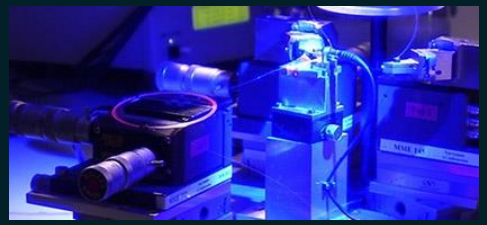
iXblue

iXblue develops advanced technologies to match Customers' challenges in tough environments

iXblue develops advanced technologies to match Customers' challenges in tough environments

iXblue










All necessary know-how for any critical component or operation is developed in-house

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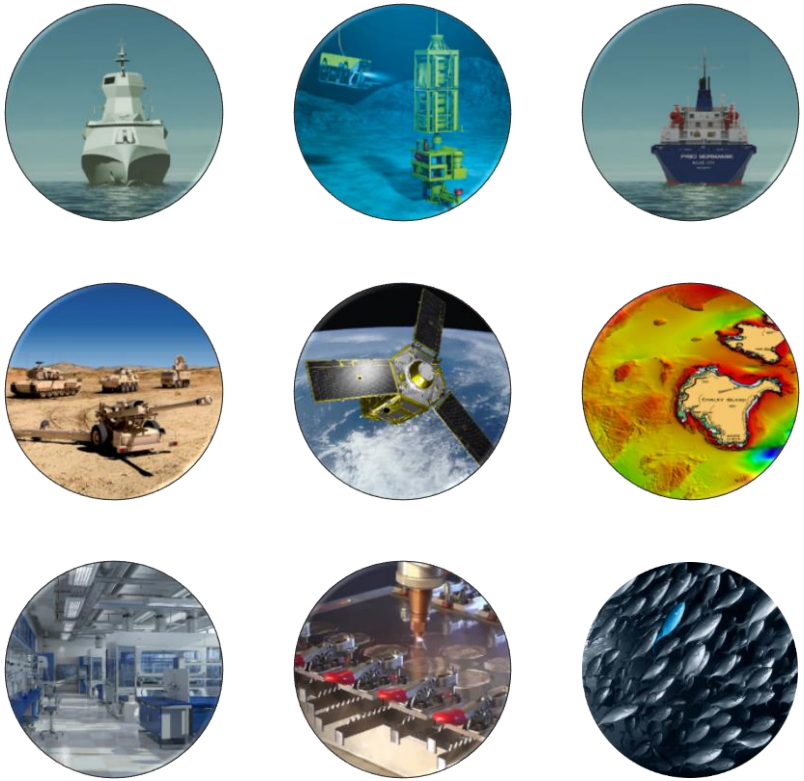
Global Presence

24/7



Global Markets

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PHOTONIC SOLUTIONS

Specialty Fibers
& Photonic
Components

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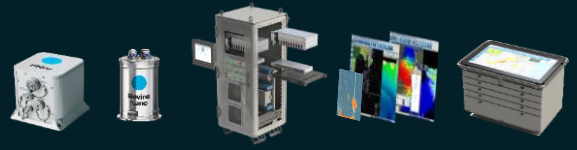
NAVIGATION SYSTEMS

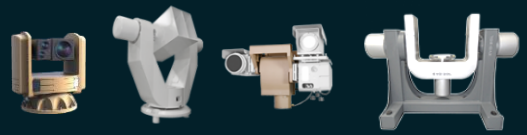


Inertial Systems
& Navigation Solutions

iXblue
ACOUSTICS SYSTEMS

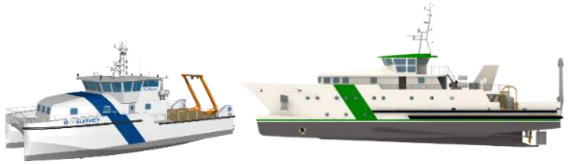
Acoustic Positioning
& Sonar / Sounder solutions

iXblue
MOTION SYSTEMS



Multi-axis Tables, Simulators,
Pan & Tilt & Positioners

iXblue
DIVISION H2X

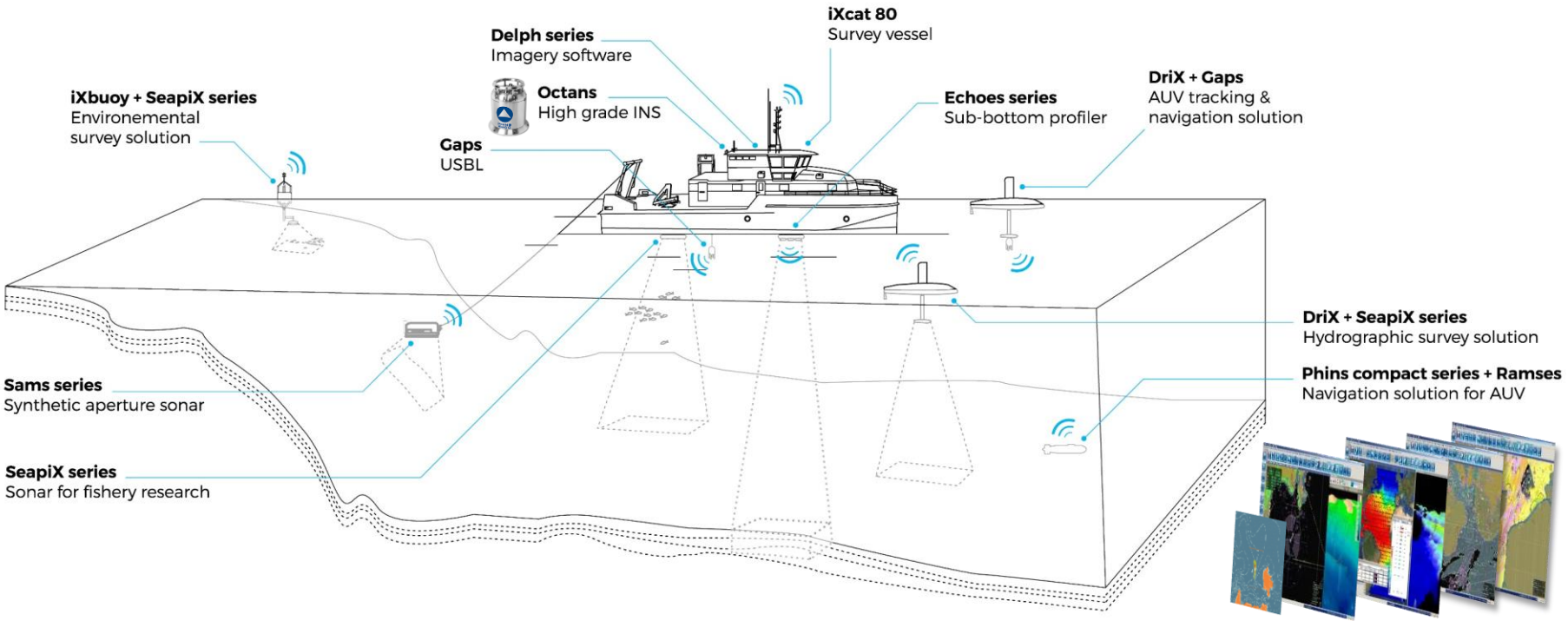


Composite
Specialized ships

iXblue
SEA OPERATION

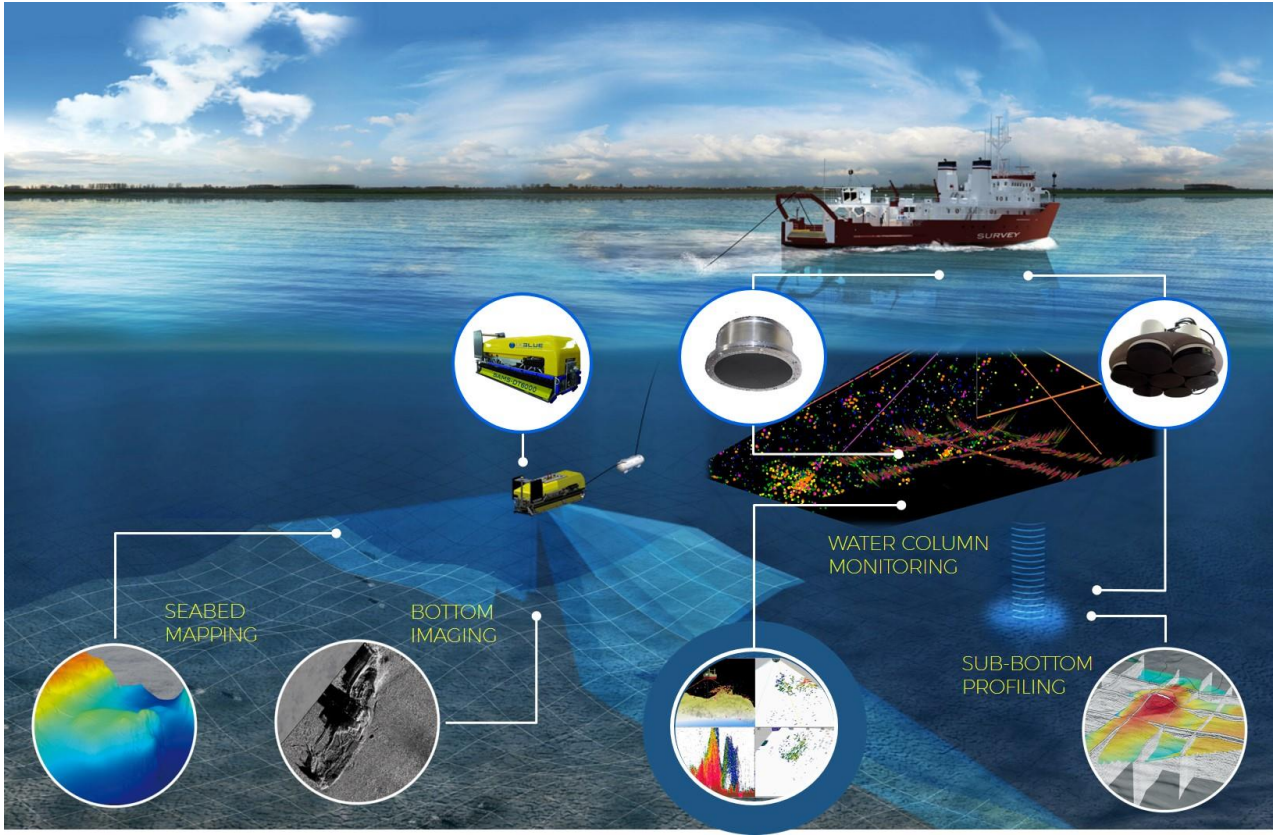
A Survey
Company

Our strength : building on in-house Expertise



Sonar System Division

- More than 30 years of experience in acoustic solution design
- Ocean Imaging
  - Water Column
  - Seabed
  - Sub-bottom
- Key technologies
  - Transducers
  - 3D MBES
  - Inertial SAS
  - Software image processing
- 1400 m² facilities @ La Ciotat shipyard including water tank (acoustic testing down 8kHz)



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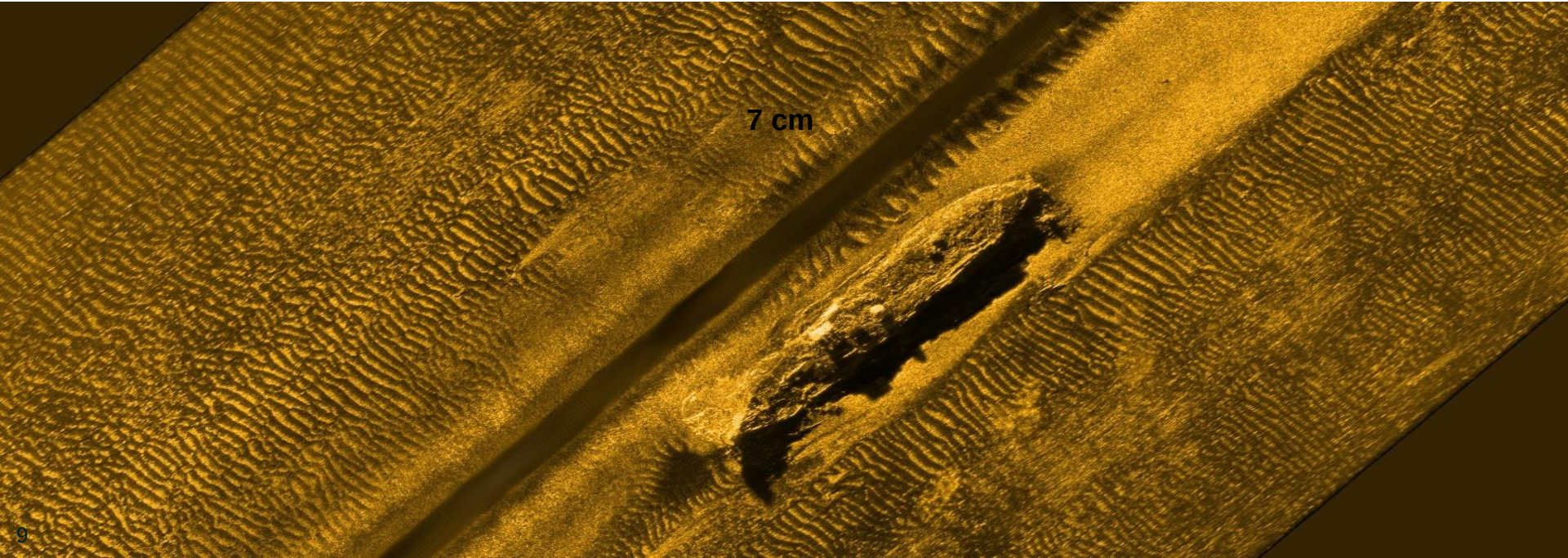
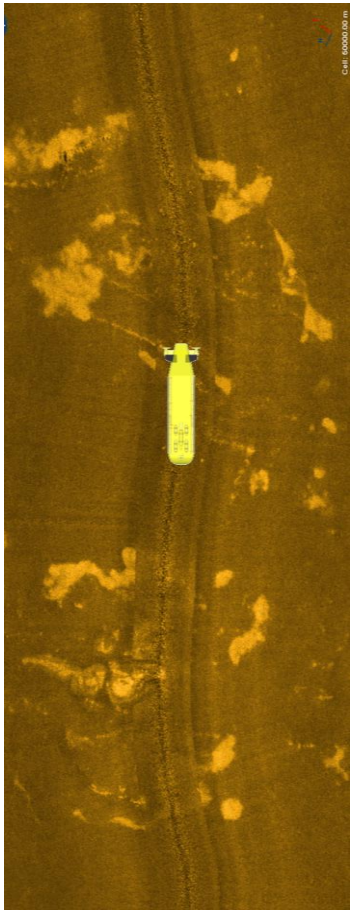
SAMS Inertial SAS Mapping



SAMS Product Range



SAMS-150-STD-1000 SAMS-100-LR-3000 SAMS-50-LR-6000

Reference	Length	Swath	Resolution	Operation Speed	Operation Depth	Full Swath Bathymetry
SAMS-150 Compact	1.2	500 m	7 cm	4	300	Yes by Default
SAMS-150 Standard	1.8	500 m	7 cm	7	1000 3000	Yes by Default
SAMS-150 High-Speed	2.4	500 m	7 cm	10	1000 3000	Yes by Default
SAMS-100	2.1	800 m	15 cm	6	1000 3000	Option
SAMS-50	3	1600 m	40 cm	3	6000	Option

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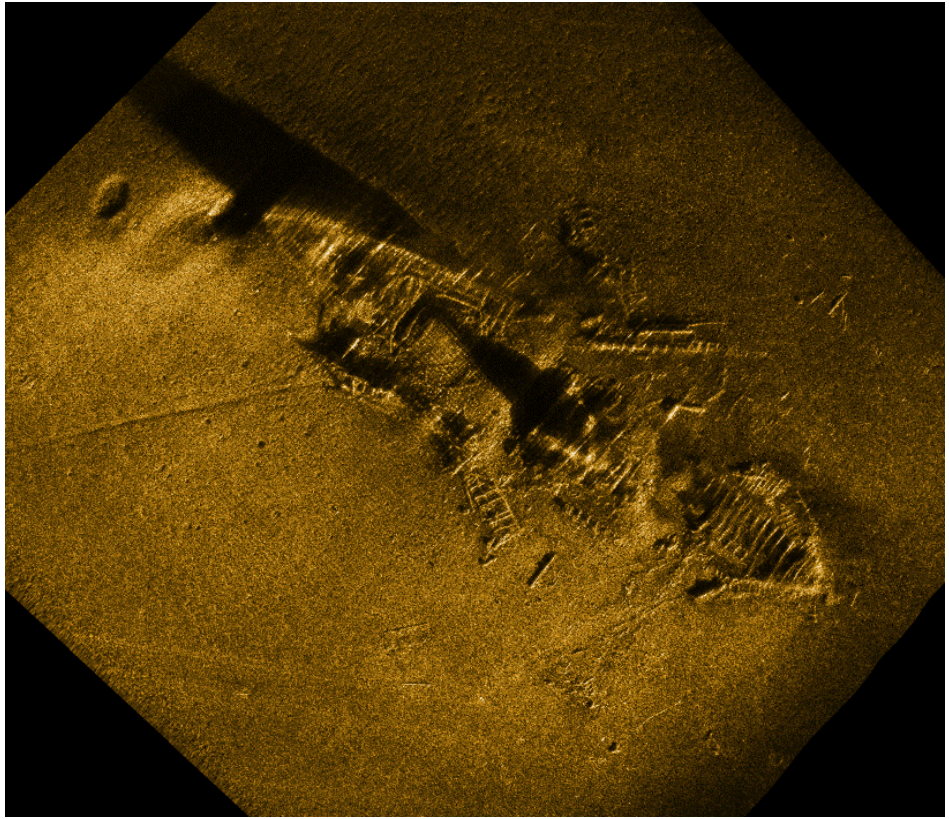
SAMS iXblue Inertial SAS

Key Features

- Real-Time Georeferenced Sonar Mosaic
- Sub-metric Absolute Positioning
- Optimizing target detection (Non coherent integration) and classification (high-resolution – coherent integration)
- SAS Gain > 6 in Any Condition
  (x10 more tolerant to platform motion than standard SAS)
- Raw Data available for Post-Processing
- Industry standard processing and analysis software solution
- Multi-sensor platform



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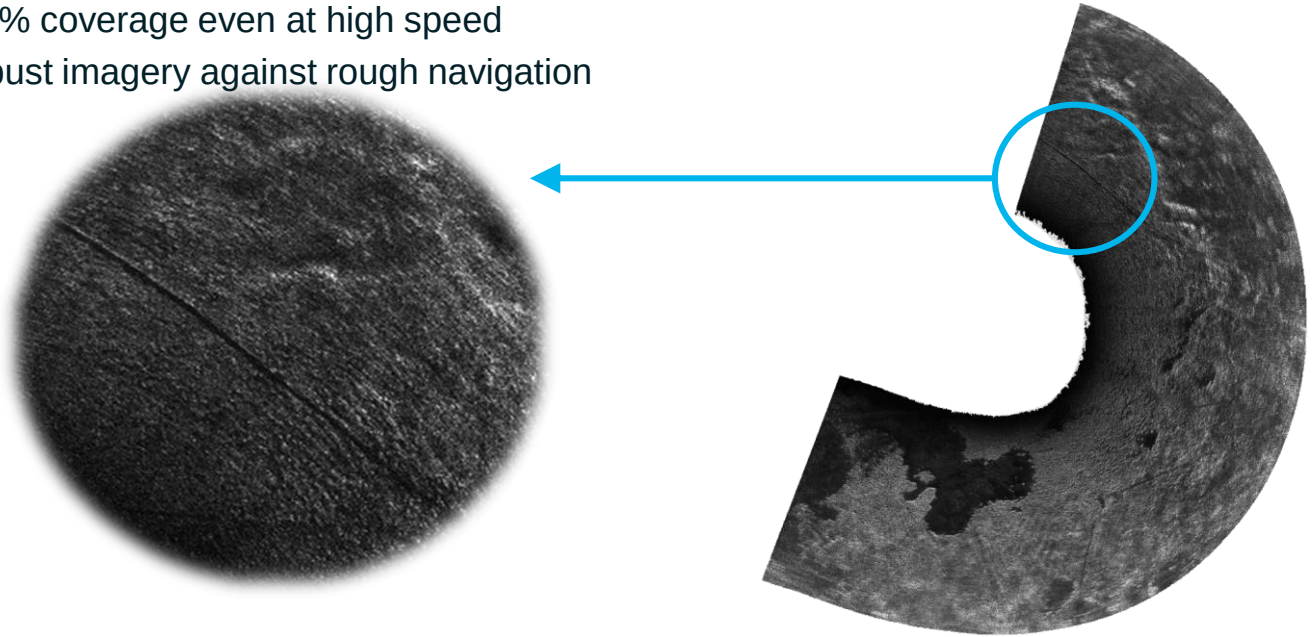
SAMS – Performances & Results

Extreme case: Imaging in U-turn

Wide Aperture Imaging

- Multiple sidescan beams are formed inside the wide emission aperture
- 100% coverage even at high speed
- Robust imagery against rough navigation



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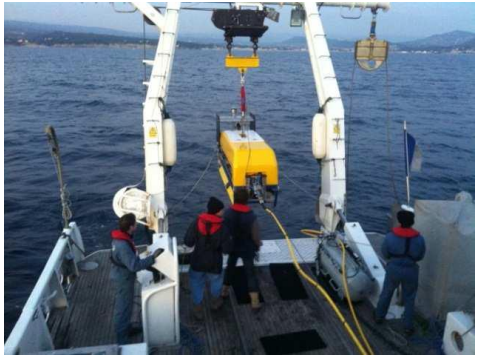
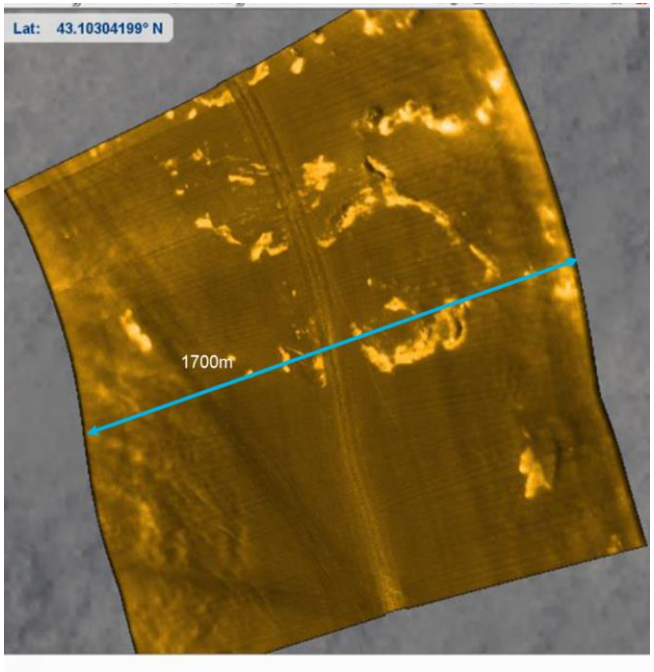
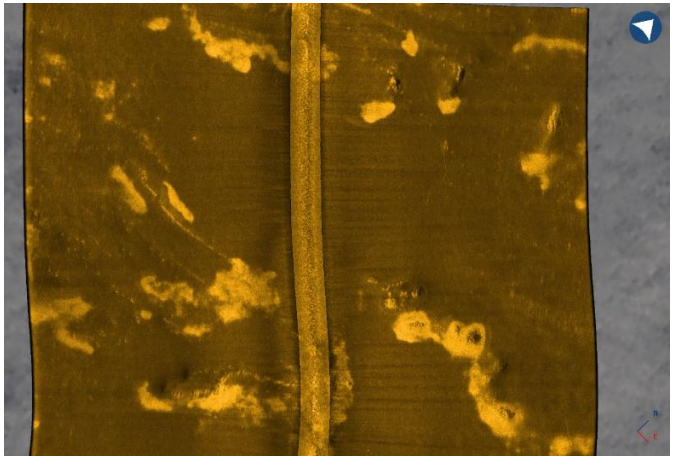
iXblue Deep-Tow Inertia

SAMS-50-DT-6000







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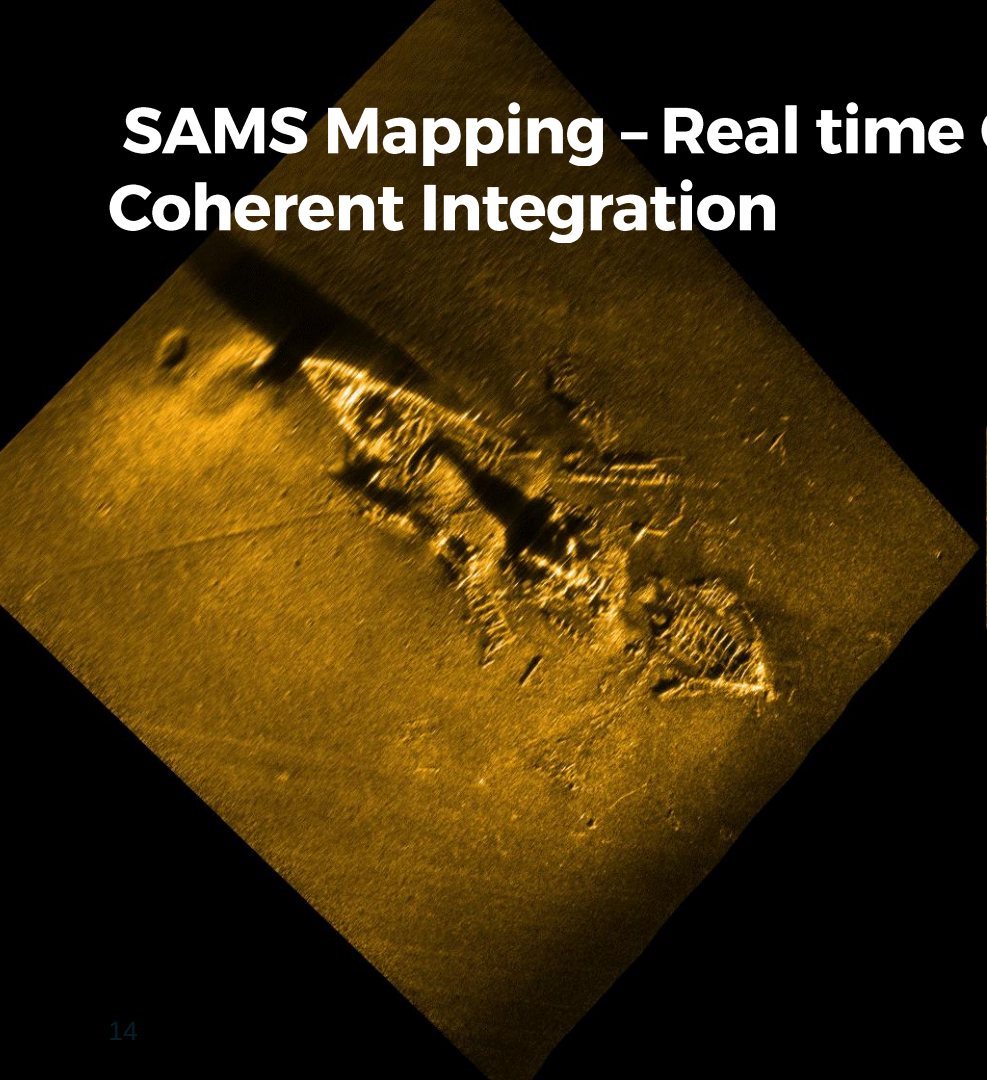
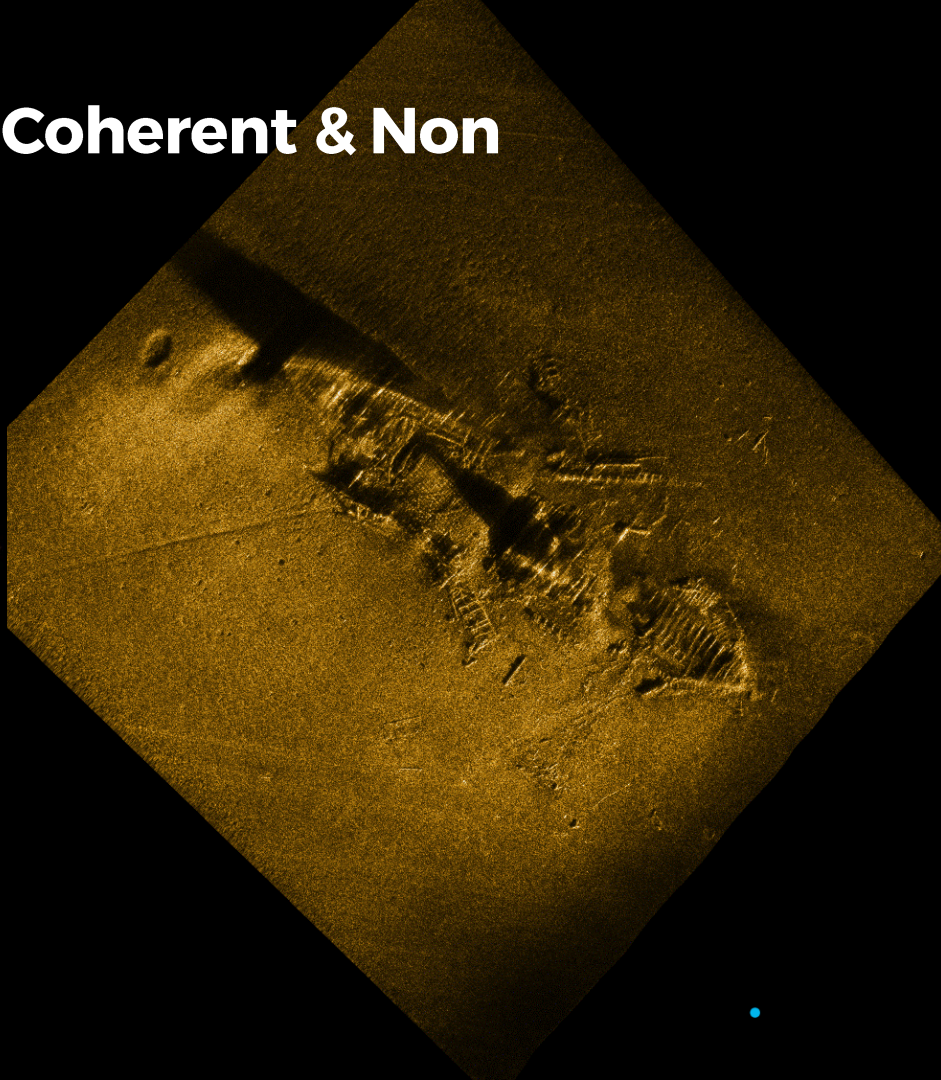
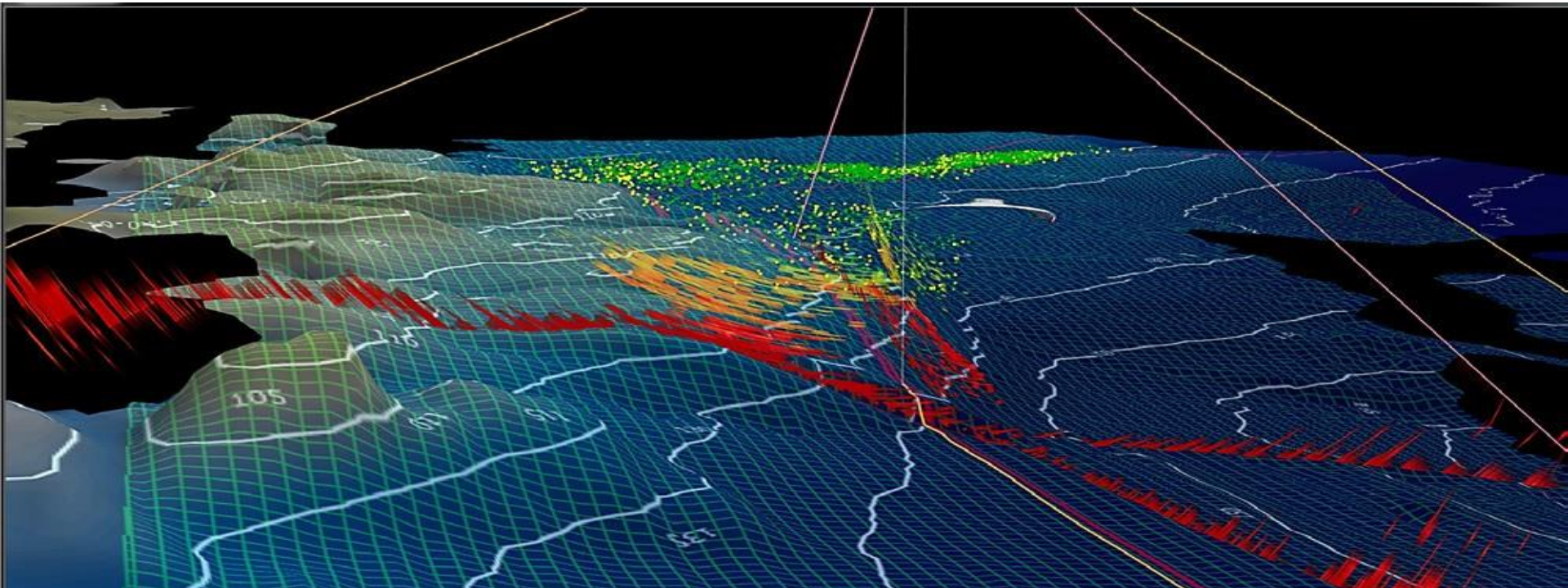
SAMS Mapping – Real time Coherent & Non Coherent Integration





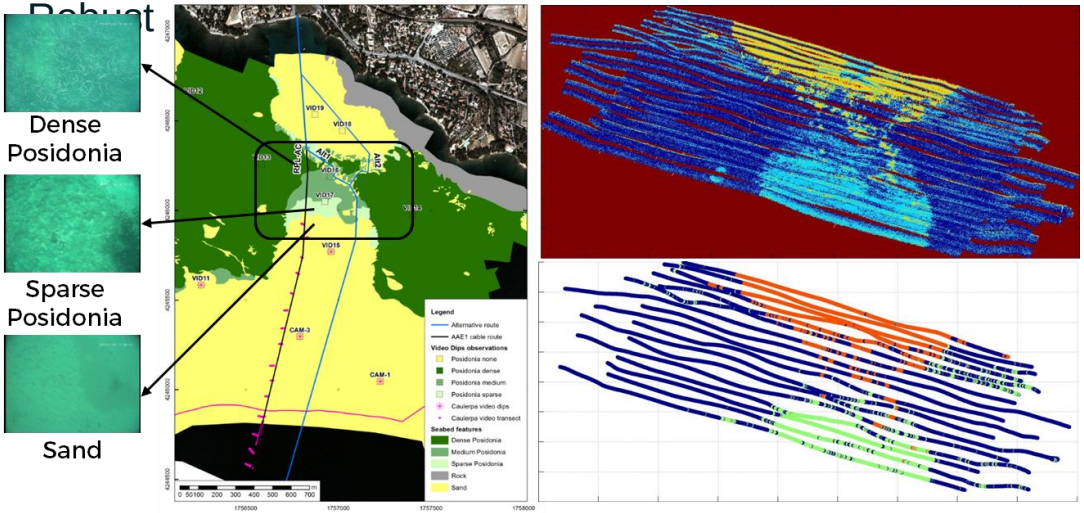
SEAPIX multipurpose 3D Multibeam sonar

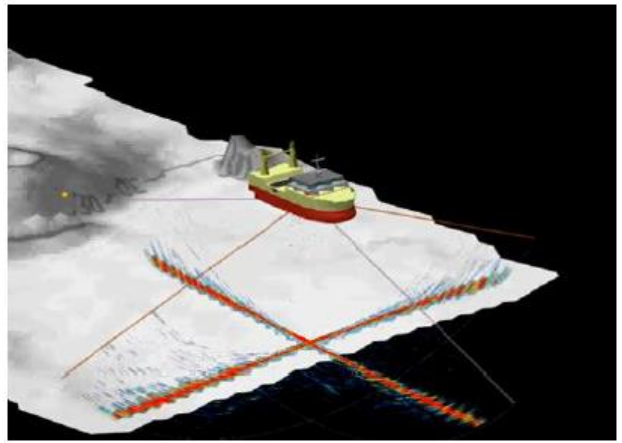


Seabed Classification: a unique robust method

- Use of axial mode to measure the full backscattering energy in function of the greasing angle

- Robust





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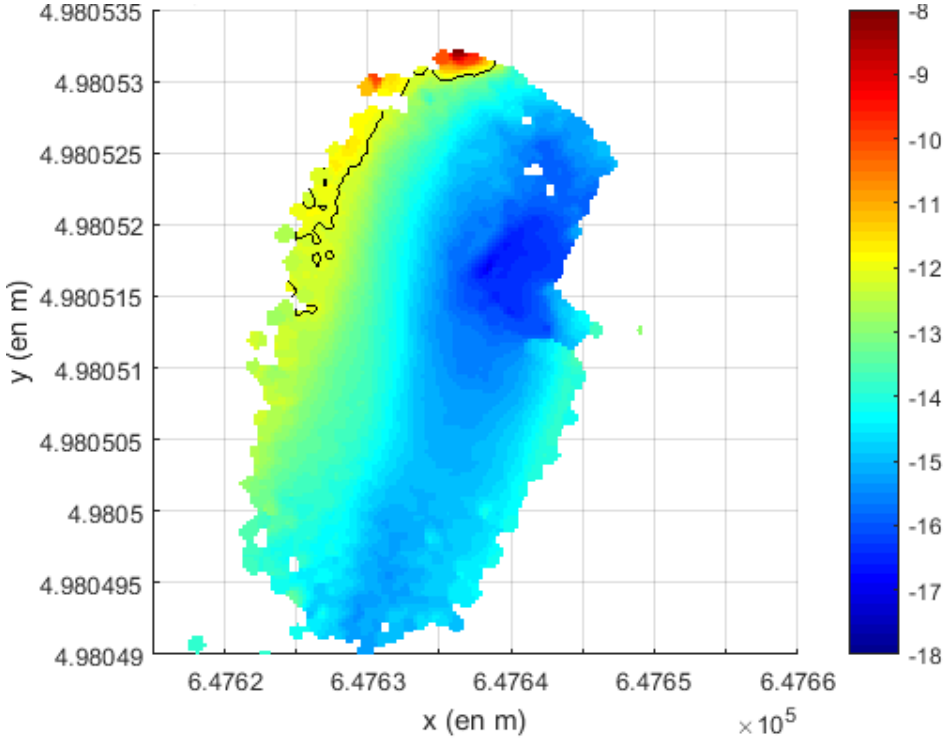
Static Bathymetry : for dam and river



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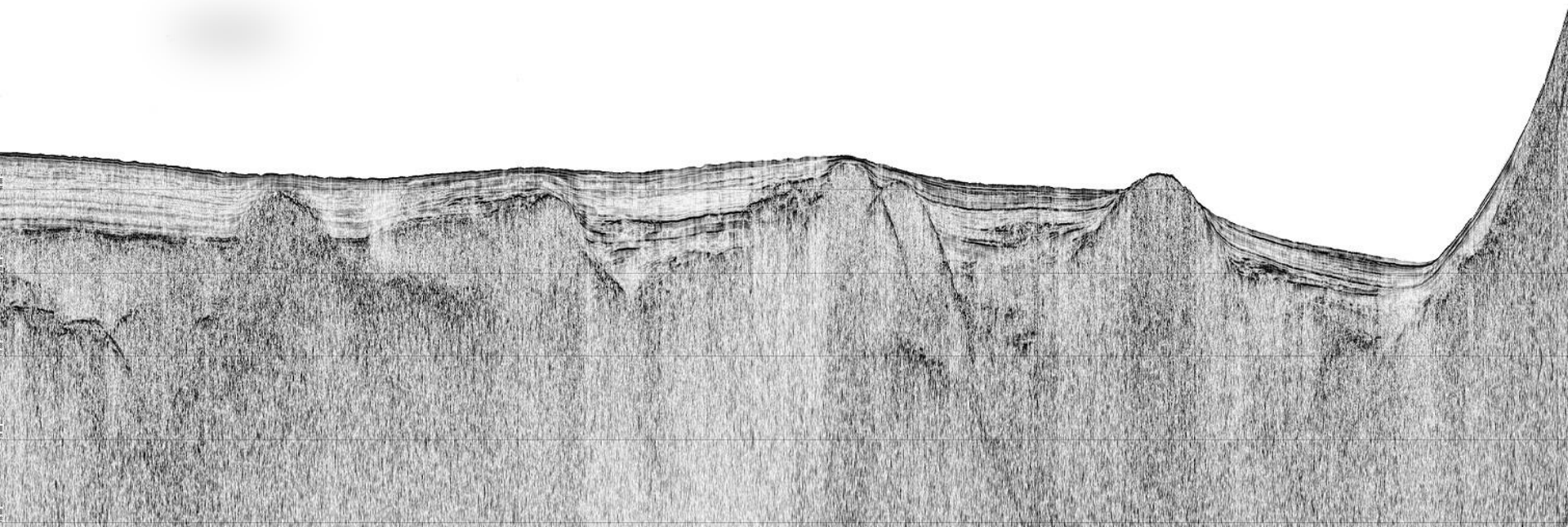
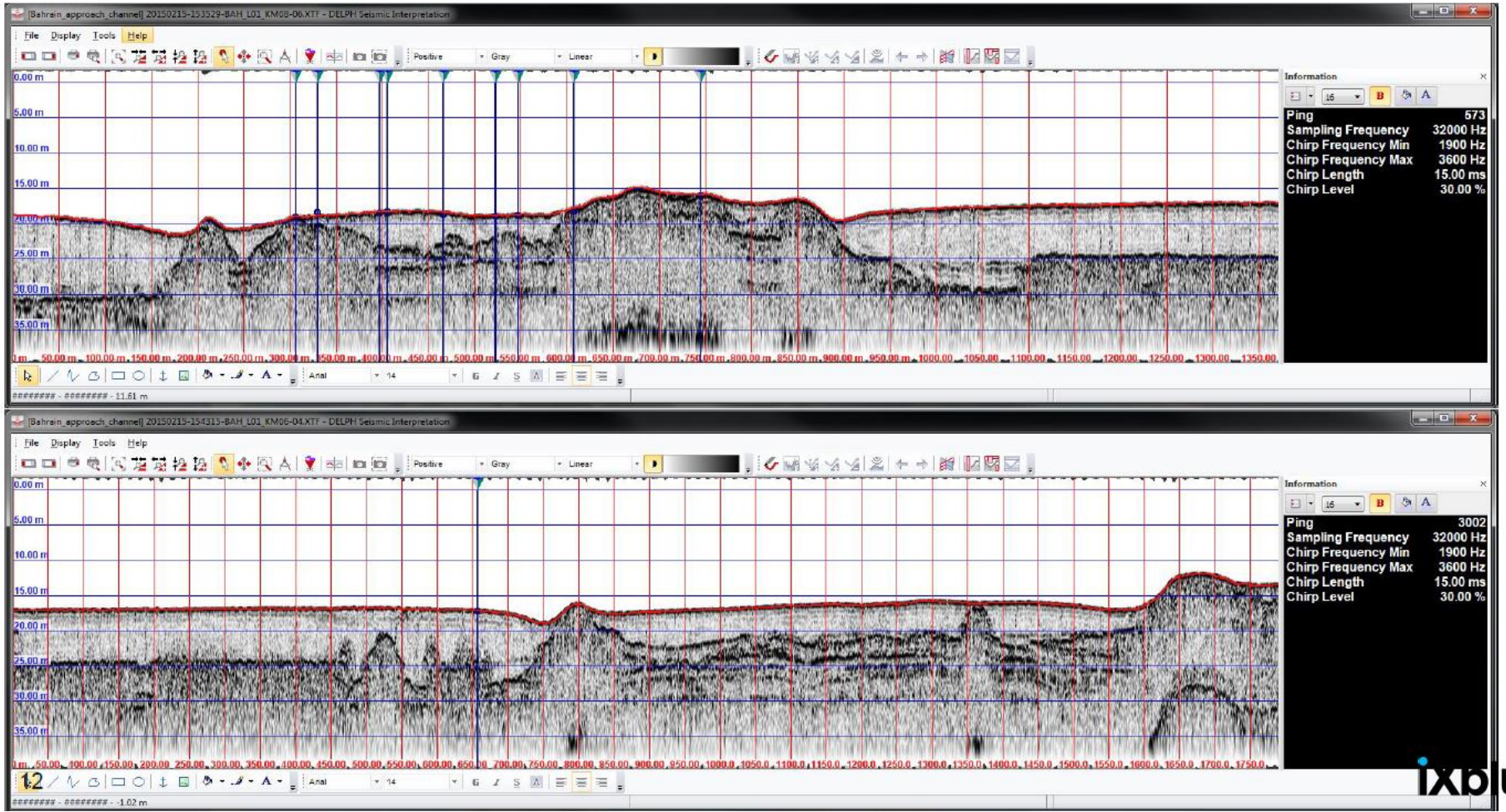
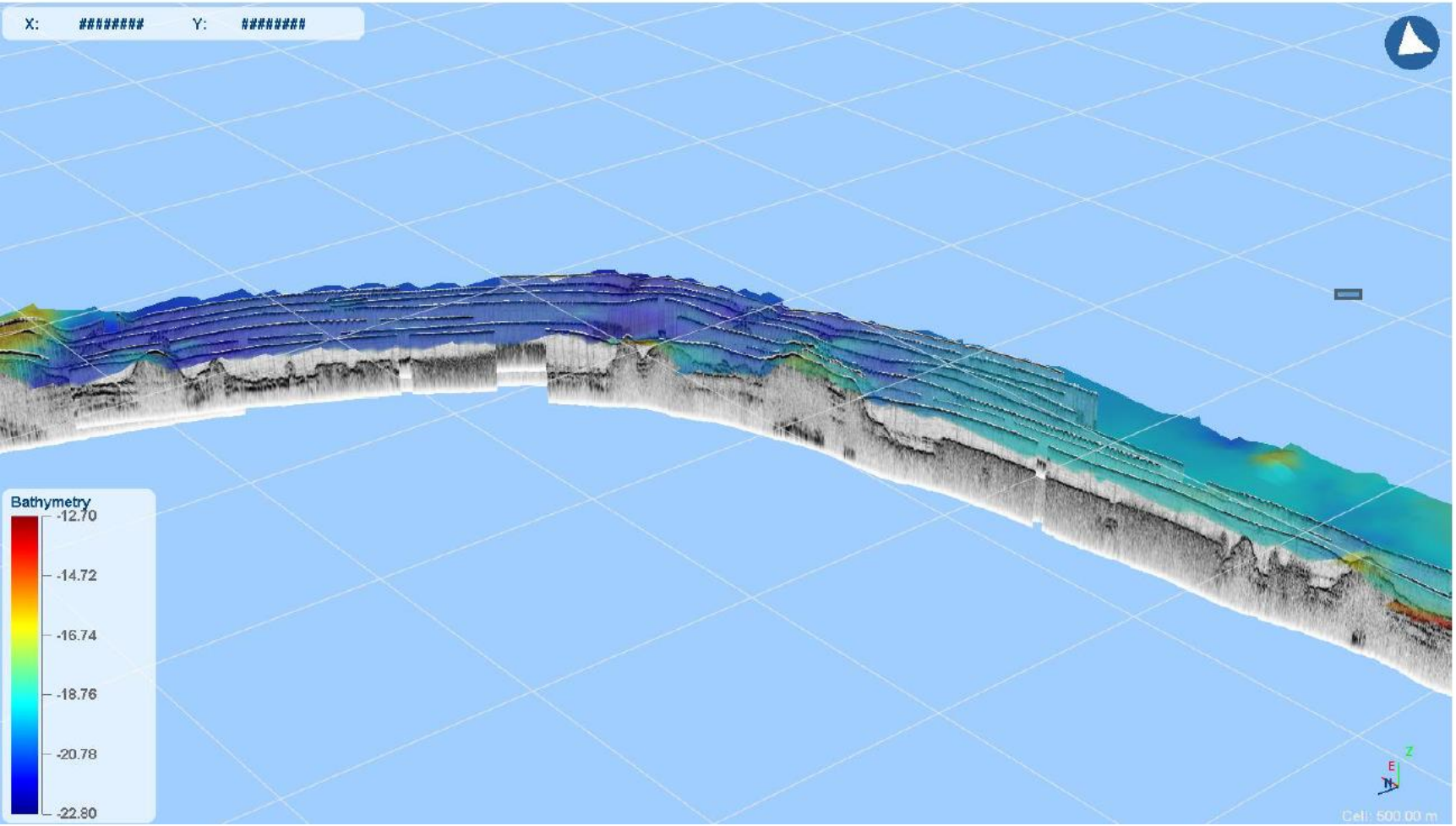
ECHOES Sub-bottom Profilers



Echoes 3500 T3 Dataset



Echoes 3500 T3 Dataset



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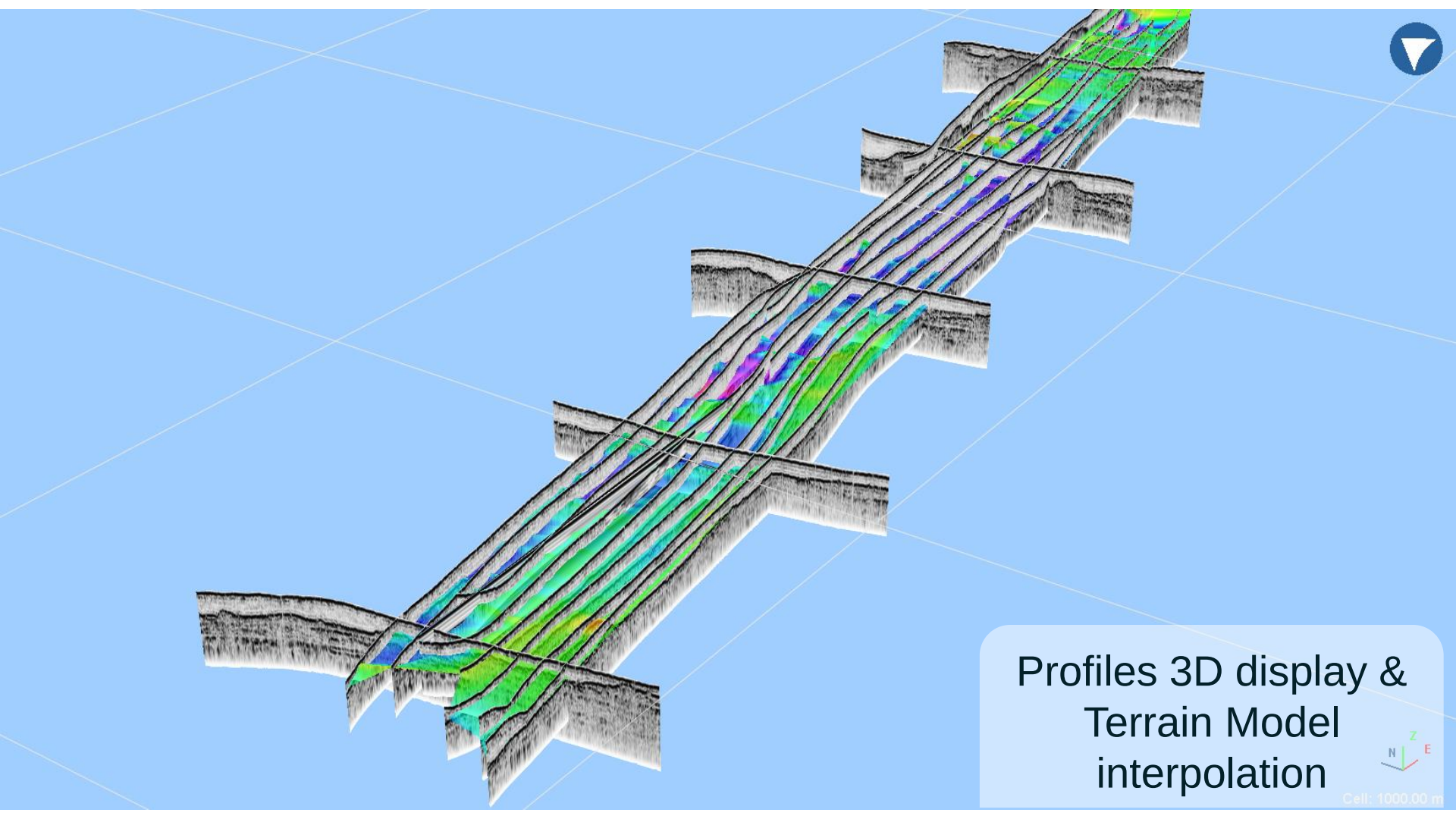
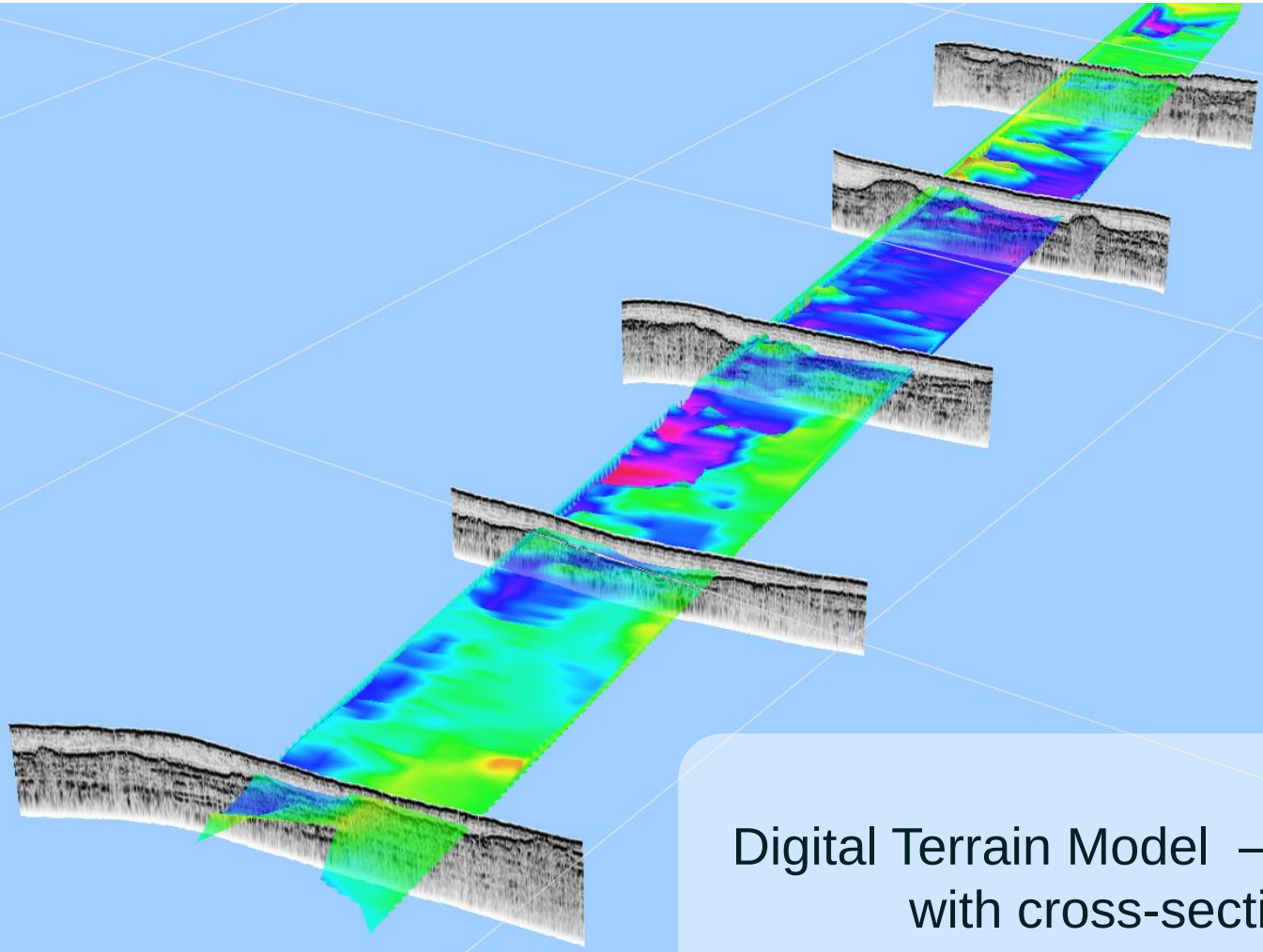
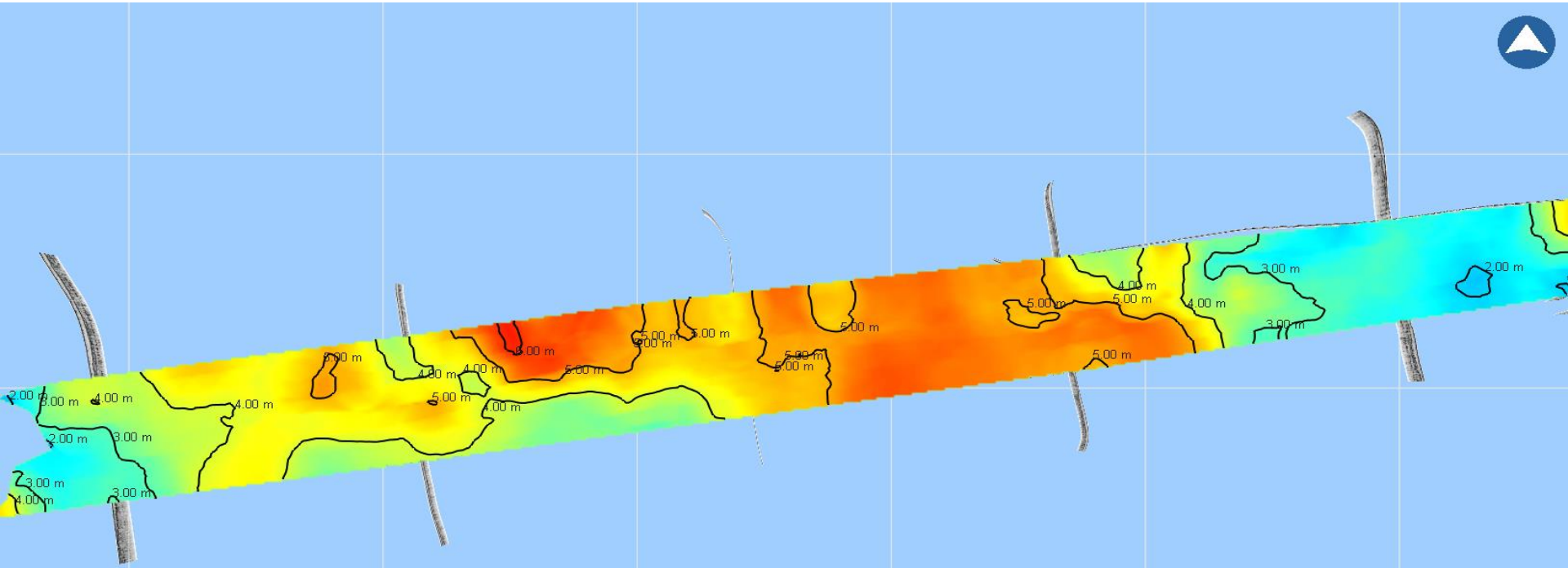
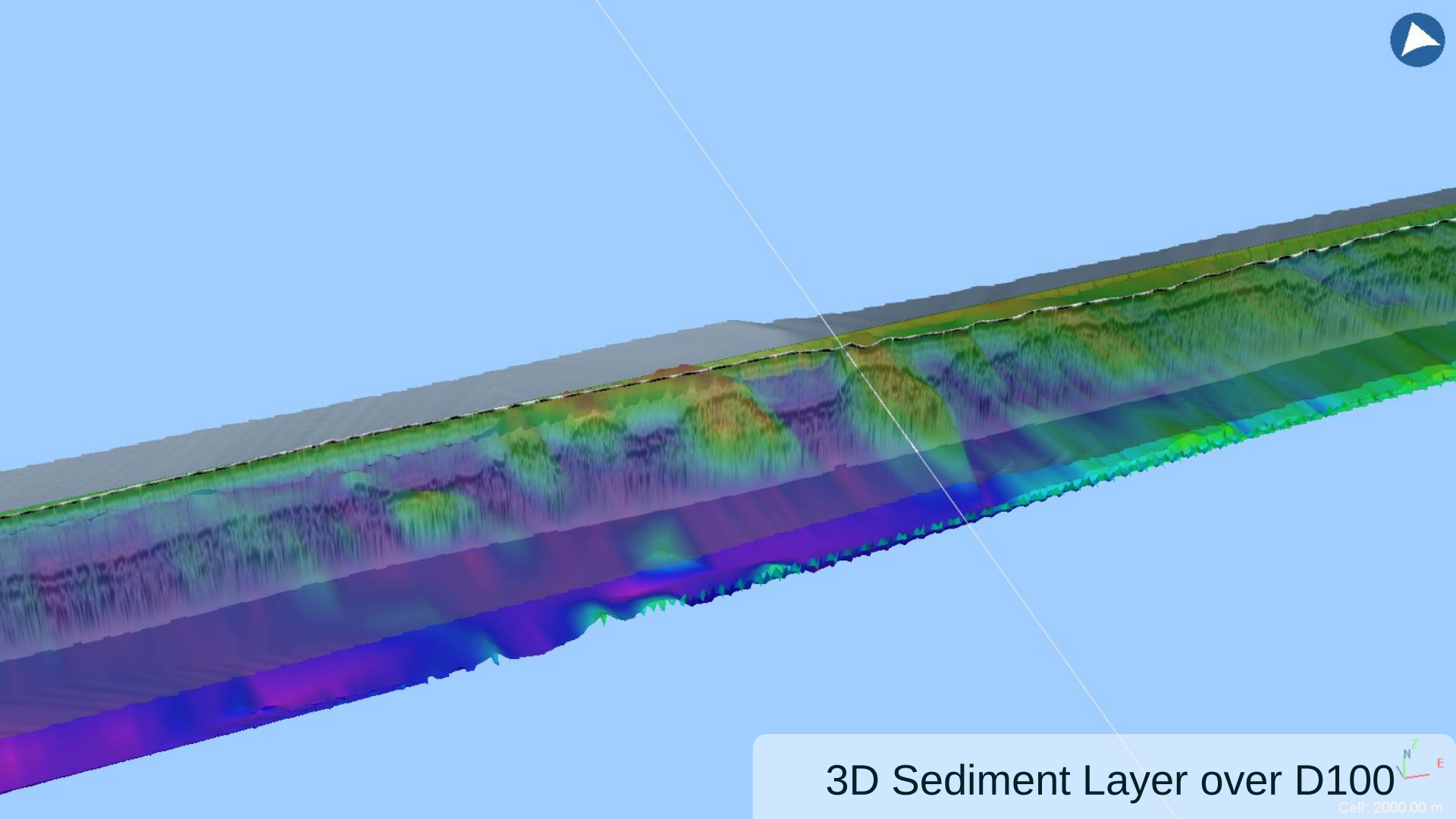

Profiles 3D display &
Terrain Model
interpolation
N
E
Z
Cell: 1000.00 m



Digital Terrain Model – Unit D100
with cross-sections



Isopach map – Thickness between seabed & unit D100


3D Sediment Layer over D100
N
Z
E
Cell: 2000.00 m

The rise of AUSV to perform high quality hydrographic survey.
DRIX – Case Study

Author: David Vincentelli, iXblue
david.vincentelli@ixblue.com
+33 647 330 120

ROPME, 19th of February 2019

iXblue

TABLE OF CONTENT

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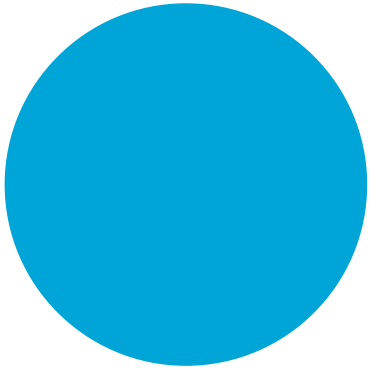

WHAT IS THE AUSV DriX ?

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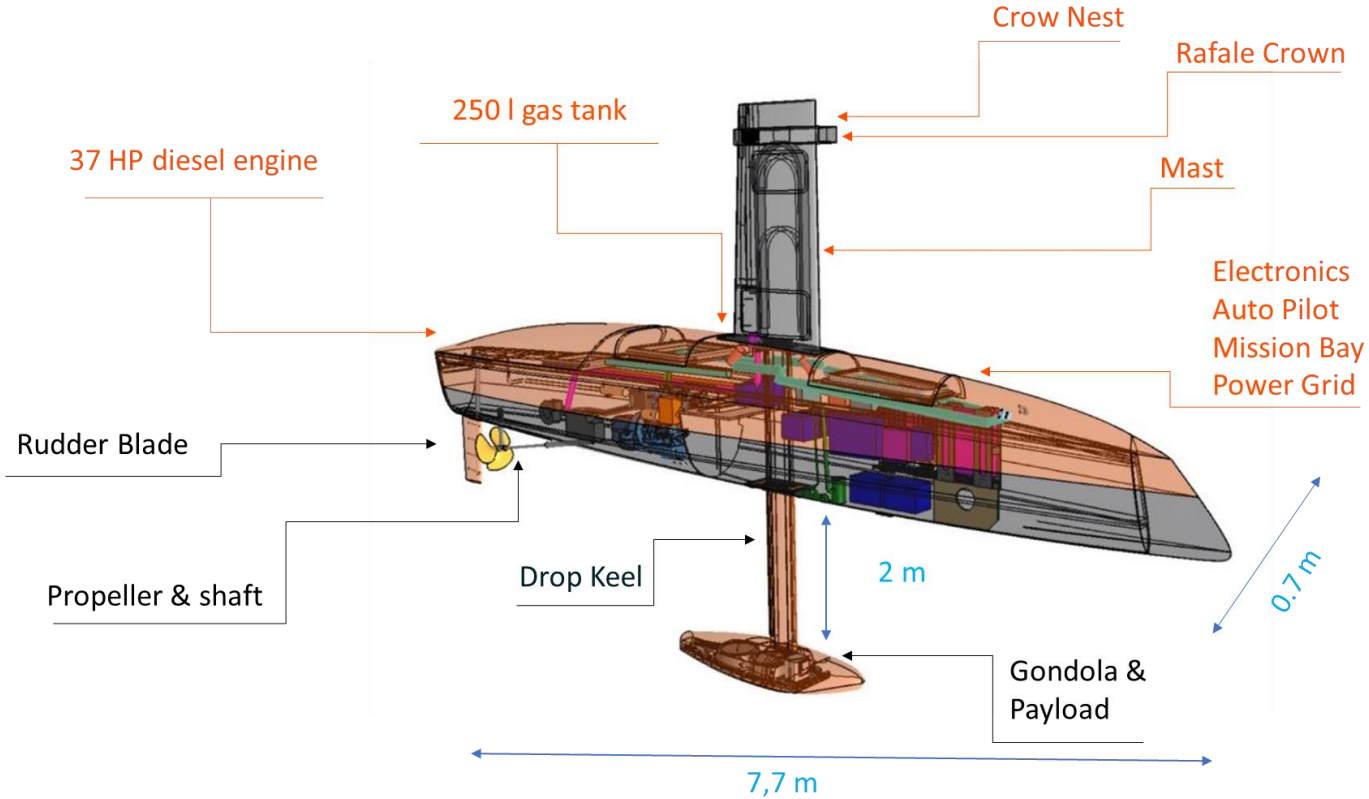
DriX : AT SEA

DriX first test in the North Sea operated from a Mother Vessel

DriX : THE INSIDE

A Naval Architecture breakthrough, reliable as a workhorse should



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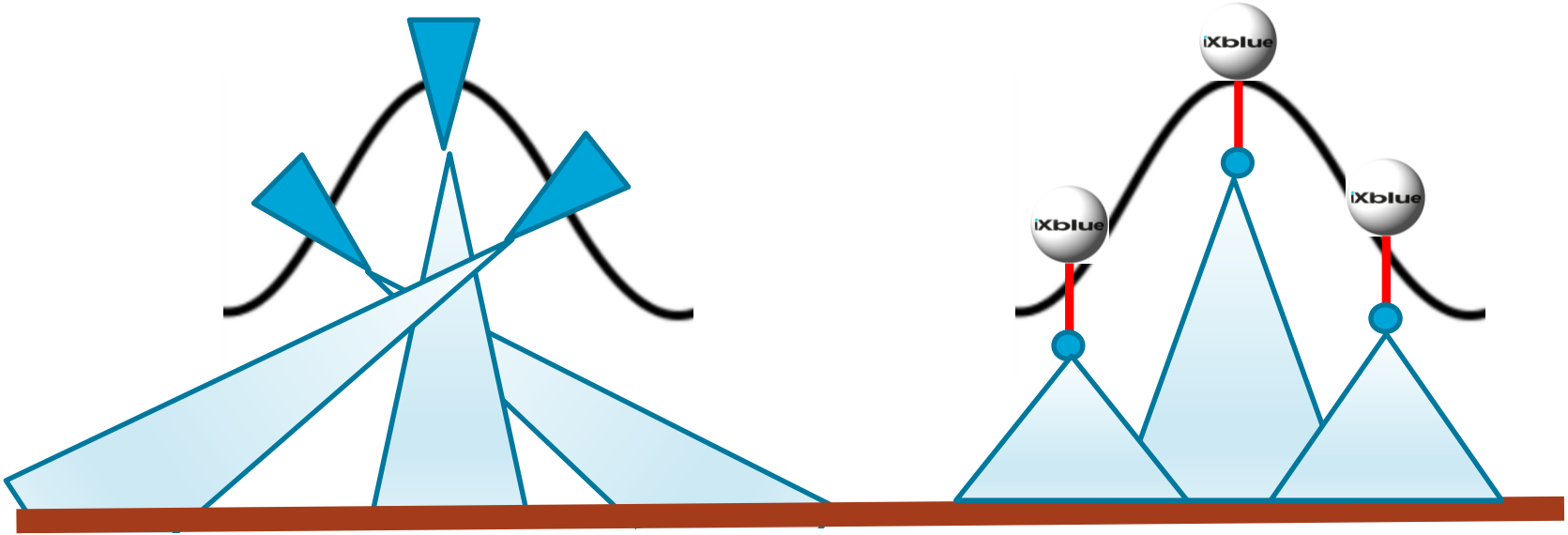
A bit of naval architecture

DriX is a ping pong ball!



Traditional V-shape hull riding a wave

DriX riding a wave

DriX : AN UTMOST STABILITY FOR THE SENSORS

Video of DriX in strong winds (40kts)

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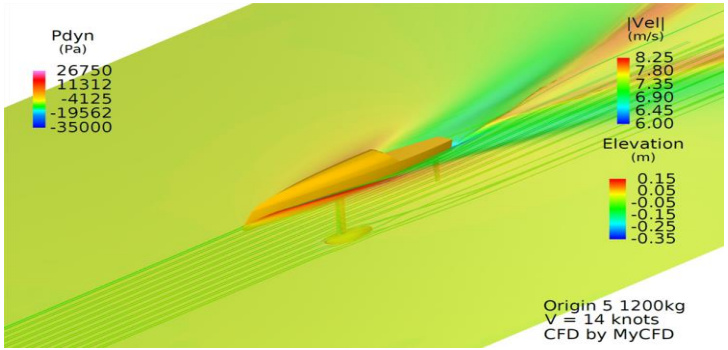
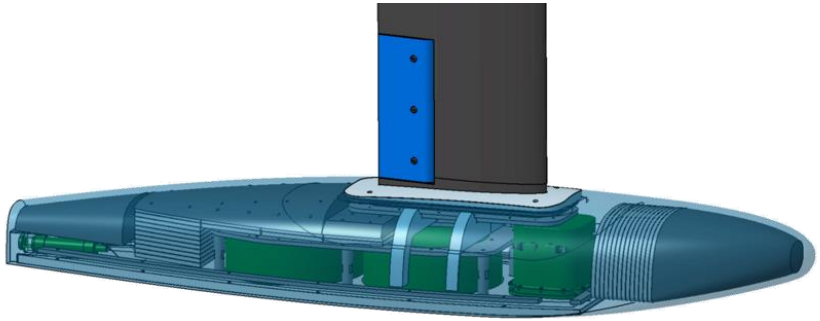
DriX : GONDOLA





- Custom made to accomodate your equipment
- Makes the most of hydrodynamics
- Can be oustrechted to 3 m x 2 m

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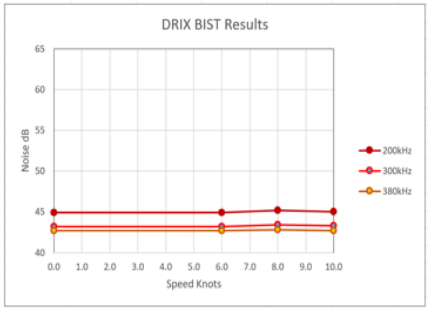
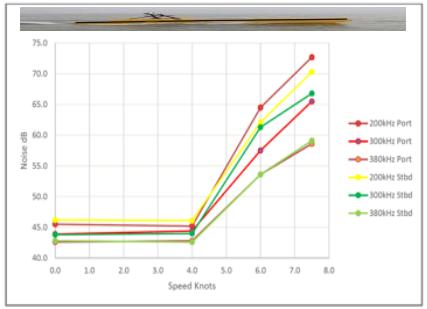
GONDOLA MBES INTEGRATION

BIST TEST : Results of the observed noise level using a EM2040C MBES transducer

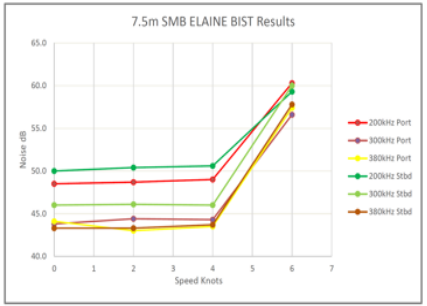
DriX
(Gondola in France)



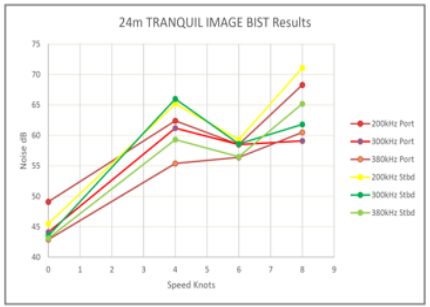
Other AUSV
Long endurance
Length 5m
(Hull mounted in France)



Elaine
(Gondola in NZ)

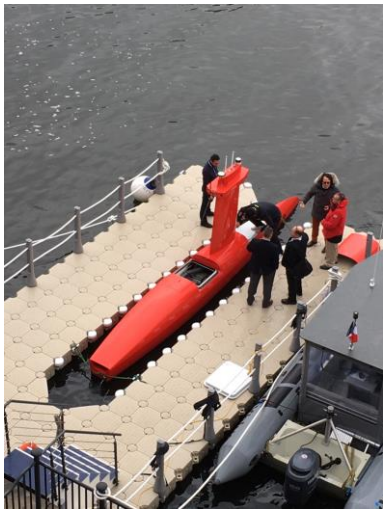


Tranquil Image
(Gondola in NZ)



EASY ACCESS FOR MAINTENANCE

Access to DriX's main compartment:
unclip a Kevlar canopy, unbolt the hatch underneath - 4 quick bolts



At Sea

its LARS is a comprehensive maintenance interface

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THEORICAL EXPECTATIONS

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FIRST CASE STUDY - La Ciotat (France)

Hydrographic IHO grade survey test in shallow waters [16m – 80m]

Standard Hydro-grade set-up

- **Real-time mission planner and acquisition: QPS Qinsy**
- **Motion Sensor: iXblue Phins C7**
- **GNSS: Trimble receiver**
- **MBES: Dual head EM-2040 in line**
- **Positionning post-pro: Grafnav**

The survey plan:

- **30 hours continuous acquisition**
- **Including calibration sites at various depth**
- **Survey speed tested: 4 to 12 kts**
- **Survey site water depth: 10 to 80m**

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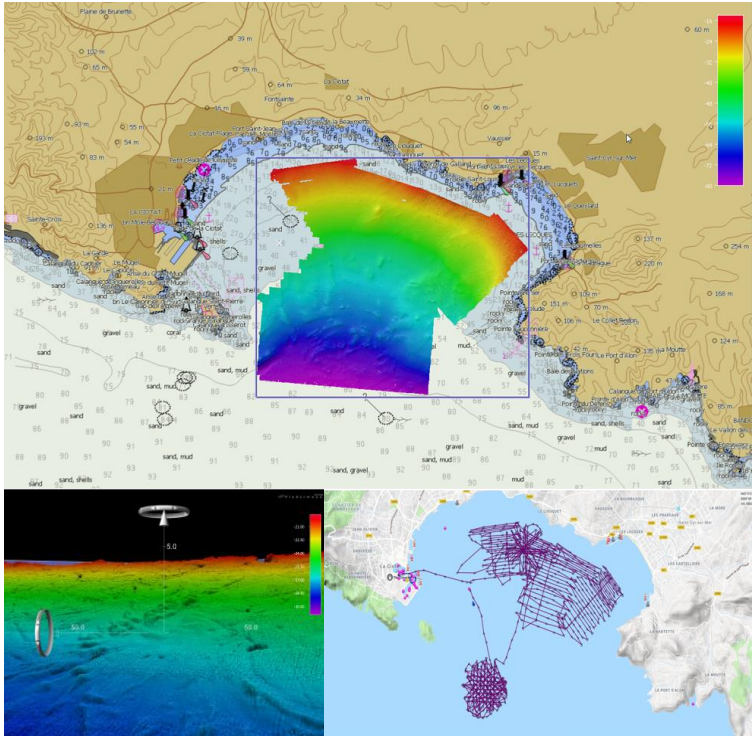
RESULTS

Test in shallow waters [16m – 80m]



- No survey downtime for crewchange
- Line Keeping : No rerun for steering issue
- Line Change : 1 min (incl. Motion stab)
- Average survey speed : 8 kts
- Qualified Special IHO Order up to: 10kts @ 30m

At survey speed

- Fuel consumption: < 2 L/h
- Weather contingency: BEAUFORT 4

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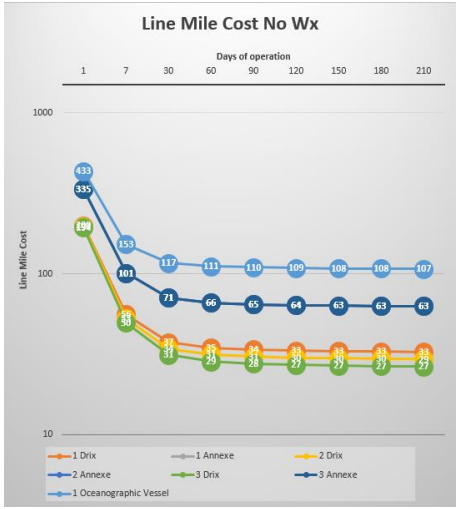
PERSPECTIVES FOR THE HYDROGRAPHIC MARKET

Operational and maintenance cost comparison

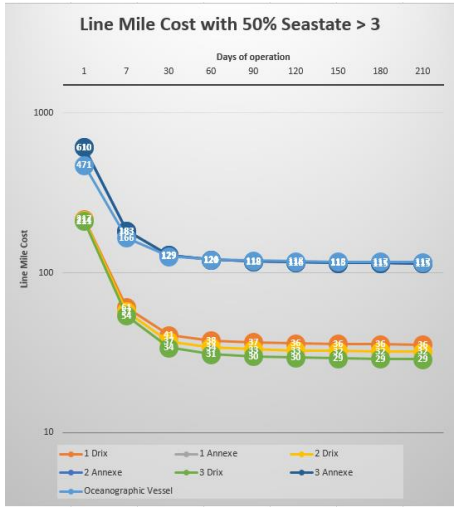
Line mile cost comparison

DriX versus oceanographic vessel & small boat

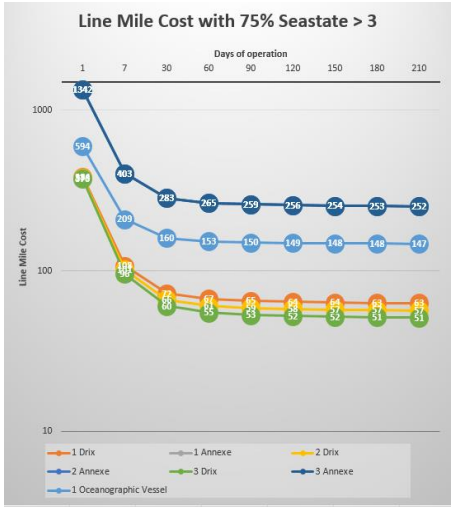
Sea state <3



50% of sea state >3

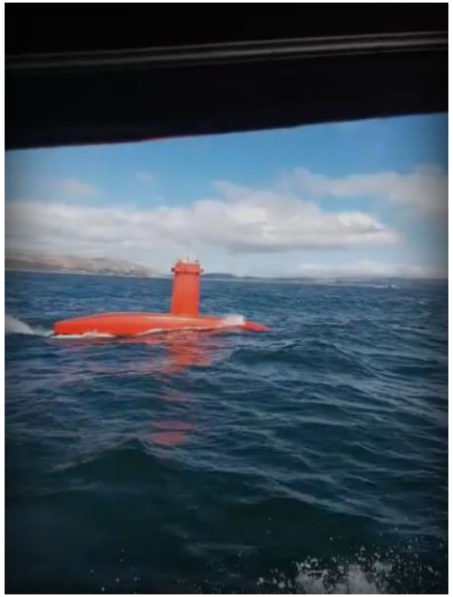


75% of sea state >3



OPERATIONAL EFFICIENCY – Hydrographic survey work

DriX Vs. Conventional Survey Platform



VS a Survey Launch

- **Up to 4 x faster / 5 x cheaper**
  - Faster line change
  - Unparalleled line keeping & endurance
  - No crewchanges
  - Capacity to survey in marginal weather

VS an Oceanographic Vessel

- **1.3 x faster / 3 x cheaper**
  - Unparalleled line change
  - Unparalleled line keeping
  - Low fuel consumption
  - little manning

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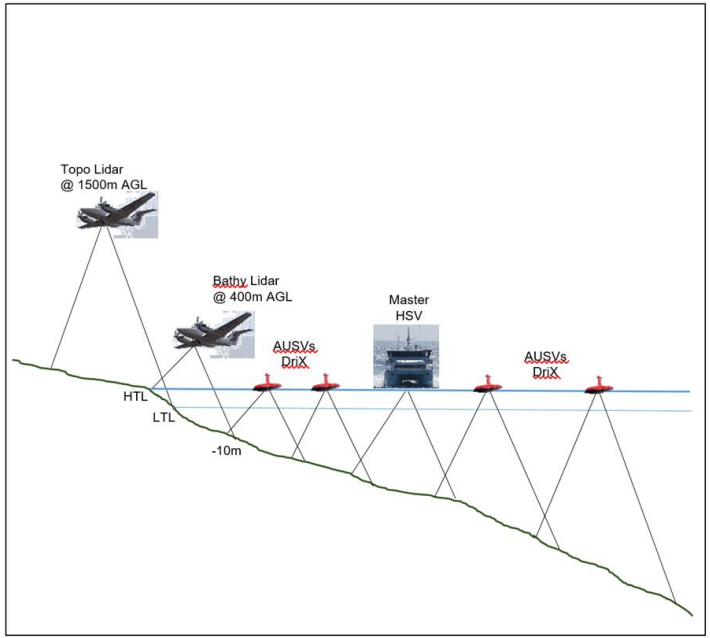
PERSPECTIVES FOR HYDROGRAPHIC MARKET

Integrate a multiplatform approach and adopt new survey strategy



- **Gondola mounted sensor**
  - Reduced and compensated vibrations
  - Less weather limited
  - Outstanding data quality
- **Near Real-time data QC**
  - Real-time QC information transfer
  - Overlapping data acquisition from various source
- **New survey strategy**
  - Multiple sensor acquisition
  - Possible flexible scenario – scouting, shared tasks

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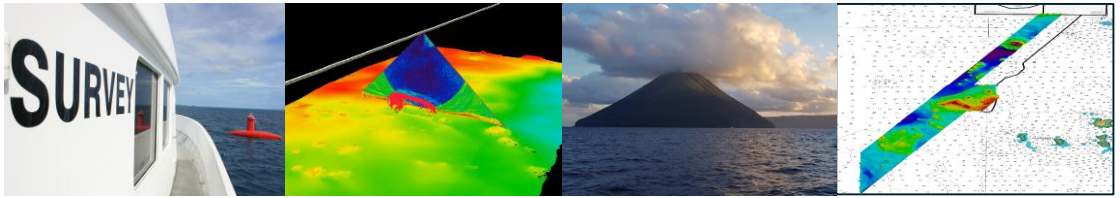
3

LARGE SCALE DEPLOYMENT

Field proven technology



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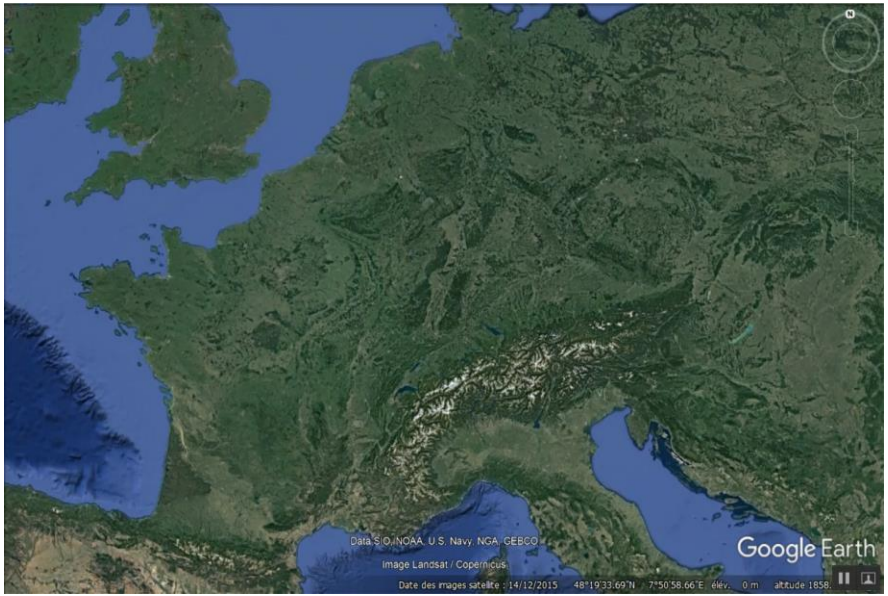
PROJECT CONTEXT

Surveying the south pacific waters – Tonga Islands

- Project context
  - Survey location : Kingdom of Tonga (archipelago of 170 islands)
  - Client: LINZ (Land Information New Zealand)



- Survey specifications
  - Survey area oriented North/South, 200km long
  - Multiplatform approach:
    - Airborne LIDAR to cover areas 0 to 18m WD
    - Mother ship + AUSV to cover 694km2

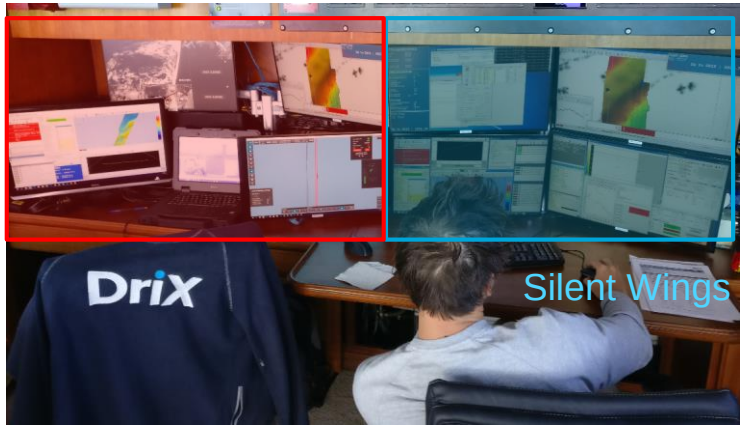
      7500 Line km

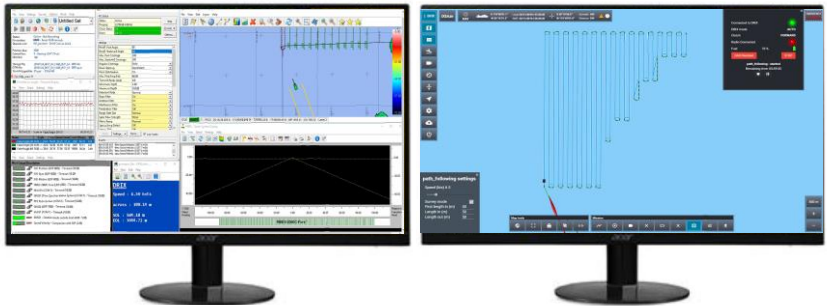
CONDUCT OF SURVEY OPERATIONS

- Drix fitted on our support vessel without preliminary work
- 24/7 survey operations

- DRIX operating range from the Mother Vessel: up to 3,5km

- Drix surveyed with a max water height of 1,6m (sea state 4)
- Mother Vessel with a max water height of 2m (sea state 4/5)





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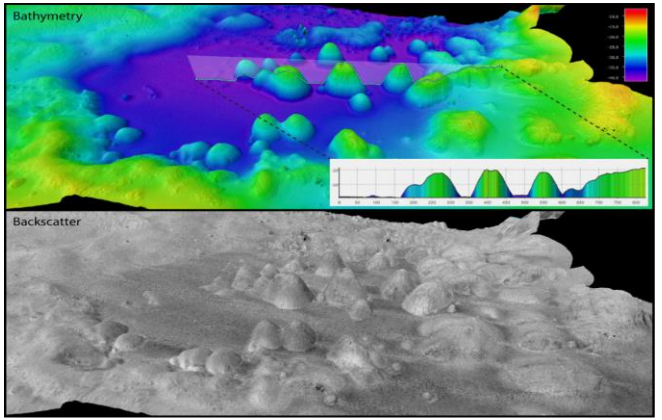
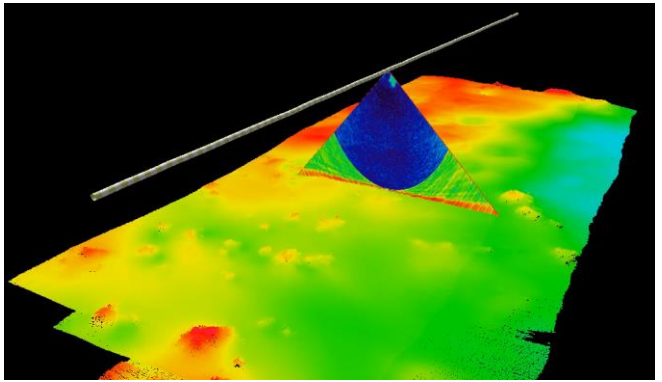
CONDUCT OF SURVEY OPERATION

- Online
  - Acquisition of Mother Vessel survey Data
  - Sending missions / monitoring QC data of DRIX
  - Sound Velocity casts
  - Data backup of SW data
  - Download of DRIX’s bathymetric data
- Post-processing of INS data using ixblue APPS software
  - Process of Drix and SW data (real time)
  - Export of smart heave solution
- Post-processing of bathymetric data in Caris
  - Merge and Process of Drix and SW data (real time)
  - Applying tide, squat and smart heave solution
- Post processing of backscatter and water column data
  - Processing of backscatter Drix and SW data in FMGT
  - Analysis of water column data in FM Midwater

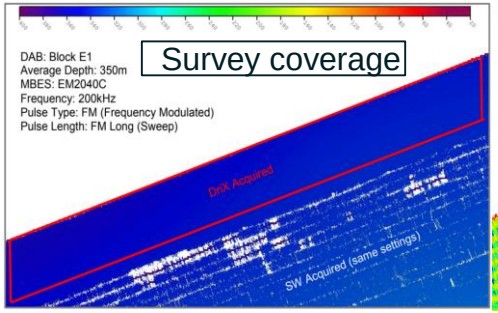


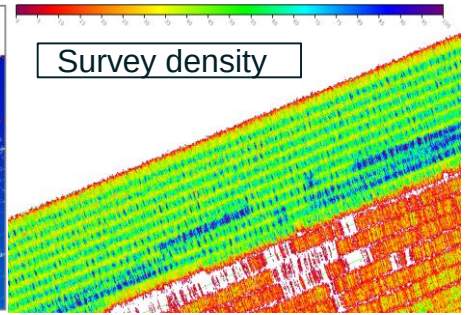


RESULTS

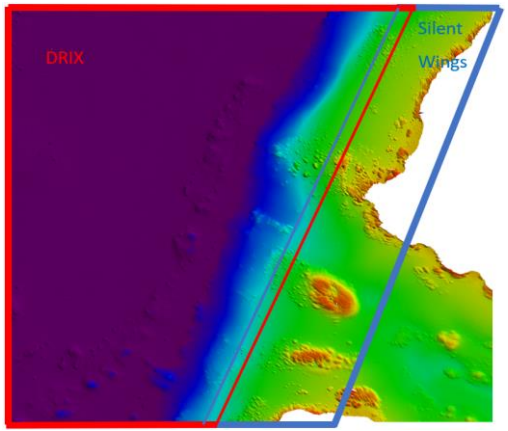
On Data Quality

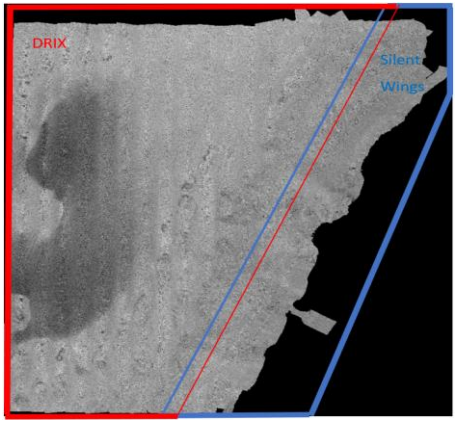
- Drix low noise level
  - Lost of seabed detection @ 320m for SW
  - 100% coverage @ 400m deep for DRIX
    - ➢ Improve bathymetric quality result
      backscatter interpretation
      water column analysis





- Perfect complementarity between the two datasets
  - Average mean depth difference of 1.4cm
    on SW and Drix overlapping surfaces
  - Complete Merging of backscatter data





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RESULTS

On Productivity

- Using DriX half of the time saved
  - 33% survey duration
  - 20% cost
  - 34% carbon footprint

- Limitation on this project
  - Impossibility to use DDS
    (Drix Deployment System)

Parameters	Drix	Silent Wings
Overall Line km	7450	
Line km	2360	5090
% of total line km	32	68
Effective survey time (Hours) *	166	358
Total use ** (days)	19	37
Average Survey Speed (knts)	7.6	7.6
Average transit speed	10	10
Autonomy @ average survey speed (days)	4-5	7
Fuel consumption @ survey speed (L/H)	2,4	~66

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Other applications

High opportunities and method optimization

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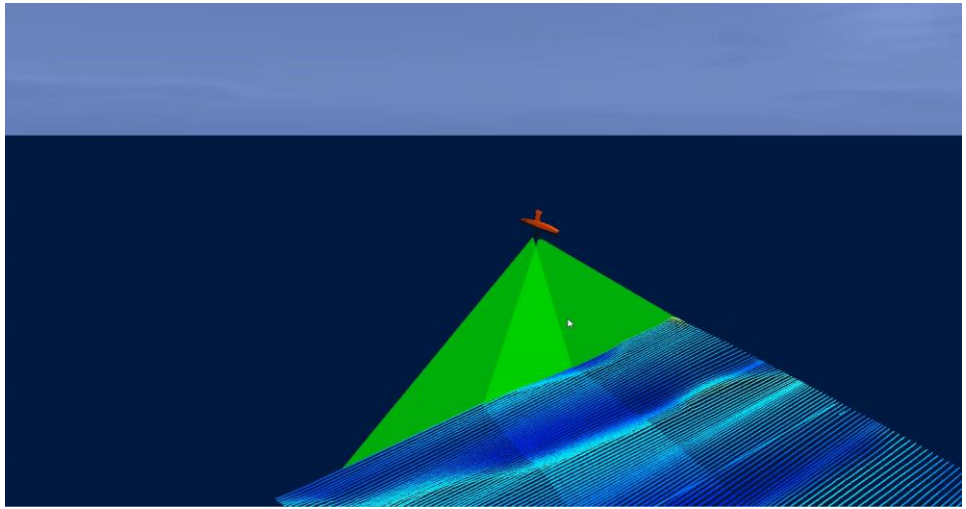
AUSVs - WORKING IN RESTRICTED AREAS

Scouring survey within a windfarm – Observed efficiency 3 to 4 times faster to conduct box survey



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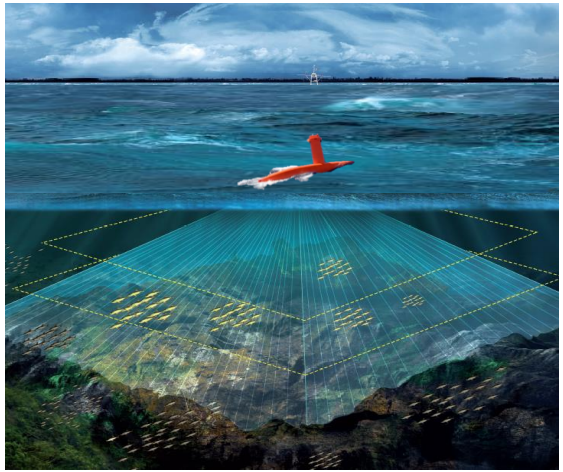
UNDERWATER SURVEILLANCE AND MAPPING

Day to day fairways surveillance

Support the fishing industry and marine environmental monitoring



Revealed the unaccessible

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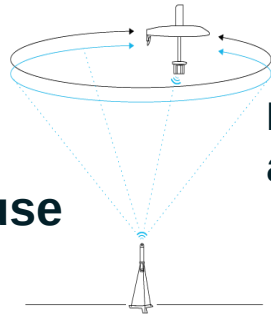
METROLOGY – SUBSEA POSITIONING

BOX IN CALIBRATION

Job description:

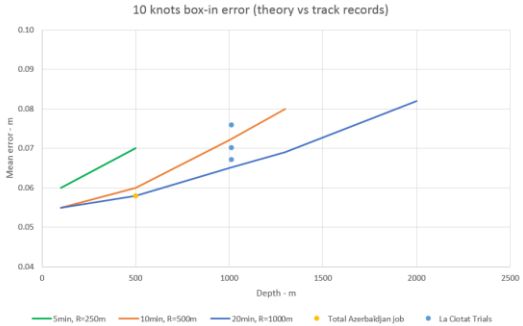
- Location : BAKU Azerbaidjan
- Calibration of 465m deep transponder
- Technique : Range only box-in
- Speed (dep. on circles) : 4knots and 8knots
- Box-IN radius : 300m and 500m



Easy to deploy, use

RESULTS: Decimeter accuracy

- In 5min, up to 500m depth
- In 10min, up to 1300m
- In 20min, up to 2000m



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CONCLUSION USING DRIX TYPE AUSV

- Save time
- Increased data quality
- Provides Multi mission & transportable platform
- Improved safety of marine operations
- Buy, lease, service

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