ROPME Sea Area Hydrographic Commission
Riyadh 4th - 6th March 2013

KONGSBERG

Building Capability for Hydrographic Products and Industry Contribution to Capacity Building

Commander Richard 'Bungy' Williams RN (Rtd)
Kongsberg Maritime

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Survey of Complex Coastal and Deep Water Tropical Bathymetry for IHO S44 standard Navigational Charting and Port Engineering, Red Sea, Kingdom of Saudi Arabia

Project:

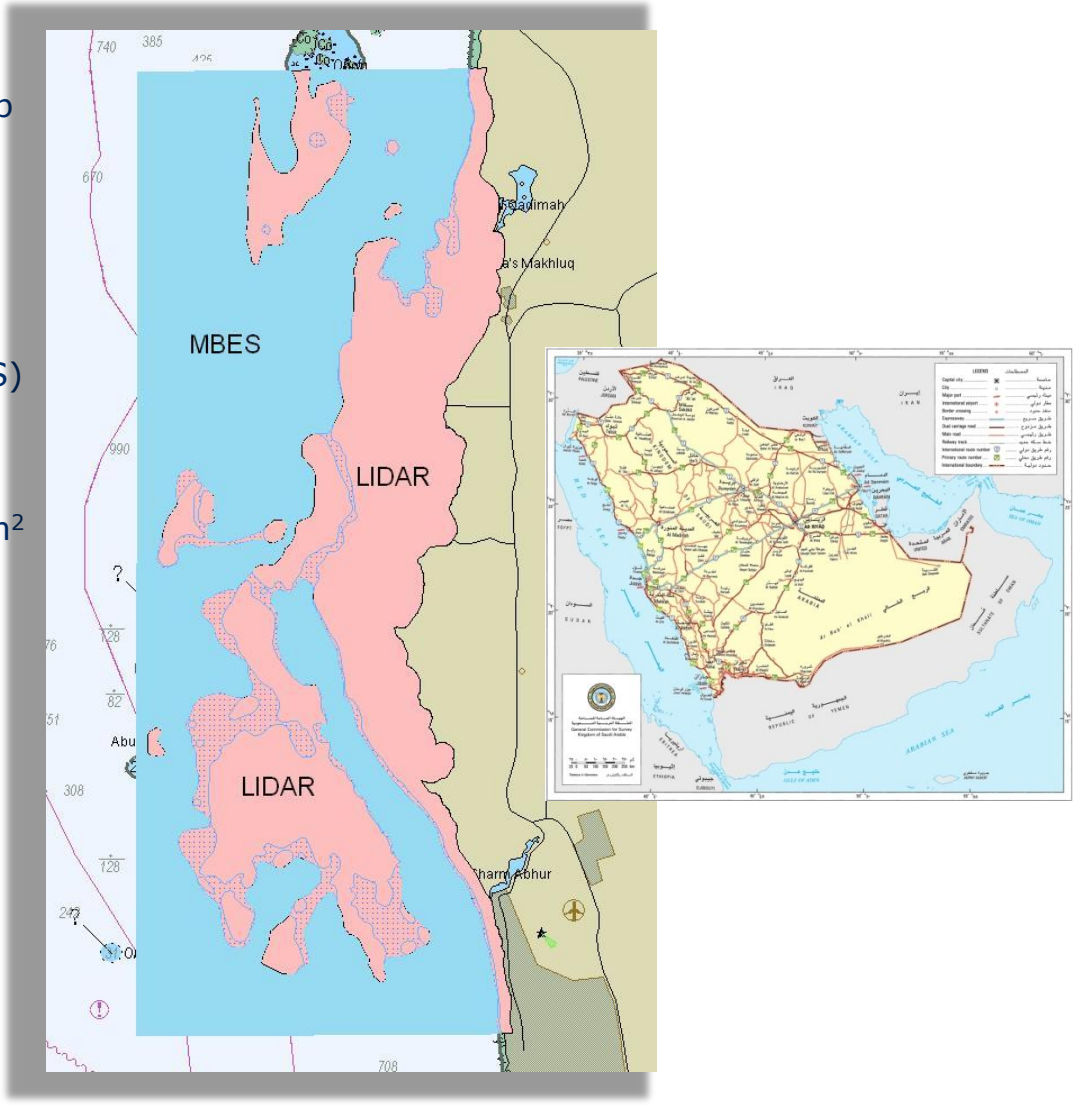
General Commission for Survey (GCS)

North Jeddah ENC / Hydrographic Charting Survey

Total Project surveyed area: 3852 km^2

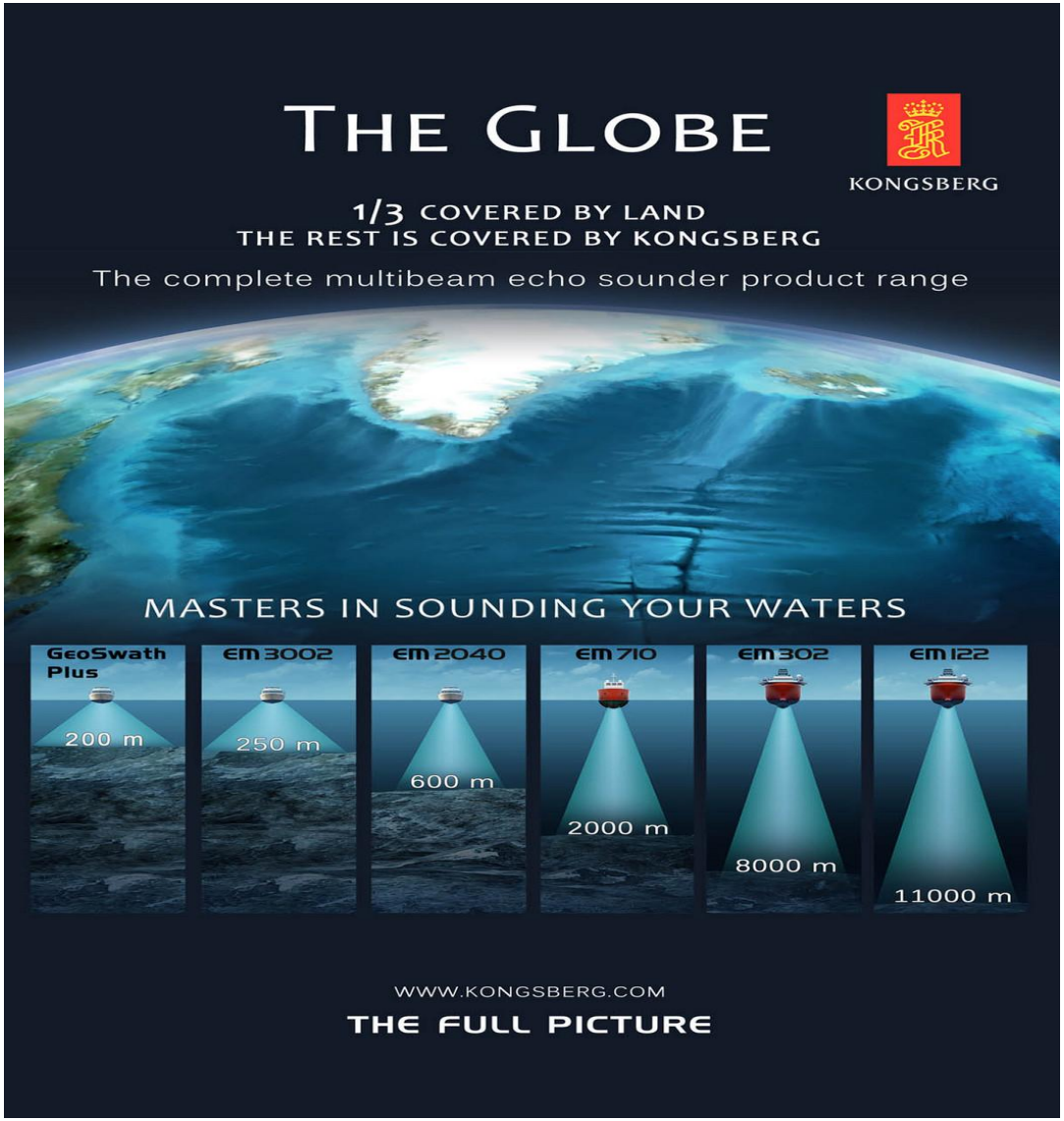
MBES: 2635 km^2

3 Vessels with 5 MBES's
Data Collection period 2 months

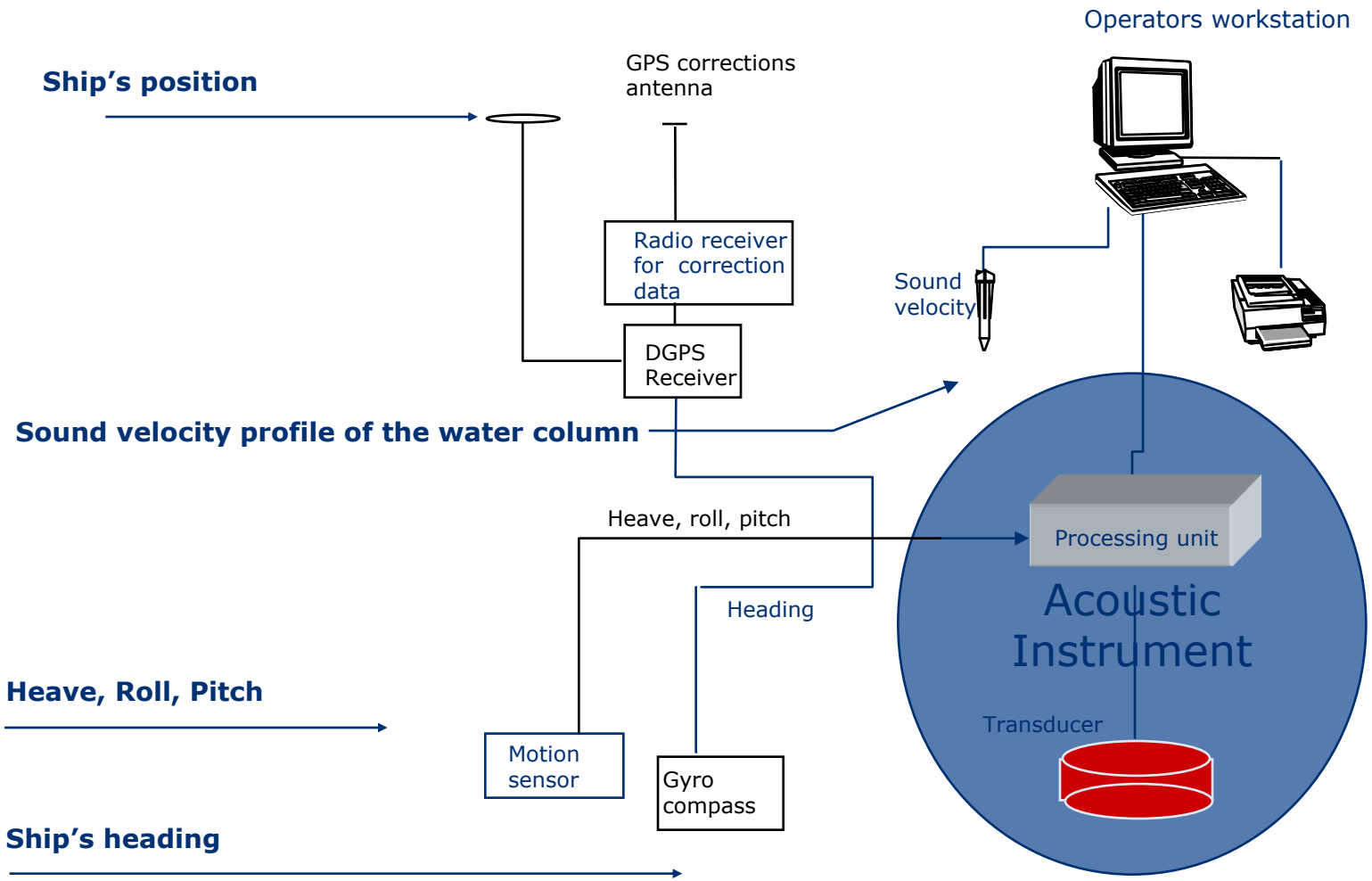


THE FULL PICTURE

EM Series


THE GLOBE
KONGSBERG
1/3 COVERED BY LAND
THE REST IS COVERED BY KONGSBERG
The complete multibeam echo sounder product range
MASTERS IN SOUNDING YOUR WATERS
GeoSwath Plus
200 m
EM 3002
250 m
EM 2040
600 m
EM 710
2000 m
EM 302
8000 m
EM 122
11000 m
WWW.KONGSBERG.COM
THE FULL PICTURE

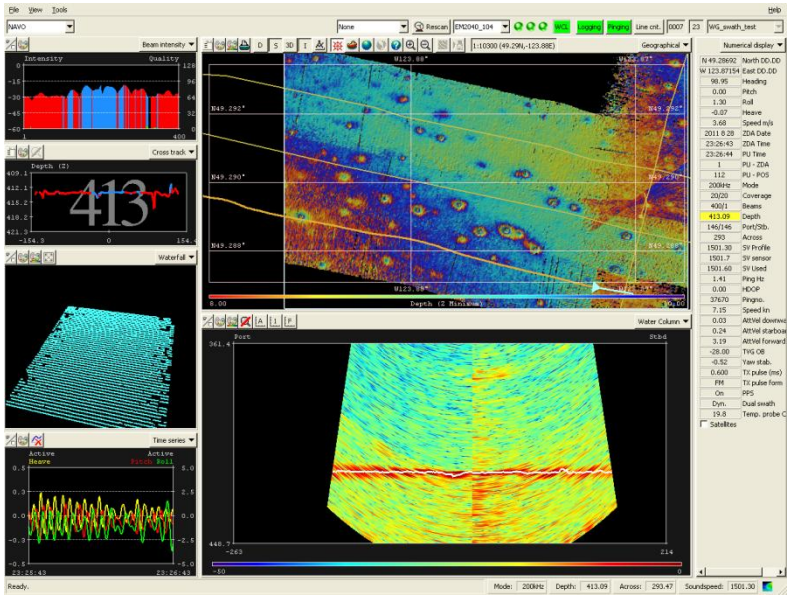
A Multibeam system is more than an acoustic device



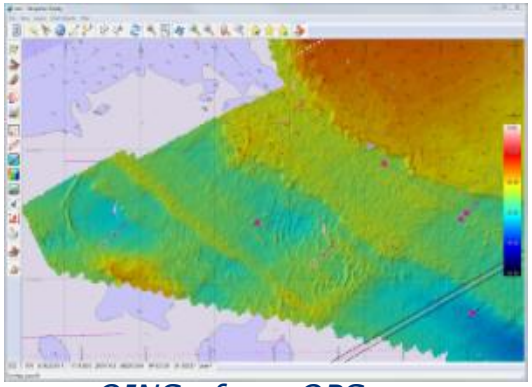
Operator Software

EM can be delivered with the following operator software:

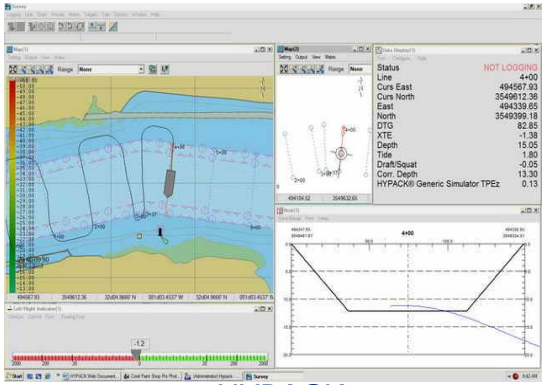
- *SIS from KM*
- *QINSy from QPS*
- *HYPACK*
- *EIVA*
- *Triton*



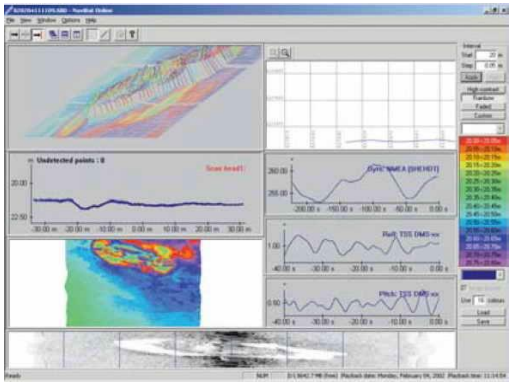
SIS from KM



QINSy from QPS



HYPACK



EIVA

Transducers physical size versus frequency

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EM3002 (1,5x1,5°)
Ø 0,3m

300kHz

EM2040 (1x1°)
~0,5x0,2m

200 – 400kHz

EM710 (1x2°)
~1x0,5m

70 – 100kHz

EM302(1x2°)
~4x2m

30kHz

EM122 (1°)
~9m

12kHz

EM System- Common Features

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Common features:

In order to meet the requirement set by IHO S-44 and the survey industry, the following features are all considered necessary, for fulfilling and/or bettering the requirements in all weather conditions.

- *Sector transmission*
- *Active electronic stabilization for roll, pitch and yaw in real-time*
- *Compensation for roll, pitch, heave in real-time*
- *Maintaining of all beams at reduced swath coverage*
- *High density beam processing*
- *Dual swath per ping to allow a doubling of the survey speed*
- *FM chirp for long range and high resolution*
- *Nearfield focusing both on transmit and receive*
- *High quality seabed imagery as standard*
- *Water Column display as standard with logging as an option*

Aim:

To provide high quality equipment to meet customer expectations of meeting international hydrographic standards by:

- Efficient collection of quality data across the maximum swath to reduce time on task
- Efficiency benefits through provision of quality raw data to reduce post processing time

HIGH QUALITY DATA PROVIDES HIGH QUALITY ENCs IN A COST EFFECTIVE MANNER

EM 122 - Specifications

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Beam width:

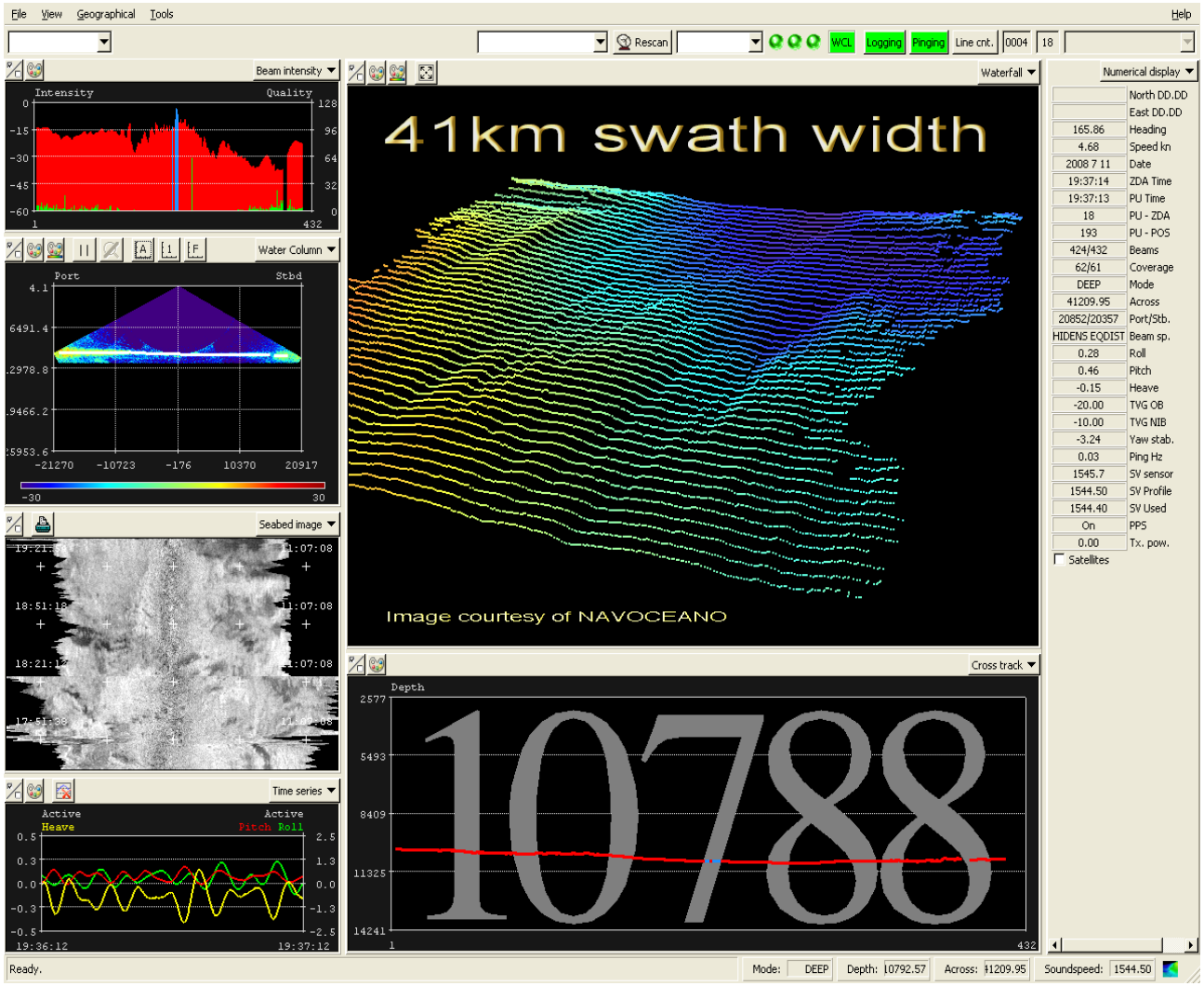
Available beam widths are:

- 0.5 x 1
- 1 x 1
- 1 x 2
- 2 x 2
- 2 x 4

The system can also be delivered with a non-standard number of modules to optimize beam width in accordance with the vessel hull shape and size.

EM 122 - Results

KONGSBERG



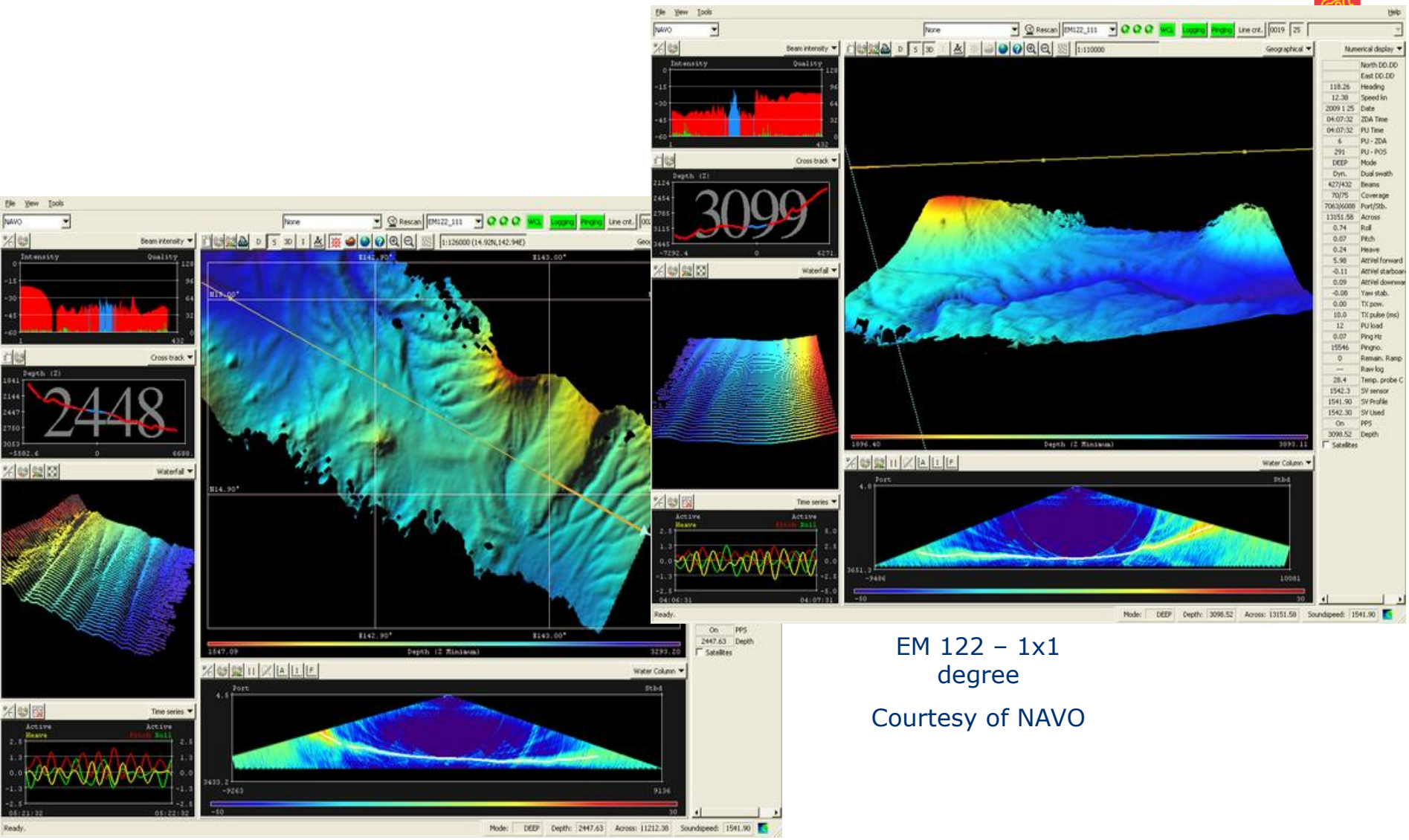
EM 122 – 1x1 degree

41209 meter across

62/61º coverage

Courtesy of NAVO

EM 122 - Results

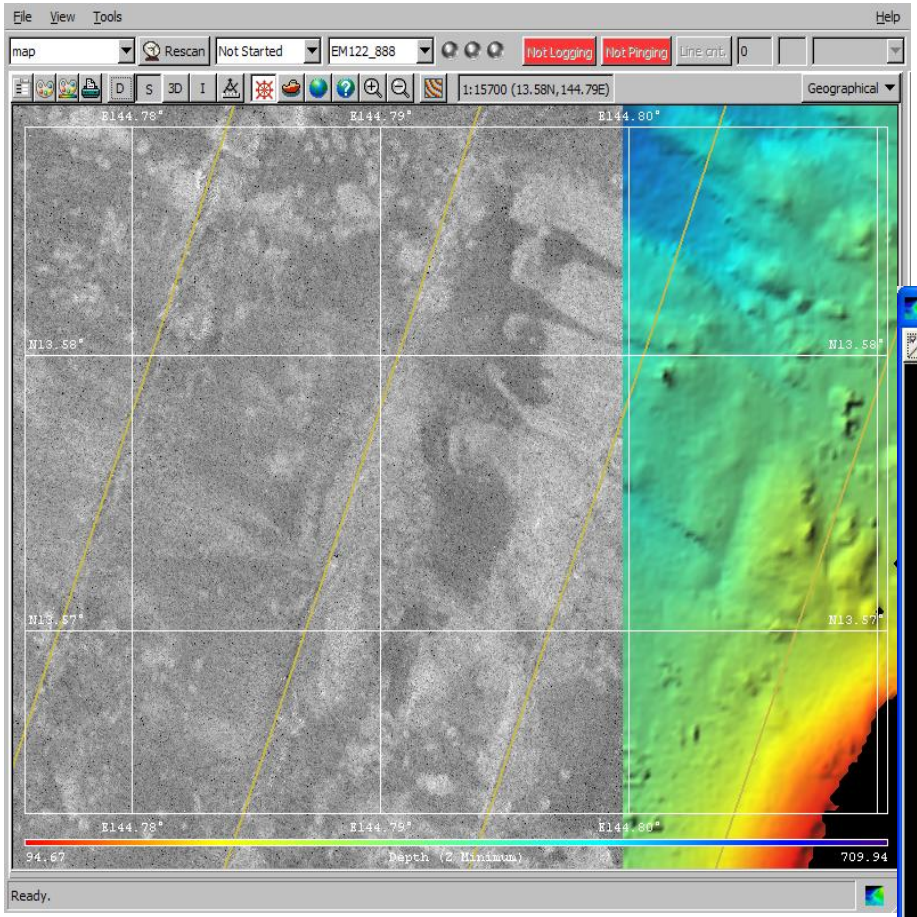


EM 122 – 1x1 degree

Courtesy of NAVO

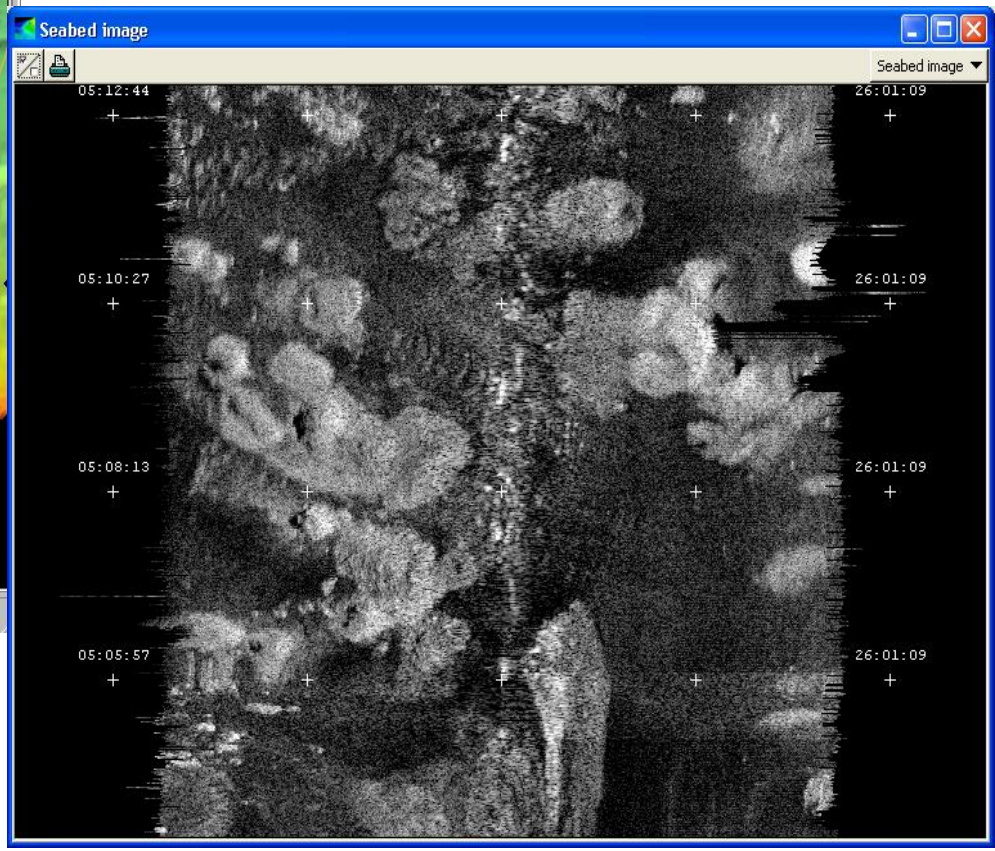
EM 122 - Results

KONGSBERG



EM 122 – 1x1 degree

Courtesy of NAVO



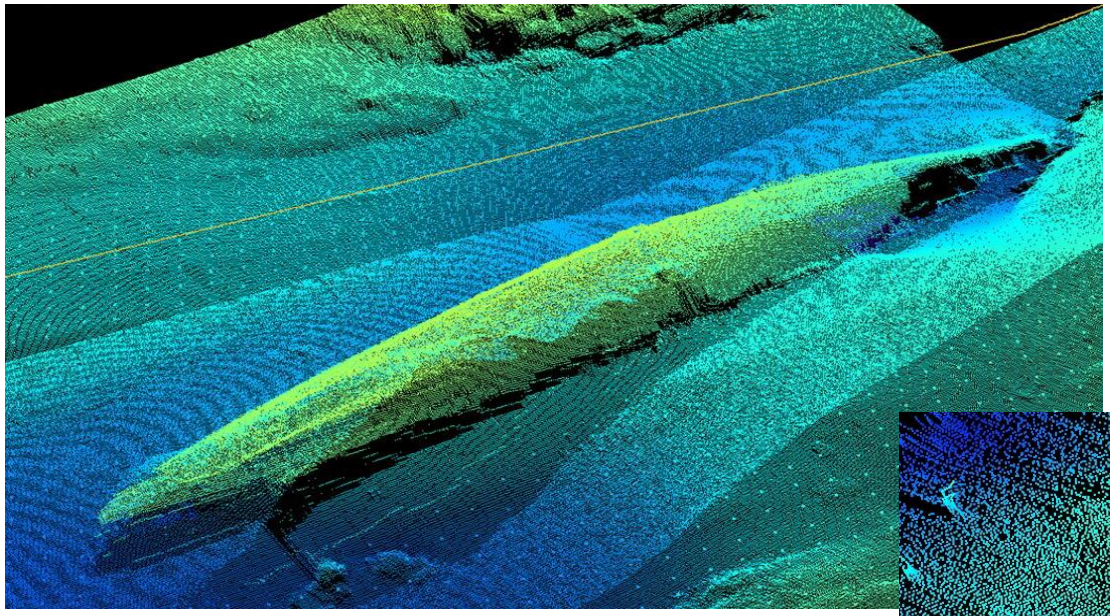
EM 710 - Specifications

KONGSBERG

- Frequency : 100 kHz (67 – 103 kHz)
- Range : 3 to 2000m
- Max swath width : 2.3 km (-30dB)
- 5.5x water depth (down to 250m)
- 140 degrees angular coverage sector
- Range sample rate: 15 kHz (5 cm)

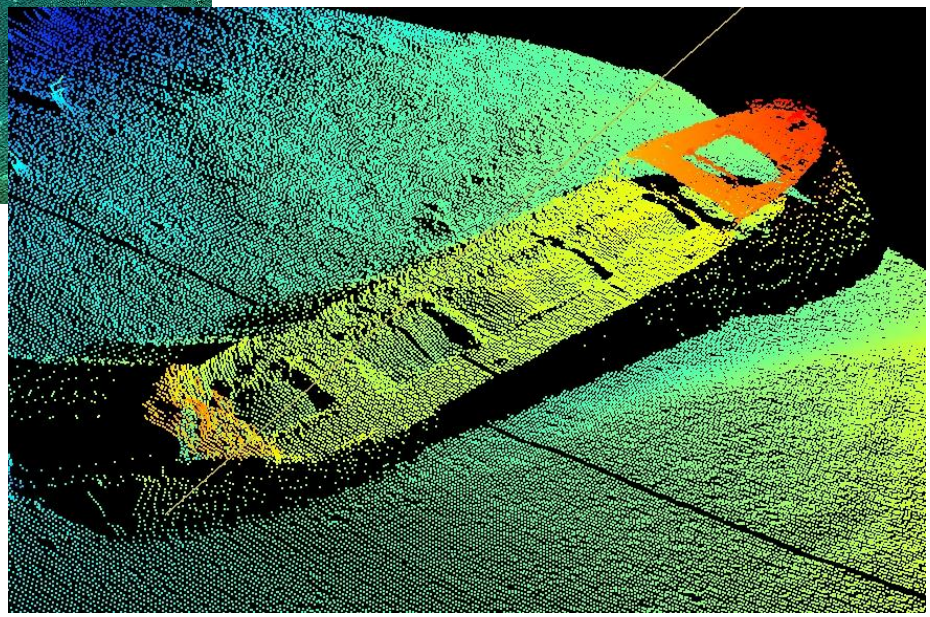
- Available beam widths are:
- 0.5 x 1
- 1 x 1
- 1 x 2
- 2 x 2
- No. soundings : Up to 800 with high density mode
- Pingrate : >30 Hz

EM 710 – Results



EM 710 0.5x1

Wreck outside Horten at 100m depth



EM 710 0.5x1

Wreck outside Horten at 50m depth

EM 710 – Results

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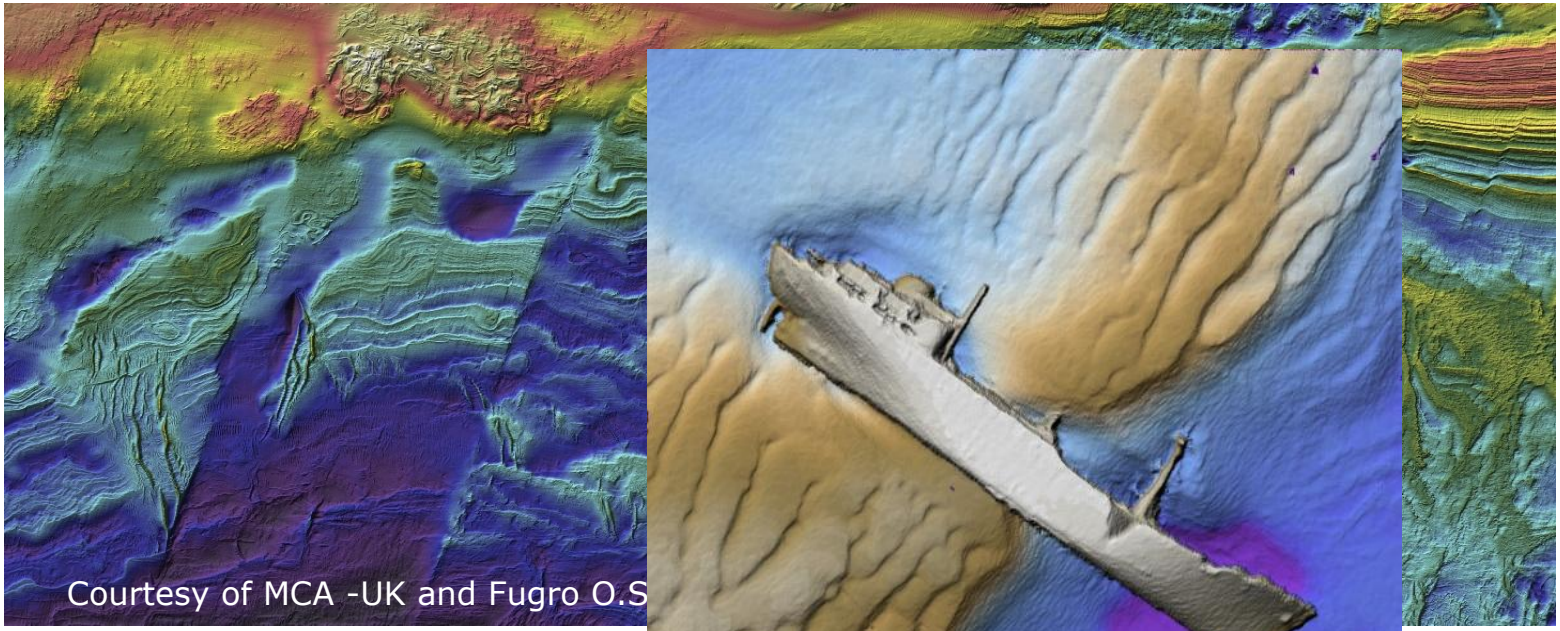
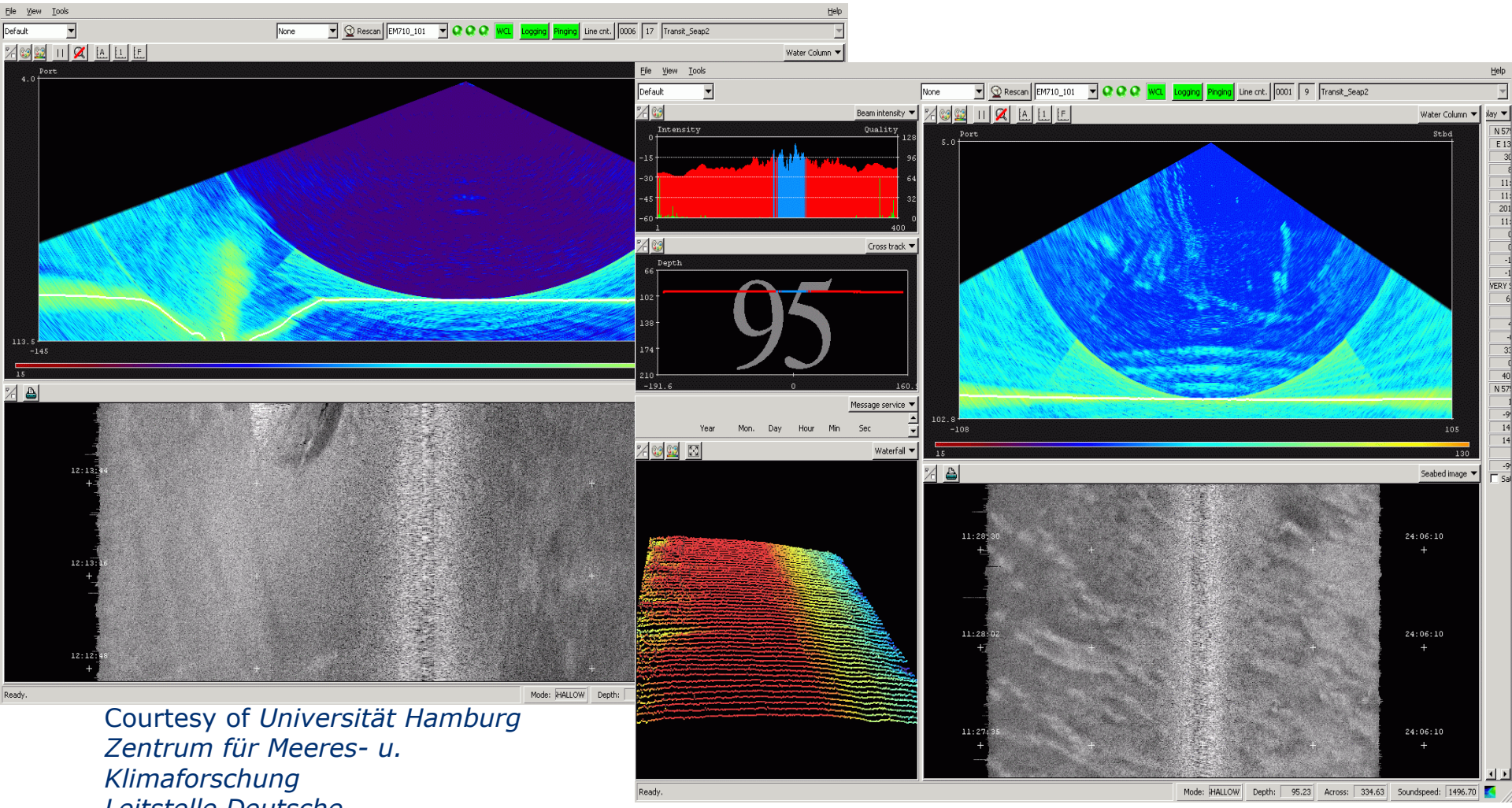


EM 710 - 0.5x1 degree

EM 710 – Results

KONGSBERG



Courtesy of *Universität Hamburg Zentrum für Meeres- u. Klimaforschung Leitstelle Deutsche Forschungsschiffe*

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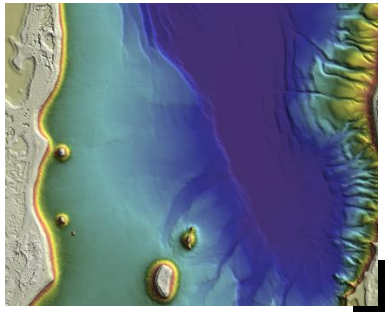

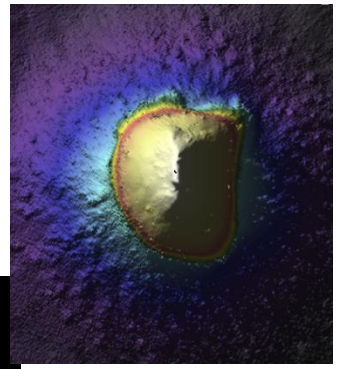

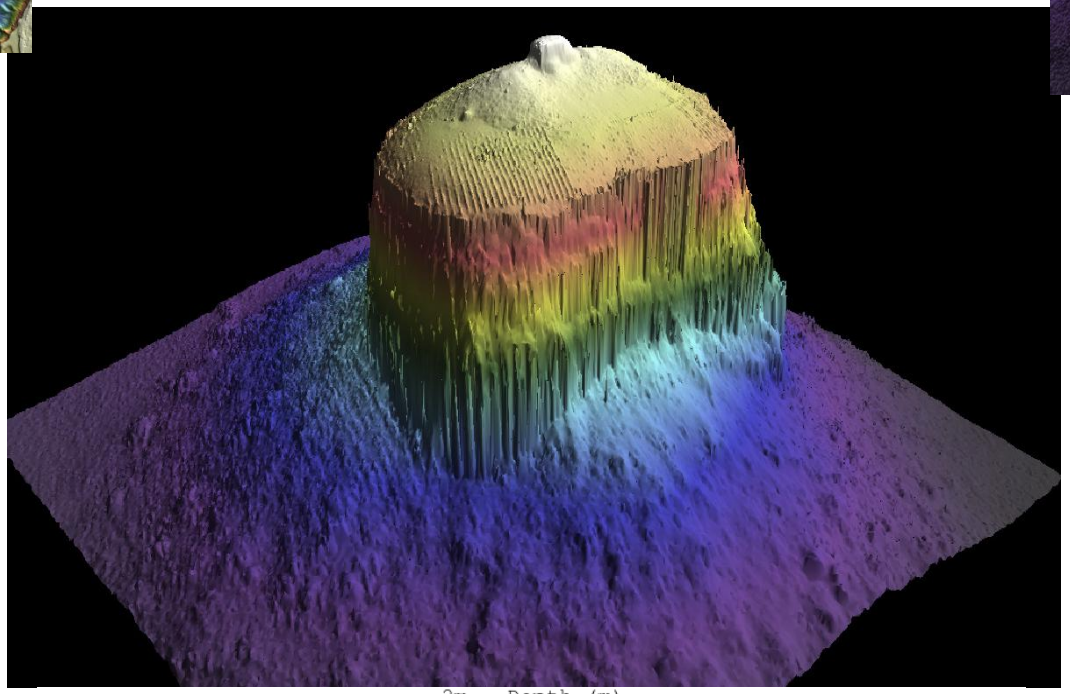

Images provided with permission of FUGRO

Reduction of Training Requirement ??

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- Training will always be necessary
- Training is expensive
  - Financially
  - Resource
- Technology can help reduce training burden ?
  - Funding and resource can be reallocated
  - High end technology can provide long term Value for Money

EM 2040 – Wide Band Multibeam
System overview

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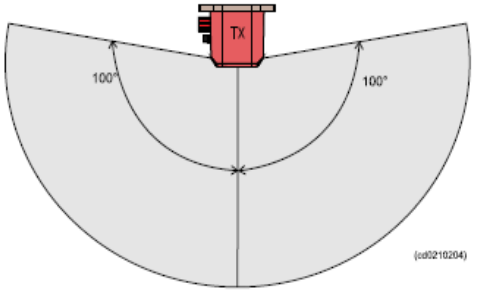
Available system configurations:

EM 2040-07: 0.7 x 0.7 degree (TX x RX)

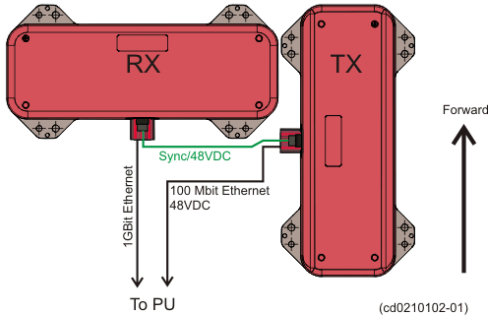
EM 2040-04: 0.4 x 0.7 degree (TX x RX)

EM 2040C: 1 x 1 (TX x RX)



Dual configuration

0.7 x 0.7 configuration

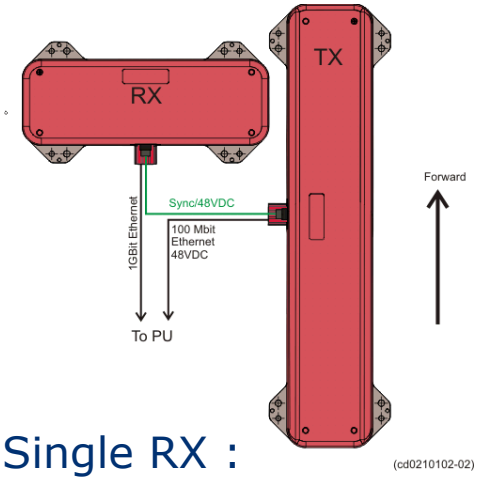


Single RX :

Coverage 5.5x Depth

(140 degrees)

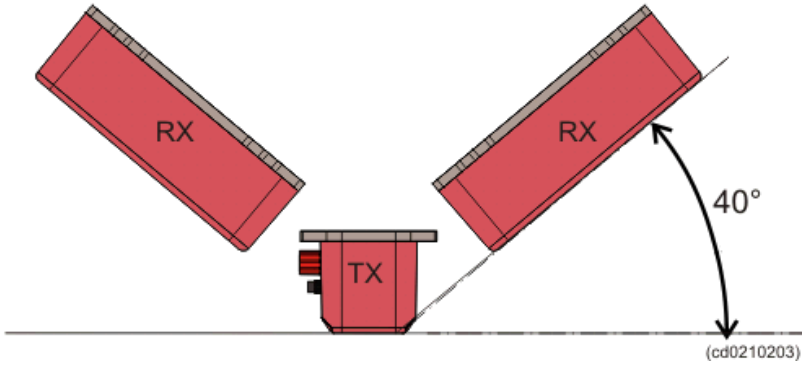
0.4 x 0.7 configuration



Single RX :

Coverage 5.5x Depth

(140 degrees)



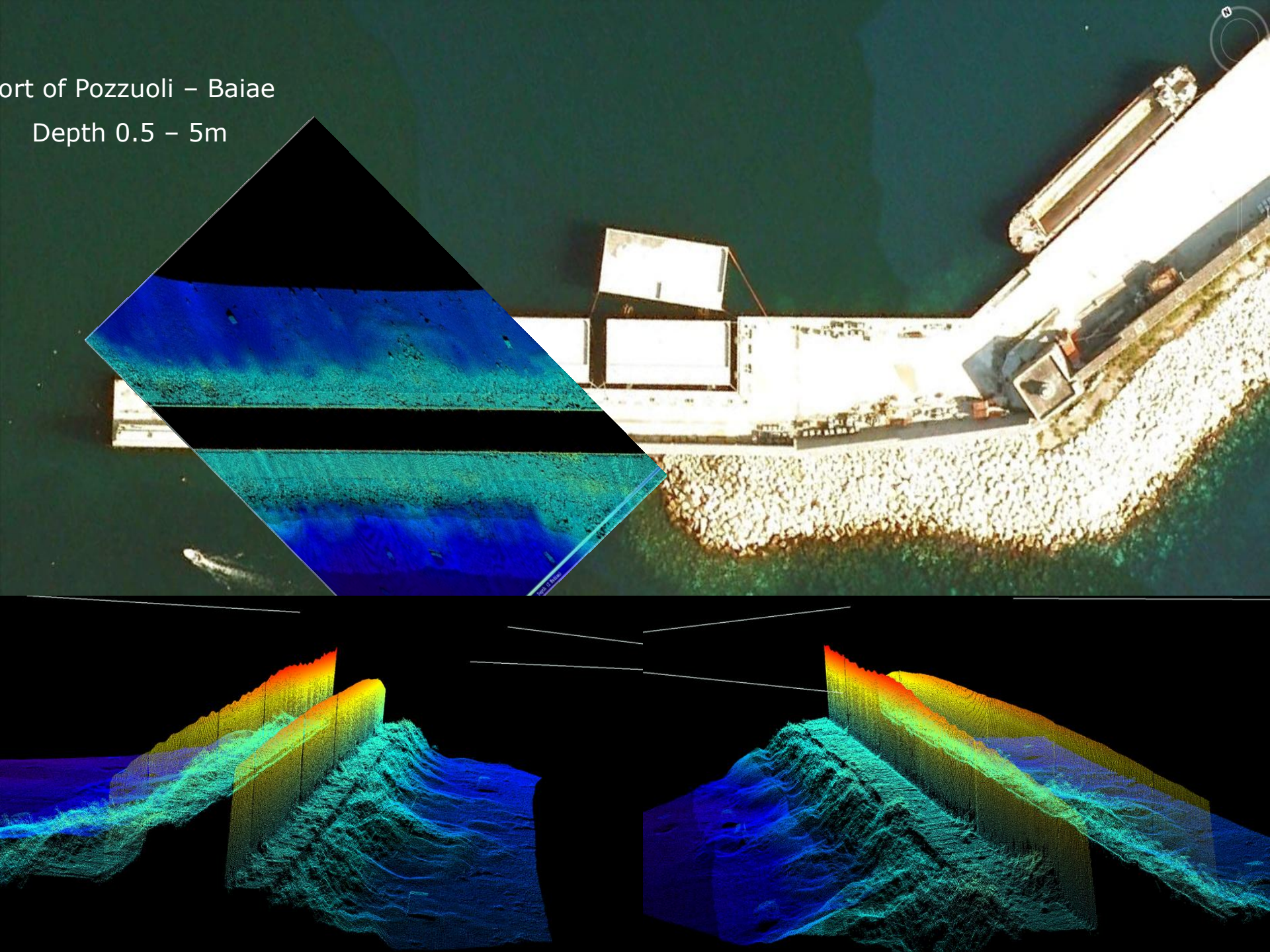
Dual RX :

Coverage 10x Depth

(200 degrees)

ort of Pozzuoli – Baiae

Depth 0.5 – 5m



Images – Shallow water conference NZ

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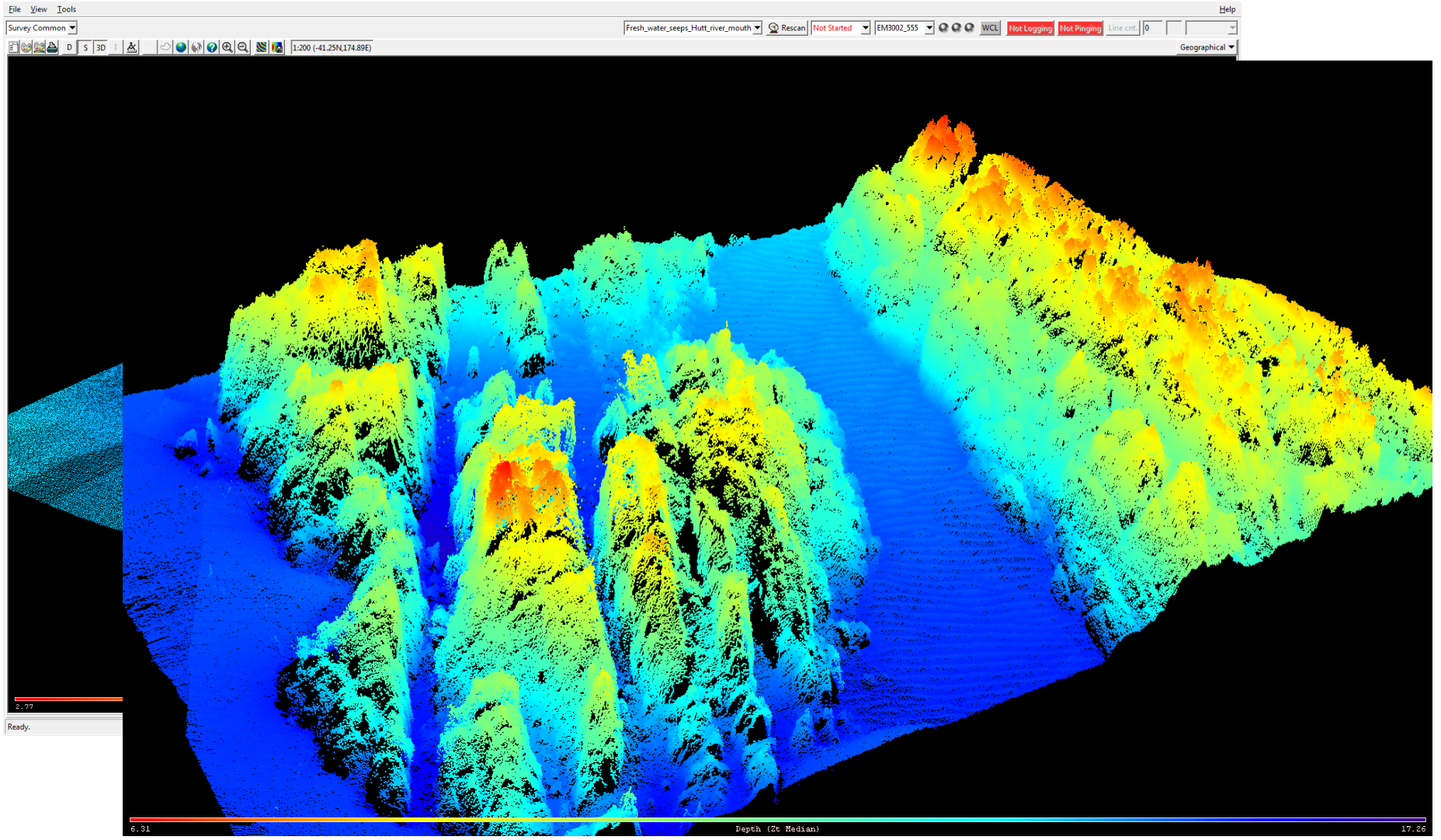
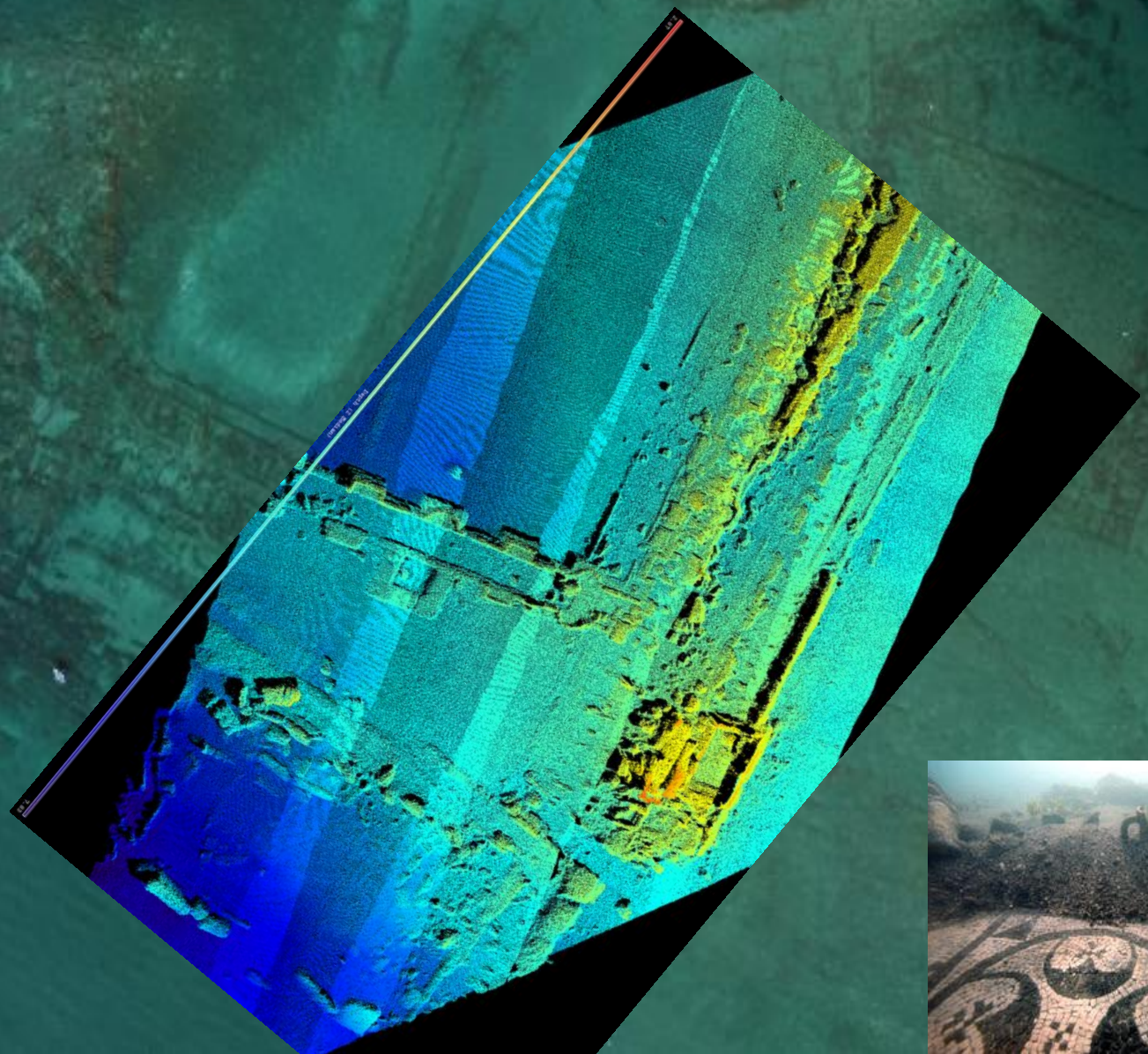


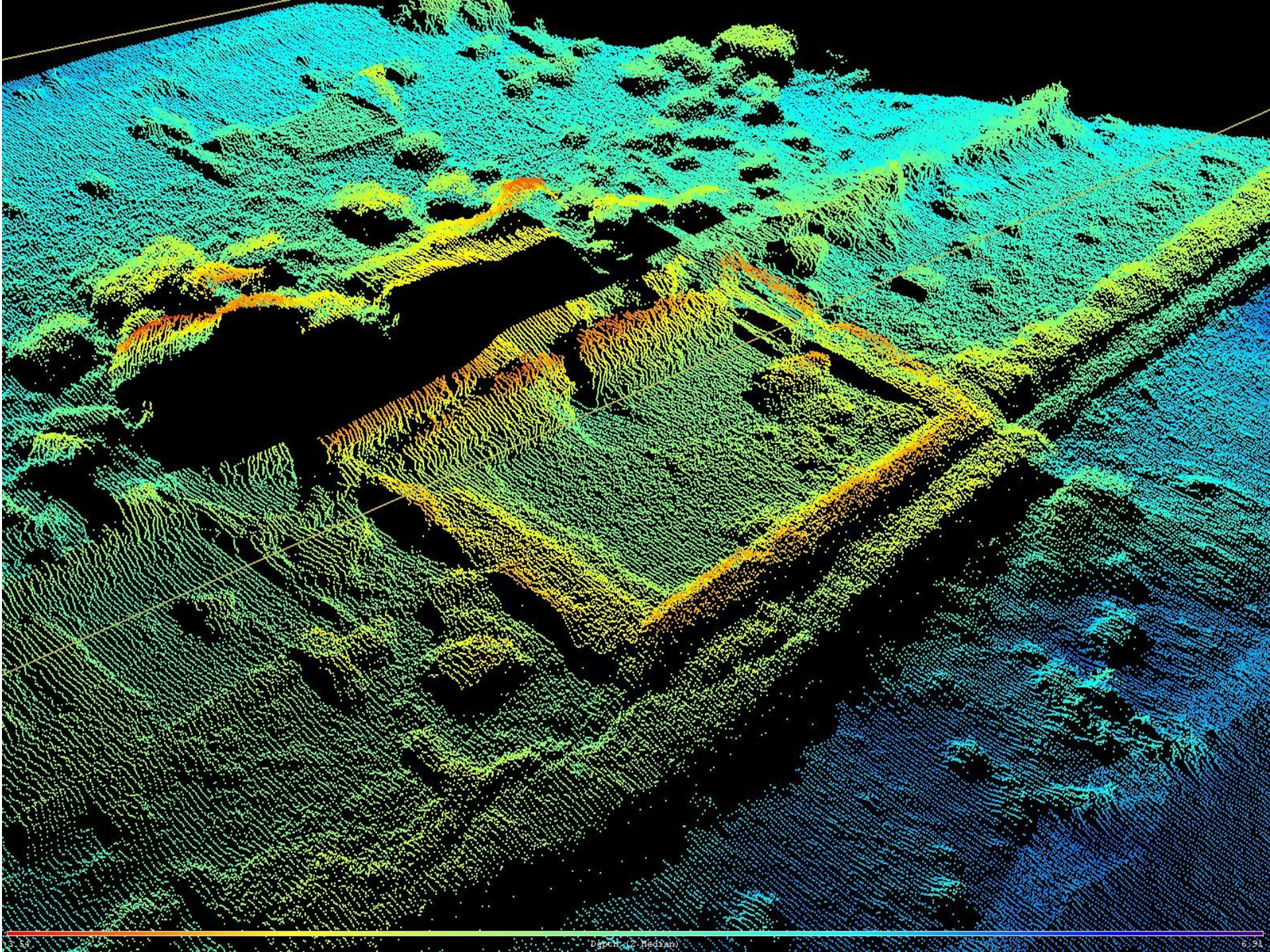
Portus Julius

Port of Baia – Naples

Depth 0.5 – 5m

Sunken Roman city




Depth (2 Median)

EM 2040 – Result

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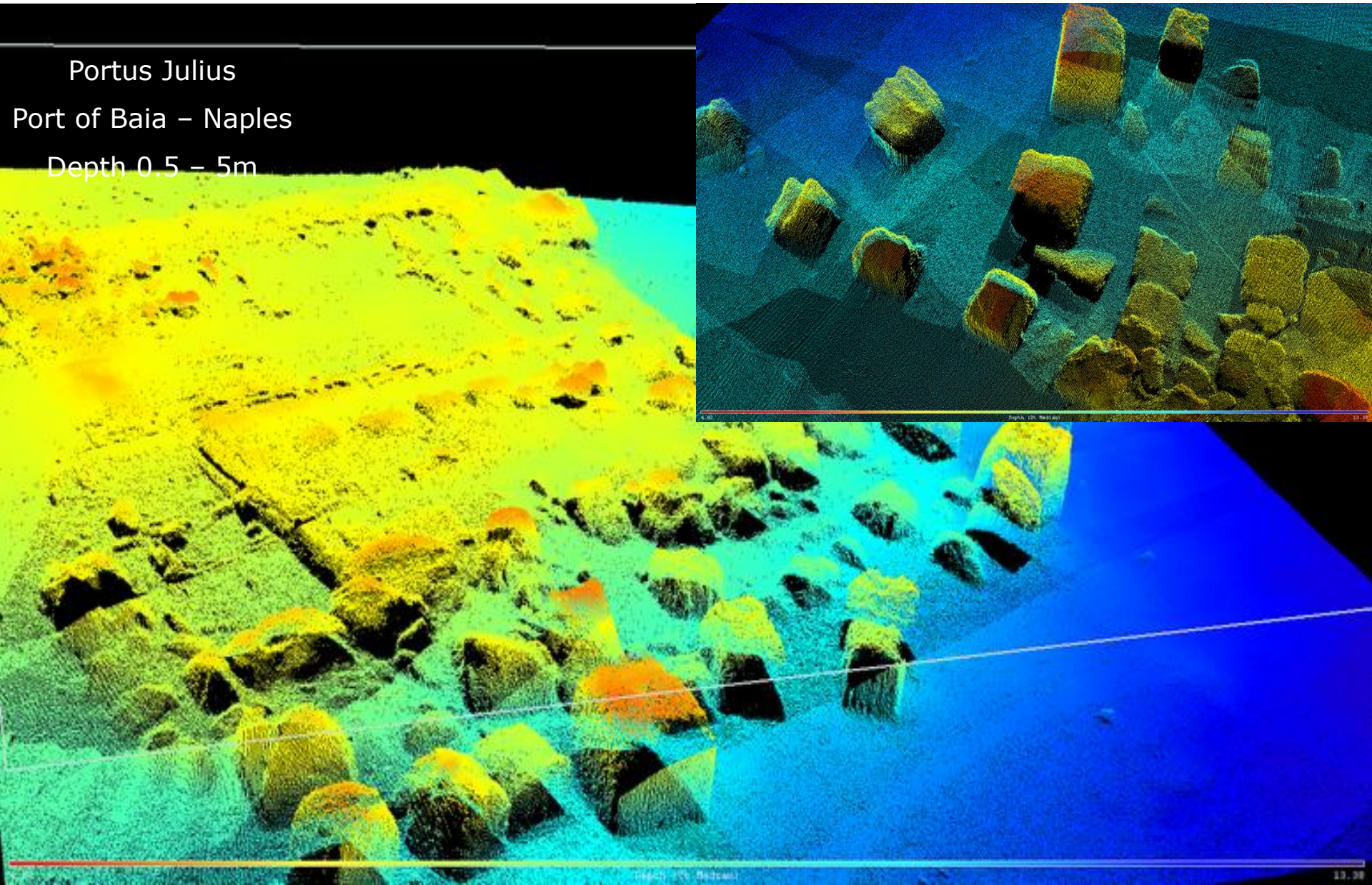

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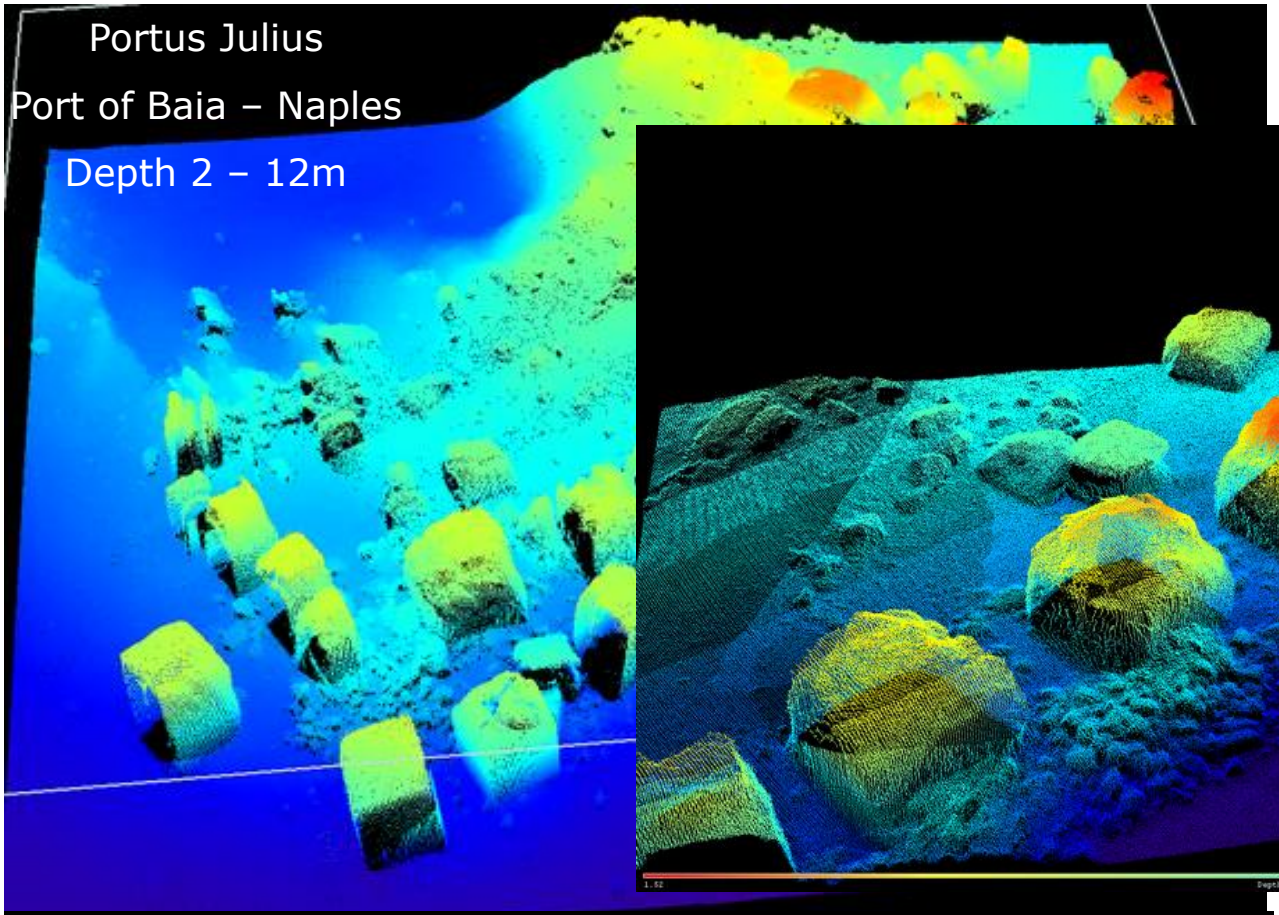
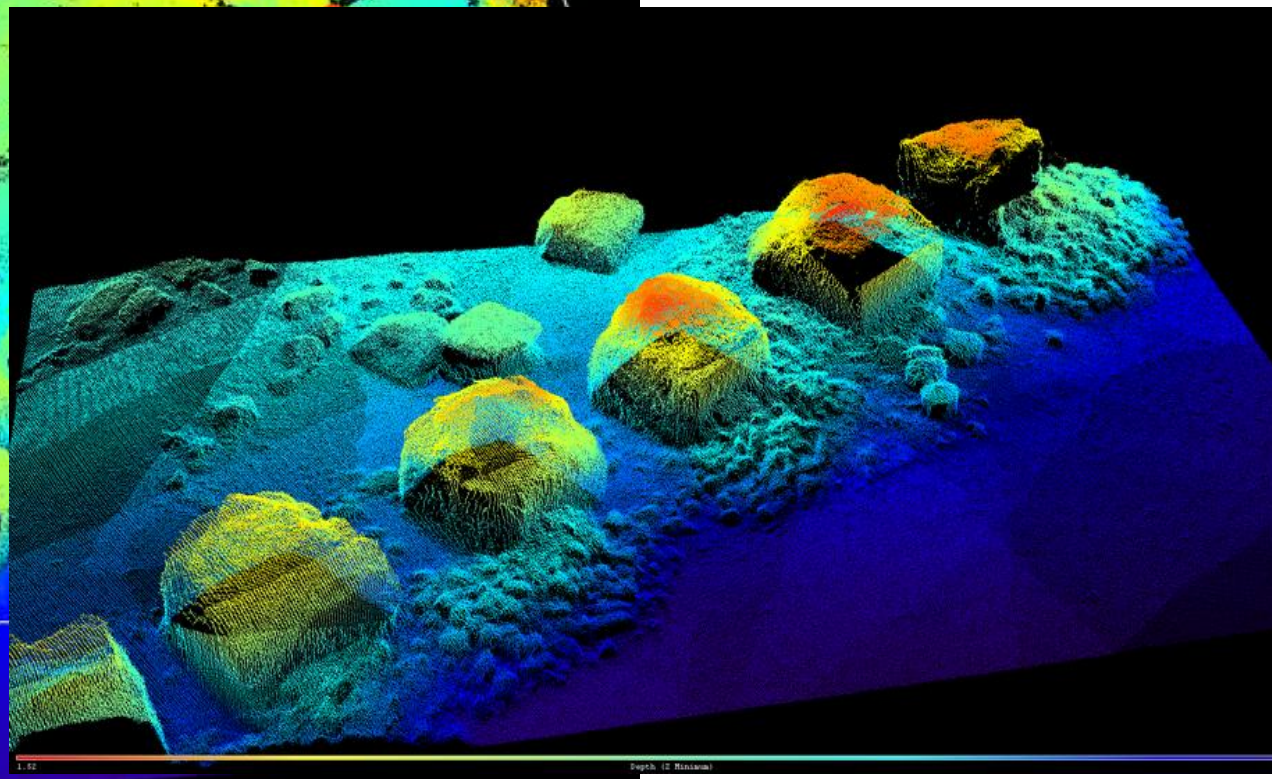
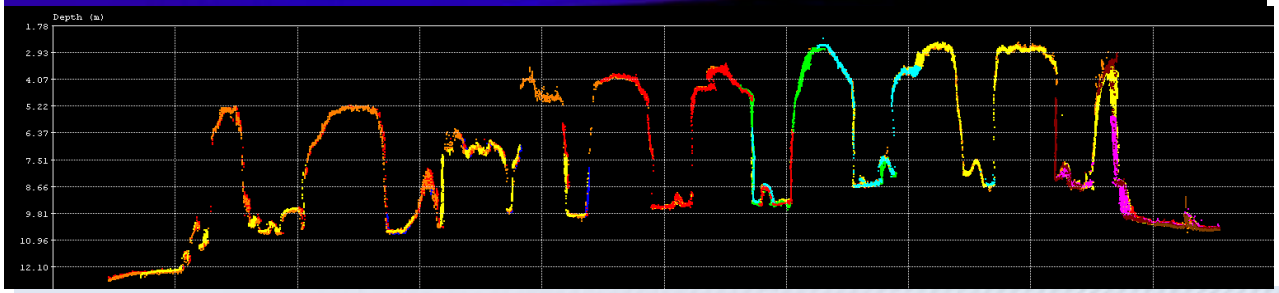
Portus Julius

Port of Baia – Naples

Depth 2 – 12m







EM 2040 – Results – The end of data cleaning

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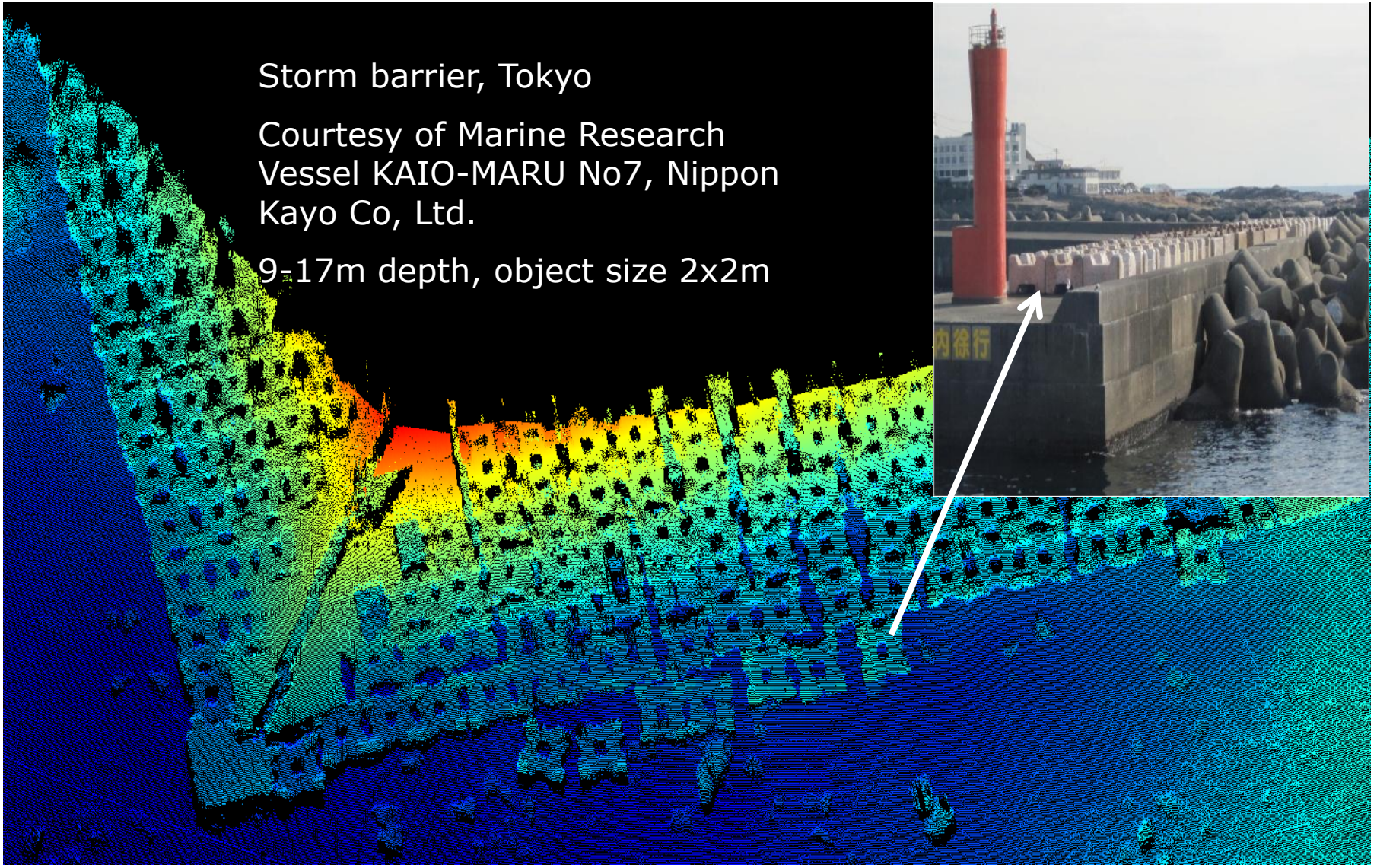
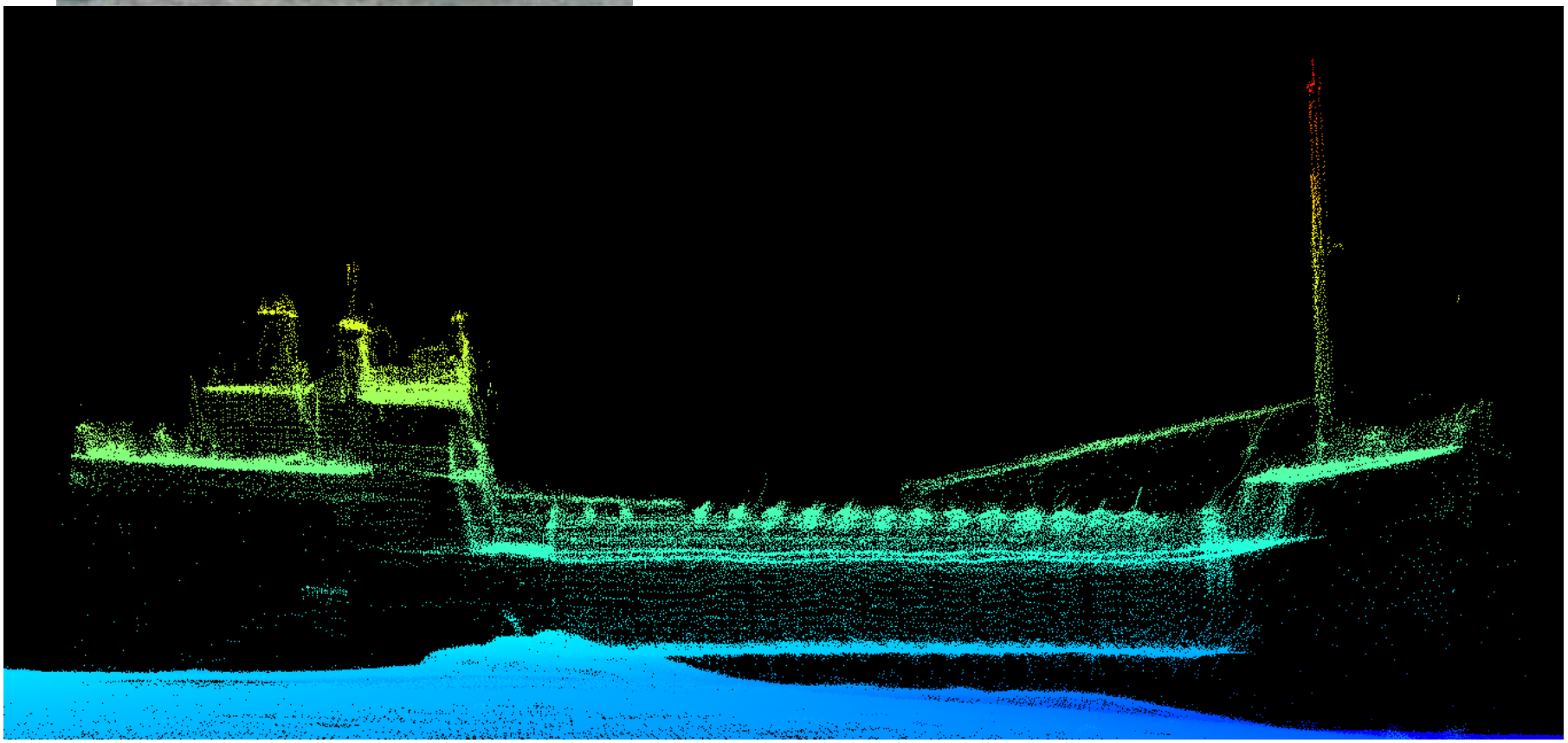


EM 2040 0.4 x 0,7 degrees -

Single RX system

300kHz / 70us - depth/sea bottom 30m

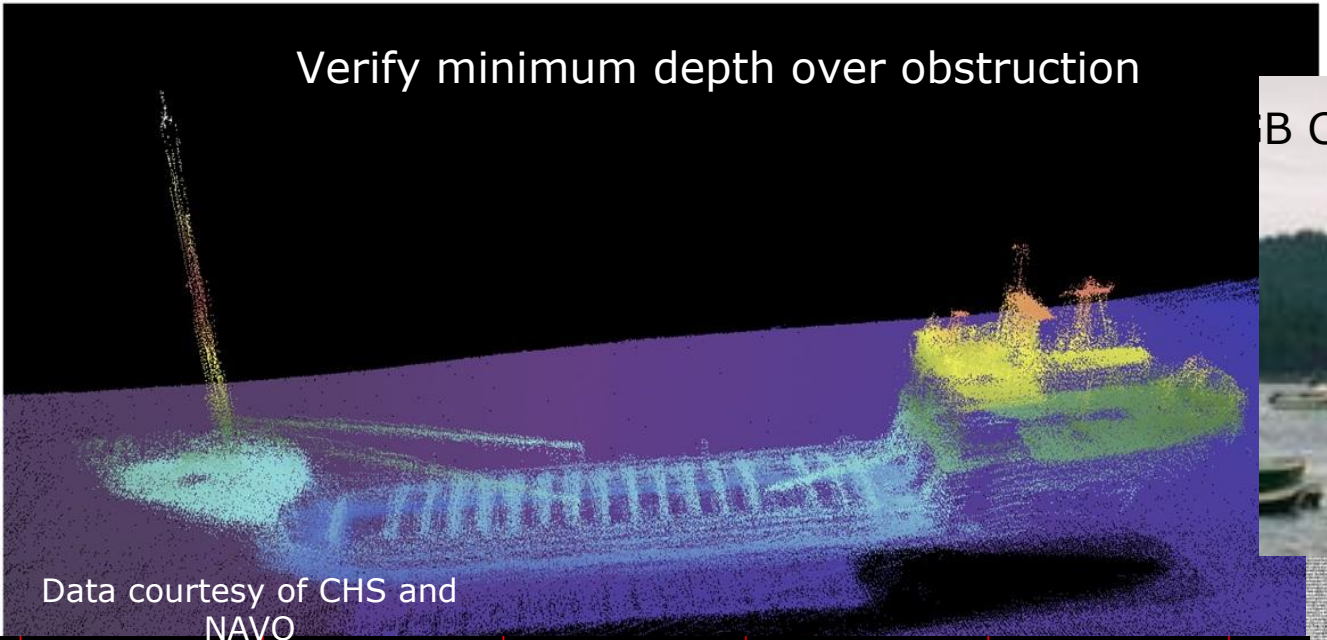
The wreck Church



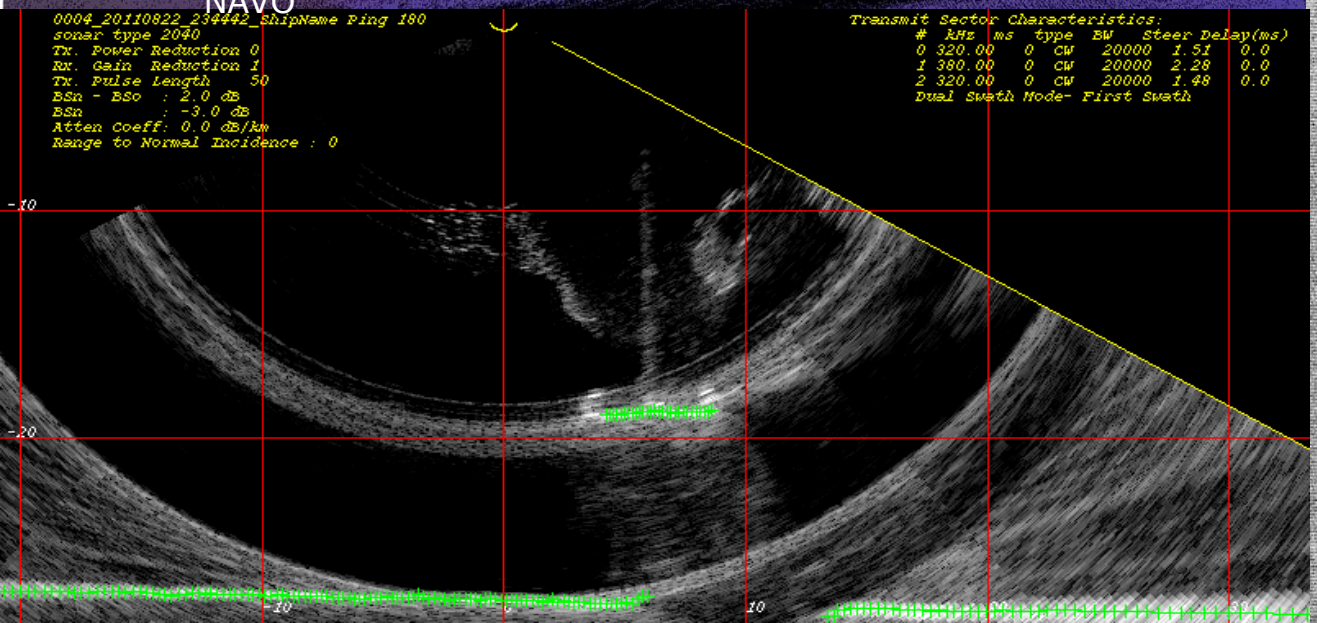
Courtesy of Canadian Hydrographic Services

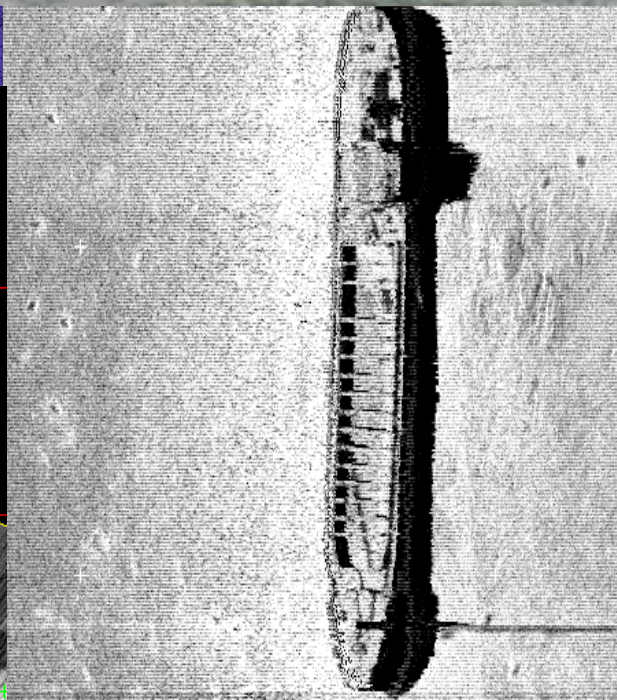
EM 2040 – Watercolumn results

KONGSBERG



Data courtesy of CHS and NAVO





EM 2040 – Watercolumn results

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EM 2040 – Results – The end of data cleaning

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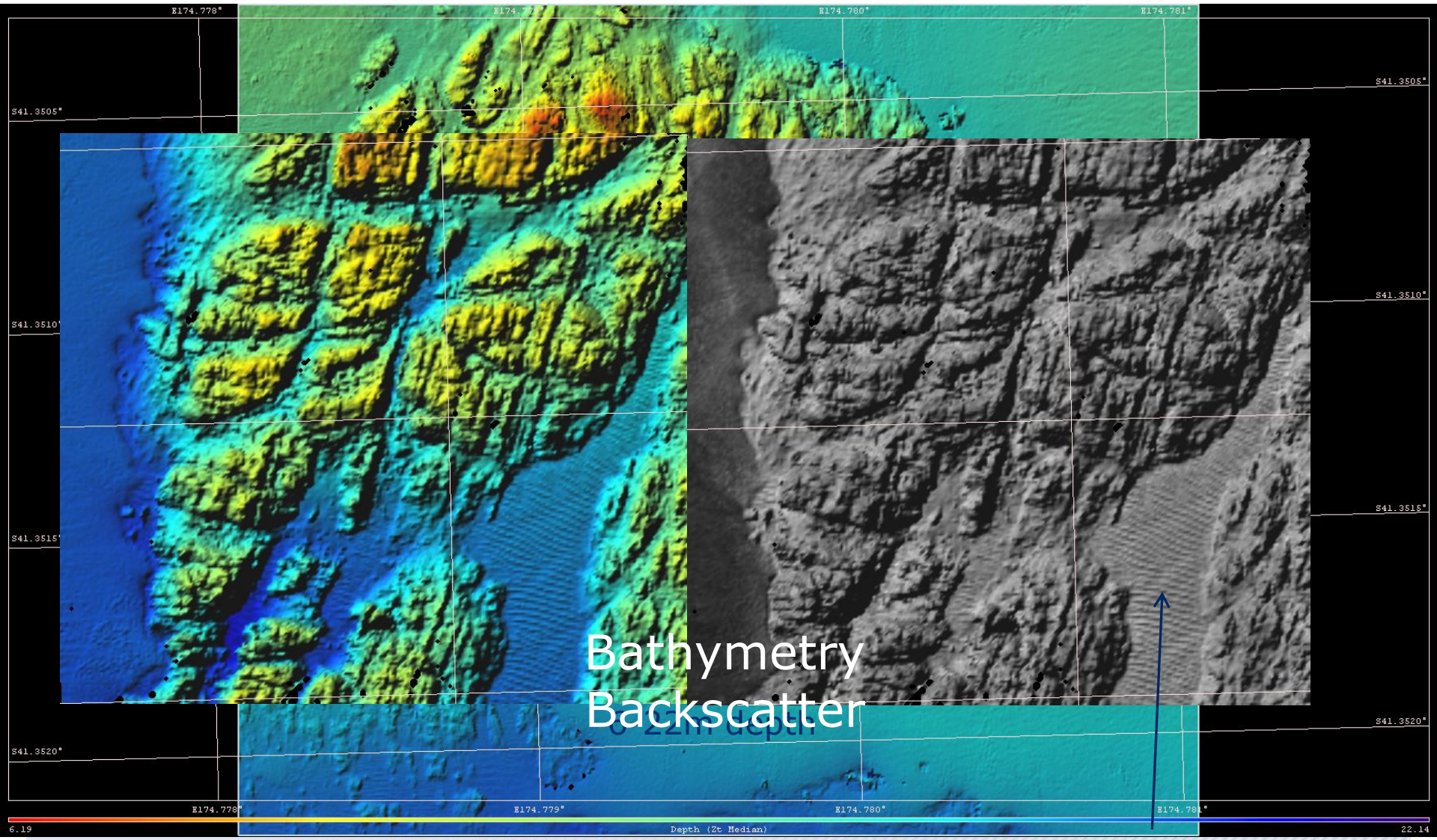

Sand waves +/- 8 cm at 15 m depth

Survey Data Direct to Database Initiative

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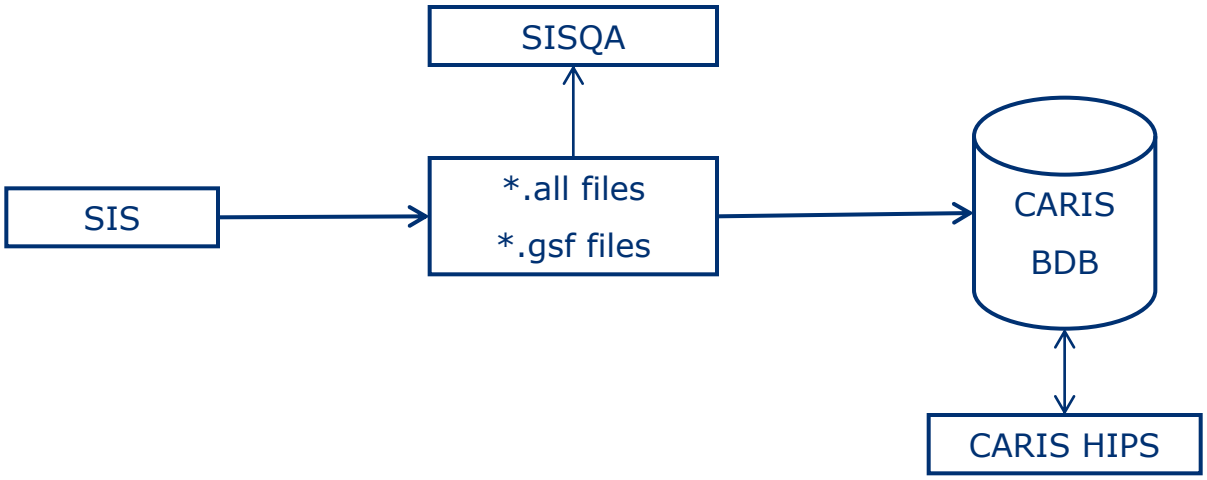
Kongsberg SIS (SISQA) to CARIS bathy DataBASE

HIPS/SIPS used to process erroneous data

If the data is clean then real time data basing and product creation becomes a reality !!



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Extracted from an Industry Paper presented to the IRCC in Singapore in 2012. It is available on the IHB Website under Capacity Building.

- The following have been identified as requiring some form of enhancement to pull through Capacity Building to its conclusion:
  - Funding
  - Education
  - Training
  - Organic capability
  - Sustainability

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- Funding
  - The CBSC has limited funds and a wide remit, it is not intended that this proposal draws heavily, if at all, on this funding stream
  - Mechanisms are in place to bid for enhanced funding against international bodies but these have yet to be leveraged and exploited
  - Potential donor organisations, if presented with evidence of a coherent plan for development of hydrography in support of both SOLAS requirements and economic generation may provide the avenue for capital funding of industry contribution
  - Industry can assist the IHO in the lobbying of such organisations as the World Bank etc
    - The Blue Economy Vision is a useful 'hook'

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- Education
  - It is considered that the IHO consider funding specific modules or full IHO Cat B Certification through distance learning courses
  - This element is essential for the long term generation and maintenance of an organic capacity at a national level
  - Industry can provide bespoke, in country education to specific equipments, systems, operations or procedures for a tailored hydrographic capability

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- Training
  - Industry is able to make available a permanent equipment and training service to a regional operator undertaking regional survey schemes
  - The regional operator, in time, could provide support and training to its region enhancing organic capability
  - Phase 2 Training has been proven and recognized as a mechanism for proving the need for hydrography. Industry can continue to support these initiatives on a cost plus basis.

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- Organic Capability
  - In 2003 the UN recognised the progress the IHO and RHC's had made in Capacity Building but encouraged intensified efforts to continue towards organic capability
  - It is not expected every developing nation would have complex, expensive equipment but, at the minimum, a basic equipment set allowing it to meet its SOLAS obligation and support its economic development
  - Kongsberg and CARIS have led Industry contribution to date and together with Fugro are leaders in their fields and have strong links with each other. Together we can provide a coherent and consistent contribution to IHO aims and objectives in achieving a national hydrographic capability
  - Industry cannot lead CB that is the remit of the IHO. Industry recognise that its contribution is not for short term gain.

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- Sustainability
  - Once a Organic Capability is deemed to have been achieved there will be a requirement to monitor and assess such through the CB programme
  - Industry is well placed to deliver 'top-up' education and training at discrete or regular intervals to assure sustainable capability is restored and/or maintained

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- This proposal makes several assumptions:
  - The involvement of Industry is recognised as a collaborative approach with the IHO
  - Industry training costs and incurred direct overheads are covered
  - IHO continue to lead at the political level
  - A sustainable training programme leading to, and maintaining organic capability is agreed
  - **The host Region / State must have a recognised and stated requirement for data collection**, charting and other uses; sustainable resources; demonstrable real-term contribution in the form of personnel, facilities and platform
  - **The host must become a major stakeholder**
  - Cat B certification, preferably in depth could be an aim; training should be aimed at one nation at a time; training should be ideally in English; training should be a combination of practical and classroom training; practical training shall deliver products to IHO S-44 standards.

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- Summary

  - Industry cannot undertake CB alone, nor wishes to
  - This proposal relies on the IHO recognising the potential of Industry contribution
  - Donor organisations shall be leveraged for funding recognising a coherent Industry and IHO approach to CB
  - CB strategy can be aimed at individual nations, collective nations or at the RHC level. Industry can provide a flexible response as required.
  - **Industry expects stakeholders and recipients to contribute to CB effort**
  - Sustained support, education and training must be included in any CB package
  - Industry should recover costed outlay and develop further business opportunities under the regional IHO schema
  - Kongsberg, CARIS and Fugro stand by to support the IHO by providing a unique portfolio of experience, resource and flexibility to deliver hydrographic CB

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ROPME Sea Area Hydrographic Commission
Riyadh 4th - 6th March 2013

Thank you