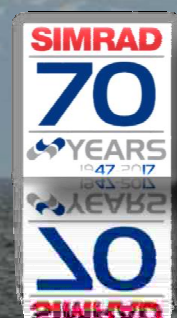


Fra fiskeskøyter til dagens høyteknologiske fartøy og droner

Mandagsklubb Fosnavåg Shippingklubb 13. februar

SIMRAD

Frank Reier Knudsen
Fiskeriforskning, Simrad, KM Subsea



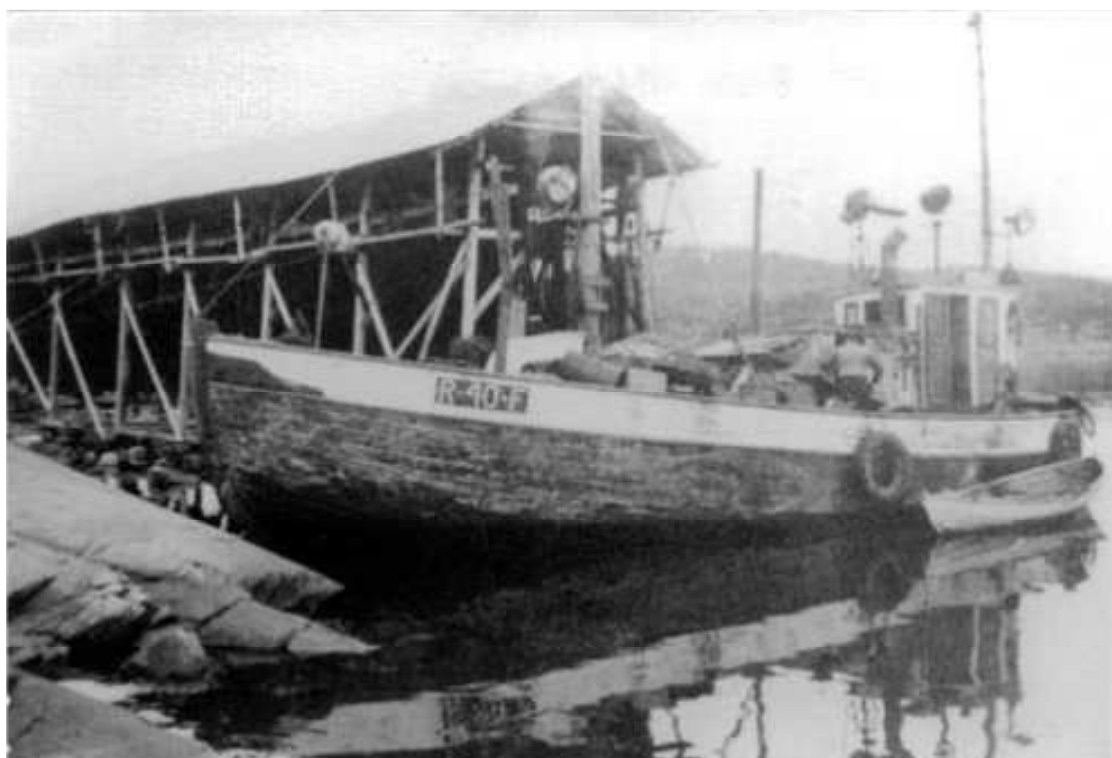
“Signal III”, Notbåt fra Rogaland, 1934

SIMRAD

Første ekkolodd i Norge (1)

Admiralitetsslodd fra Hughes,

senere Kelvin-Hughes



Kilde: fiskeri.no

TECHNOLOGY FOR SUSTAINABLE FISHERIES

“Borgenes”, Sildetråler fra Kristiansund, 1934

SIMRAD

Første ekkolodd i Norge (2)

Dampbåt bygget i Hull
Leveret: 1906

Ekkolodd:
Hughes loddet, 1934
kr. 6000,-

Brutto fangstverdi
kr. 142 000,-

Kilde: Stiftelsen Maritim
Historie, Nordmøre



TECHNOLOGY FOR SUSTAINABLE FISHERIES

Nature, Oscar Sund, 8 juni 1935

SIMRAD



Hughes loddet



«Johan Hjort»

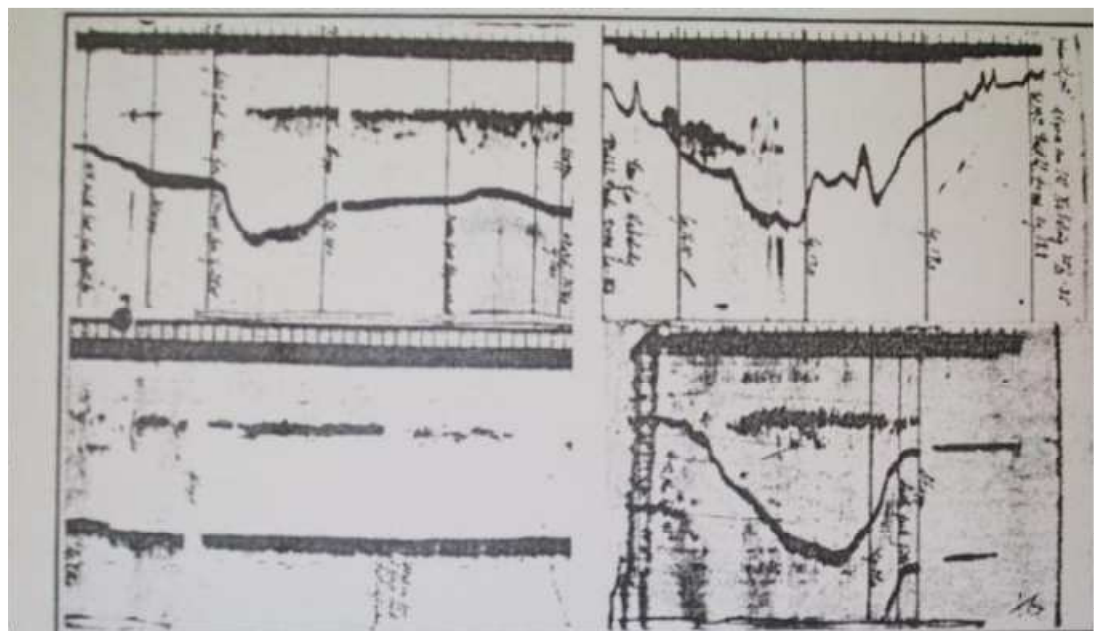


FIG. 1. Four 'echo'-records showing spawning cod in midwater at Lofoten. The left-hand diagrams partly with ship stopped. The bottom right-hand record is somewhat disfigured by oscillations set up by excessive shaking of ship's motor; but it shows also a second echo from the bottom, reflected from the surface. Marks on top of each diagram are produced every minute and are 6.7 mm. apart.

before leaving Bergen last February. The gear

TECHNOLOGY FOR SUSTAINABLE FISHERIES

Simonsen Radio (Simrad) etablert i 1947

SIMRAD



Første ekkolodd fra Simrad ble lansert i 1951



SIMRAD
70
YEARS
1947

TECHNOLOGY FOR SUSTAINABLE FISHERIES

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Sterke konkurrenter

SIMRAD

Også Alfa, Elac, Kelvin-Hughes, Furuno



Kilde: fiskeri.no

Reklame fra 1949

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Skipper loddet fra 1957

SIMRAD

Kompakt og robust
Prisgunstig
Service langs hele kysten




TECHNOLOGY FOR SUSTAINABLE FISHERIES

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SIMRAD

**NÅ HAR DE OGSÅ Plass-
OG RÅD-TIL ET KVALITETSLODD**

**SIMRAD
COMPACT**



Kontakt oss for demonstrasjon



FORHANDLER

SIMRAD

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ASDIC for fiskeri i 1949

SIMRAD

Sildeforskeren



Finn Devold,
Havforskningsinstituttet



«GO Sars»



Kilde: fiskeri.no

FFI og HI

TECHNOLOGY FOR SUSTAINABLE FISHERIES

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“Ramoen”, Ålesund, 1952

SIMRAD

Første ASDIC i
fiskebåt.

Rettighetene til
FFI asdicen
ble overtatt av
Simrad i 1953



Kilde: fiskeri.no

TECHNOLOGY FOR SUSTAINABLE FISHERIES

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TECHNOLOGY FOR SUSTAINABLE FISHERIES

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Historie



1951
First SIMRAD
Echosounder



1958
First fishery research
sonar and echo
sounder, Simrad
580-10

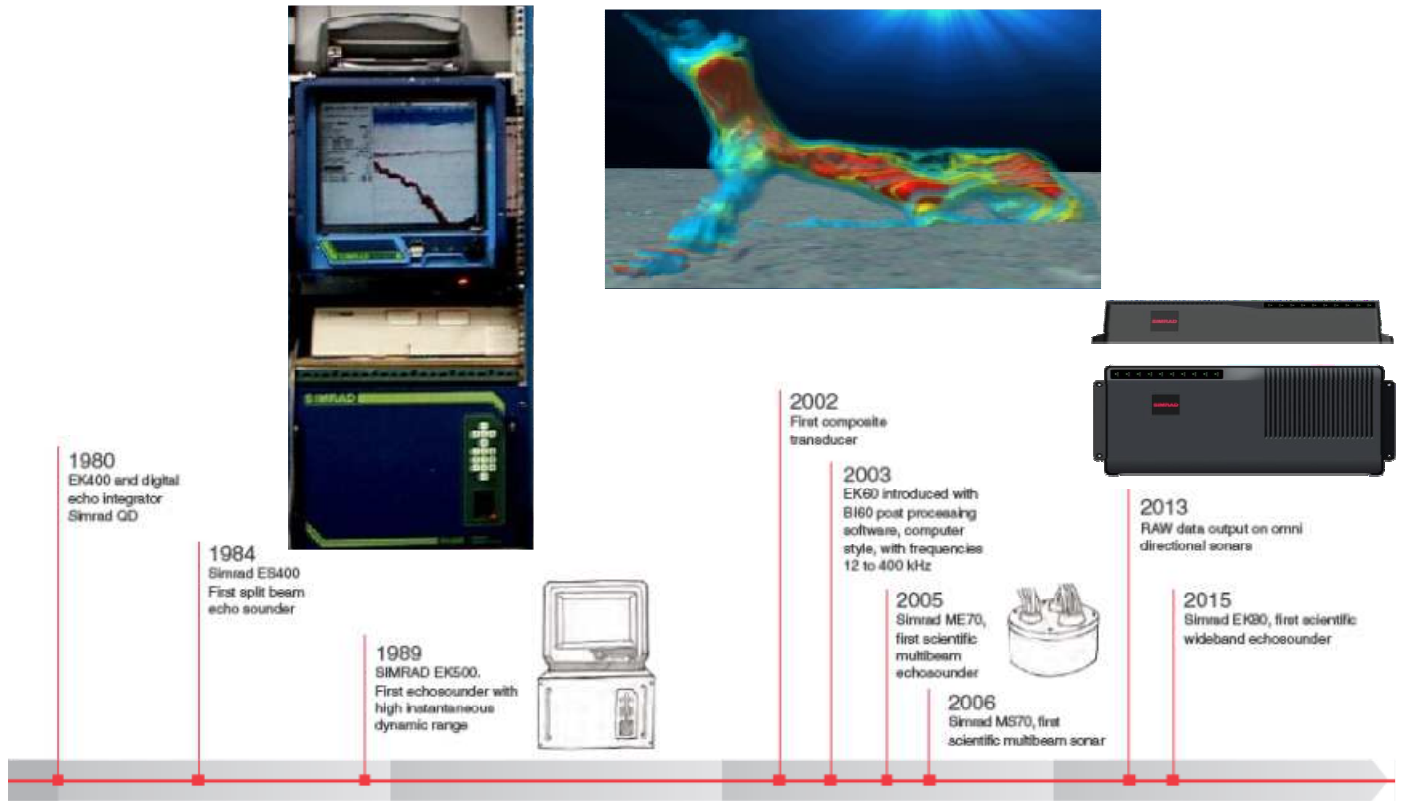
1968
First generation
EK scientific echo
sounders with
calibrated output at
12, 18, 38 and 120 kHz

1970
Rack version of EK
sounder, EK-S and the
first analogue Echo
integrator Simrad GM

1947
SIMRAD
foundation

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Scientific Echo Sounders

-history

- EK500 in 1989
 - Easy to use
 - Accurate and Reliable!
- EK60 in 2002
 - PC based & GPT
 - More frequencies, split beam



TECHNOLOGY FOR SUSTAINABLE FISHERIES

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Species characterization

SIMRAD

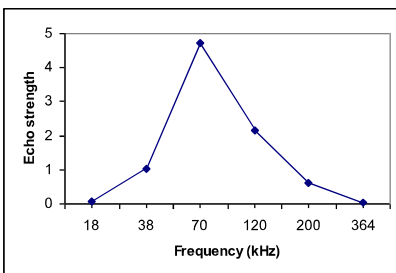
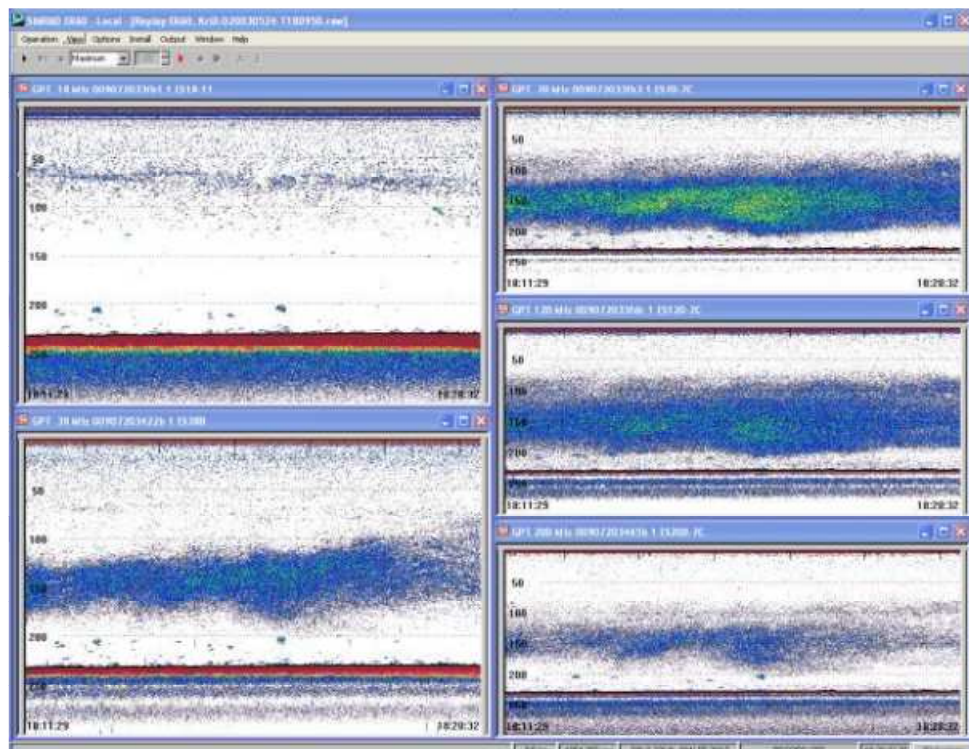


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Krill (*Meganyctiphanes norvegica*)

SIMRAD



Euphausiid – fluid like

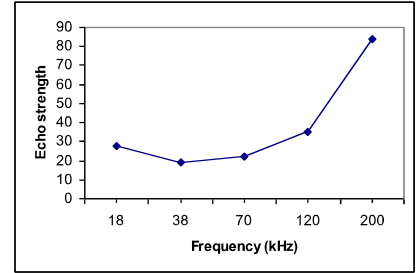
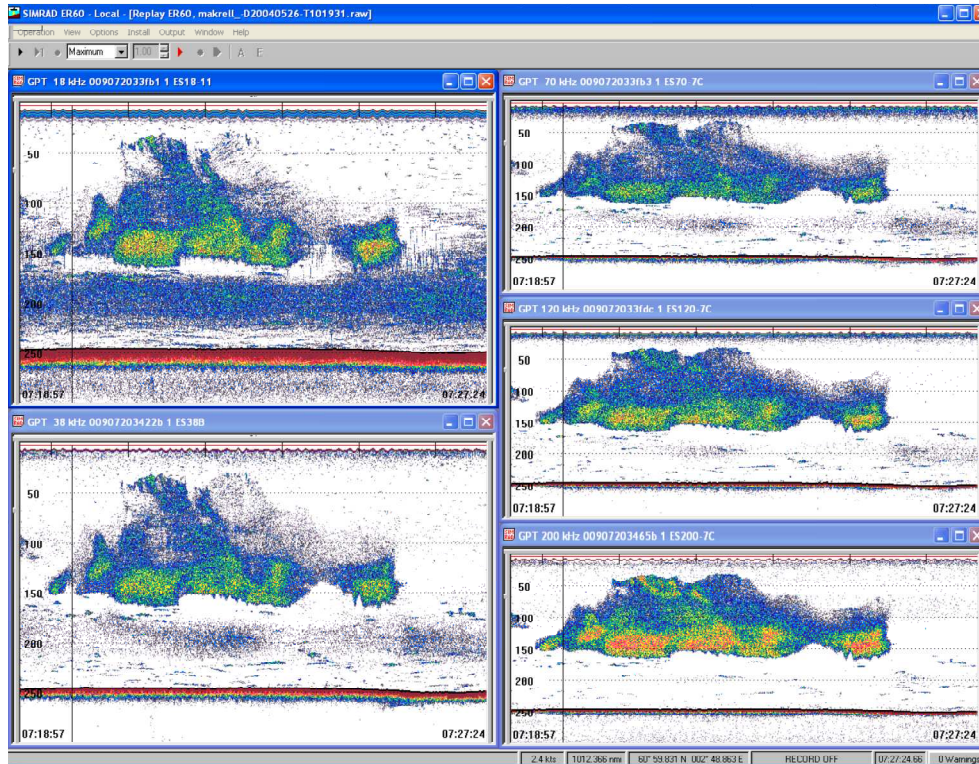
IMR, with permission

TECHNOLOGY FOR SUSTAINABLE FISHERIES

KONGSBERG PROPRIETARY - See Statement of Proprietary Information

Mackerel MF-response

SIMRAD

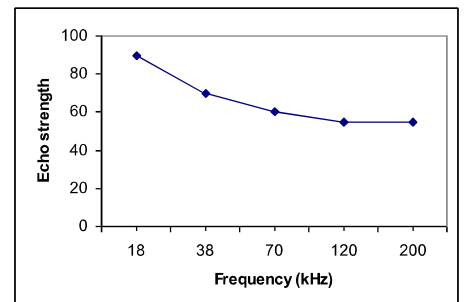
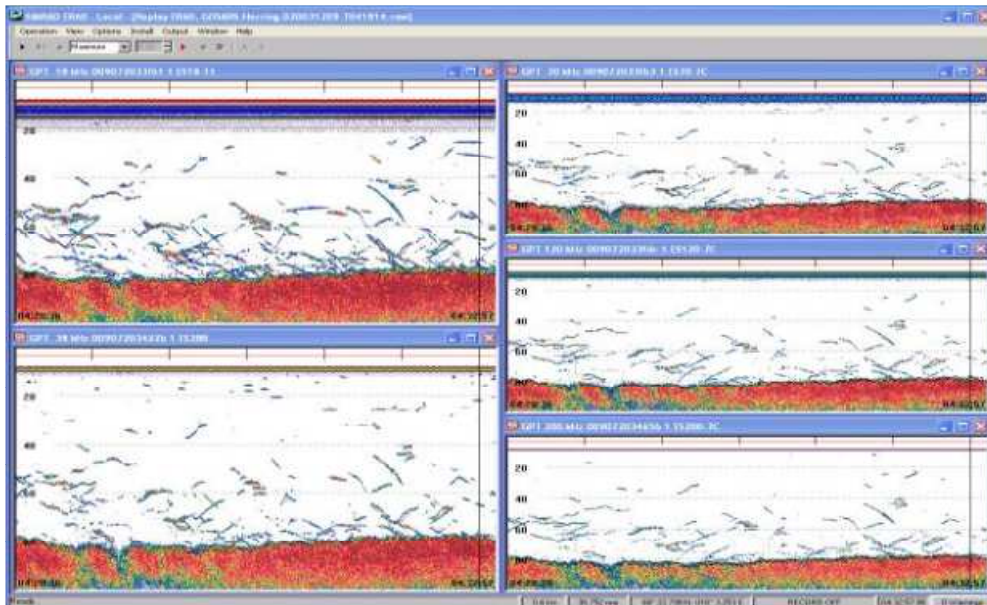


IMR, with permission

TECHNOLOGY FOR SUSTAINABLE FISHERIES

Herring MF-response

SIMRAD

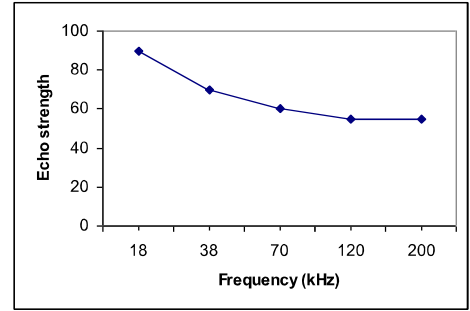
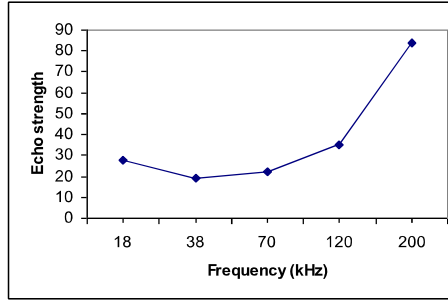
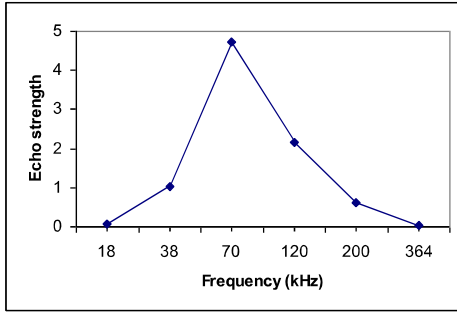


IMR, with permission

TECHNOLOGY FOR SUSTAINABLE FISHERIES

Acoustic signatures

SIMRAD



Krill



Mackerel



Herring

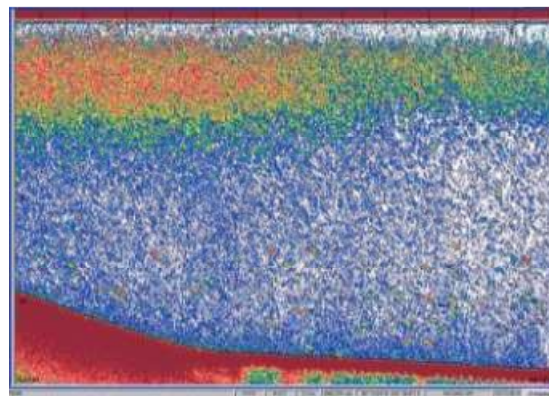
TECHNOLOGY FOR SUSTAINABLE FISHERIES

Classical problem – species separation

SIMRAD

Species mixture at 200 kHz

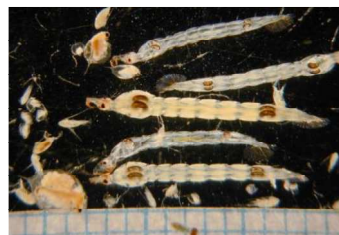
Can they be separated?



Small fish



Chaoborus flavicans



Mysis relicta

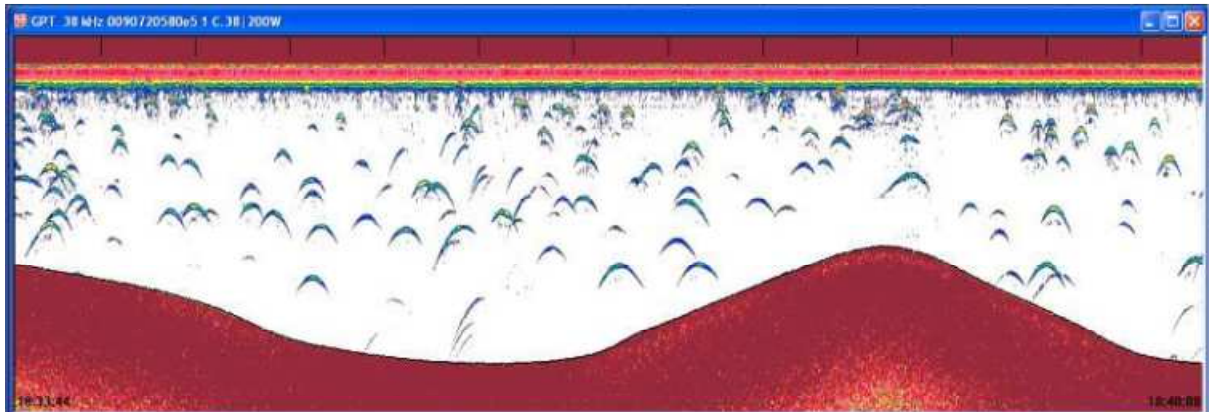


TECHNOLOGY FOR SUSTAINABLE FISHERIES

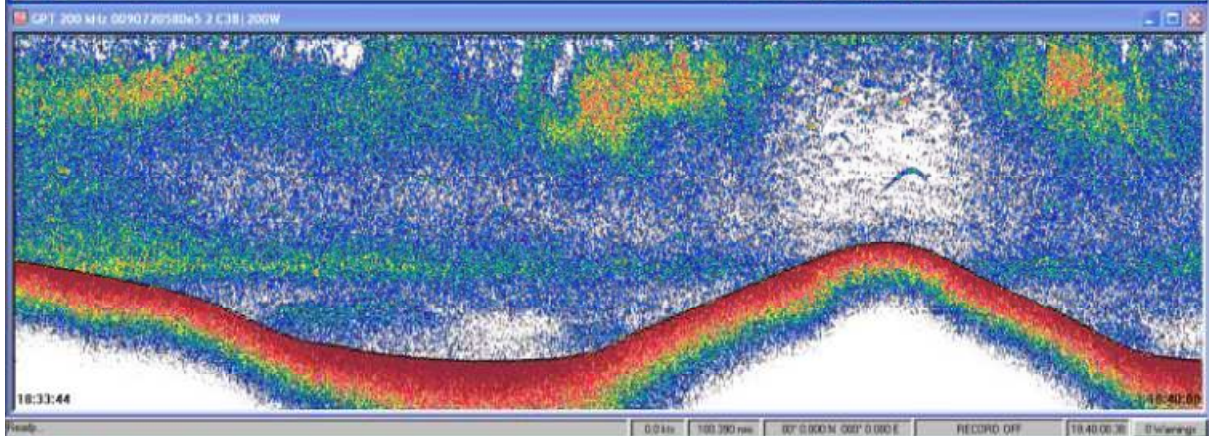
Separating fish and plankton

SIMRAD

38 kHz



200 kHz



TECHNOLOGY FOR SUSTAINABLE FISHERIES

EK80

SIMRAD

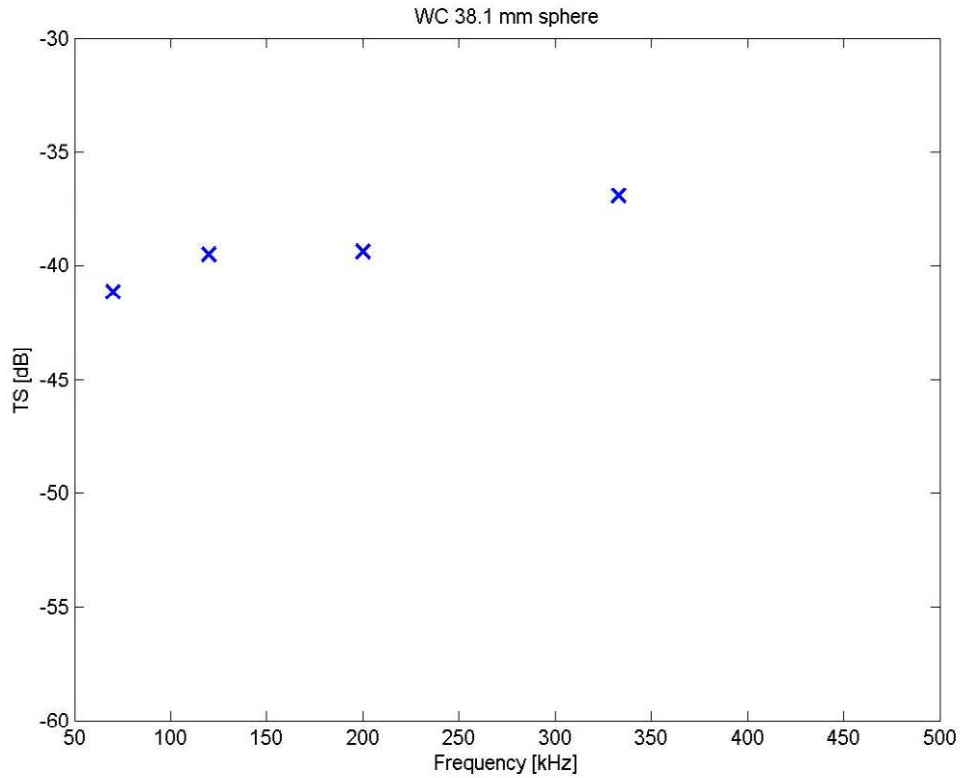
- What is EK80
 - EK60 functionality
 - And **Wideband** (Broadband) functionality
 - New Wide Band Transceiver (WBT)
 - New operating software (EK80)
 - Existing and new transducers



TECHNOLOGY FOR SUSTAINABLE FISHERIES

EK80 - frequency response

SIMRAD



TECHNOLOGY FOR SUSTAINABLE FISHERIES

Simrad EK80 Series Scientific Wideband Echosounders for any platform

SIMRAD

- ✓ Succeed the EK60 as the world standard for biomass assessment & water column studies
- ✓ Split beam reception
- ✓ Wideband capable
- ✓ Built in calibration
- ✓ Documented RAW data output
- ✓ Several variations for various sensor carriers:



WBAT; a stand-alone autonomous scientific echo sounder with battery and internal recording

EK80 with WBT; the no-compromise solution for research vessels



WBT mini; compact, small and energy efficient



WBT Tube; 4000 meter depth rated transceiver



New generation of **compact** low weight transducers



TECHNOLOGY FOR SUSTAINABLE FISHERIES

WBAT – Autonomous echo sounder

SIMRAD

Self contained cylinder

- transceiver
- mission control
- data storage
- battery



No PC, echo sounder software runs on microcontroller

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Sail drone and research vessel

SIMRAD

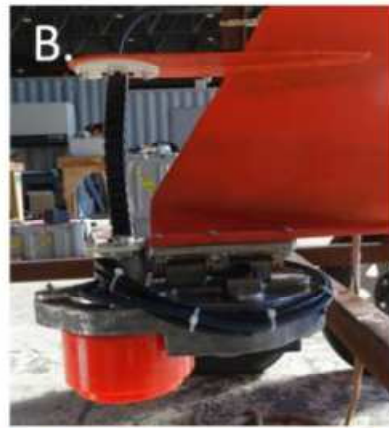


TECHNOLOGY FOR SUSTAINABLE FISHERIES

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WBAT on saildrone

SIMRAD



Temporary echosounder installation. A) Saildrone with WBAT (yellow tube) mounted on front. B) Transducer installation on 2 m keel. C) EK60 system mounted in gray box. Alex De Robertis et al, AFSC, NOAA

TECHNOLOGY FOR SUSTAINABLE FISHERIES

Application: Autonomous vehicles

WBAT in Hugin

SIMRAD

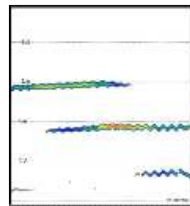


TECHNOLOGY FOR SUSTAINABLE FISHERIES

Application: TS from deep scattering layers

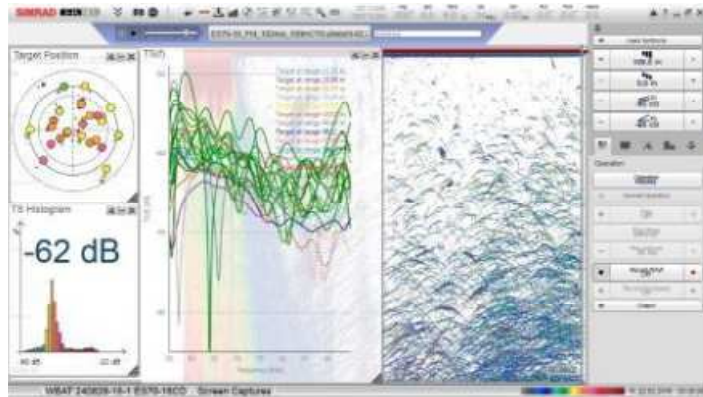
WBAT mounted on CTD probe

SIMRAD



Myctophides

(*Bentosema glaciale*)
400 m depth
Dorsal wideband TS
measurements



IMR Norway, with permission

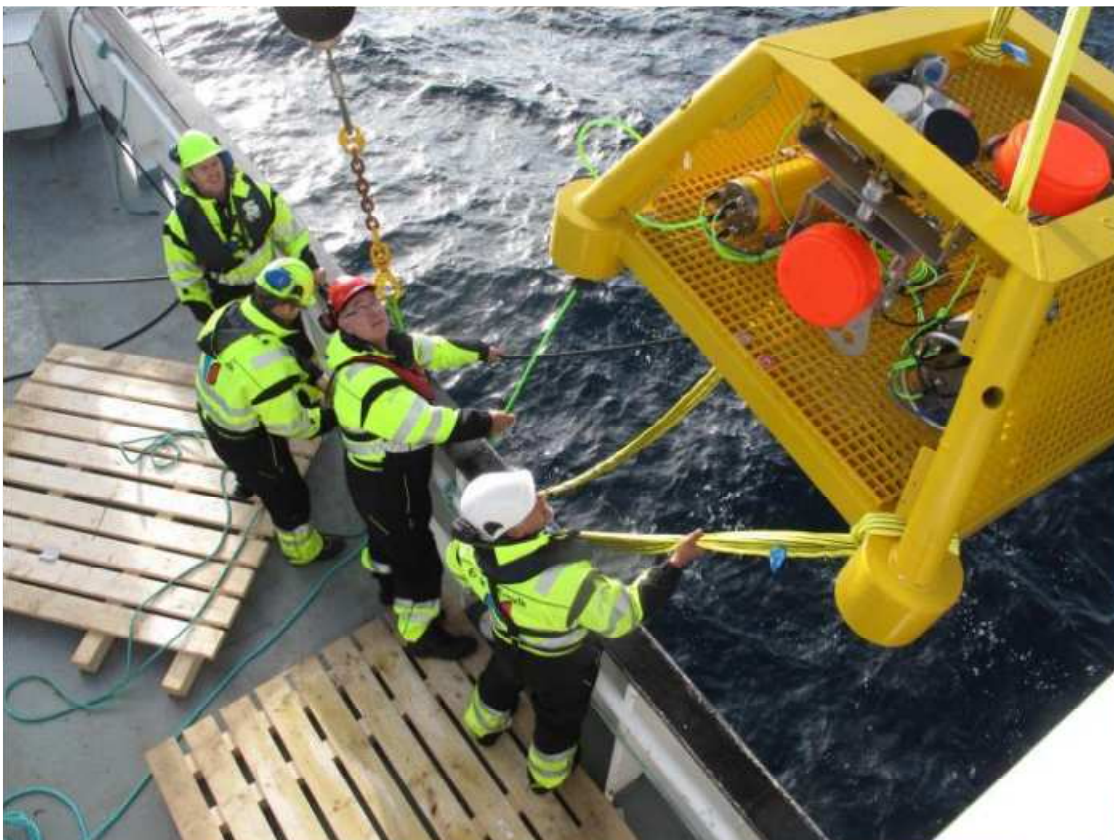
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LoVe observatory

(www.love.statoil.com)

SIMRAD



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Sonar transducer Simrad SU90

SIMRAD

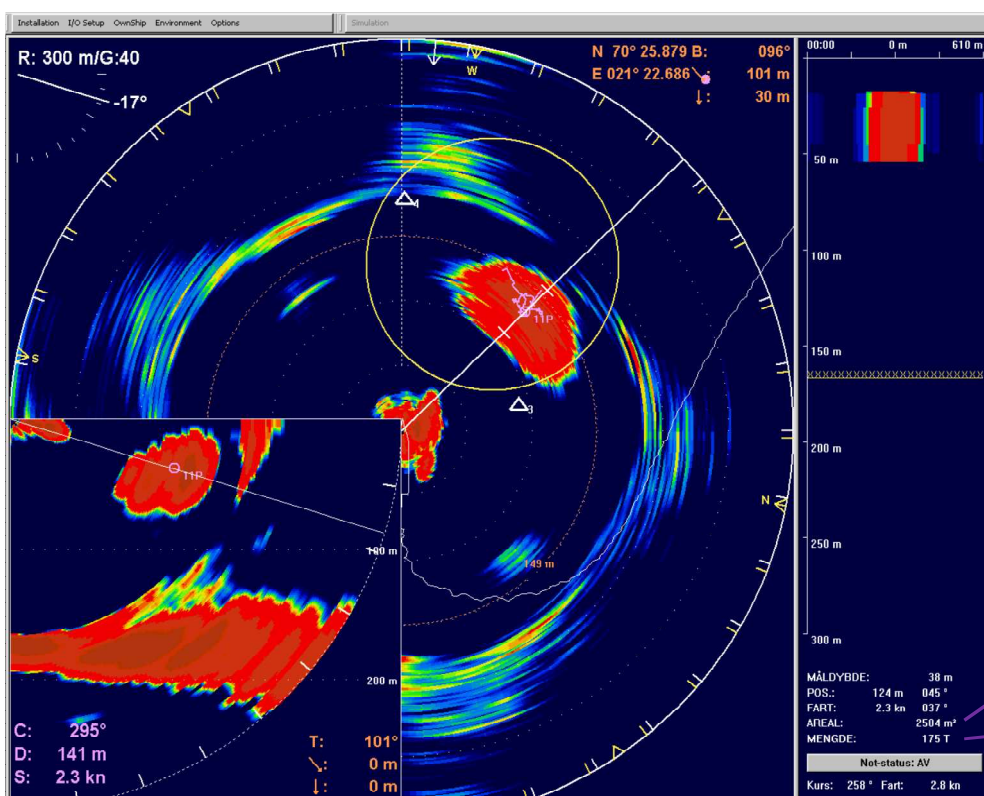


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Typical Sonar picture with Biomass estimation readout

SIMRAD



Rough estimations
of the quantity

Area (m²)

Quantity (tons)

TECHNOLOGY FOR SUSTAINABLE FISHERIES

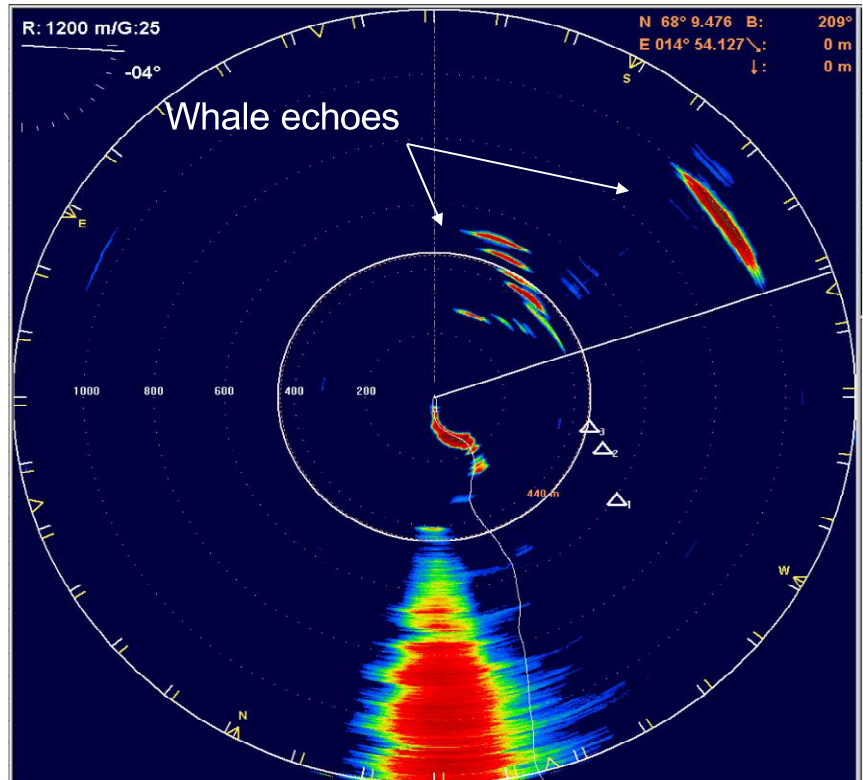
KONGSBERG PROPRIETARY - See Statement of Proprietary Information

Marine mammal detection

SIMRAD



Killer whale

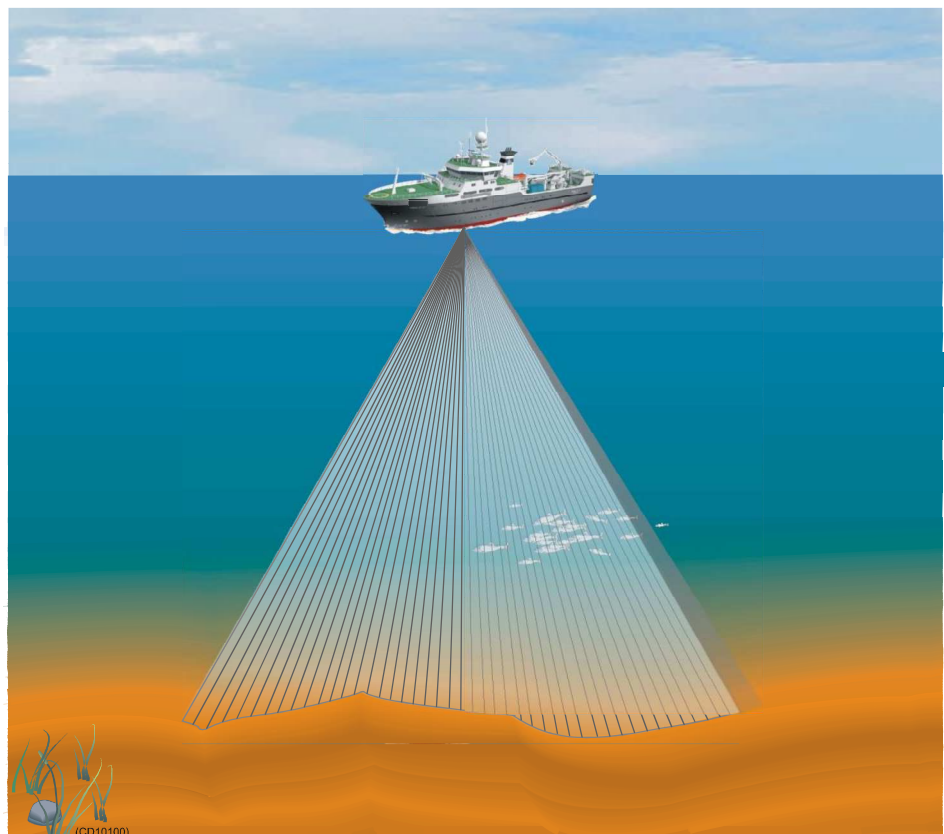


TECHNOLOGY FOR SUSTAINABLE FISHERIES

Multibeam echosounder (ME70)

SIMRAD

- Fan up to 150°
- 3-45 beams
- Narrow ~2° -7°
- Up to 45 split beams
- 2 Reference beams
- Frequency 70 – 120 kHz
- Low side lobe level
- Short pulses
- Roll & Pitch stabilization
- Fan and beam steering
- Multi frequency analysis



TECHNOLOGY FOR SUSTAINABLE FISHERIES

ME70 - Transducer

SIMRAD

- Outer diameter: 677 mm
- Thickness: 400 mm
- Composite material (Wideband)
- 800 combined TX/RX Channels
- Frequency: 70 – 120 kHz



TECHNOLOGY FOR SUSTAINABLE FISHERIES

ME70 - Thalassa

SIMRAD

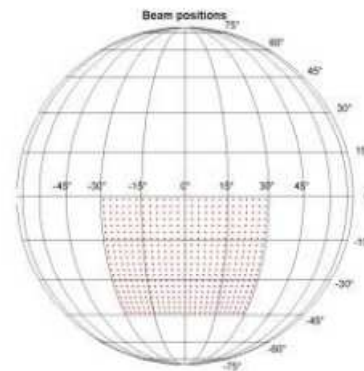
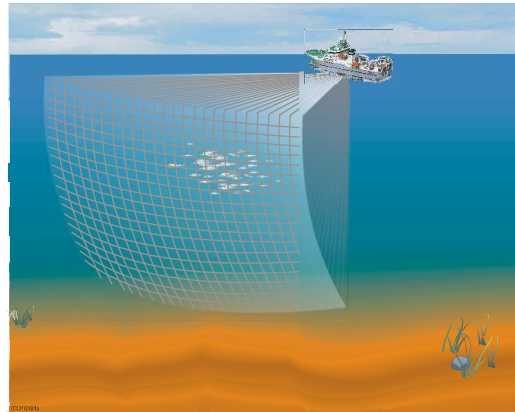


TECHNOLOGY FOR SUSTAINABLE FISHERIES

Mulibeam Sonar (MS70)

SIMRAD

- Matrix of beams
(25 Horizontal & 20 Vertical)
- Narrow beams ($\sim 3^\circ \times \sim 4^\circ$)
- Hor. $\pm 30^\circ$, Ver. 0° to -45°
- Frequency 75 – 112 kHz
- Side lobe level 2-way
< -25 dB (Horizontal)
< -35 dB (Vertical)
- Beam interleakage
< -35 dB (Vertical)
using FRST
(Freq. Rot. Sect. Transmission)
- CW and FM (2 – 10 ms)
- Roll stabilization
- Remote control + Data subscription



TECHNOLOGY FOR SUSTAINABLE FISHERIES

MS70 – G.O. Sars

SIMRAD



Photo by Harald M. Valderhaug. Used with permission.

TECHNOLOGY FOR SUSTAINABLE FISHERIES

RV Kronprins Haakon – new Norwegian ice going research vessel



To be finished 2018
 The Norwegian Polar Institute
 Institute of Marine Research
 University of Tromsø



The SIMRAD scope:

- EK80
- ME70
- MS70
- SH90
- Catch monitoring

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Some 2016 RV contracts

-equipped for modern ecosystem surveys



- DFO Canada, 3 vessels
- DOF, Angola
- BAS, UK
- NIFS, Korea
- INDEP, Argentina
- IMR, Norway
- AAD, Australia
- IMR, Norway



TECHNOLOGY FOR SUSTAINABLE FISHERIES

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Takk for oppmerksomheten!

TECHNOLOGY FOR SUSTAINABLE FISHERIES