

MULTIBEAM SURVEYS FOR HYDROGRAPHY WITH THE DRIX H-8 *MARLIN* AND AN EM 2042





Equipment

Areas & Data

Drix vs Vessels

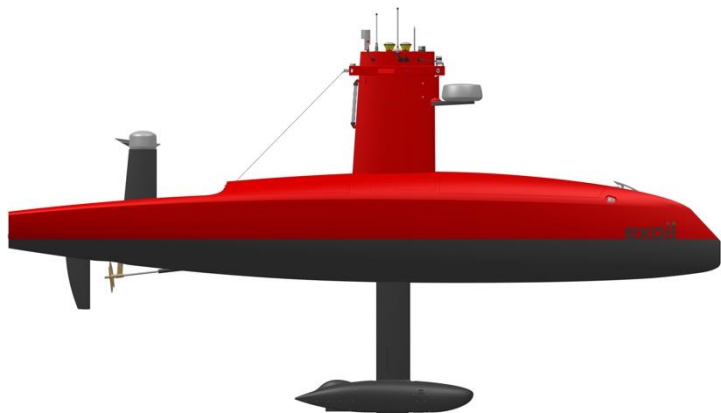
Equipment

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Drix vs Vessels

Overview

- DRIX *Marlin* received in Brest in September 2025.
- Operated from shore or from a vessel. Assistance from survey launches.



Picture from Exail

- Multibeam EM2042
- Singlebeam EK80
- Sub-bottom profiler ECHOES Compact
- Sound Velocity : Valeport Swift & MINI-SVS
- GNSS with Marinestar or RTK
- IMU PHINS Compact C7

Equipment

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Details on Multibeam – Kongsberg EM2042

- Beamwidth : $0.7^{\circ} \times 0.7^{\circ}$
- Frequency : 200-400 kHz. Trials with 300 kHz
- Stabilisation : roll, pitch and yaw
- Aperture : up to 170°
- Number of soundings : 512 in Ultra High Density
- Dual swath
- SIS v5.14.3 in 2025/2026 ; v5.15.1 as of end of June 2026
- Processing : Caris v11.4, v12.1 as of July 2026
- Sound velocity : Doris v2.5.1, v2.5.3 as of May 2026 [Shom/Ifremer software]



Equipment

Areas & Data

Drix vs Vessels

Method

Metrology

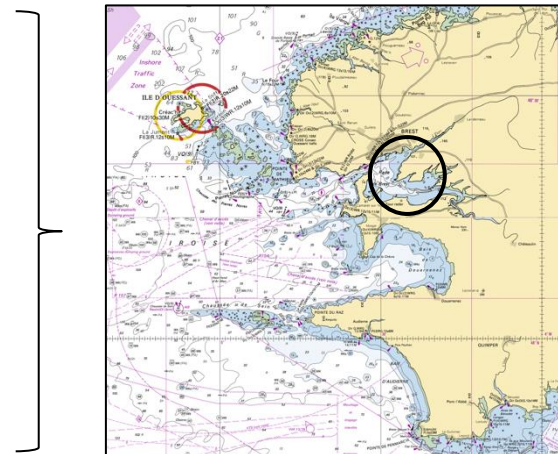
BISTs tests

Patch Test – Gobetas

Vertical assessment – Carre Renard

Horizontal assessment – Rascas

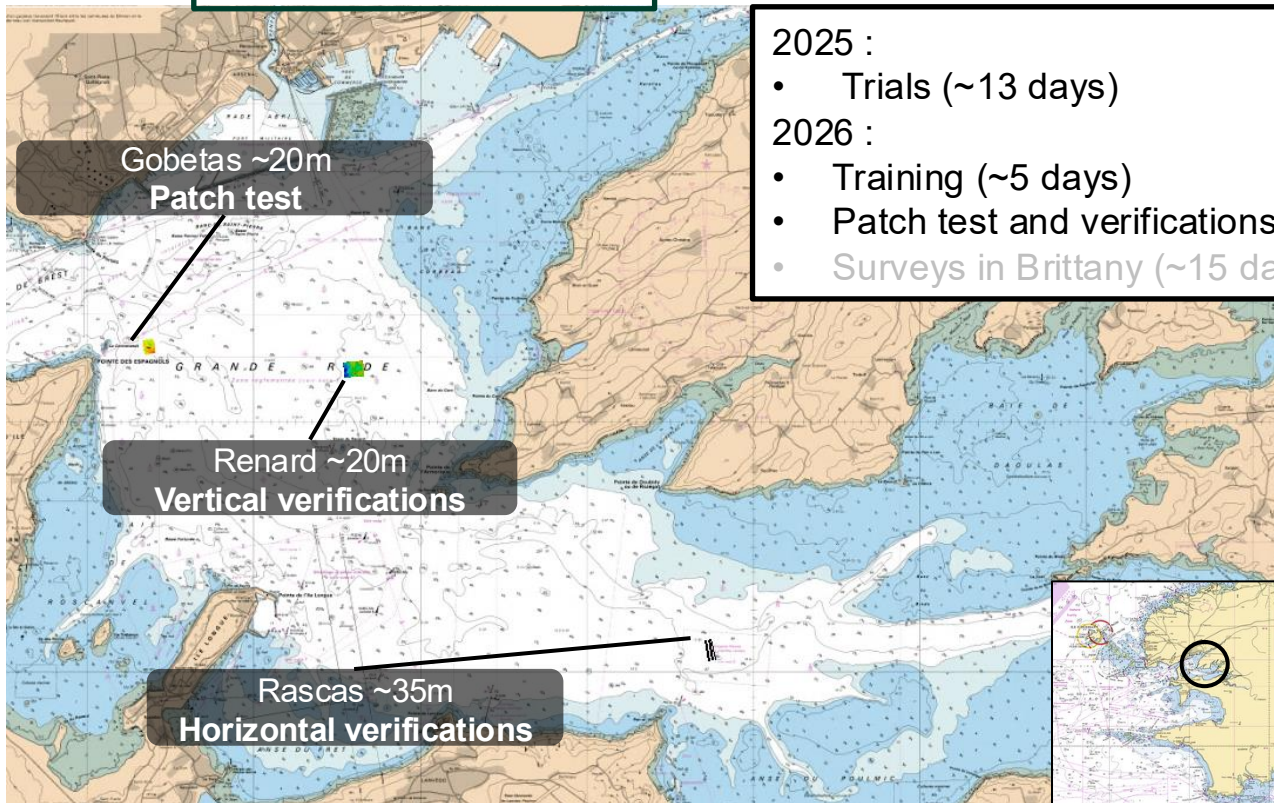
Operational Surveys



Equipment Surveys overview

Areas & Data

Drix vs Vessels



2025 :

- Trials (~13 days)

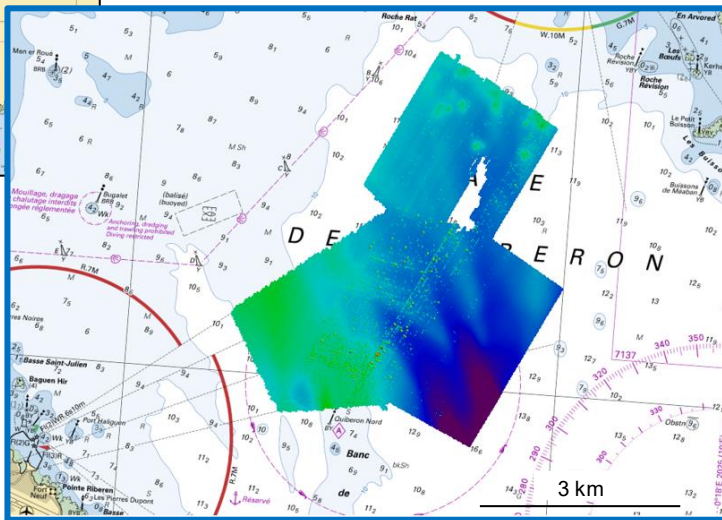
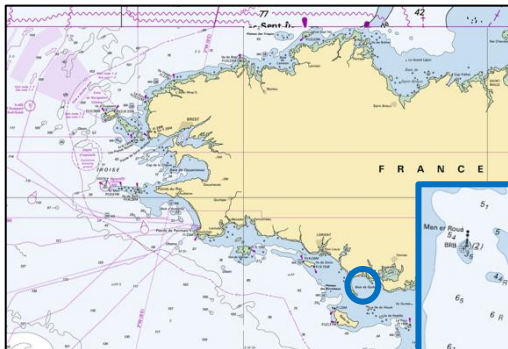
2026 :

- Training (~5 days)
- Patch test and verifications (~3 days)
- Surveys in Brittany (~15 days)

Surveys overview

Areas & Data

Drix vs Vessels



February 2026, grid 1m

2025 :

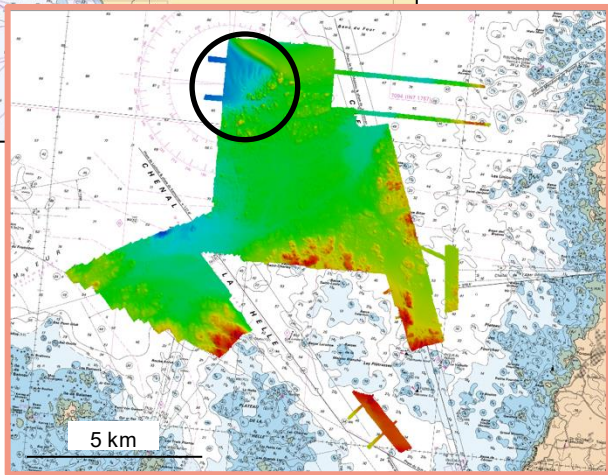
- Trials (~13 days)

2026 :

- Training (~5 days)
- Patch test and verifications (~3 days)
- Surveys in Brittany (~15 days)

Equipment

Surveys overview



Depth, grid 1m - March 2026

Areas & Data

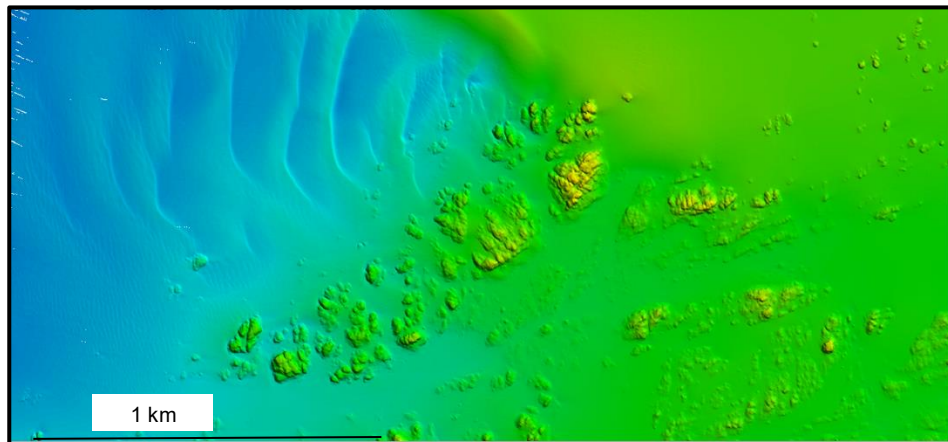
Drix vs Vessels

2025 :

- Trials (~13 days)

2026 :

- Training (~5 days)
- Patch test and verifications (~3 days)
- Surveys in Brittany (~15 days)



Depth, grid 1m - March 2026

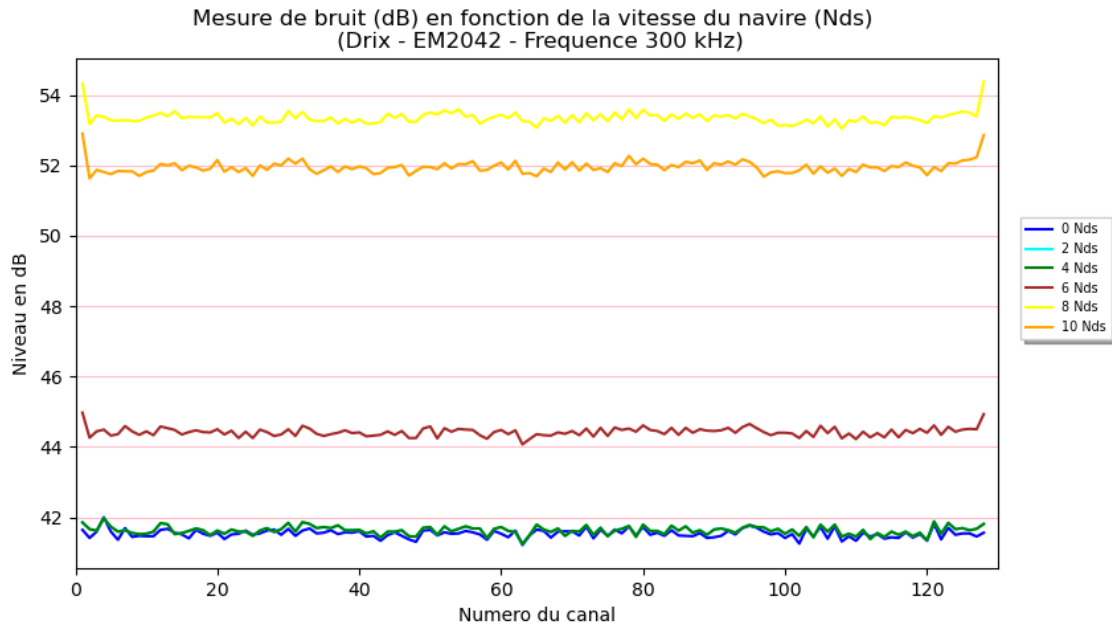
Equipment

Areas & Data

Drix vs Vessels

BIST Tests – Rx Noise

- More noise at 8 kts than at 10 kts (we get the same effect on EM710).
- All channels are ok.



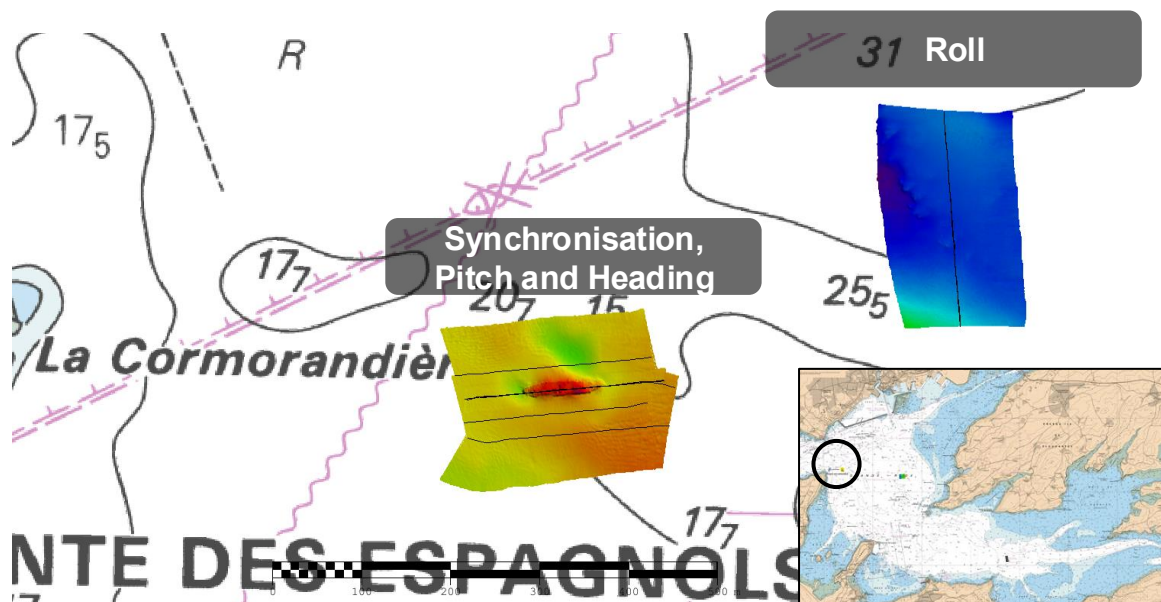
Drix – EM 2042 – January 2026

Equipment

Areas & Data

Drix vs Vessels

Patch test – Gobetas wreck



January 2026
Depth: ~20 m
Speed: 2-4 kts

Equipment

Areas & Data

Drix vs Vessels

Patch test – Gobetas area

- Tide from Brest tide gauge applied
- Few outliers cleaned
- No previous patch test angles applied – only metrology values

Metrology	Roll	Pitch	Heading
TX	0.16°	-0.22°	0.25°
RX	-0.07°	-0.43°	0.17°

- Corrections obtained in Caris : Synchronisation : 0s. Roll : -0.05°. Pitch : 0.4°. Heading : 0.3°.
- Applied to SIS Installation parameters/Transducer setup. [Sensor Setup/Attitude angles at 0].

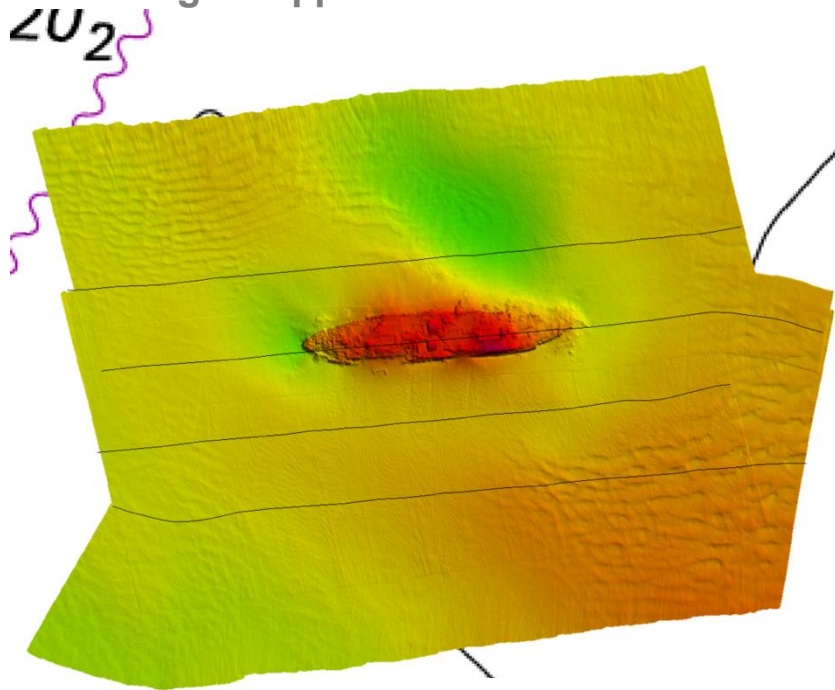
Results	Roll	Pitch	Heading
TX	0.16°	$-0.22^\circ + 0.4^\circ = 0.18^\circ$	$0.25^\circ + 0.3^\circ = 0.55^\circ$
RX	$-0.07^\circ - 0.05^\circ = -0.12^\circ$	-0.43°	0.17°

Equipment

Areas & Data

Drix vs Vessels

Data from patch test, patch test angles applied + tide file



January 2026
Depth: ~20 m
Speed: 2-4 kts

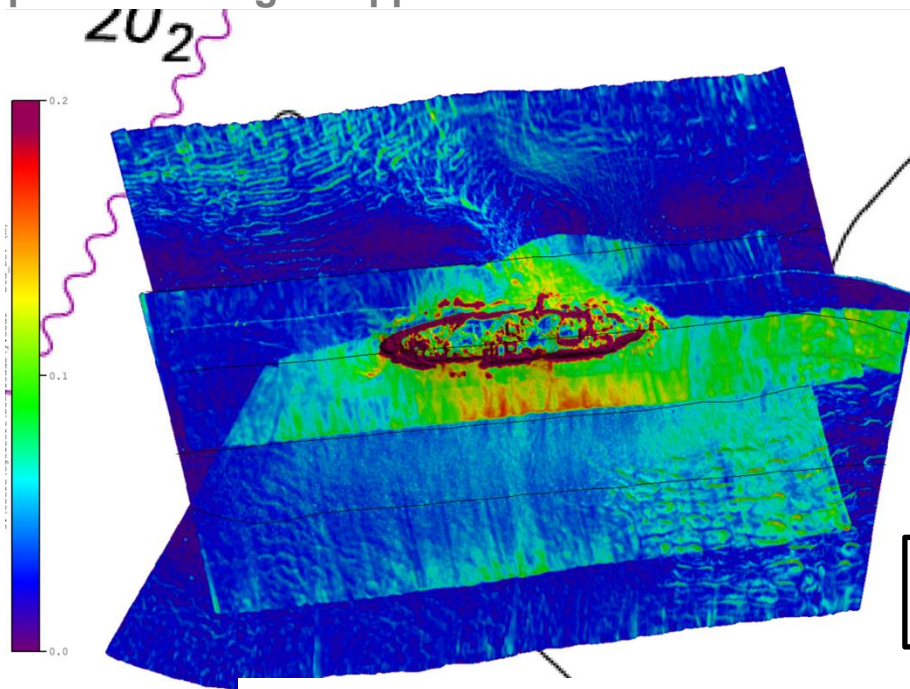
Depth [m], grid 0.20m

Equipment

Areas & Data

Drix vs Vessels

Data from patch test, patch test angles applied + tide file



January 2026
Depth: ~20 m
Speed: 2-4 kts

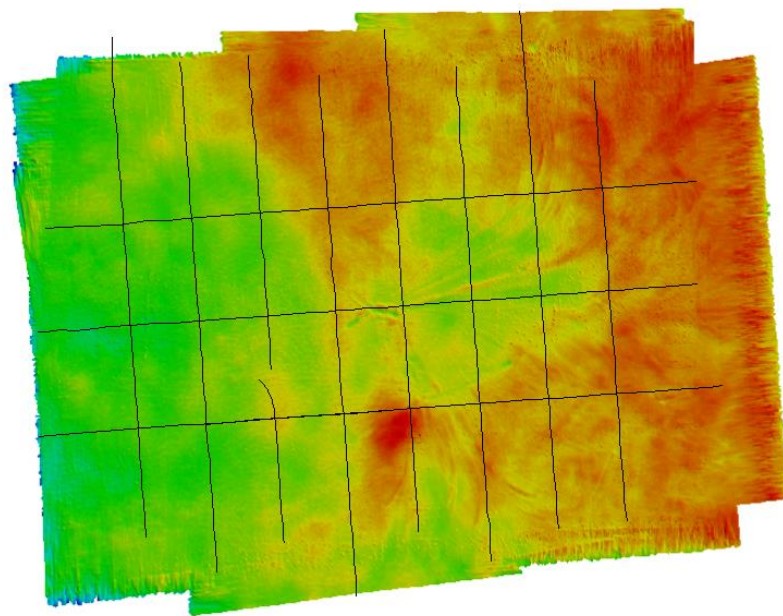
New metrology and patch
test planned in 2026

Equipment

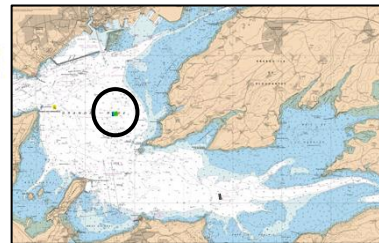
Areas & Data

Drix vs Vessels

Vertical Assessment – Renard area



Depth, grid 0.20m



January 2026
Depth: ~20 m
Speed: 7 kts
Aperture : $\pm 80^\circ$
HD - equidistant
Manual

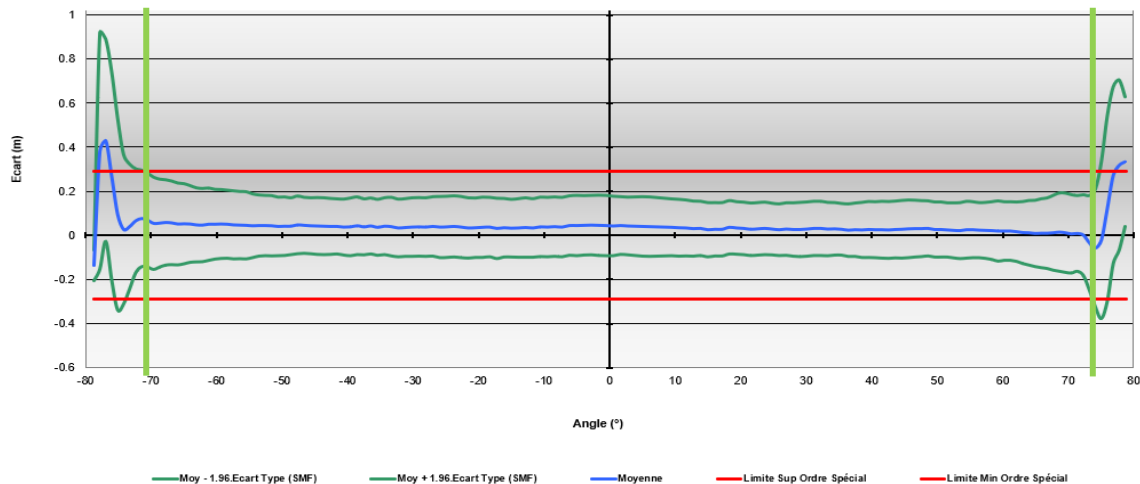
Equipment

Areas & Data

Drix vs Vessels

Vertical Assessment – Renard area

Vérification Verticale : écart (m) par rapport à la référence en fonction de l'ouverture (°)



Profondeur moyenne (m)=19.41 Biais Moyen (m)=0.045 Ecart Type SMF Moyen (m)=0.081 Extremum QC (m)=0.921

Tide reduction

January 2026
 Depth: ~20 m
 Speed: 7 kts
 Aperture : $\pm 80^\circ$
 HD - equidistant
 Manual

IHO Special Order on $\pm 73^\circ$



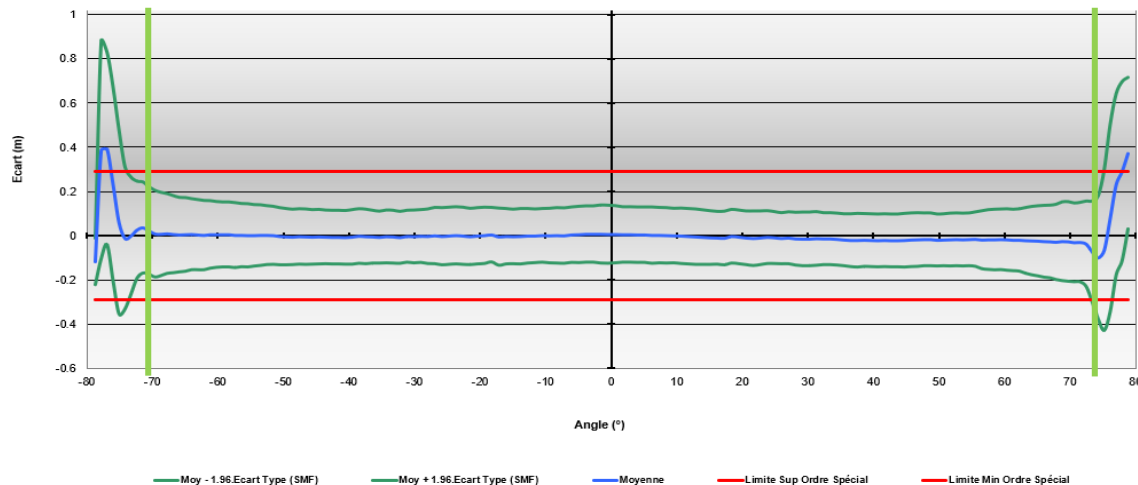
Equipment

Areas & Data

Drix vs Vessels

Vertical Assessment – Renard area

Vérification Verticale : écart (m) par rapport à la référence en fonction de l'ouverture (°)



Profondeur moyenne (m)=19.41 Biais Moyen (m)=0.005 Ecart Type SMF Moyen (m)=0.078 Extremum QC (m)=0.877

Ellipsoid reference

January 2026
 Depth: ~20 m
 Speed: 7 kts
 Aperture : $\pm 80^\circ$
 HD - equidistant
 Manual

IHO Special Order on $\pm 73^\circ$



Equipment

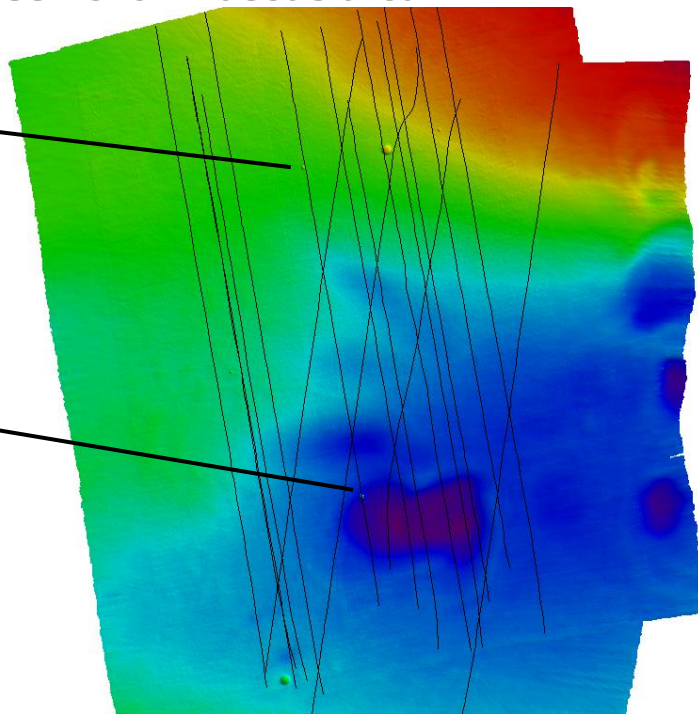
Areas & Data

Drix vs Vessels

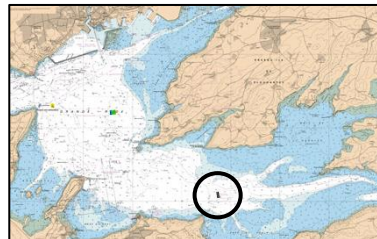
Horizontal Assessment – Rascas area

1m Cube

2m Cube



Depth, grid 0.20m



January 2026

Depth: ~35 m

Speed: 4 and 7 kts

Aperture : $\pm 70^\circ$ and
 $\pm 30^\circ$

HD - equidistant

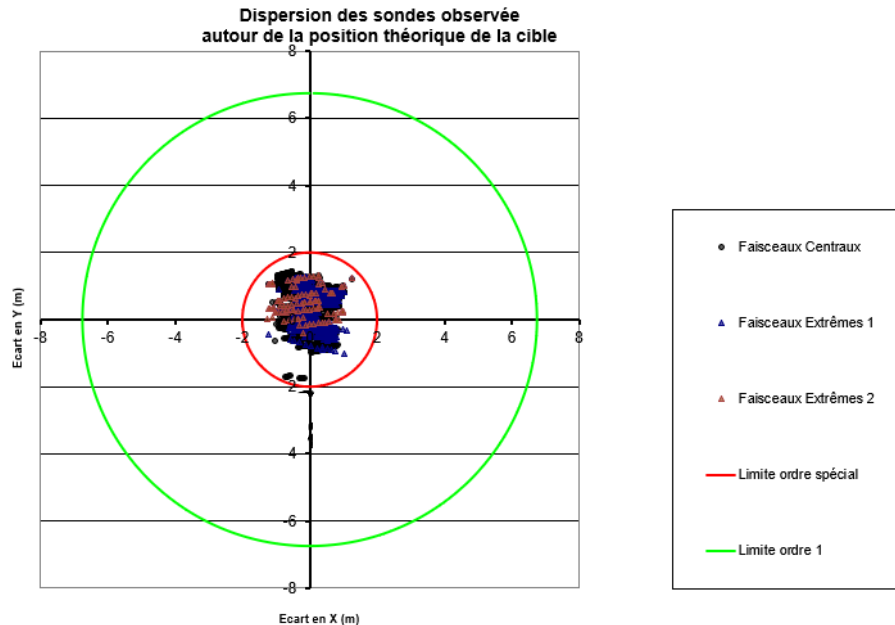
Auto

Equipment

Areas & Data

Drix vs Vessels

Horizontal Assessment – Rascas area



2m cube

January 2026

Depth: ~35 m

Speed: 4 and 7 kts

Aperture : $\pm 70^\circ$ and
 $\pm 30^\circ$

HD - equidistant

Auto

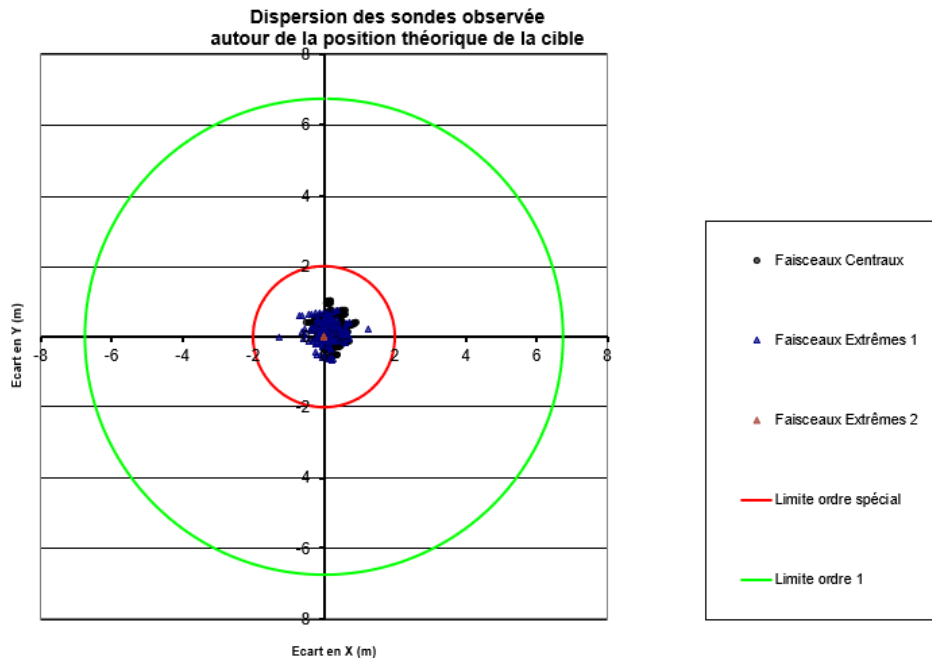
IHO Order 1



Equipment

Areas & Data

Horizontal Assessment – Rascas area



1m cube

Drix vs Vessels

January 2026

Depth: ~35 m

Speed: 4 and 7 kts

Aperture : $\pm 70^\circ$ and
 $\pm 30^\circ$

HD - equidistant

Auto

IHO Special Order

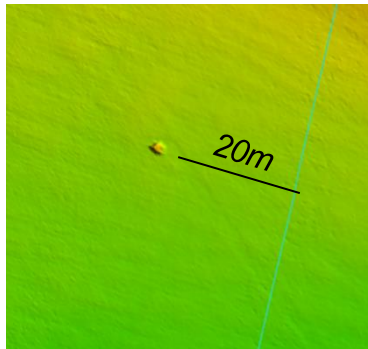
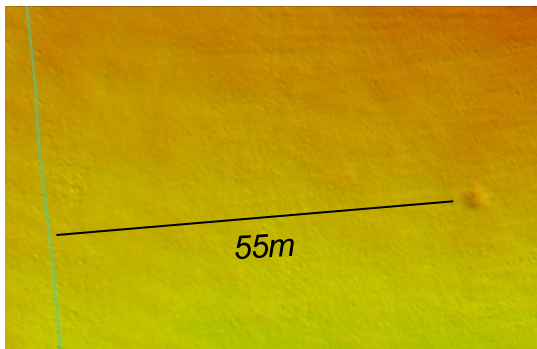
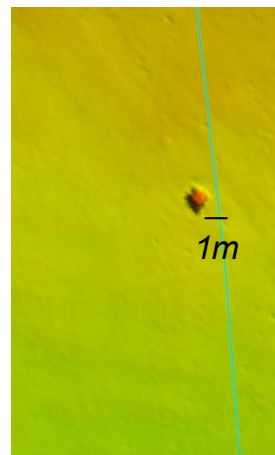
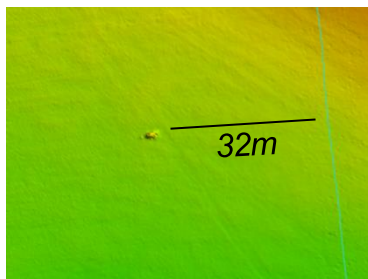
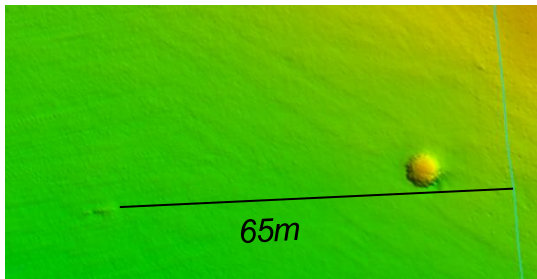


Equipment

Areas & Data

Drix vs Vessels

Detection – Rascas area (1m cube)



✓ Detection and cotation on central beams and outer beams, with $\pm 30^\circ$ and $\pm 65^\circ$ aperture

Operational aperture recommended : $\pm 65^\circ$
Maximum survey speed : 8 kts

Depth [m], grid 0.20m

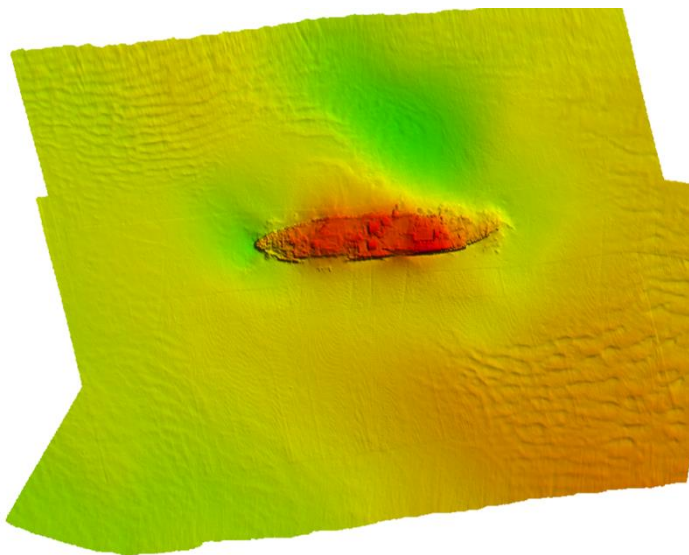
Equipment

Areas & Data

Drix vs Vessels

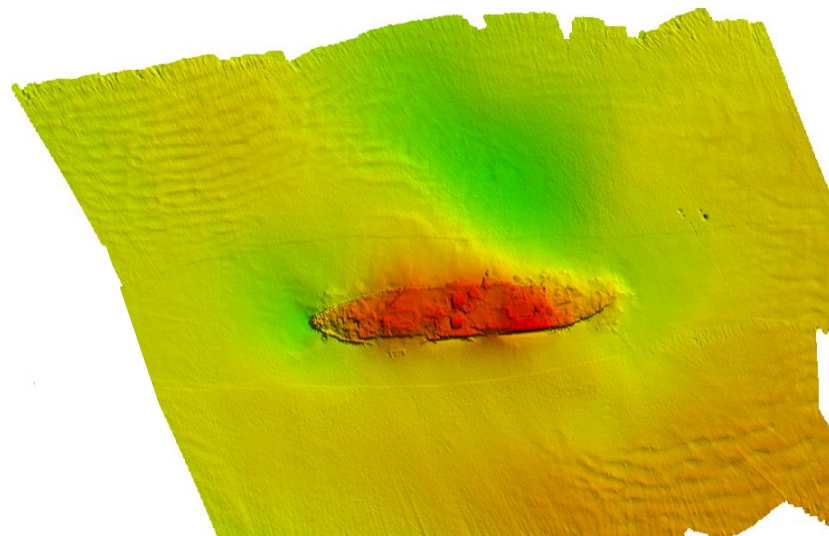
Data from EM2042/EM2040C – Gobetas area

DRIX, January 2026



Depth, grid 0.20m - EM 2042
Aperture: $\pm 30^\circ$ and $\pm 65^\circ$. Speed : 2-4 kts
Weather : wind 10-15 kts

SURVEY VESSEL, *Phaeton*, March 2026



Depth, grid 0.20m - EM 2040c
Aperture: $\pm 30^\circ$ and $\pm 65^\circ$. Speed : 4-7 kts
Weather : wind 0-15 kts

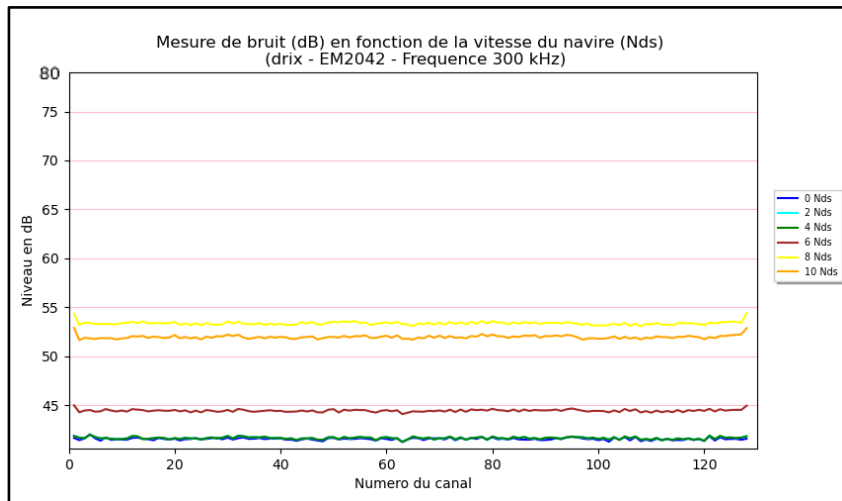
Equipment

Areas & Data

Drix vs Vessels

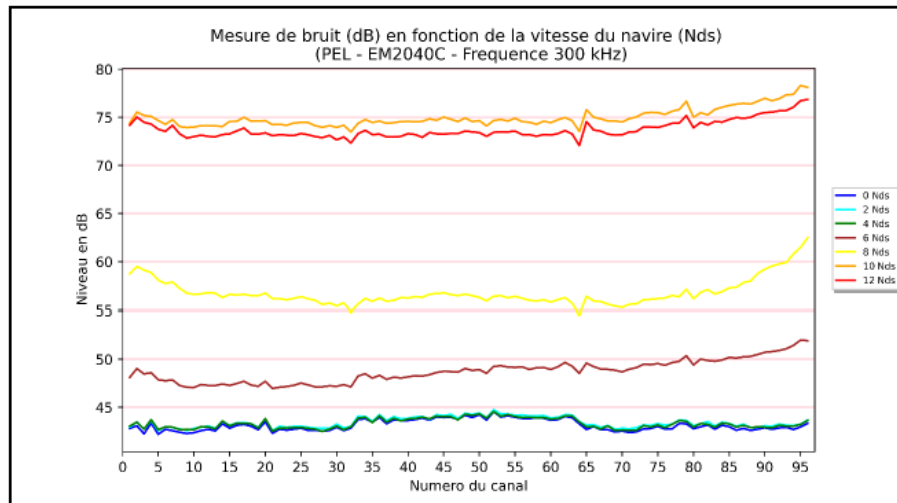
Data from EM2042/EM2040C

DRIX



Drix – EM 2042 – January 2026
Weather : wind 10-15 kts

SURVEY VESSEL



Pelican – EM 2040c – February 2026
Weather : wind 10-15 kts

Equipment

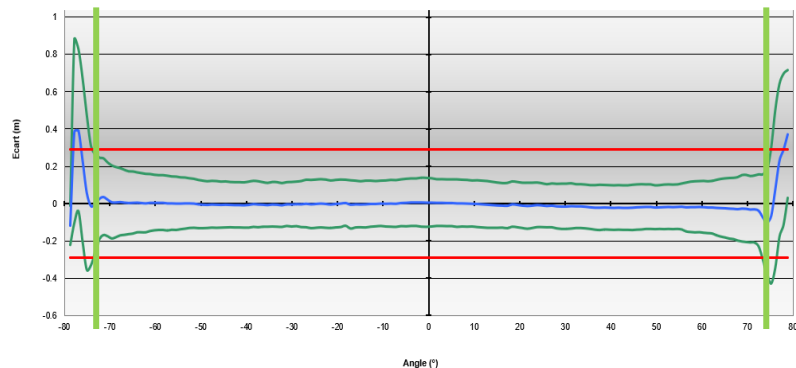
Areas & Data

Drix vs Vessels

Vertical Assessment (vs ellipsoid) – Renard area

DRIX (January 2026)

Vérification Verticale : écart (m) par rapport à la référence en fonction de l'ouverture (°)



— Moy - 1.96 Ecart Type (SMF) — Moy + 1.96 Ecart Type (SMF) — Moyenne — Limite Sup Ordre Spécial — Limite Min Ordre Spécial

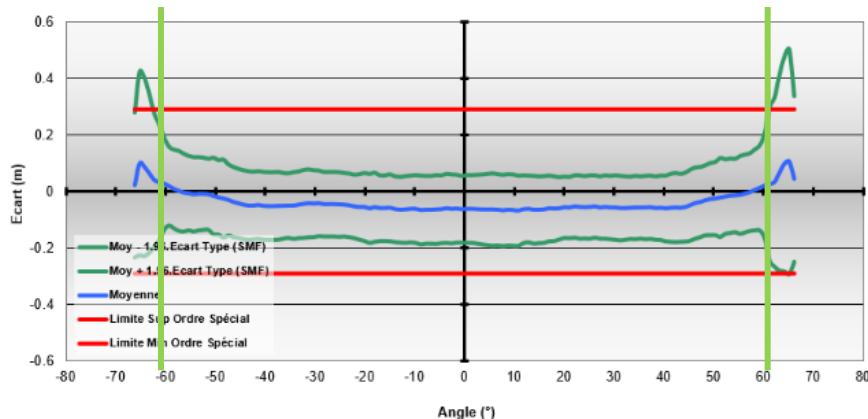
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IHO Special Order on $\pm 73^\circ$



SURVEY VESSEL (*Phaeton*, March 2026)

Vérification Verticale : écart (m) par rapport à la référence en fonction de l'ouverture (°)



Profondeur moyenne (m)=20 Biais Moyen (m)=-0.036 Ecart Type SMF Moyen (m)=0.07 Extremum QC (m)=0.504

IHO Special Order on $\pm 60^\circ$



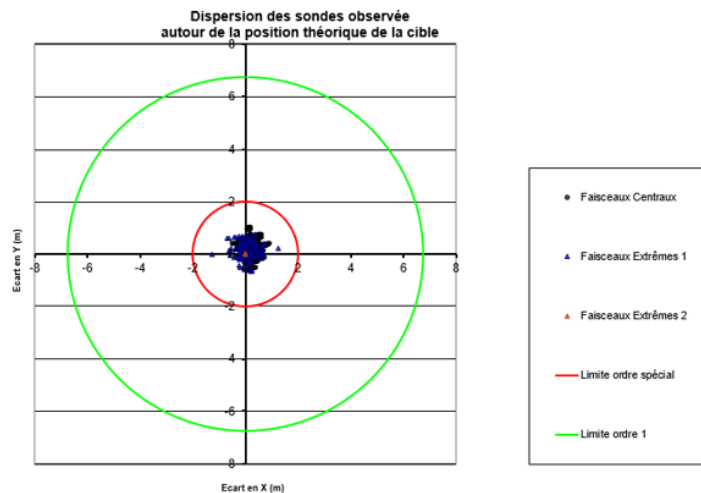
Equipment

Areas & Data

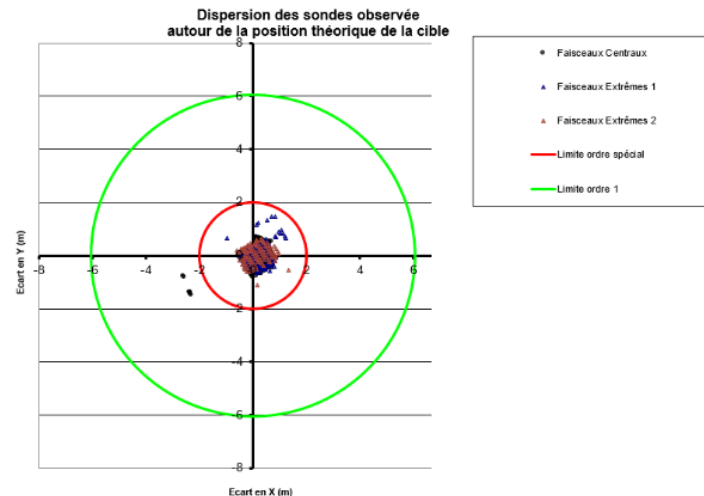
Drix vs Vessels

Horizontal Assessment - Rascas area (1m cube)

DRIX – January 2026



SURVEY VESSEL *Albatros* – December 2025



Equipment

Areas & Data

Drix vs Vessels

DRIX

- Less fuel consumption
- Continuous operations ~5 days (no crew change) with 2 people on watch
- Communication or engine issues often means going back to shore
- Line steering & efficient turns
- Low noise : less spikes in data
- High stability platform
- Possibilities for a feedback on TX/RX=1 to check correct booting (new data output, camera ?)
- Virtual machine slows down option selections

SURVEY VESSELS

- Spare parts on-board
- On-board troubleshooting
- Can conduct other operations at the same time (deployments or crew transfer for example)

✓ **TRIALS IN BREST : IHO SPECIAL ORDER SURVEYS WITH THE DRIX AND AN EM2042**

✓ **FIRST OPERATIONAL SURVEYS CONDUCTED**

✓ **SAME PROCESSING, SOFTWARES AND DATA INTEGRATION IN SHOM DATABASES**

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