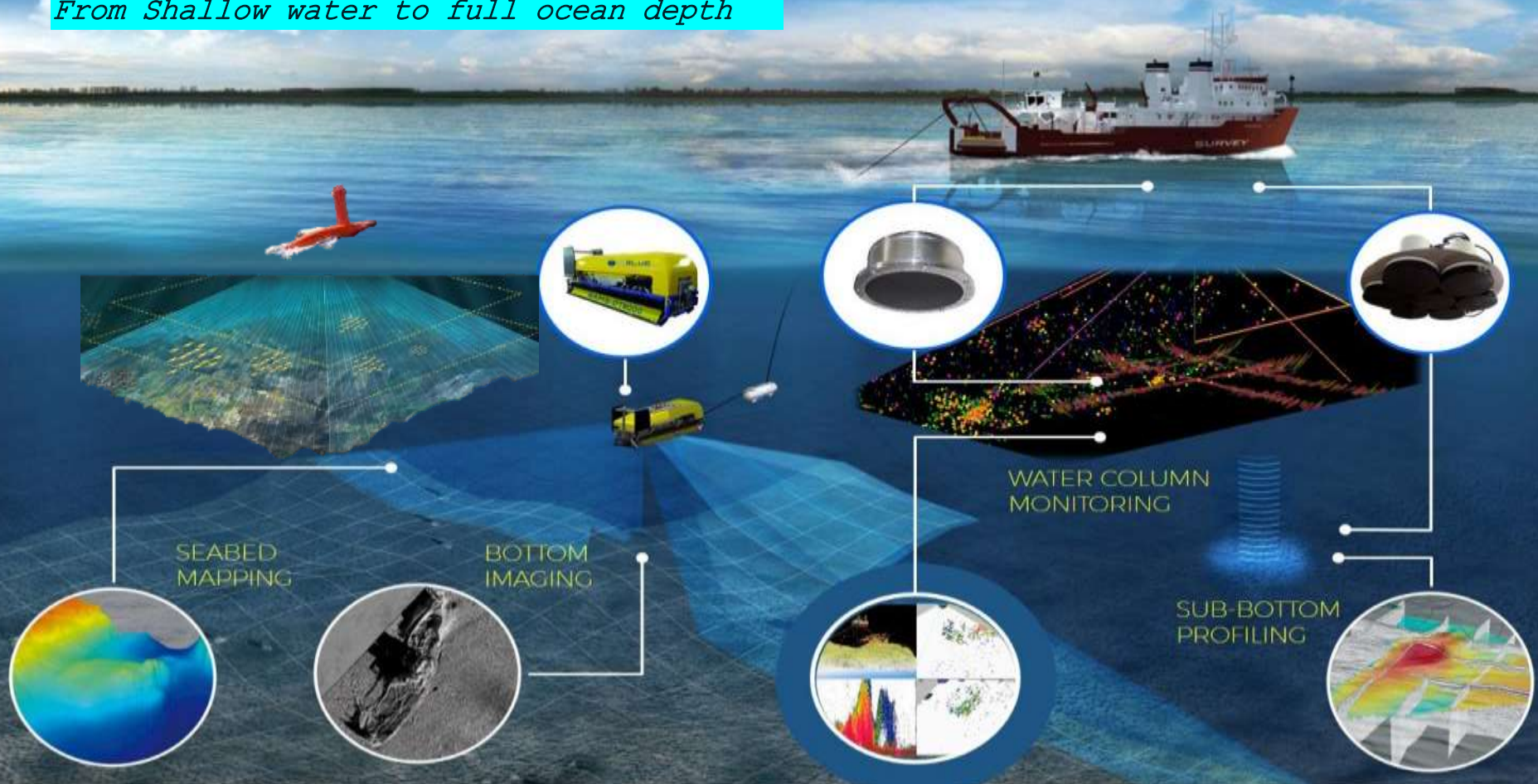


iXblue



# Hydrography Oceanography Geophysical

*From Shallow water to full ocean depth*



# Survey vessels, survey launches and USVs

A survey vessel fully equipped with MBE, SBP, Side Scan Sonar, Delph data acquisition & processing system, Acoustic positioning

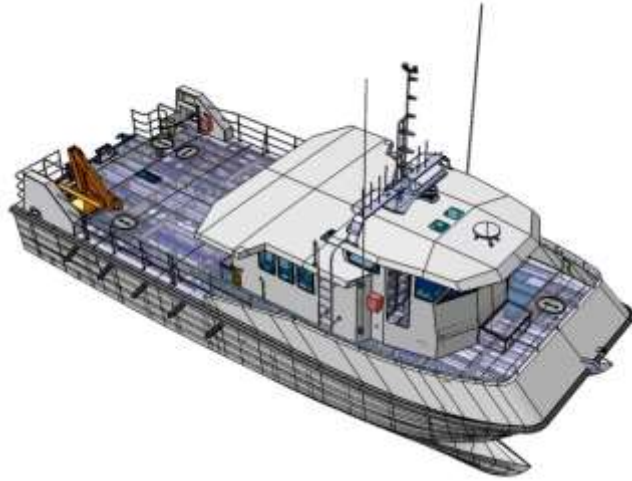
- Length : 36 m
- Max beam : 8,85 m
- Displacement : Less of 300 T
- Draft : 2,90 m
- Max speed : 13 knots



# Survey vessels and survey launches, and USVs

Multi- purpose survey vessel  
able to transport heavy duty equipments

- Length : 17 m
- Max beam : 7 m
- Displacement : 40 T
- Max speed : 28 knots



# Survey vessels, survey launches and USVs



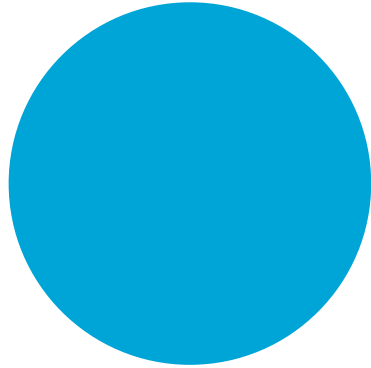
- Length : 15 m
- Max beam : 7 m
- Displacement : 20 T
- Max speed : 25 knots



## Survey vessels, survey launches and USVs

*WHAT IS THE USV DriX ?*





# Improving Hydrographic survey with USV platform - DRIX

**SAIHC 2019 – Regional IHO commission**

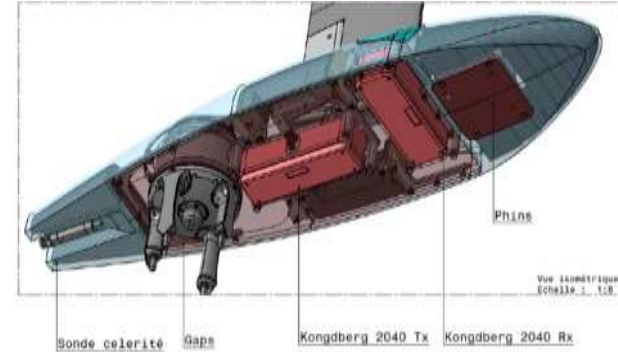
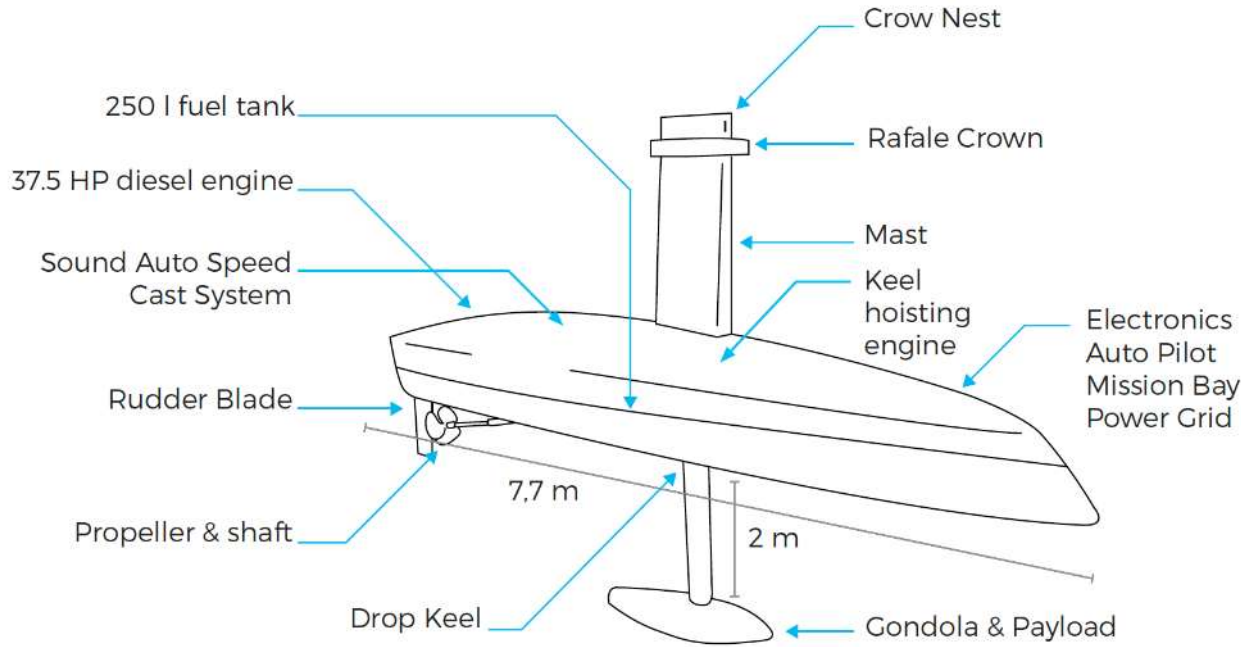
**Contact: Emmanuel Sgherri**  
**[emmanuel.sgherri@ixblue.com](mailto:emmanuel.sgherri@ixblue.com)**  
**+971 50 664 8390**  
**+33 684 795 408**

# TABLE OF CONTENT

1. What is the USV DriX
2. Large scale deployment
3. Raising hydrographic awareness



# An hydrodynamic serving : data gathering and endurance



# DriX : AN UTMOST STABILITY FOR THE SENSORS

PROPERTY OF IXBLUE



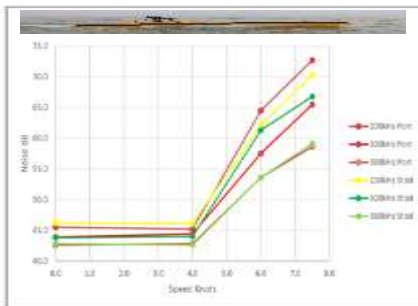
# A silent environment

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

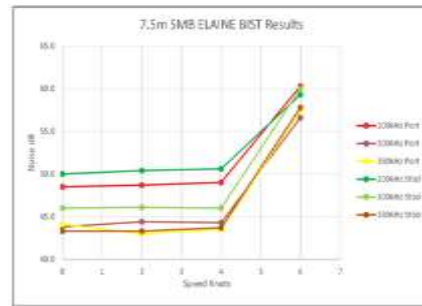
**DriX**  
(Gondola in France)



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



**Elaine**  
(Gondola in NZ)

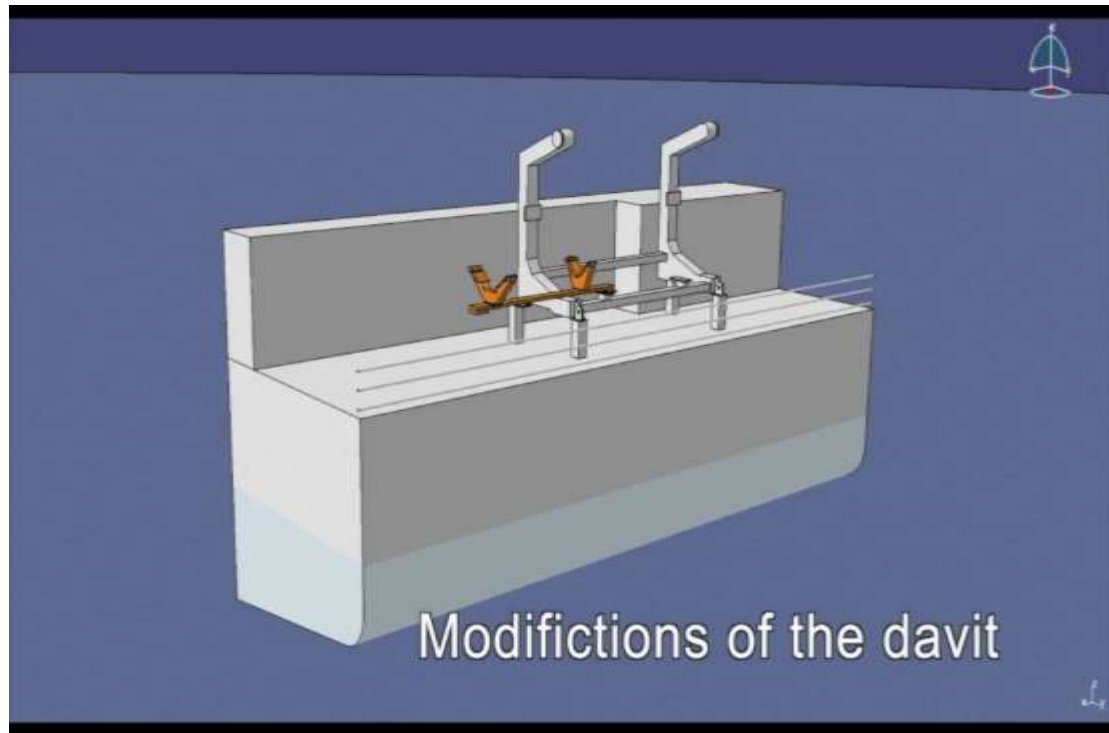


**Tranquil Image**  
(Gondola in NZ)



# A user friendly, sea proven, Launch And Recovery System

The corner stone of any unmanned solution operating from an asset at sea



DriX for NOAA - davit modification

# An easy handling

One of the key points

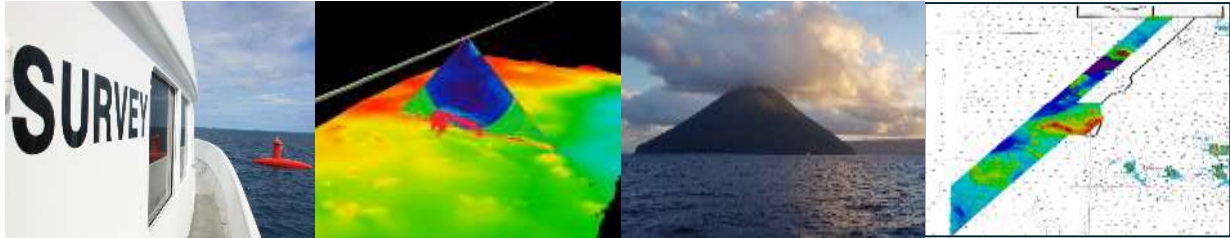
- Lifting devices: A-Frame, Crane, Davit.
- Export control: Considered as a stand-alone solution (Ease the shipping of dual-use sensors)



2

**CASE STUDY**

Large Scale Survey for LINZ - TONGA



# CASE STUDY : Large Scale Survey Operation

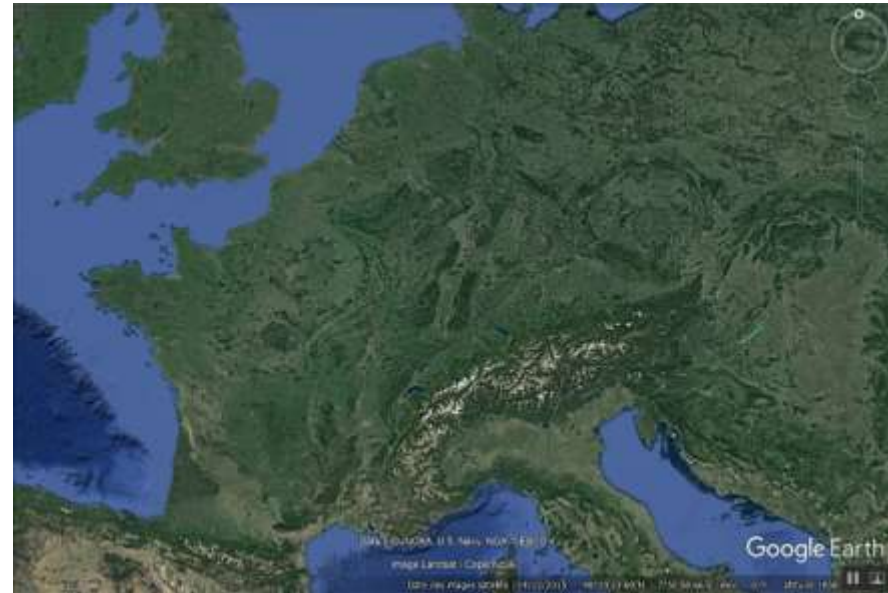
Surveying the south pacific waters – Tonga Islands

- Project context

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

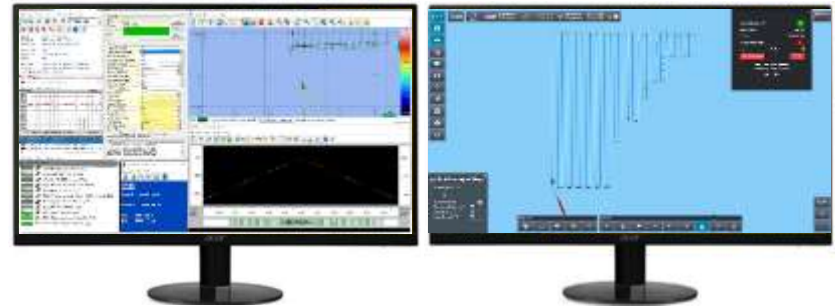
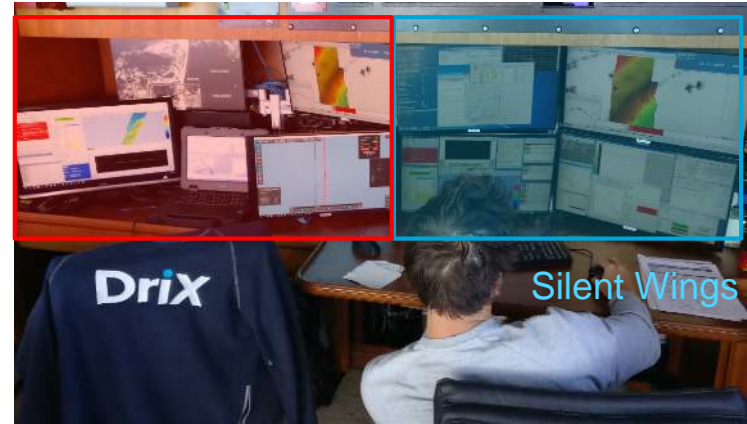
- Survey specifications

- Survey area oriented North/South, 200km long
  - Multiplatform approach:
    - Airborne LIDAR to cover areas 0 to 18m WD
    - Mother ship + USV to cover 694km<sup>2</sup>
- 7500 Line km



# CONDUCT OF SURVEY OPERATIONS

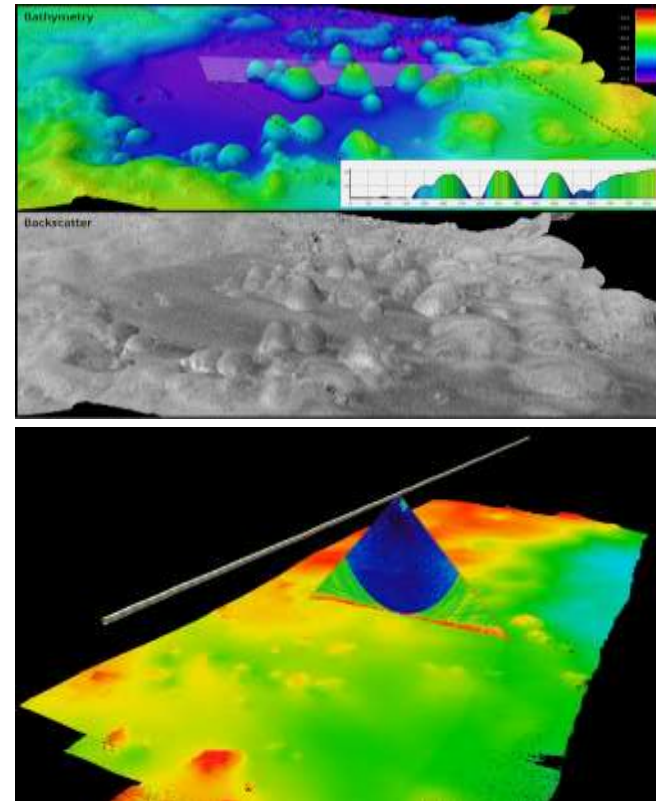
- Drix fitted on our support vessel without preliminary work
- 24/7 survey operations
- DRIX operating range from the Mother Ship: up to 3,5km
- Drix surveyed with a max water height of 1,6m (sea state 4)
- Mother Ship with a max water height of 2m (sea state 4/5)





# CONDUCT OF SURVEY OPERATION

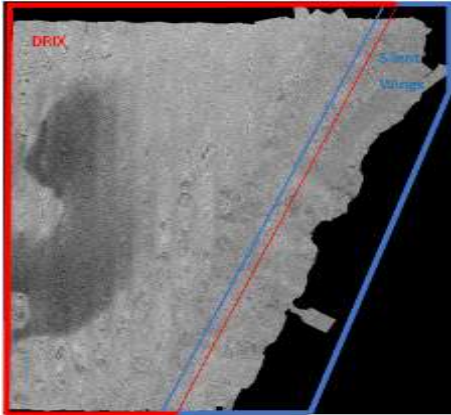
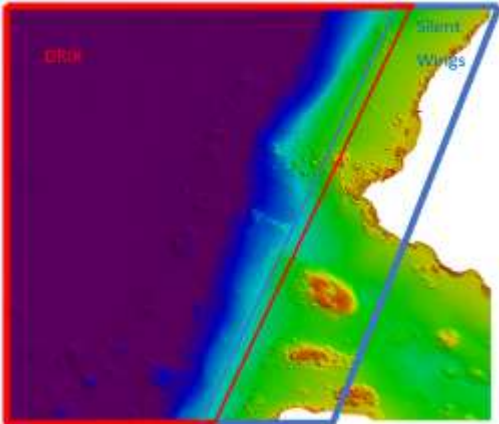
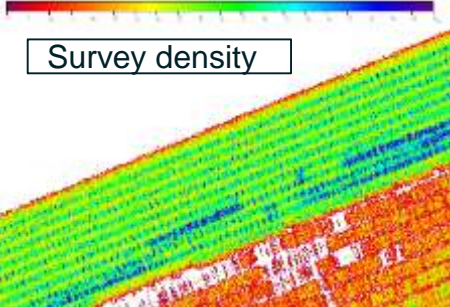
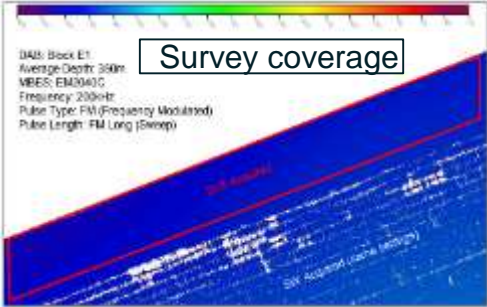
- Online
  - Acquisition of Mother Ship survey Data
  - Sending missions / monitoring QC data of DRIX
  - Sound Velocity casts
  - Download of DRIX's bathymetric data
- Post-processing of INS data using ixblue APPS software
- Post-processing of bathymetric data in Caris
  - Merge and Process of Drix and Mother Ship data (real time)
  - Applying tide, squat and smart heave solution
- Post processing of backscatter and water column data



# RESULTS

## On Data Quality

- Drix low noise level implies higher Data Quality
  - 100% coverage @ 400m deep using DRIX
  - Seabed Lost @ 320m deep for Vessel
  - DRIX Improves 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



# RESULTS

## On Productivity

- Using DRIX saved
  - 33% survey duration
  - 20% cost
  - 34% carbon footprint
  
- Limitation on this project
  - Impossibility to use DDS  
(Drix Deployment System)

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

# OPERATIONAL EFFICIENCY – Hydrographic survey

## 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

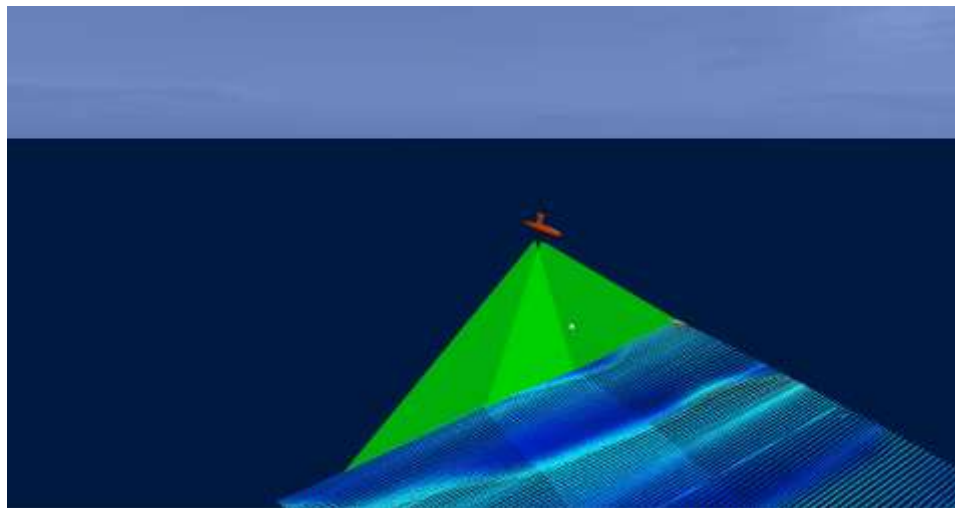
- 1.3 x faster / 3 x cheaper
  - Unparalleled line change
  - Unparalleled line keeping
  - Low fuel consumption
  - little manning

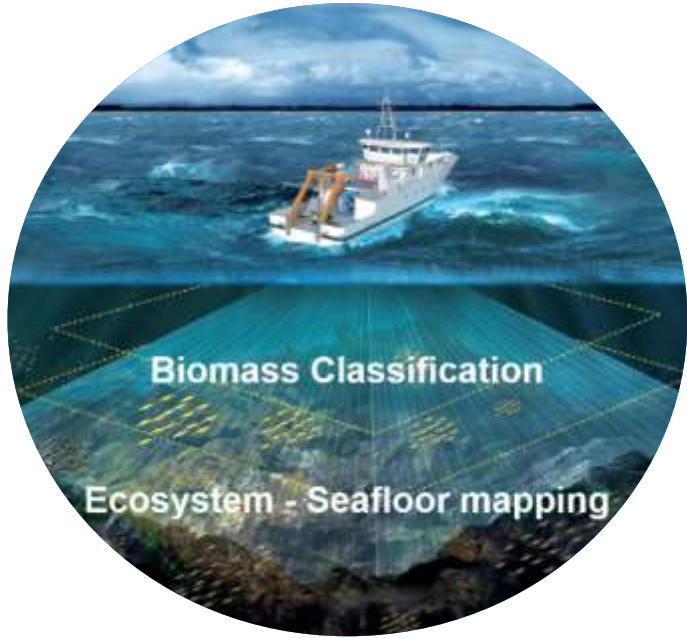


# **iXblue investing to raise hydrographic awareness**

# DriX – USV to support increasing demand for HR data

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





## **SEAPIX**

### **Hydro grade environmental Multibeam**

# SEAPIX – Hydro grade environmental sonar

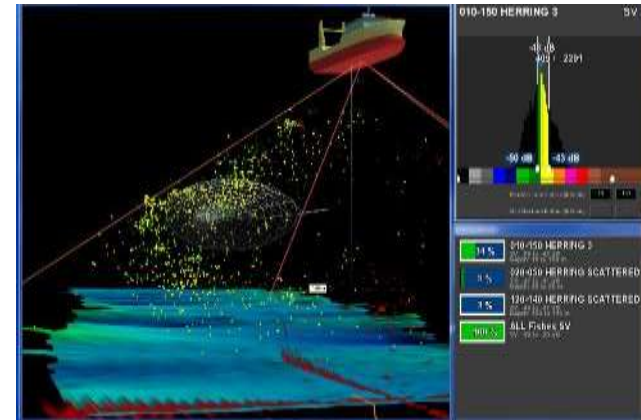
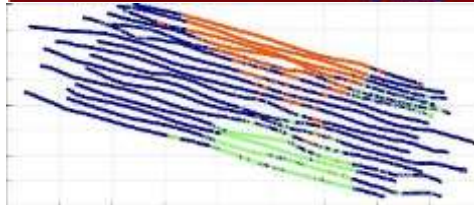
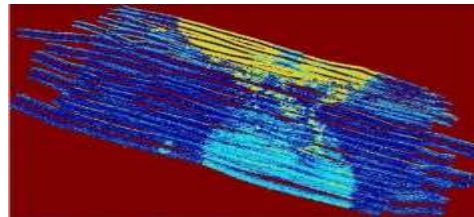


An Environmental sonar

- Fish discrimination
- GBA – Global Biomass assessment
- Seabed Classification
- All data stored in built-in database
- GIS

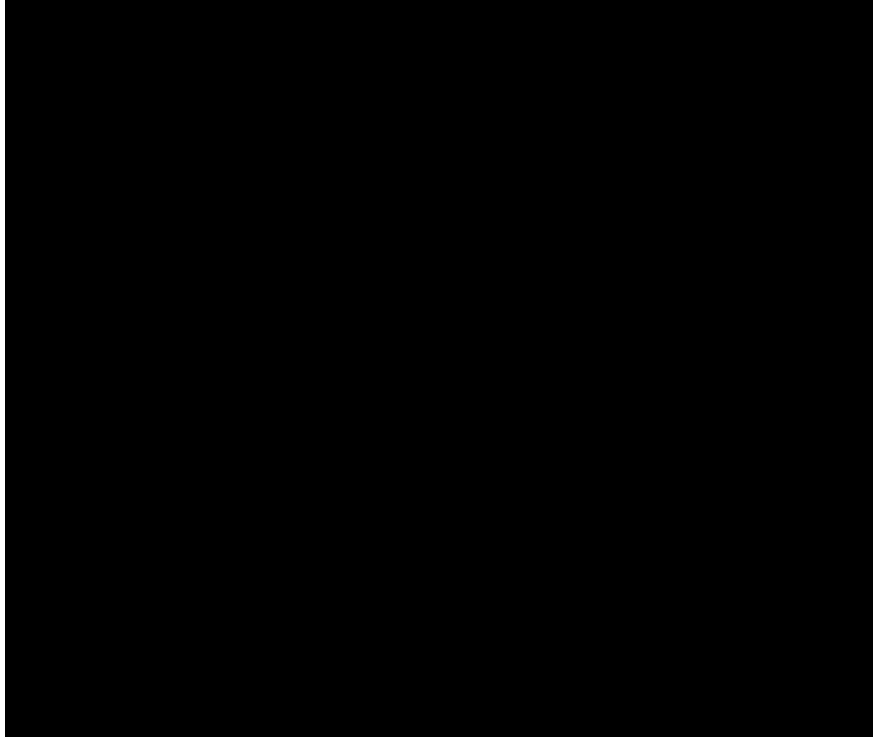
Recent successes

- Feroe x 15
- Turkey x 6
- Japan x 4

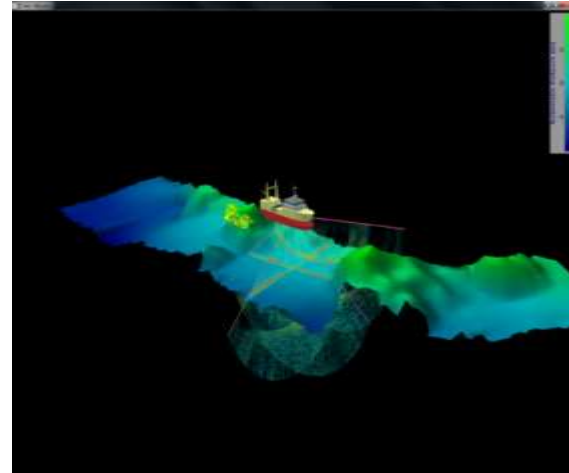


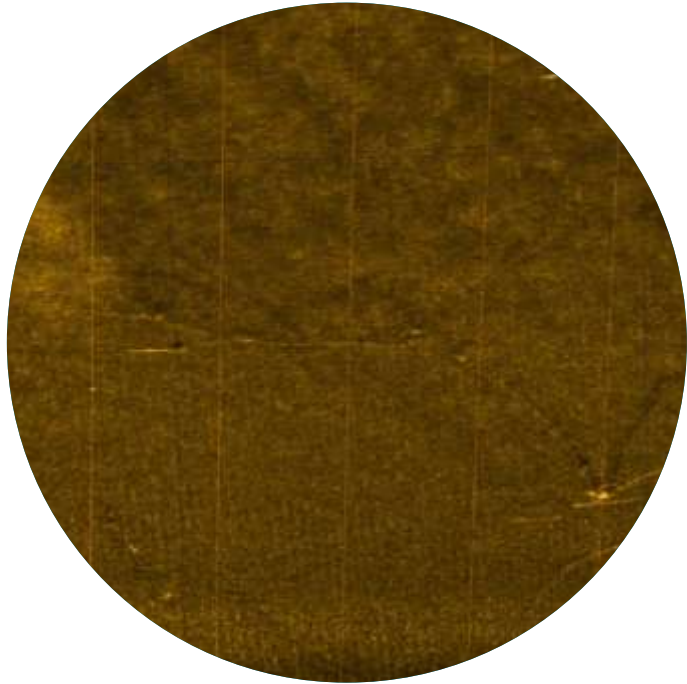


# SEAPIX – Hydro grade environmental sonar



- ALSO an Hydrographic sonar
- Motion stabilized
  - IHO order 1A or 1B capability
  - Static bathymetry





## **SAMS** **Synthetic Aperture Mapping Sonar**

# SAMS – Mapping Sonar

*The sonar merges the sonar data and the navigation and builds the in Real Time*

## Relative Positioning

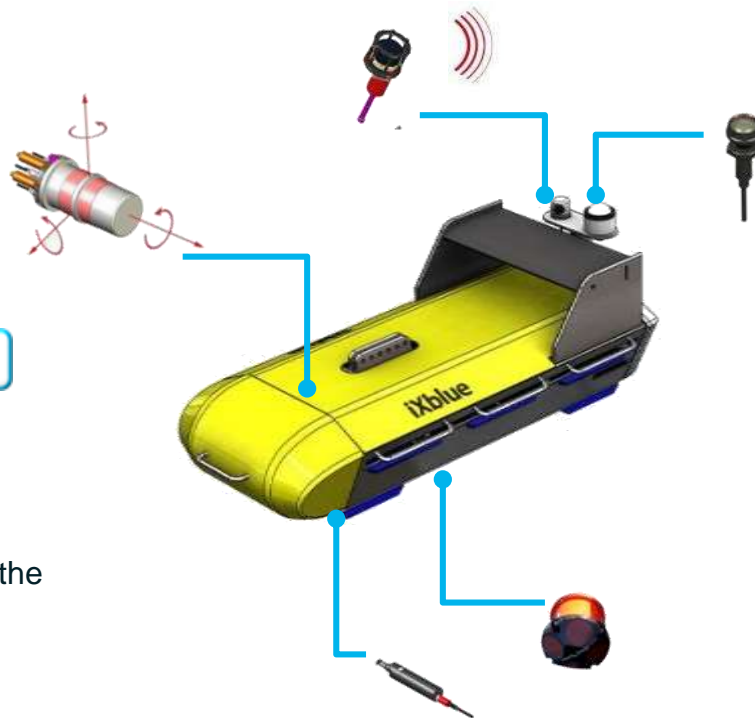
A FOG Inertial Navigation System provides:

- Accurate Attitude
  - Pitch  $\pm 0.01$ deg
  - Roll  $\pm 0.01$ deg
  - Heading  $\pm 0.02$ deg
- And Relative Positioning

## Absolute Positioning

INS is aided by:

- GPS for initialization
- Depth Sensor, Sound Velocity
- DVL: X, Y speed above ground
- USBL providing Lat, Long and Z to the INS

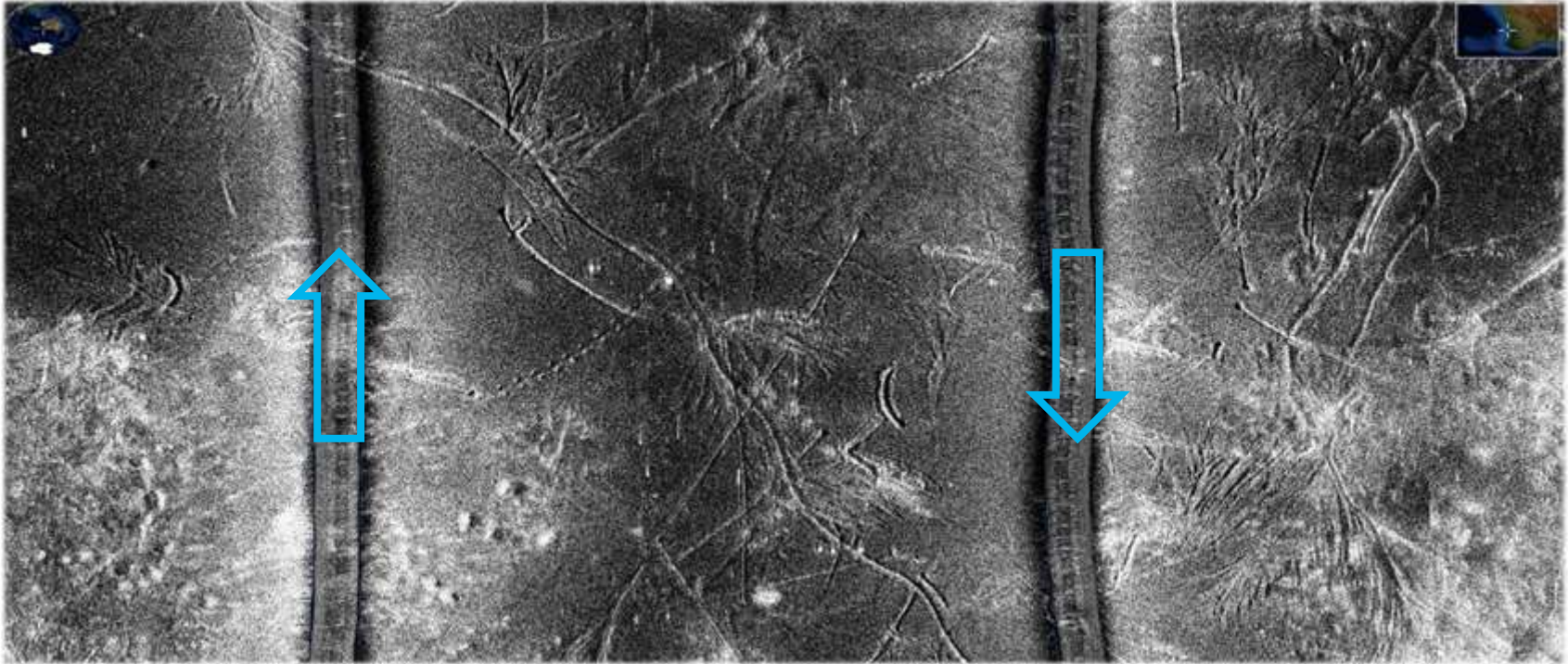


Recent deliveries

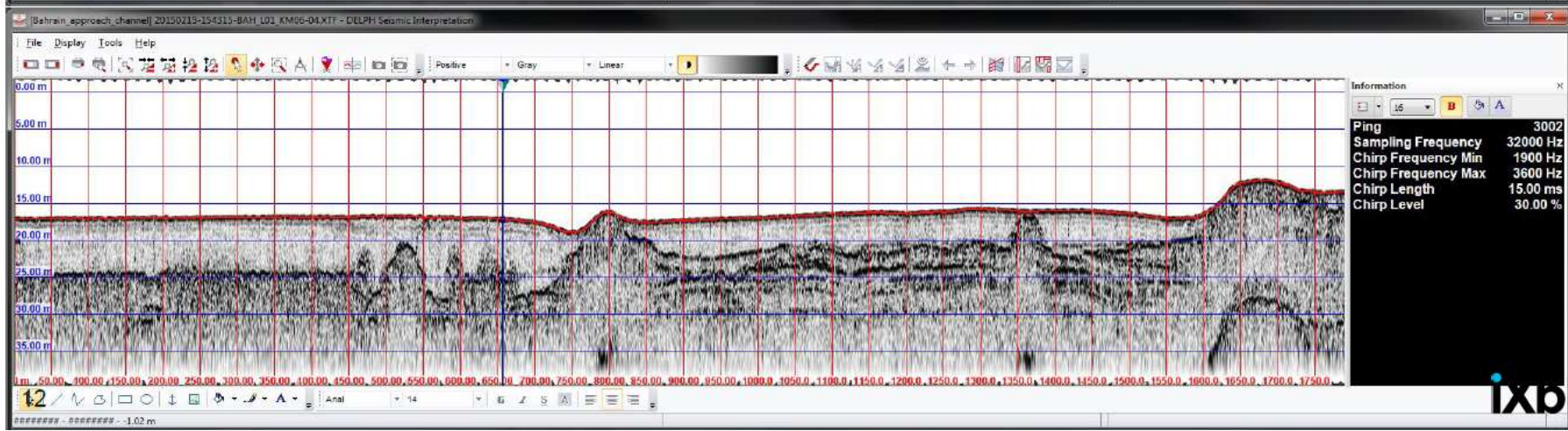
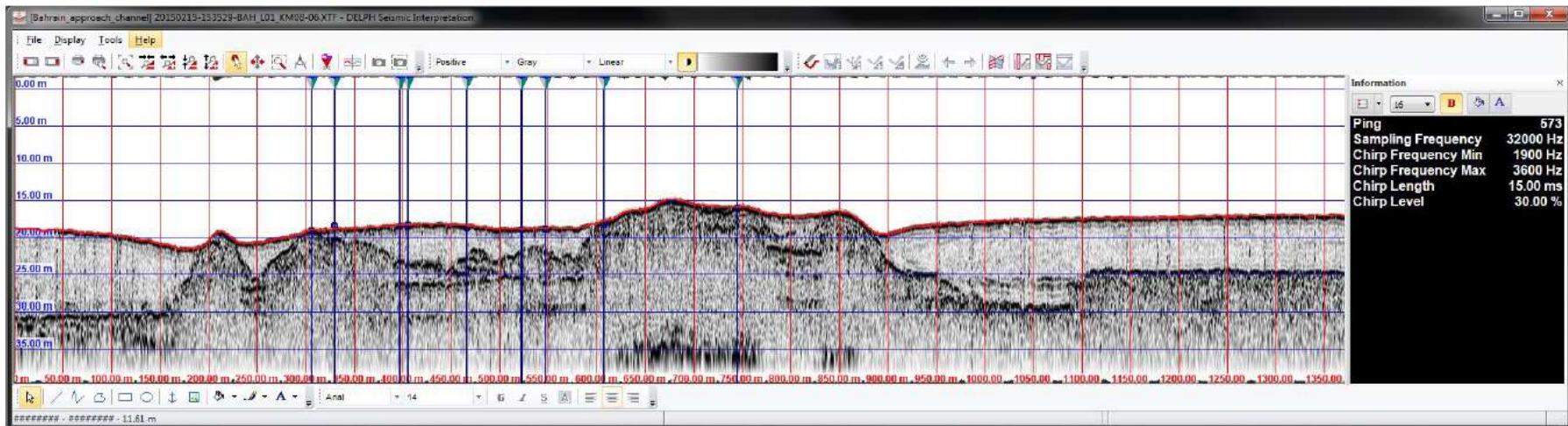
- China x 4
- India x 2
- Pakistan x 1

## SAMS – Results

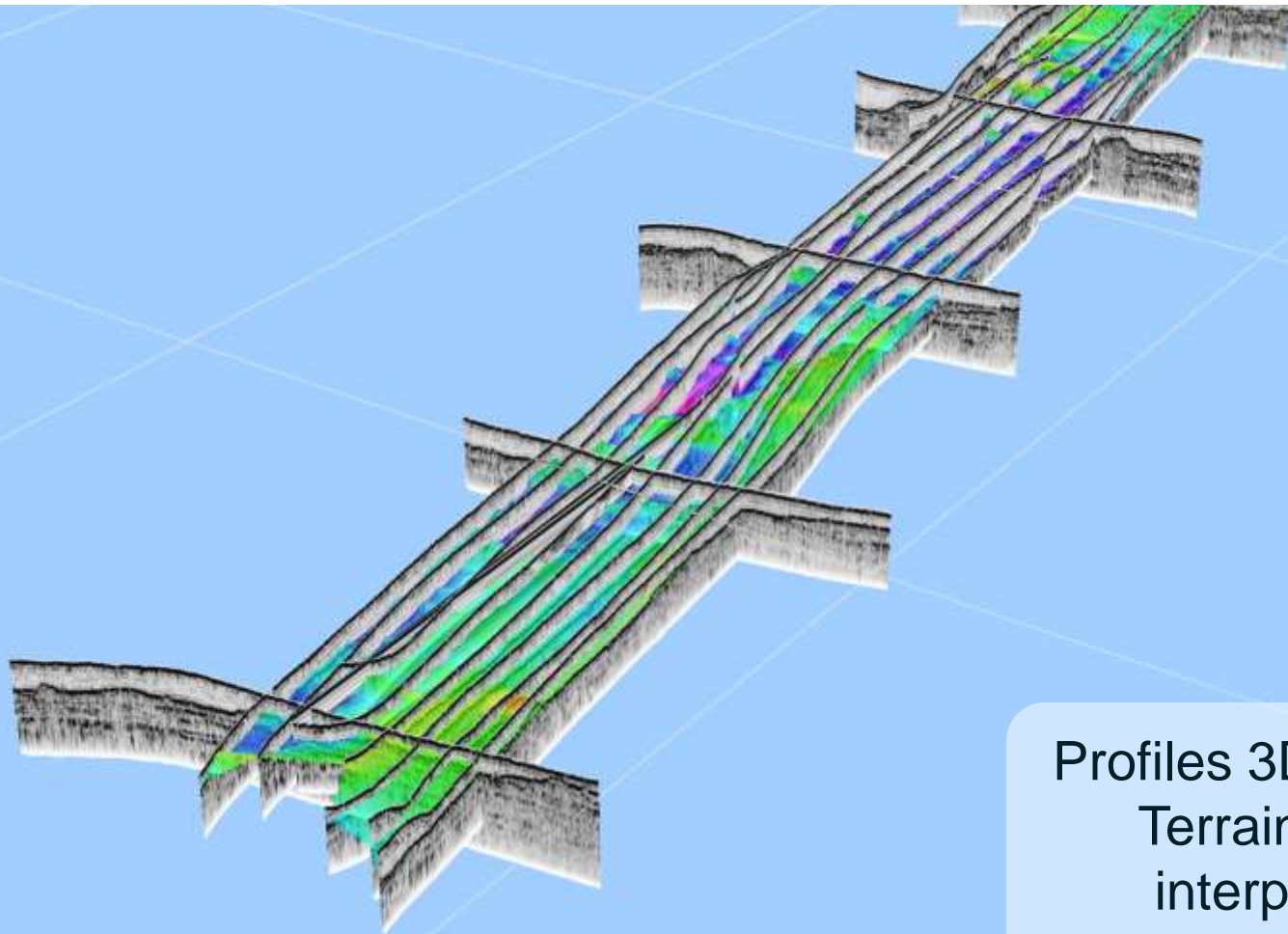
- Real-time mosaic
- Two sonar lines automatic matching
- 1km wide



# Sub-bottom Profiler – Echoes series



# Sub-bottom Profiler – Echoes series



Profiles 3D display &  
Terrain Model  
interpolation



Cell: 1000.00 m

## IXBLUE in La Ciotat – France

- Hydrography Oceanography Geophysical
- Turnkey Survey vessels, survey Drone
- sensor integration:
  - Multibeam, Sonar, sub-bottom profiler
- **Training:** theoretical and at sea training
- *En Anglais et en Français !*



## **IXBLUE in La Ciotat – France**

*We are close to the IHO*

- *Welcome to our site*
  - *Bienvenue !*

*Thank you for your attention*





# Hydrography Oceanography Geophysical

*From Shallow water to full ocean depth*

