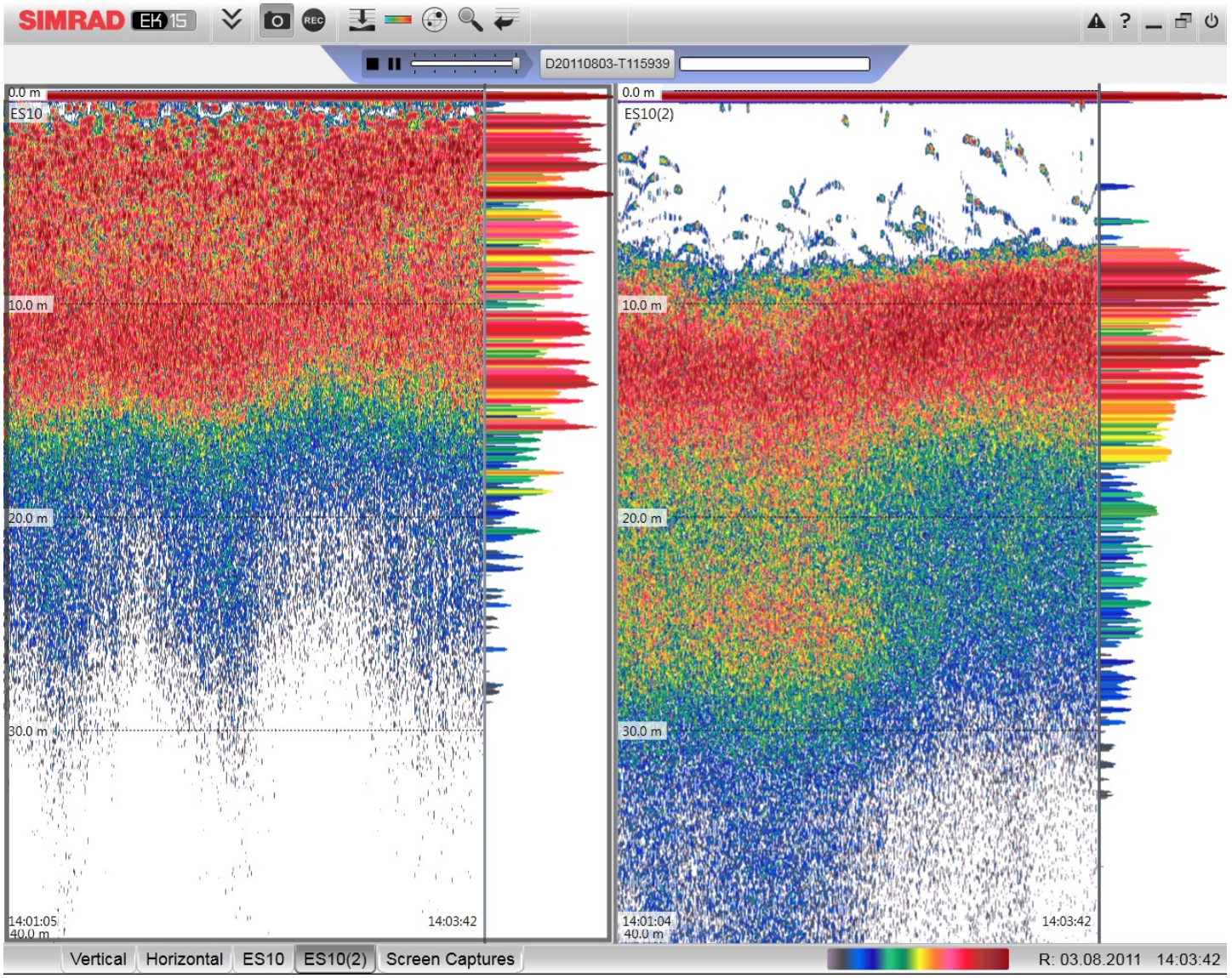
# Echogram from cage



# Echogram from cage



# Echogram from cage



# Trengning i not, slipping og dødelighet

**Maria Tenningen, Havforskningsinstituttet**

*Siste tillate tidspunkt for slipping av makrell er når 7/8 av nota er halt inn. Imidlertid; fangststørrelse, form og volum på nota betyr vel så mye for fiskens overlevelse.*

# One of the main problems in Norwegian purse seine fisheries is mortality related to slipping

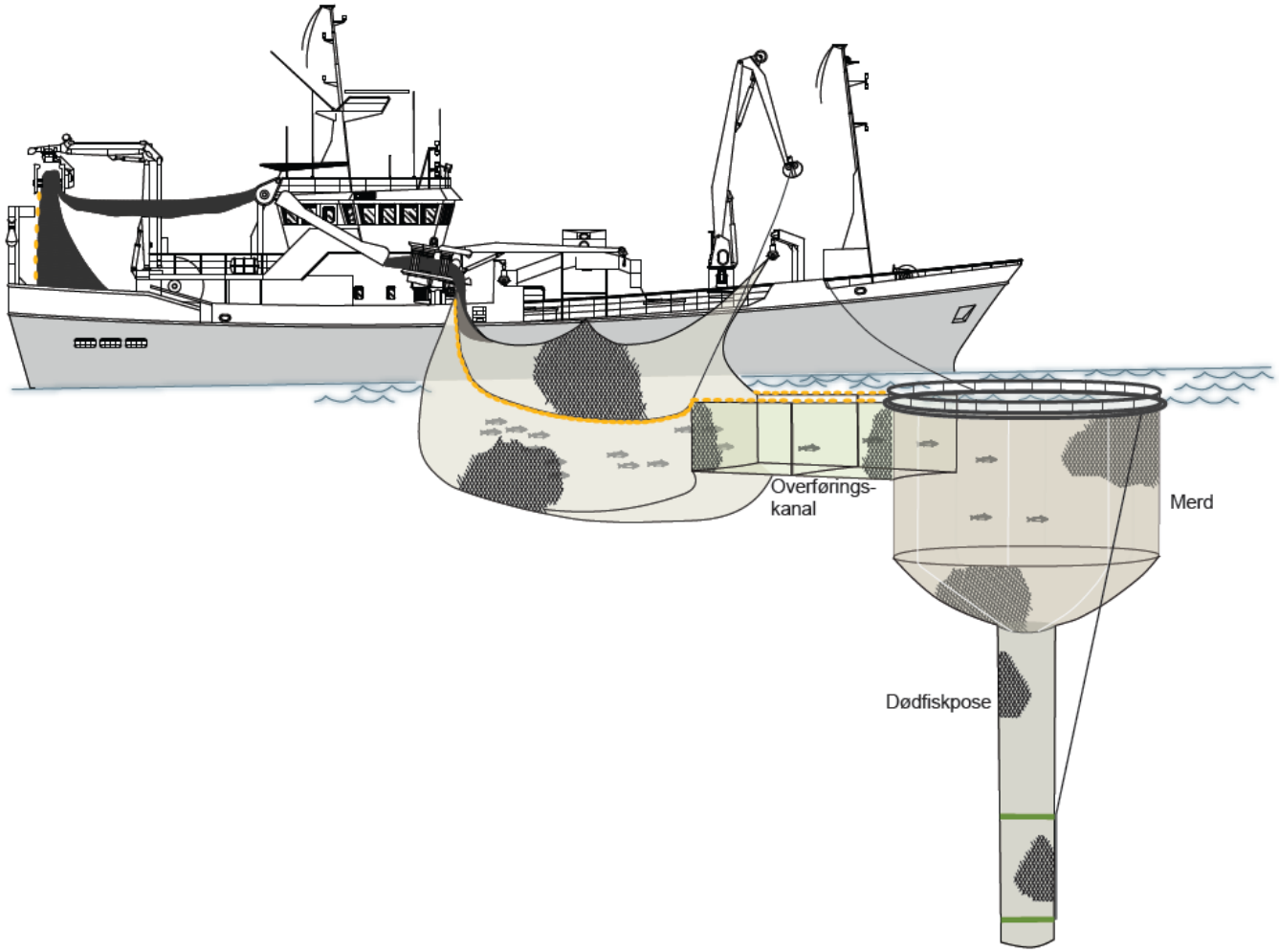
Reasons for slipping: too large catches or unwanted size, quality or species

Illegal to slip dead or dying fish, but how can this be defined?

In addition to being a waste and causing unaccounted mortality it is controversial because discarding is illegal in Norway

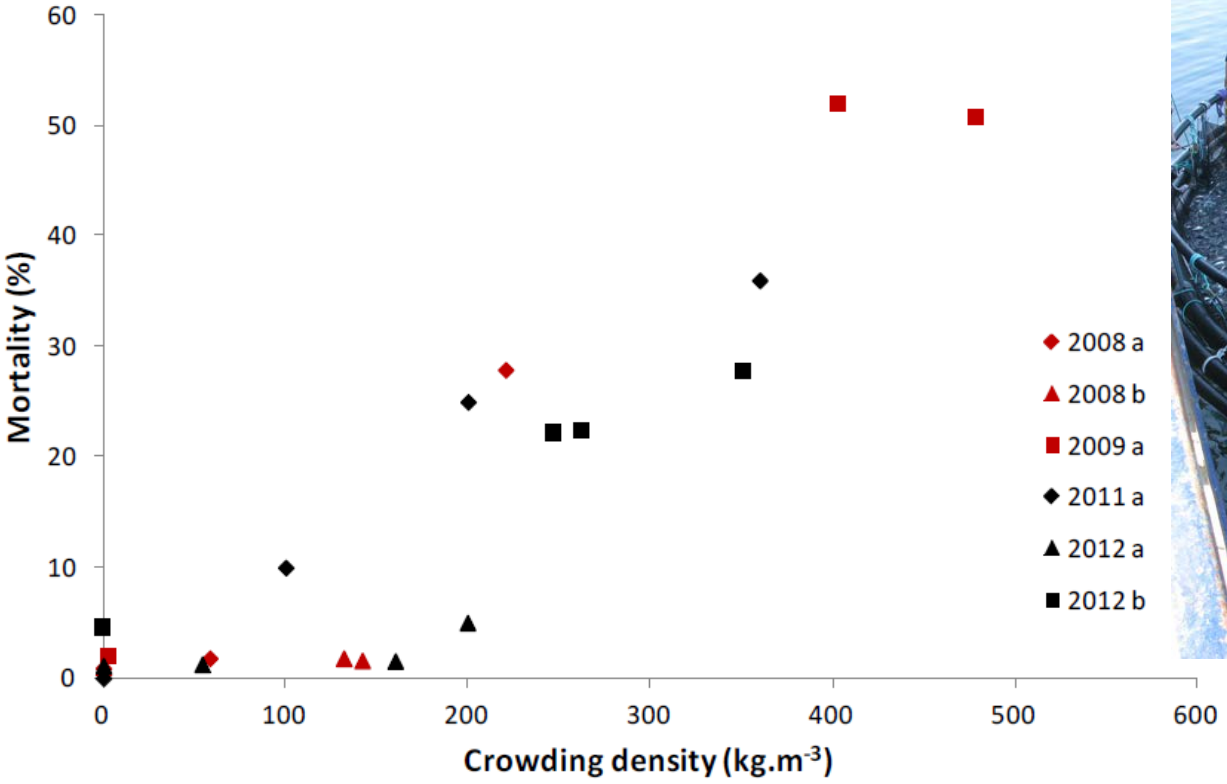
→ If slipping is allowed we have to make sure the fish survive!

# Survival experiemts on mackerel and herring crowded in the purse seine (Field experiments)



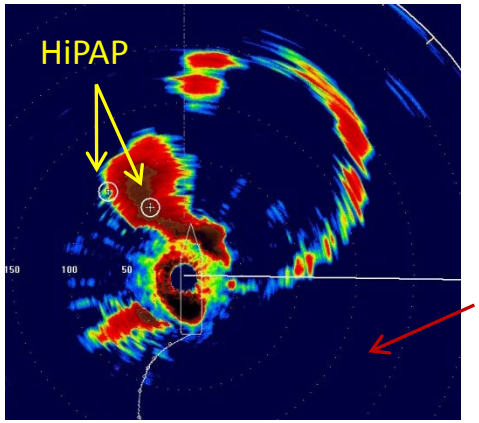
# Results from the herring crowding experiments

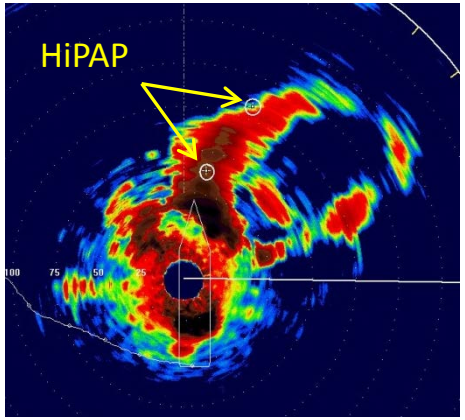
(10 minute crowding phase and mortality after a 4-5 days monitoring period)

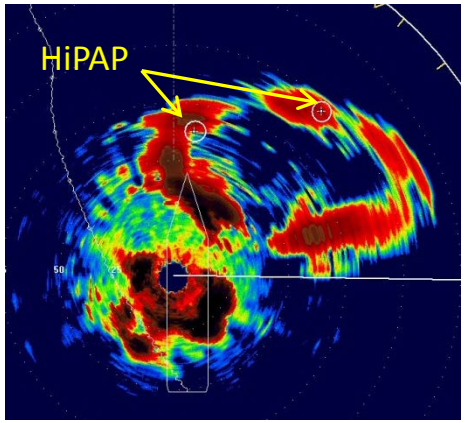



Low mortality up to densities of about 150 kg $m^{-3}$

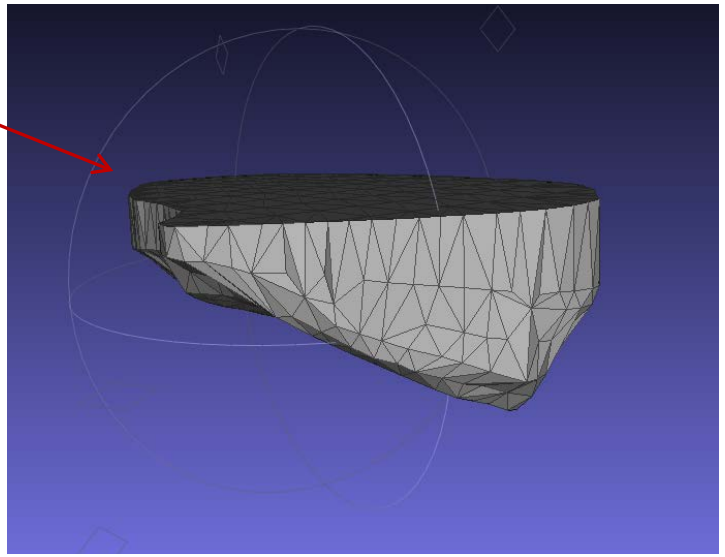
# Rough 3D reconstructions of the net

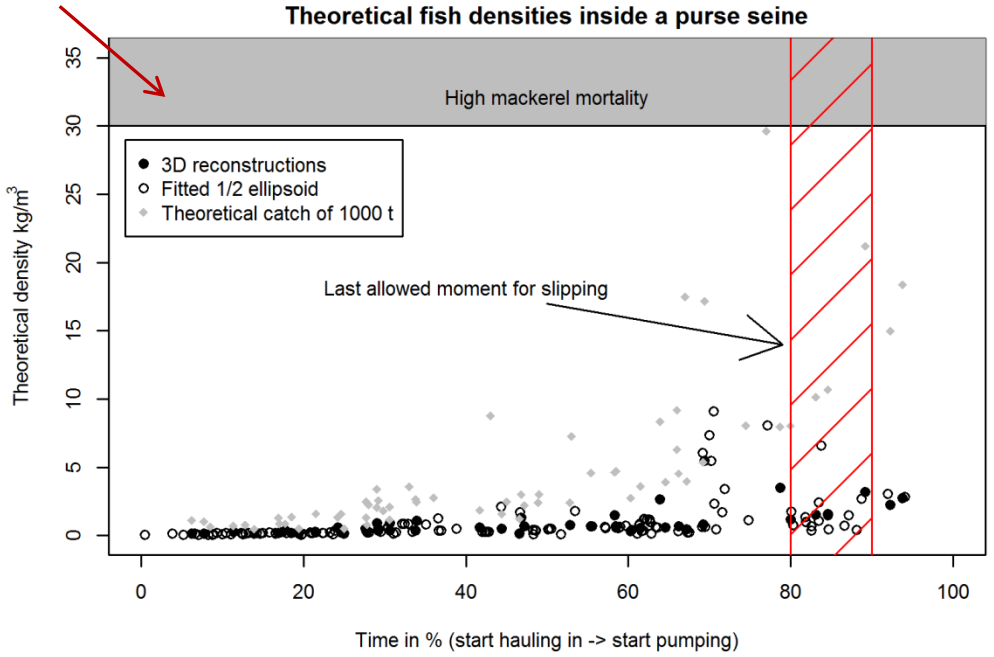



- 3D reconstructions based on horizontal sonar slices of the net
- Compare how well the sonar data correspond to the HiPAP positions (uncertainty)
- Theoretical fish densities → Catch / Available volume

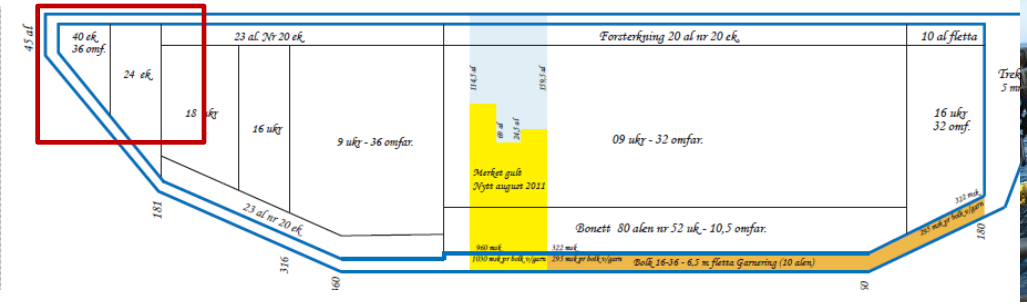




# Using HiPAP for net monitoring

- HiPAP – provides 3d positions of the transponders about every 1 sec
- May provide data where sonar data is not usable
- Up to 6 transponders mounted on the last 150 meters net

Challenge to use the transponders in the purse seine while fishing




# Takk for oppmerksomheten!

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