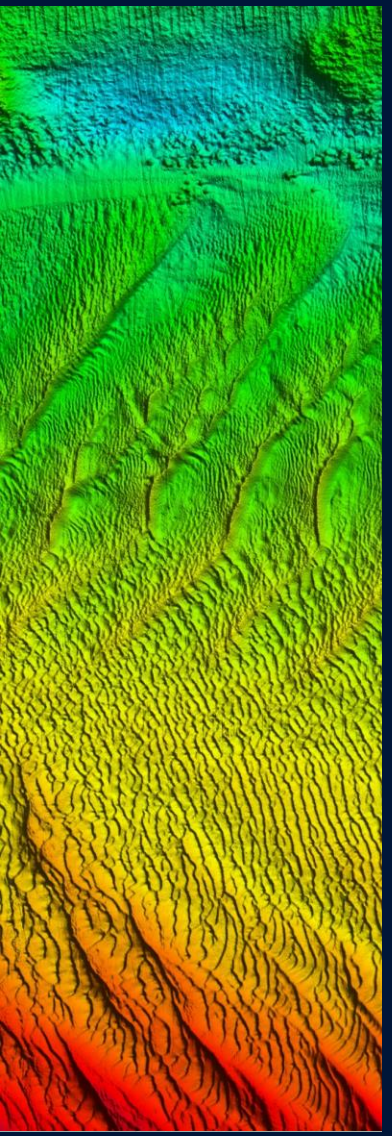

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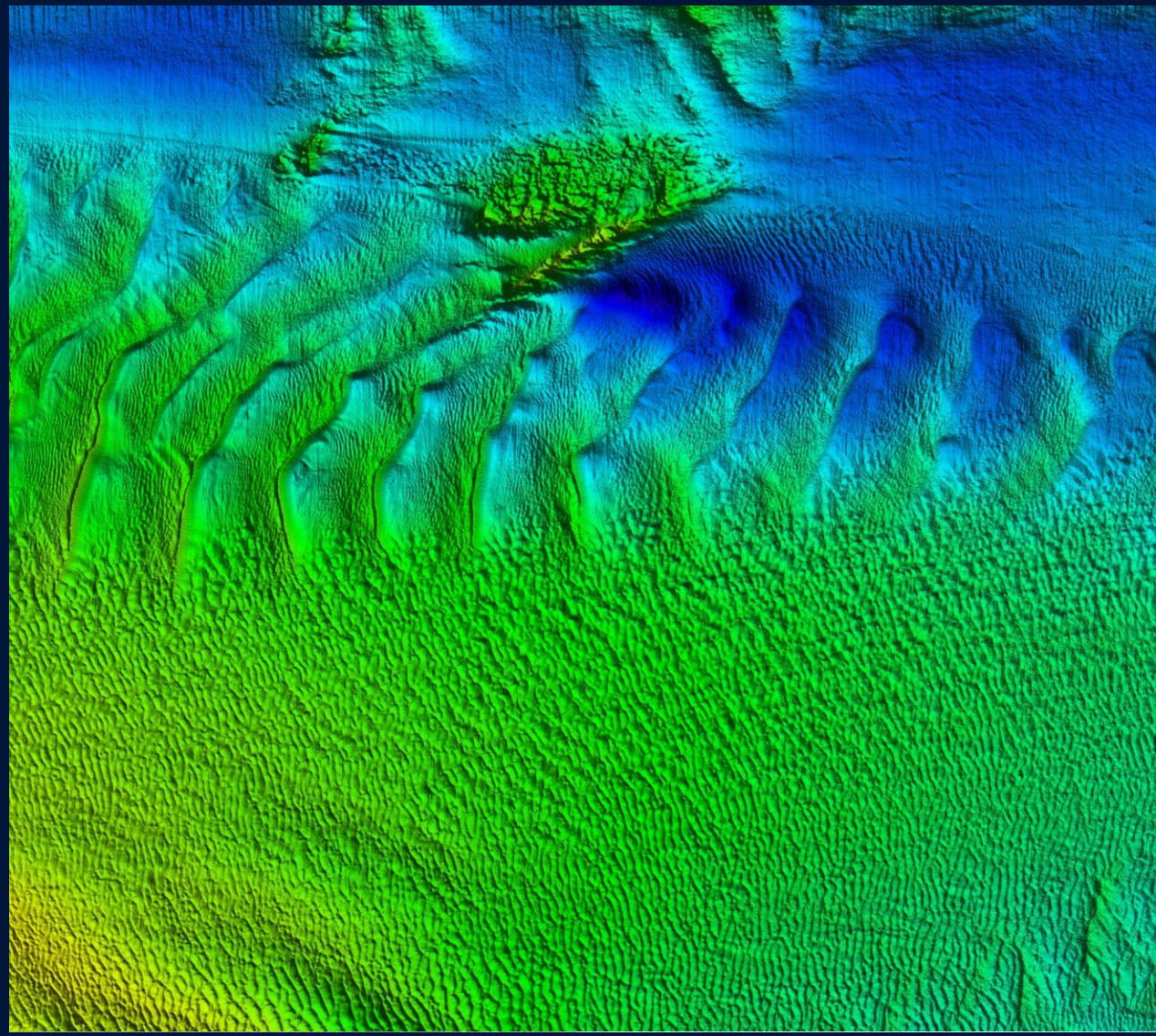
MBSHC 21

Kongsberg Maritime

Beyond batymetry and backscatter

June 2019

Miguel A Lleches SALES SUBSEA Spain and Portugal



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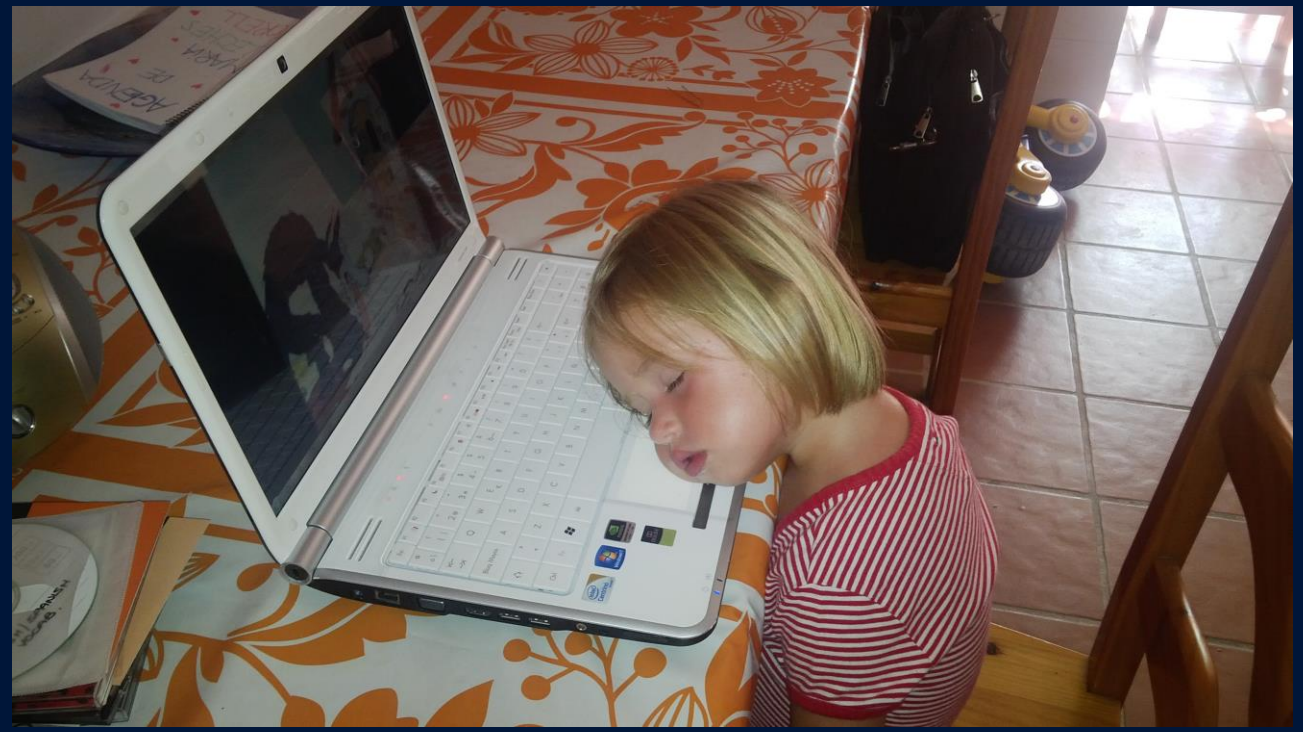
WAKE UP!



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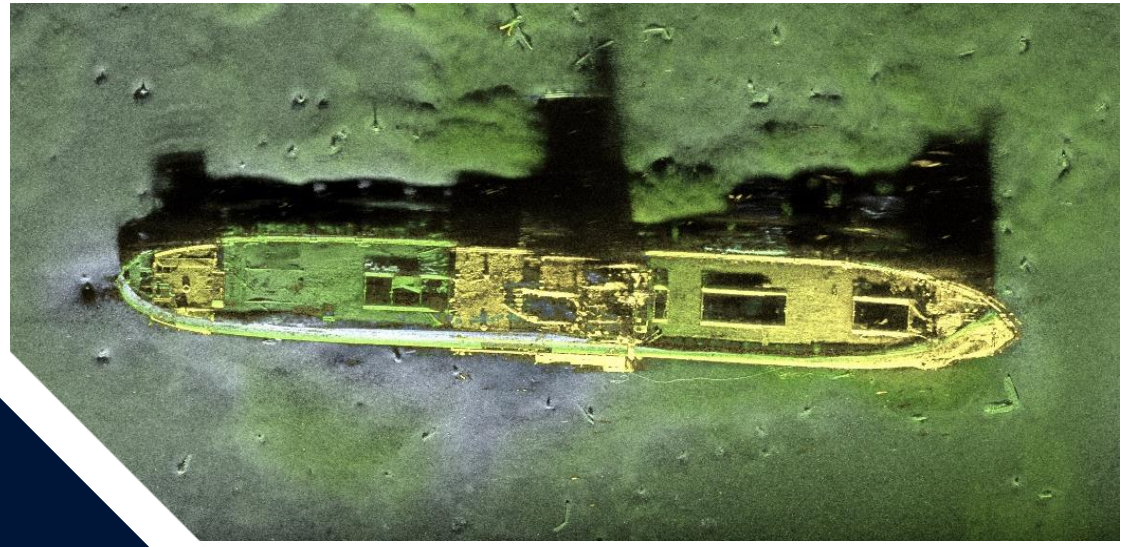
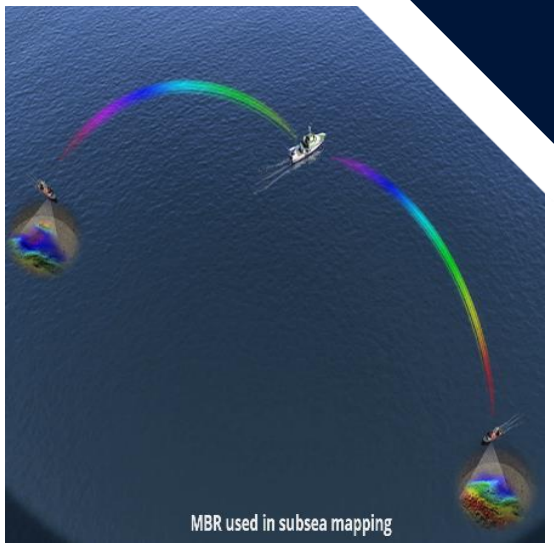
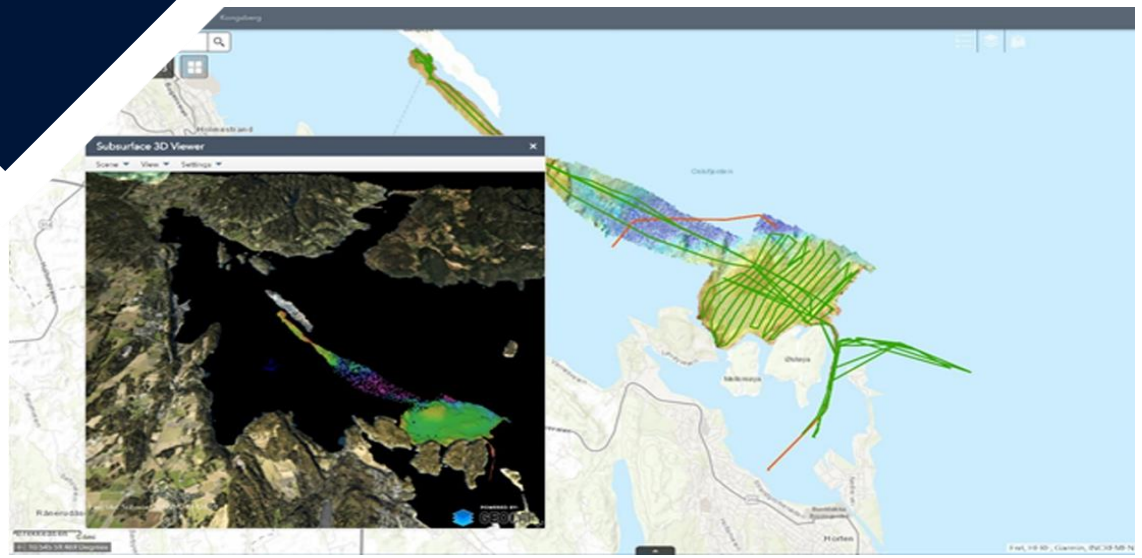
New:

- SIS 5
- EM2040 MKII
- EM712 0,25x0,5
- EM304, EM124
- Multispectral Bacscatter
- Single beam (new life?)
- EK80 new tool for SVP prediction



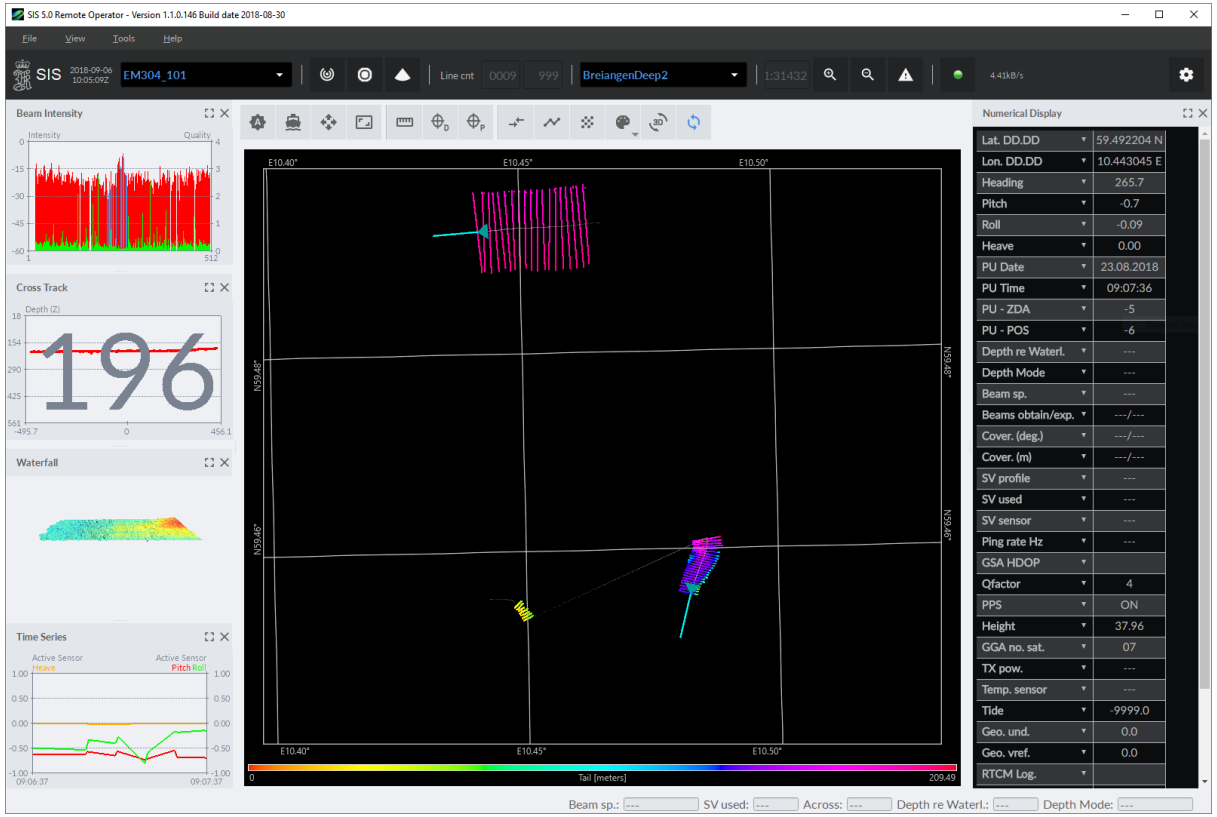




New features under development

SIS 5

- Multiple simultaneous surveys from a single SIS
  - Multiple vessels remotely controlled from central operator station
  - Multiple EM systems on the same vessel controlled and displayed from single SIS
  - See terrain models from all EM-systems in one map
  - Select which EM to monitor and control



SIS 5 on the mothership connects to Mapping Cloud and uploads data

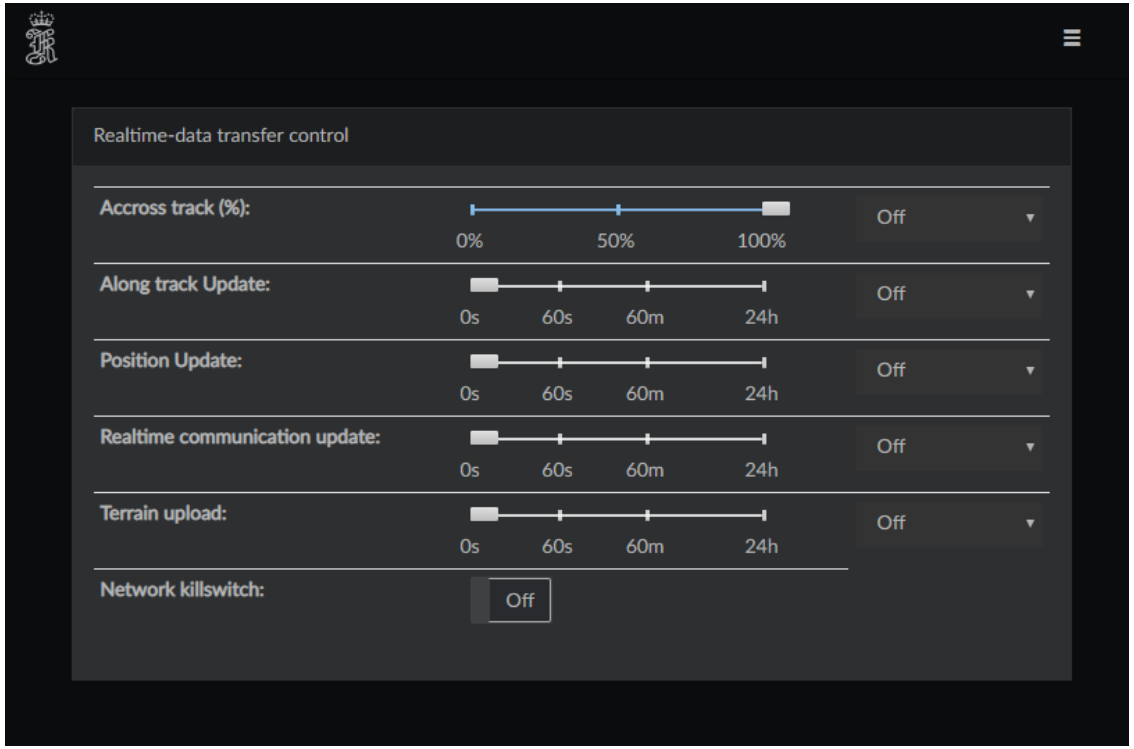
Data is made available to onshore personnel and partners

SIS 5 on the mothership connects to Mapping Cloud and uploads data. The data is then made available to onshore personnel and partners.

New features

SIS 5 April 12th Release

- Remote Operations
  - Install SIS Server on one or more ships, install one SIS Client on mother-ship, or on shore
  - Works with both fast and slow Internet connections



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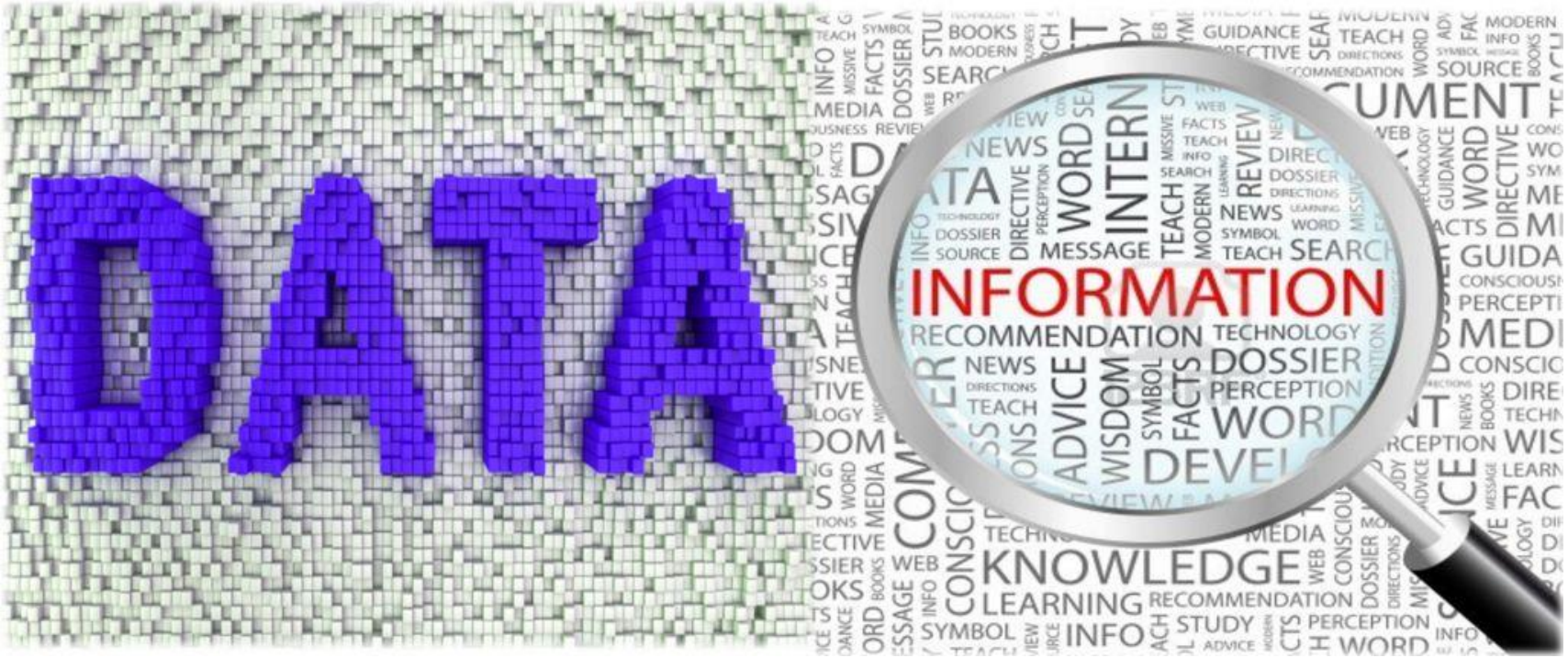
Big data…how much is the cost?



Bathymetric mapping product line

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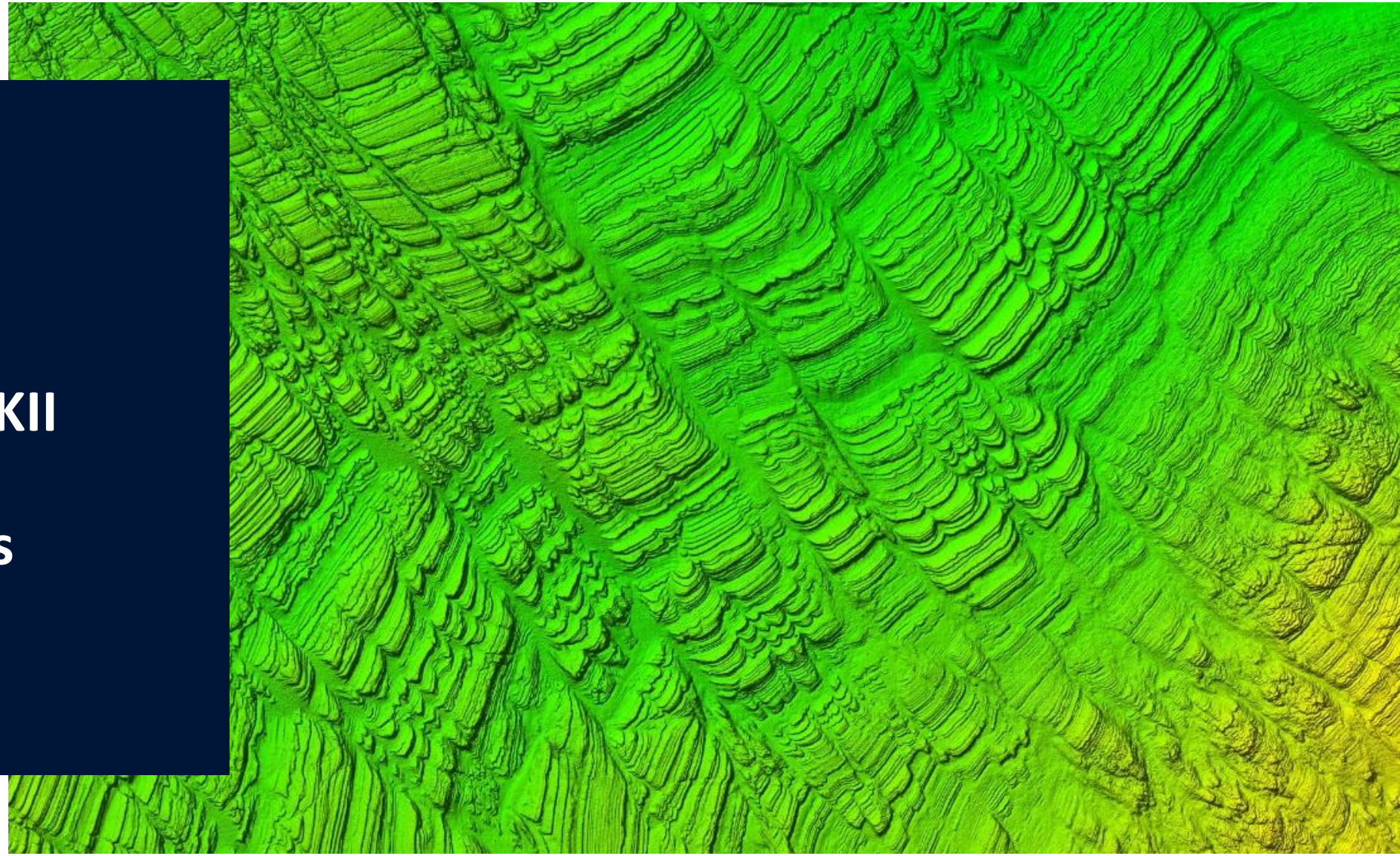
EM 2040 MKII

All models



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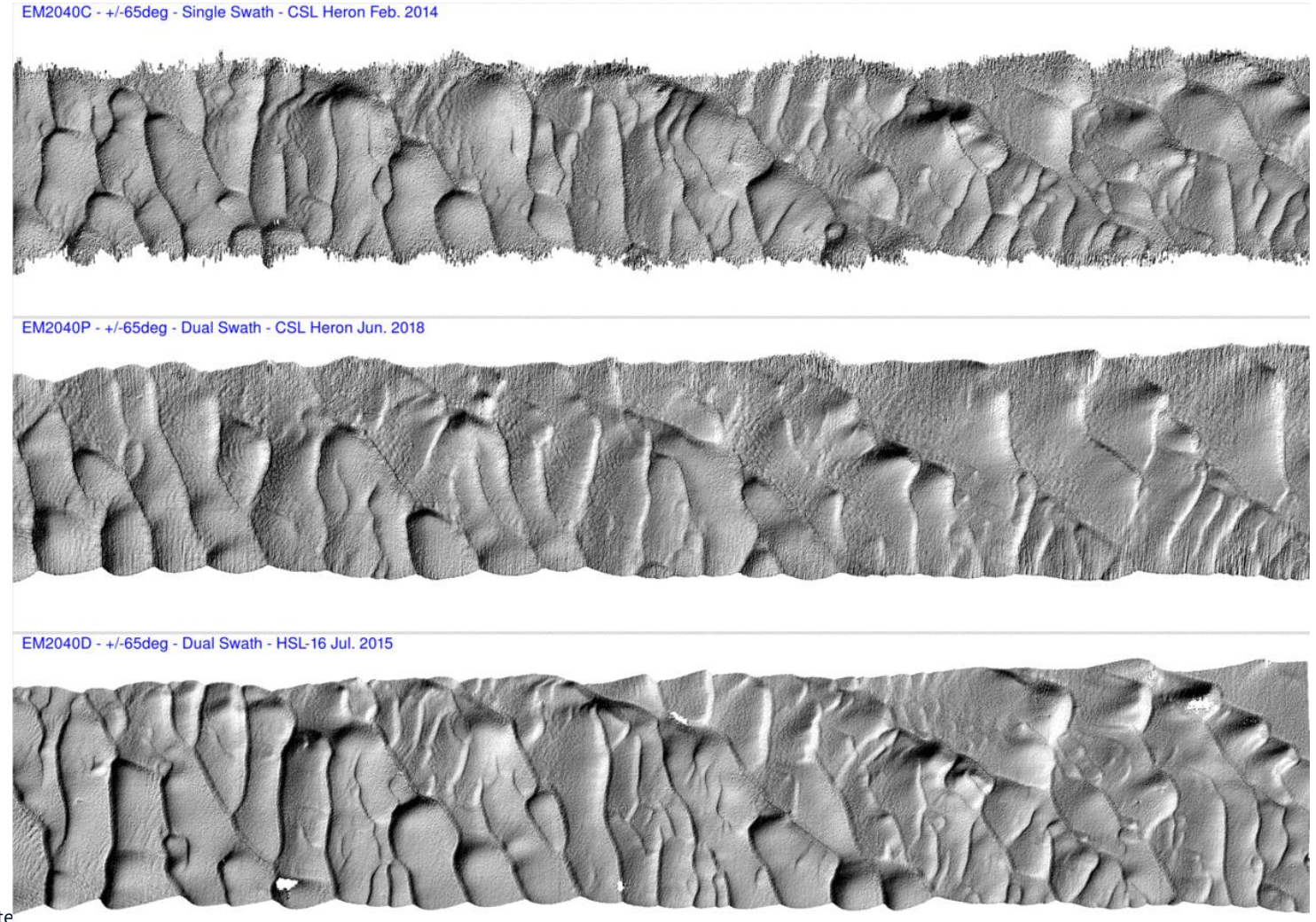
EM 2040 Models



EM 2040 MKII

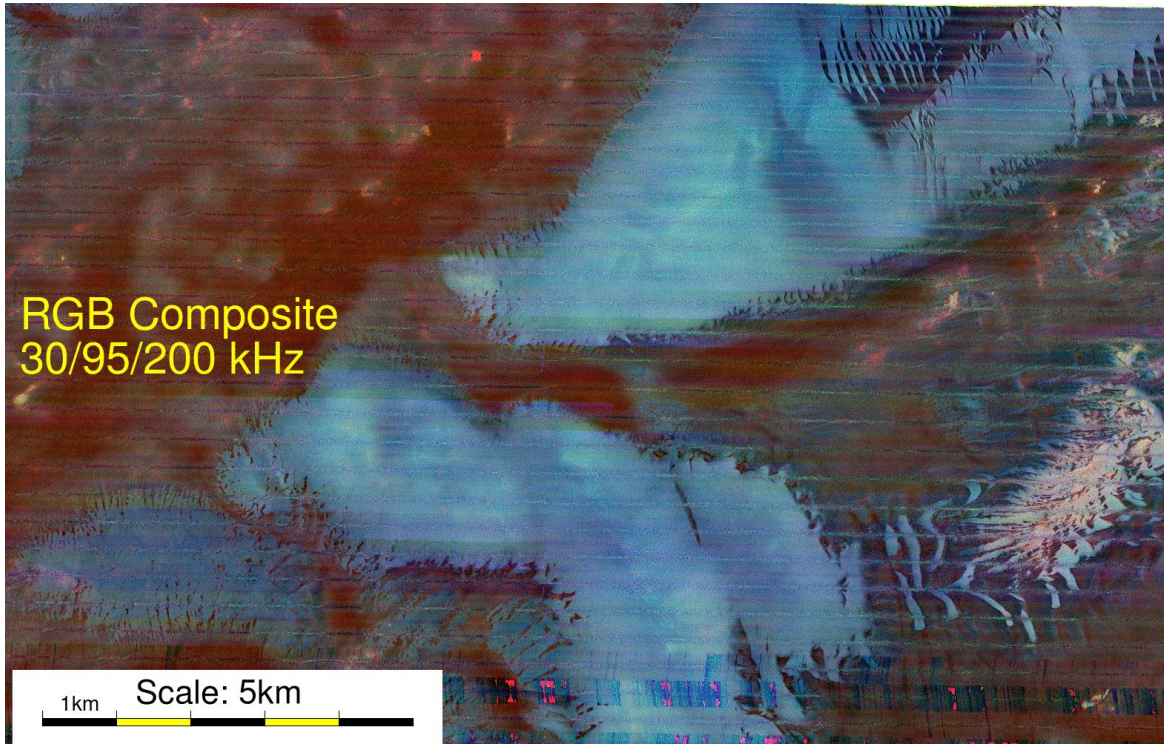
What does it entail

- The MKII is a hardware upgrade that enables the sonar to improve the bottom detection and the dB levels in the outer edges of the swath.

- The swath width improvement requires a software upgrade. This software upgrade will only be made available on the new datagram format Kmall, controlling the sonar with K-Controller.

- The upgrade means
  - Improved bottom detection for all models in existing swath width using existing software
  - EM 2040C increases from 130° to 140° swath width.
  - EM 2040 P increases from 140° to 150° on flat bottom, up to 170° on slopes, cliff sides, quay sides
  - EM 2040 0.4 Single RX from 140° to *possibly* 160° on flat bottom, up to 170° on slopes etc.

Software features being released 2019



- Multispectral backscatter for EM 2040 (Q1/Q2)
  - Simple 200/300/400 kHz ping in sequence
  - Future improvements to this feature planned based on testing and feedback.
  - Plans to implement on EM 712 (uncertain when)
- Real time calibrated BS for EM 2040 models
  - EM 2040P and EM 2040 Single RX end Q1(uncertain)
  - All models by end Q3 2019
- High frequency inspection mode (uncertain)
  - Concept has been proven
  - Still needs extensive testing before release

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Portable Hydrographic Systems

PHS

KONGSBERG

A range of Portable Hydrographic Systems

Open to suggestions for new ways to integrate

POLE MOUNTED

Geoswath
M3 Sonar
EM 2040P
EM 2040C

C.S.V MOUNTED

GeoSwath
M3 Sonar
EM 2040P
EM 2040C
Geopulse Compact

USV MOUNTED

GeoSwath
M3

EM 304

30 kHz Multibeam Echo Sounder

- Successful first SAT with Ifremer on Thalassa
- Upgrade program for EM 302 customers is available. No docking is required.
- What is new
  - New datagram format and SIS 5
  - Range extended to 8000m
  - Extra detections available
  - Ability to log water column phase data
  - 0.5° receiver is available
  - More beams
    - 1600 beams for the 0.5° and 1° receiver models
    - 1024 beam for the 2° receiver models
    - 512 beams for the 4° receiver models

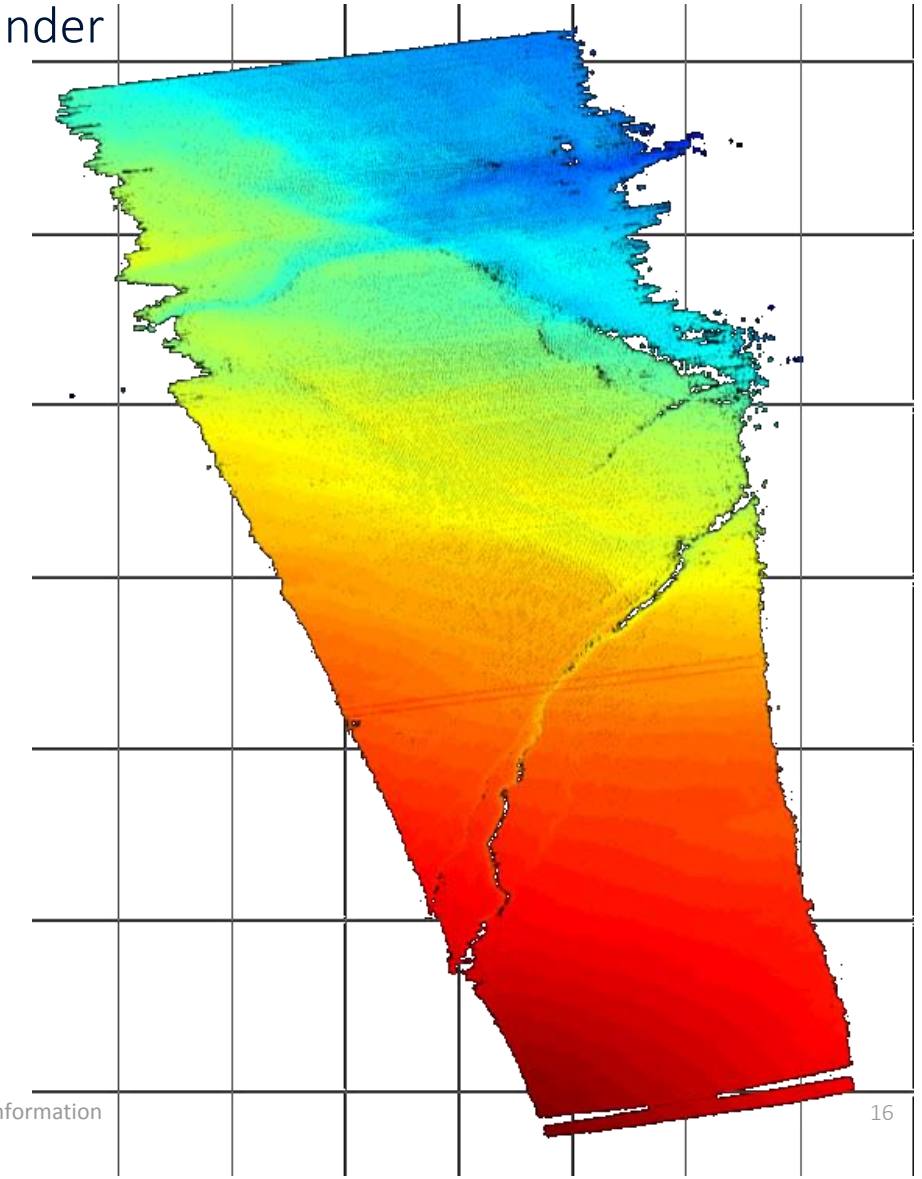
Thalassa EM 304 installation.. © Ifremer

EM 124

12 kHz Multibeam Echo Sounder

- Successful first SAT with Five Deeps on Pressure Drop
- Upgrade program for EM 122 customers is available. No docking is required.
- World class 41 km swath
- What is new
  - New datagram format and SIS 5
  - Extra detections available
  - Ability to log water column phase data
  - More beams
    - 1600 beams for the 1° receiver models
    - 1024 beam for the 2° receiver models
    - 512 beams for the 4° receiver models

Pressure Drop EM 124. © FiveDeeps



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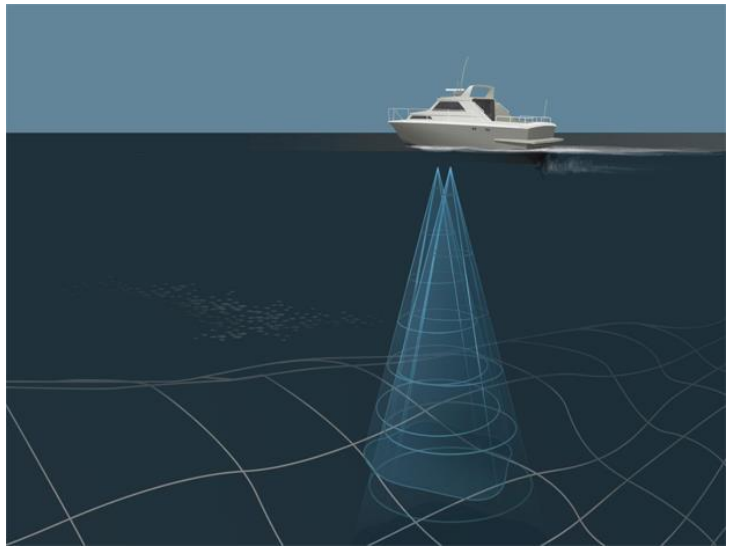
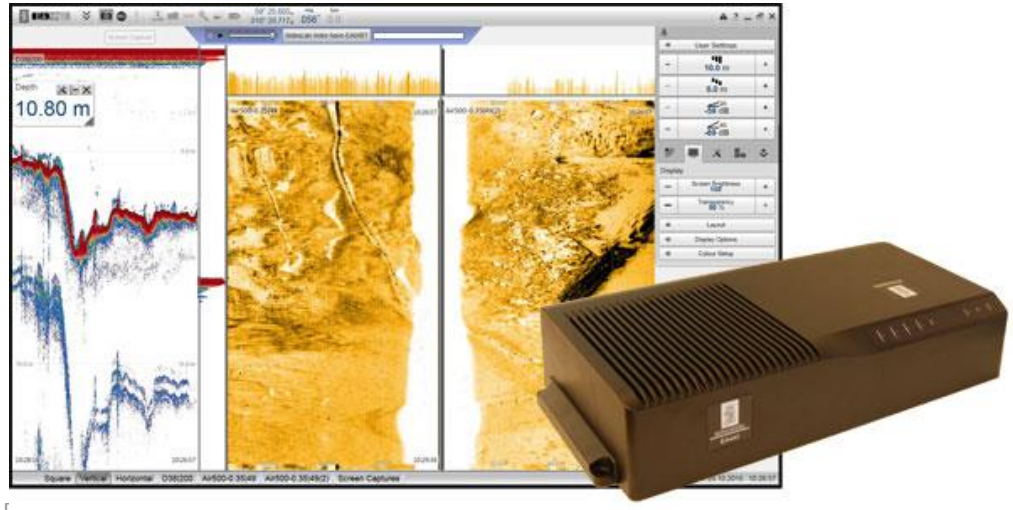
Singlebeam echo sounders



- EA440
- EA640
- WBT
- Transducers
- Hydrophone



EA440 and EA640 elements

- Wide Band Transceiver (WBT)
  - Standard (4ch @ 0.5kW each)
  - High power (2ch @ 2kW each)
  - 10-500 kHz
  - Impedance 40-100 Ohm

- Transducers
  - Ranging fro 12 to 500 kHz
  - Sidescan transducers
  - Passive transducers
  - Hydrophone transducers

- EA software
  - Winson based
  - Interface for Sonar Mosaic

WBT – Standard

A P1: Transducer: Channel 1 - 2
B P2: Transducer: Channel 3 - 4

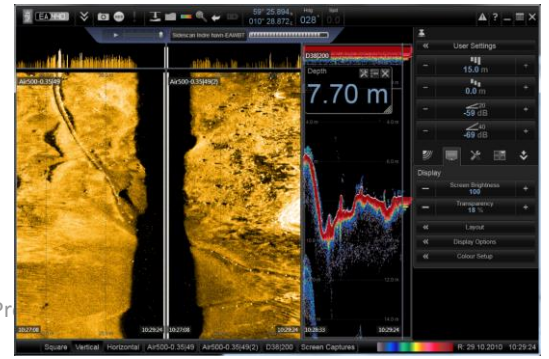
WBT – High power

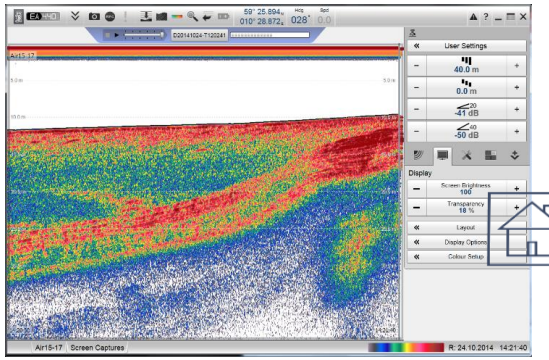
A P1: Transducer: Channel 1 - 2

200 and 500 kHz 15 kHz

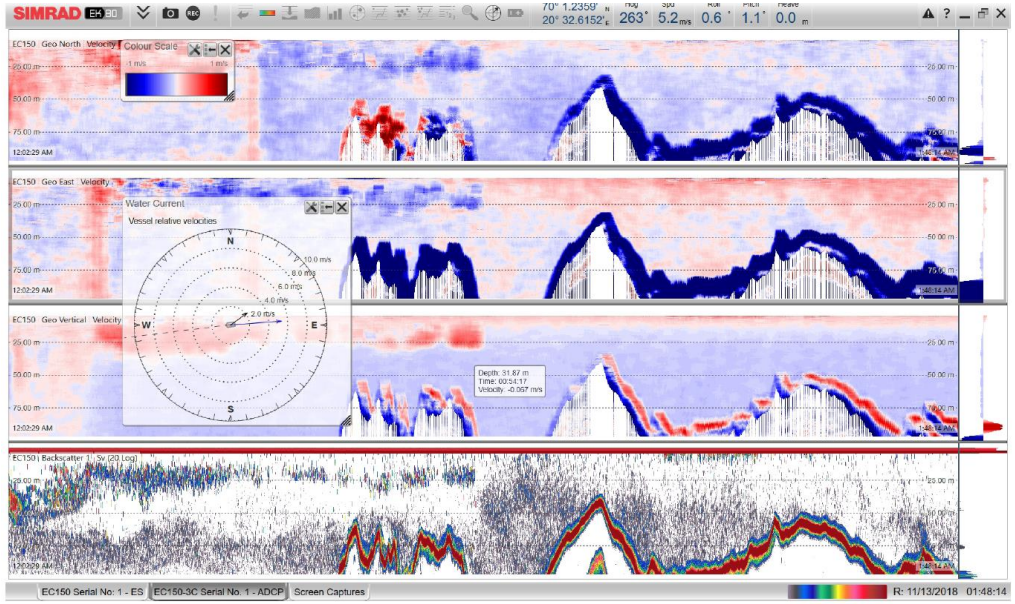
Sidescan 200 and 500 kHz

12/18kHz 38kHz 200kHz





EK60/80



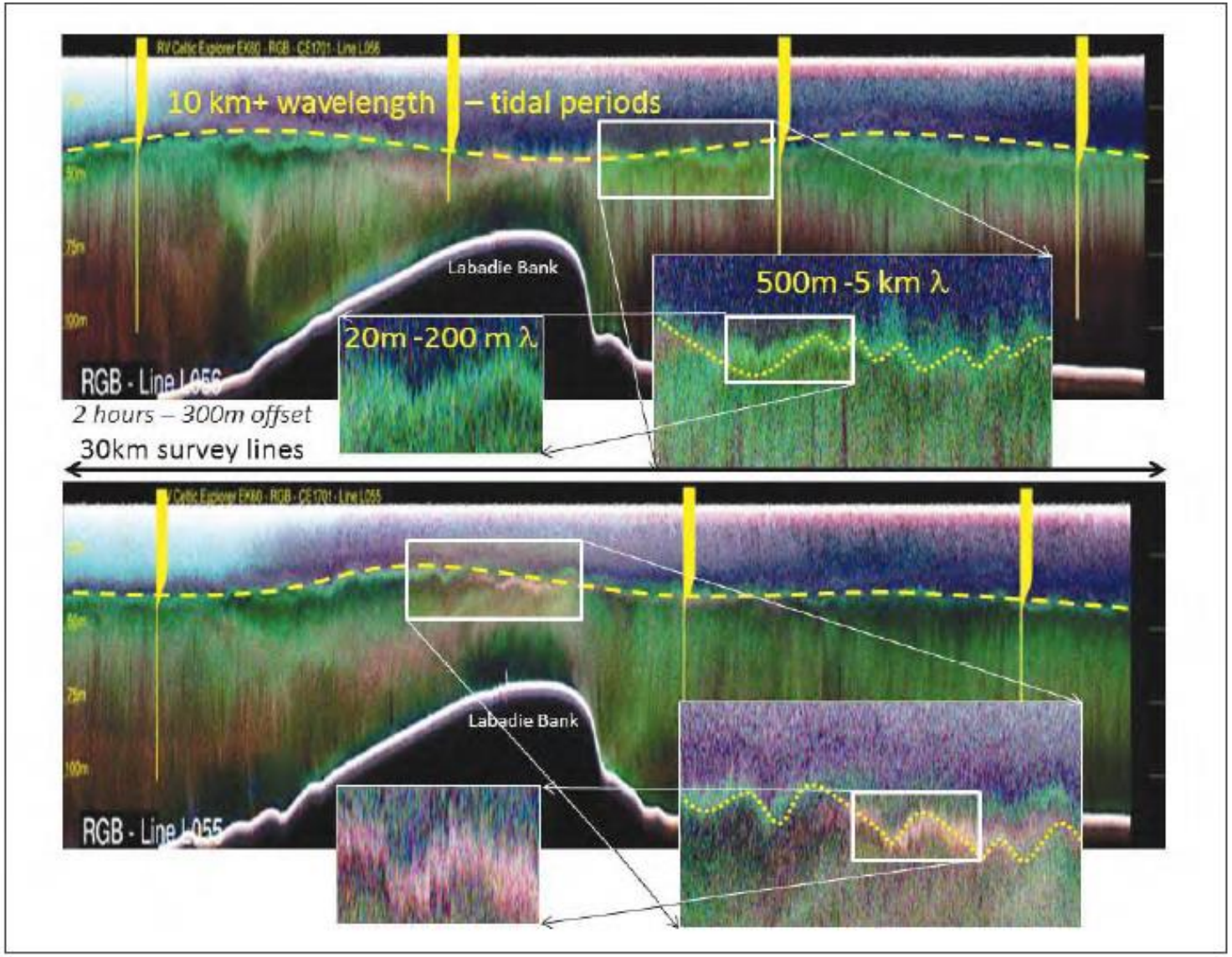


Figure ES-45. Two 30km long sequential vertical sections of acoustic scattering with discrete MVP profiles superimposed (sound speed). Acoustic imagery data is an RGB composite of EK-60 volume scattering data (red: 18 kHz, green: 38 kHz, blue: 120 kHz). The base of the velocline/thermocline (as defined by the MVP) can be clearly seen to correspond to an abrupt shift in the volume scattering signature of the zooplankton. The imagery reveal a number of different horizontal length scales over which the thermocline is oscillating, ranging from 10,000m to <100m.

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Thanks you for your attention