

FEMME 2026

From National Ambition to Near Completion

30 Years of Irish Seabed Mapping

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Marine Institute



An Roinn Comhshaoil,
Aeráide agus Cumarsáide
Department of the Environment,
Climate and Communications





From INSS to INFOMAR: 30 Years of National Seabed Mapping

- Evolution of Ireland's national mapping programme

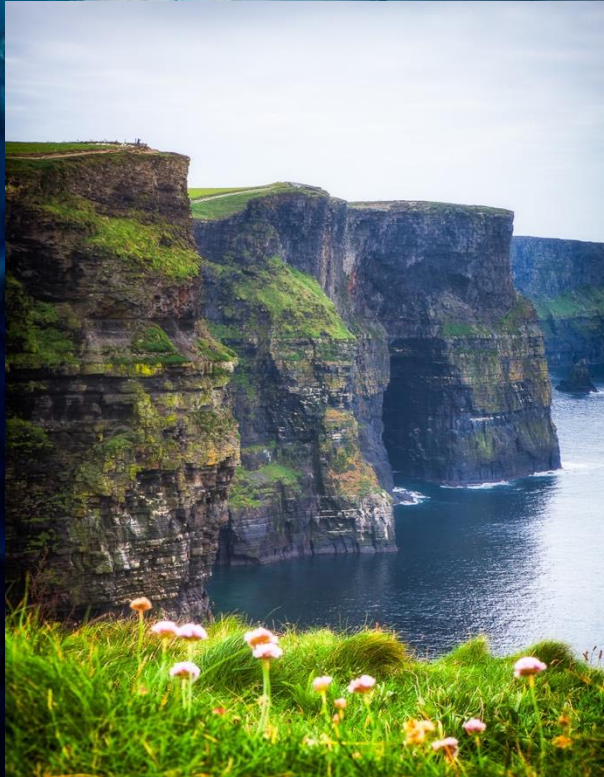
Methodology and infrastructure

- Long-term use of Kongsberg multibeam technology

Multibeam Data Supporting Scientific Discoveries – some case studies

- The Real Map of Ireland
- ROV investigations of deep-sea coral reef
- National-scale geomorphological mapping of the EEZ
- Maritime heritage – 600+ shipwrecks mapped and their pollution legacy
- Offshore renewable energy development
- Supporting seabed mapping in Small Island Nations

Ireland's hidden landscape



When you think about Ireland landscapes, what do they look like?

- ~880,000 km² maritime territory

- **Deep Atlantic margin, Porcupine Seabight, Rockall Bank & Celtic Sea**

Internationally significant ocean space

- **EEZ among the largest and most productive in the EU**

Economic, environmental & security imperative

- **Only sparse legacy data pre-1996**

No systematic baseline

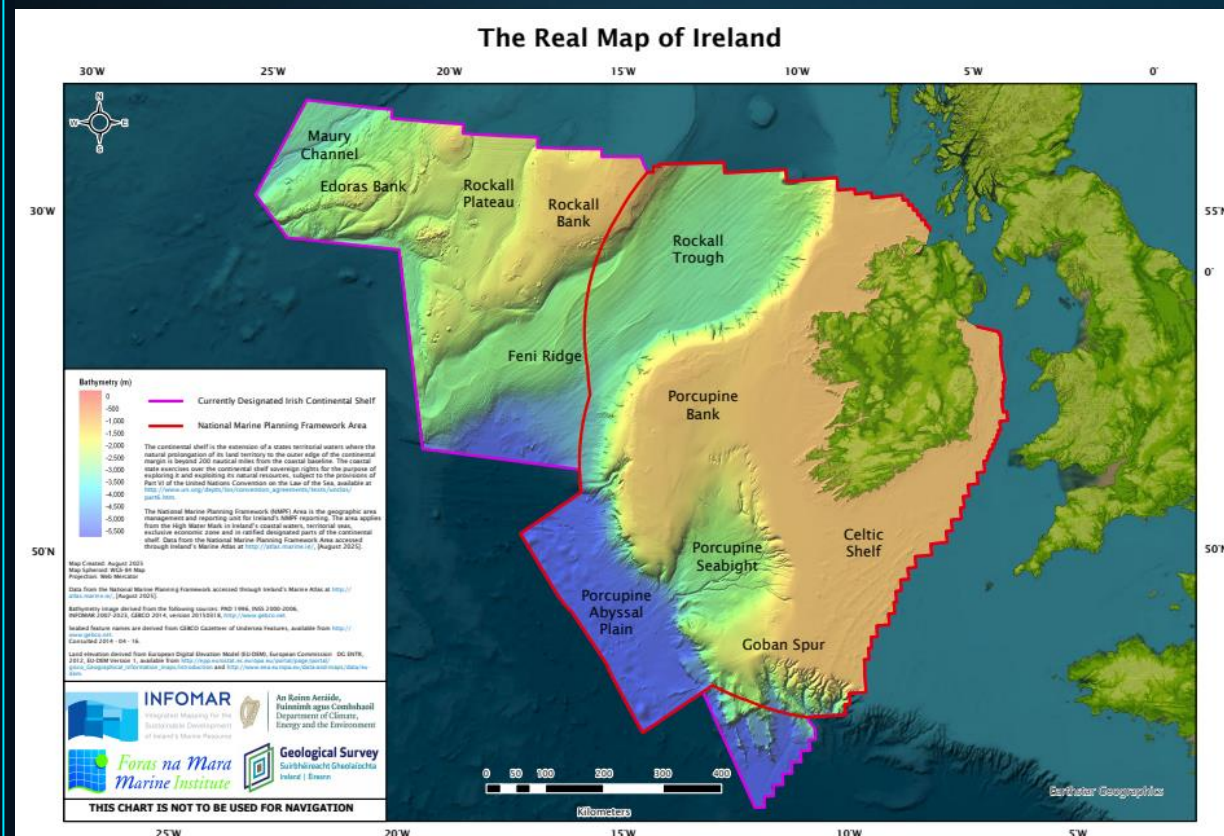
- **Ocean economy potential**

Fisheries, offshore renewables, telecoms, heritage

880K
km² EEZ

10x
Ocean vs Land

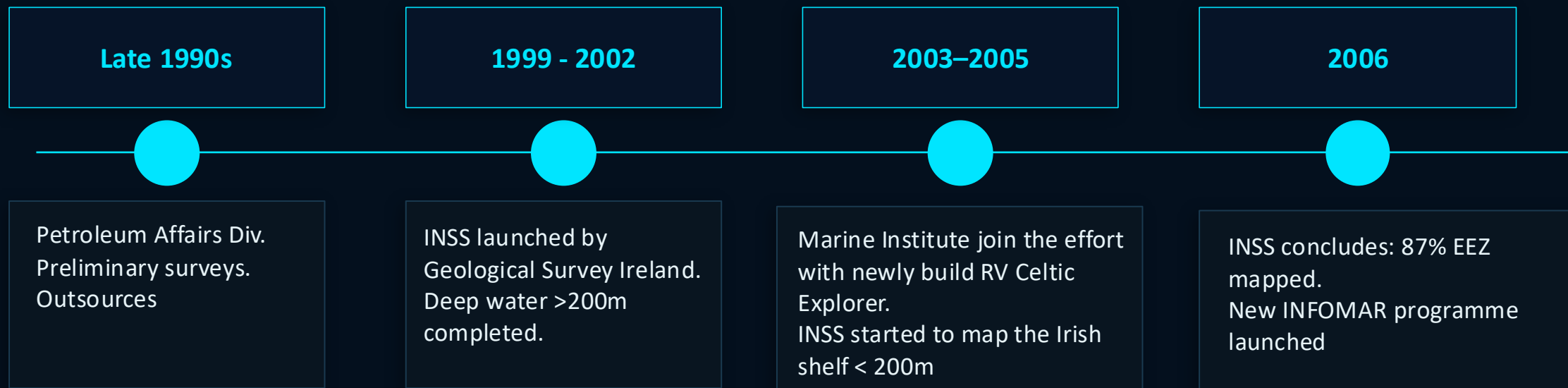
1st
Near-complete
EEZ mapping



Real Map of Ireland

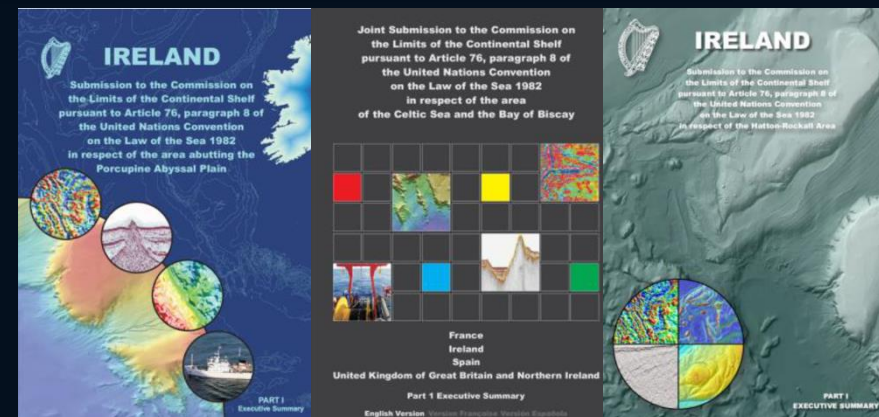
The Genesis: Irish National Seabed Survey

INSS 1999–2006 · The world's first systematic extended EEZ mapping programme



Key Outcomes:

- First nation to conduct extensive mapping of an extended EEZ
- Deep-water territory (>200m) surveyed for the first time
- Open data policy adopted from the outset — freely available to science & industry





INFOMAR: 2006 → Present

20 years of integrated seabed mapping

- **Joint venture: Marine Institute + Geological Survey Ireland**
Funded by Dept. of Environment, Climate & Communications
- **Targets shelf & coastal waters left unmapped after INSS**
Large fleet of small and big survey vessels
- **Governance: Board + Technical Advisory Committee**
Cross-sectoral relevance
- **Cost–benefit study (2008):**
4–6× return on investment
- **Focused: data integration, dissemination, R&D and education**
Novel Web Portals, third level MSc Module / Onboard Training
- **Open data — free download; INFOMAR interactive portal**
EMODnet Geology integration; >~200 TB and growing



INFOMAR Fleet



The Path to Completion: 2026–2029

The most technically demanding areas — shallowest, most complex coastal waters — remain

2026

End of 2025 ~14,000 Km²
remaining

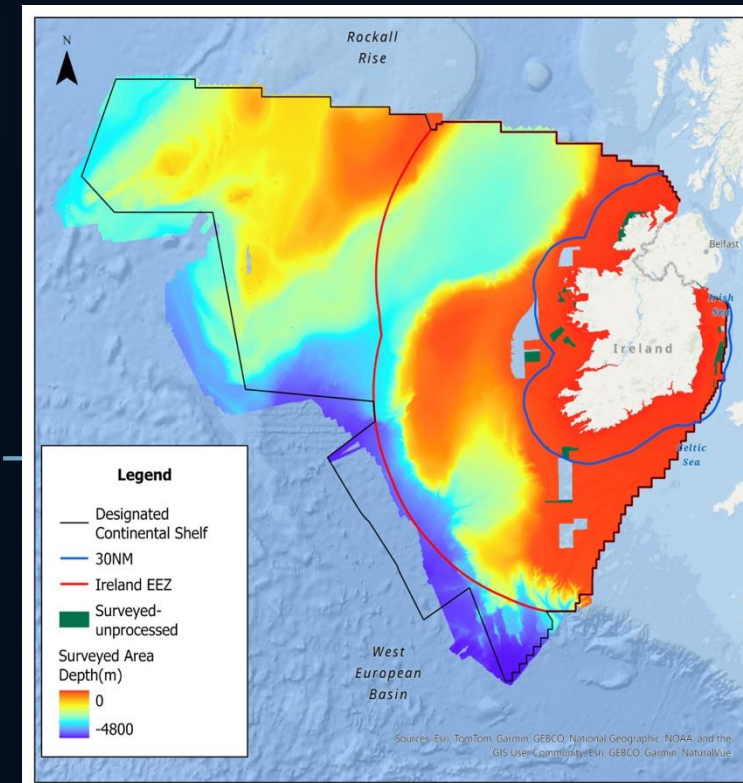
Final Extension phase
approved by Government
May 2026

2027 - 2028

“All hands-on Deck”
All vessels deployed to
complete all remaining
coastal gaps, including
harbours & estuaries

2029

Data finalization and
integration.
Data publishing.



"Ireland will become the first nation in the world with a significant maritime area to meet the objective of mapping all of its offshore territory."

— Minister of State Timmy Dooley, May 2026

What INFOMAR Delivers: Data Products

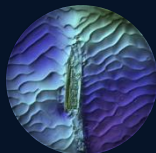
A multi-layer seabed mapping initiative — not just bathymetry

ROV investigations



Delivering large scale national deep water and shelf ROV video survey for habitat mapping and marine restoration

◆ Multibeam Bathymetry



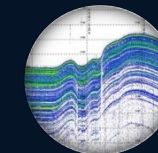
5/10 m resolution shelf grids; 25m offshore. Water depth, seafloor topography, terrain derivatives (slope, rugosity, BPI). Foundation product for all downstream applications.

◎ Acoustic Backscatter



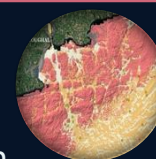
Seabed reflectivity mosaics. Proxy for substrate hardness (rock vs. sediment). Critical for habitat mapping, sediment mobility & cable route assessment.

◆ Sub-Bottom Profiler (SBP)



Chirp/parametric sonar; shallow stratigraphy to 30m depth. Reveals buried palaeochannels, gas pockets, glacial till, soft sediment thickness.

① Habitat / Sediment/ Morphology

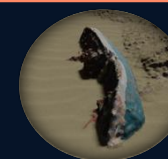


Broad & fine-scale seabed classification. Feeding into EU Habitats Directive & marine spatial planning frameworks. High resolution Geomorphology maps of entire EEZ derived using ML/AI novel methods

◎ Magnetometer

Detection of buried metallic objects — shipwrecks, ordnance, cables. Essential for UXO risk assessment and heritage site identification.

◆ Heritage

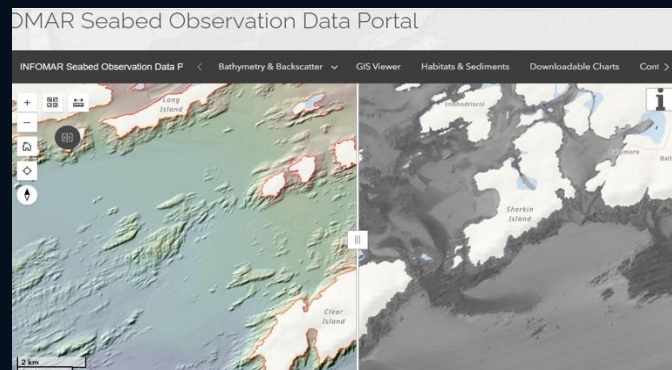


High resolution mapping and reporting of all wrecks found on seabed. Reports provided to Archeology Unit, UKHO and National Museum

From raw multibeam to a national ocean intelligence platform

INFOMAR Data Portal

Free download of Per-survey and merged regional grids.
WMS/WFS services for GIS integration.
Browser-based exploration via ArcGIS Online

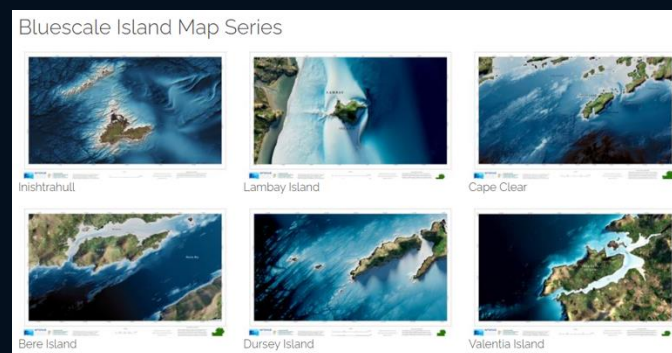


Education & Outreach

School curriculum resources (Scoilnet),
INFOMAR public engagement programmes
INFOMAR MSc modules

Bluescale Map Series

High-quality printed and digital maps of Irish bays and islands using INFOMAR bathymetry to foster public engagement.



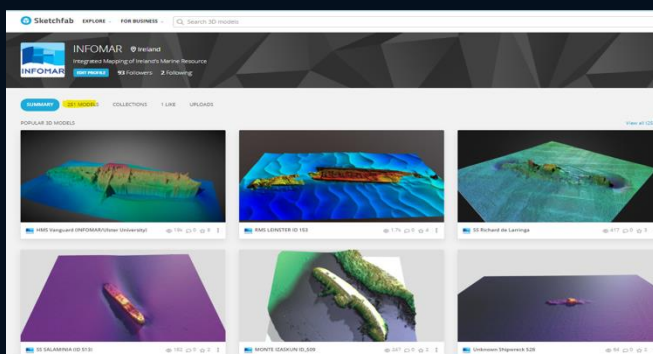
EMODnet Geology Portal

All INFOMAR data discoverable via EU EMODnet platform. Supporting pan-European marine spatial planning, offshore energy development and research.

Shipwreck Viewer & Story Maps



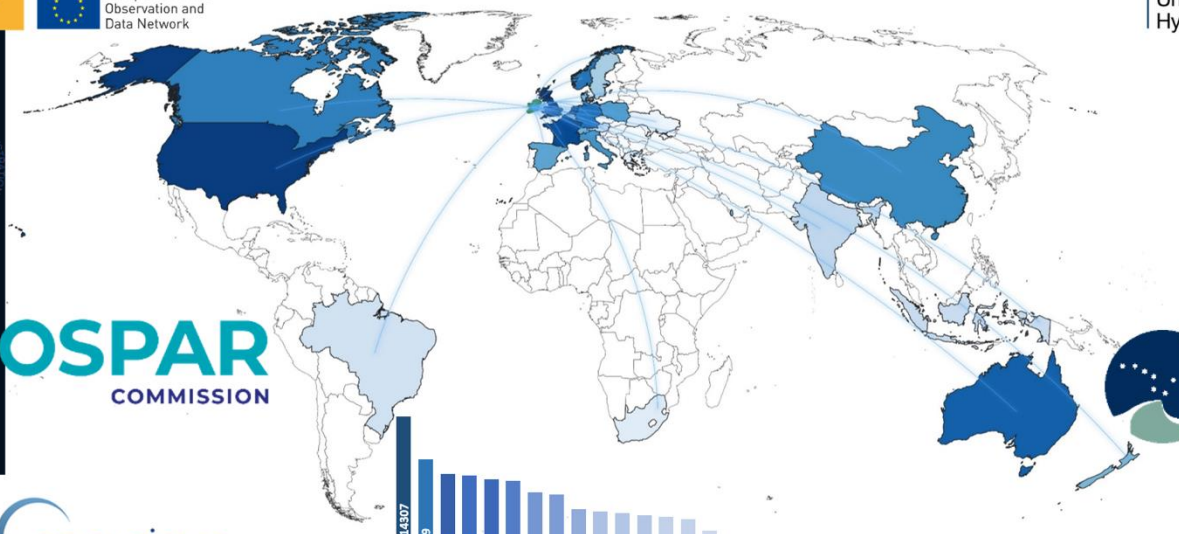
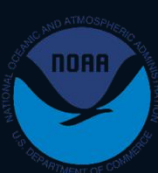
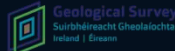
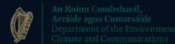
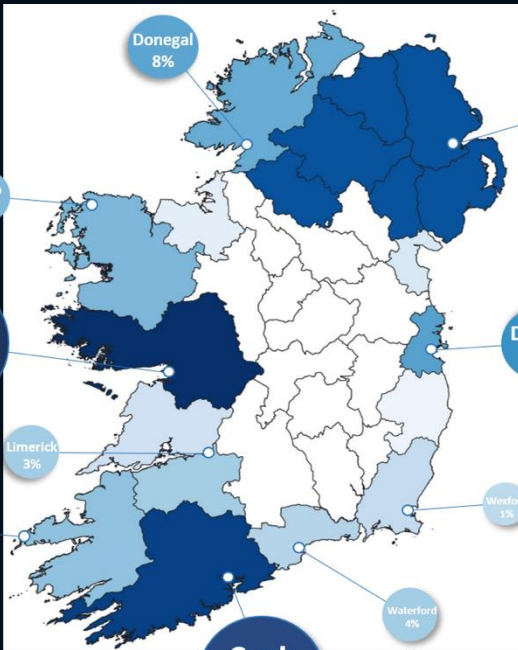
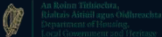
3D interactive wreck viewer. Public-facing story map series to support heritage education, conservation and maritime tourism.



GEBCO / Seabed 2030 / Admiralty

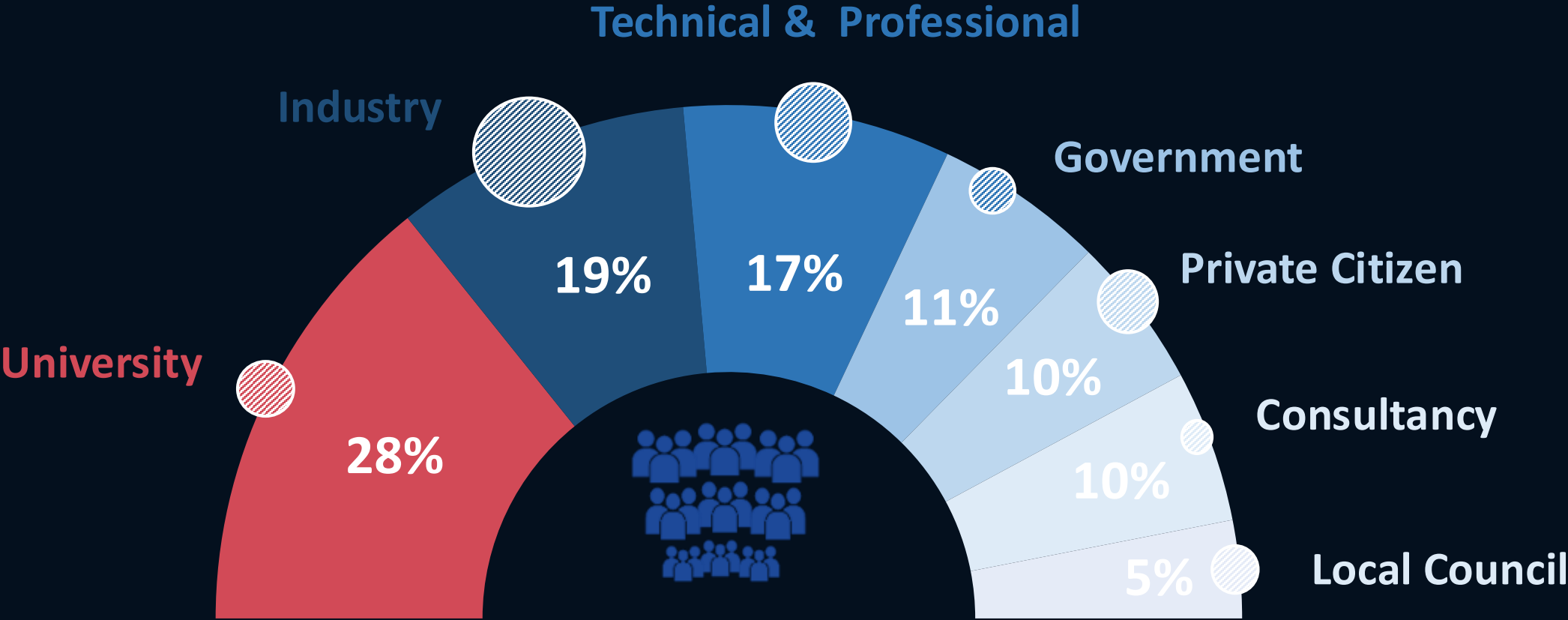
All INSS and INFOMAR bathymetric data are regularly Qc'd by the UKHO and then ingested into Admiralty chart updates and subsequently distributed to GEBCO

INFOMAR Data in numbers: National and International



INFOMAR Data in numbers: Users

INFOMAR data users 2004 - 2023



30 Years of Kongsberg Partnership

Continuity · reliability · consistent data formats and quality across generations of survey vessels

Kongsberg EM12/EM120

12 kHz
1999–2002 ·
RV Ocean Surveyor / RV Bligh

INSS deep-water mapping



Mid-range offshore

Continental slope and shelf

Kongsberg EM2040D

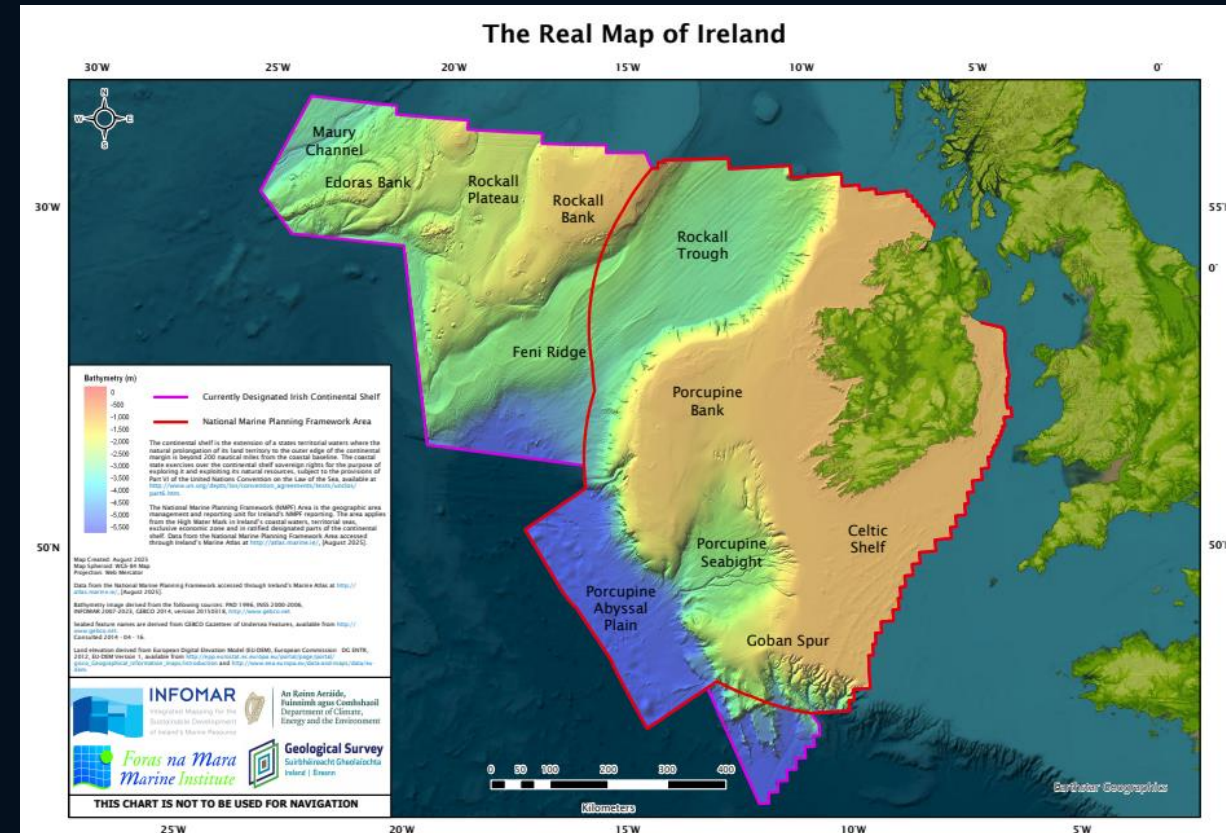
400 kHz ·
> · RV Celtic Voyager / Explorer /
om Crean / inshore vessels Keary /
et etc
-res shelf surveys

Case studies

- **The Real Map of Ireland**
- **ROV investigations of deep-sea coral reef**
- **National-scale geomorphological mapping of the EEZ**
- **Maritime heritage – 600+ shipwrecks mapped and their pollution legacy**
- **Offshore renewable energy development**
- **Supporting seabed mapping in Small Island Nations**

Case study - The Real Map of Ireland

- **Redefined Ireland's National Identity**
From island to maritime nation
- **Unlocked the Blue Economy**
Positioned the ocean as a national economic asset
- **Enabled Marine Investment**
Supporting energy, infrastructure, fisheries & tourism
- **Strengthened Sovereignty & Governance**
Making our EEZ visible and manageable
- **Changed Ocean Awareness**
Putting the sea at the heart of Ireland's future



Case study - SeaROver – Investigating Irish of deep-sea coral reef

Rationale

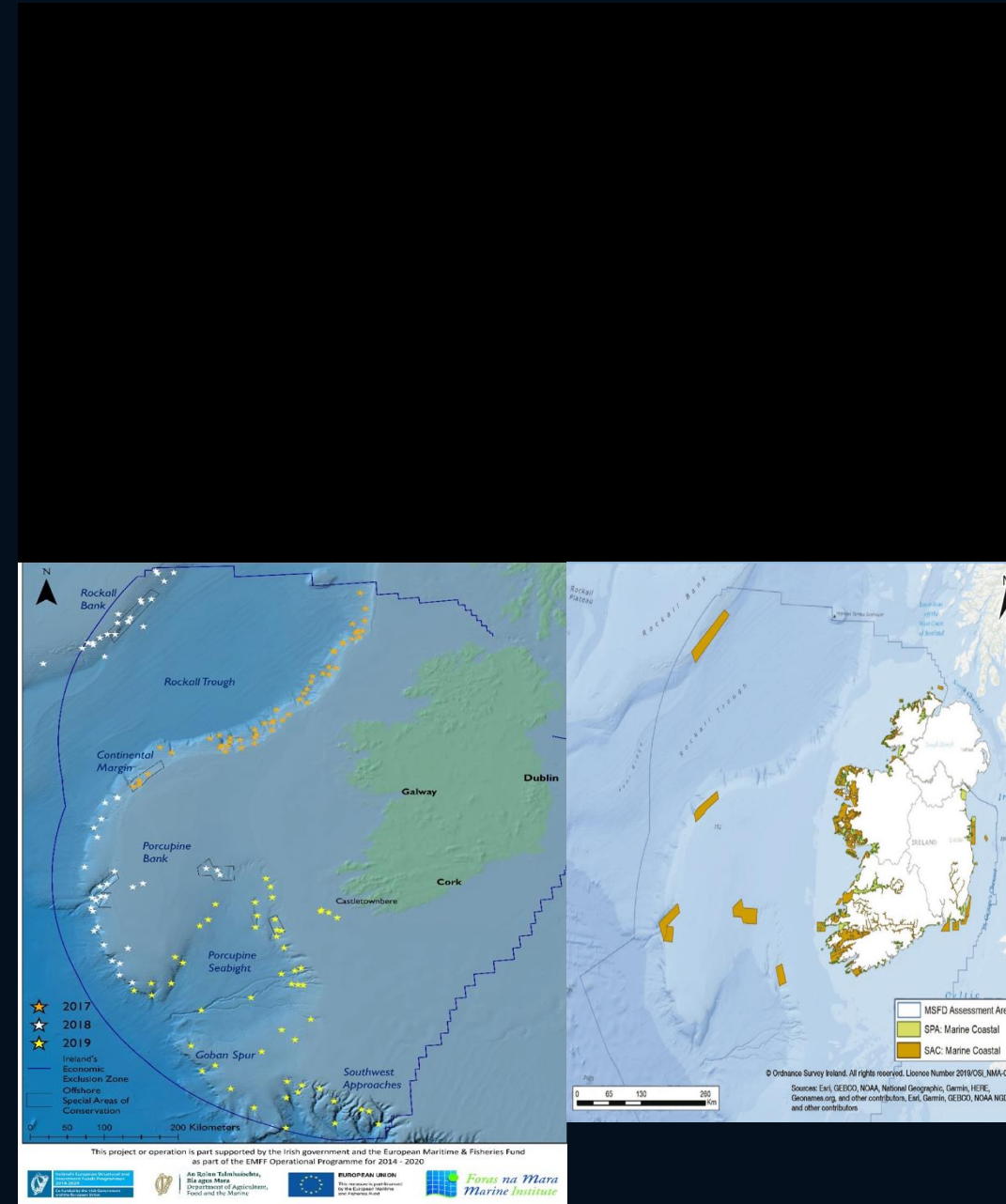
- Quantify the abundance and distribution of offshore biogenic and geogenic reef habitats
- Survey planned over coral structures identified on multibeam data

Survey

- 3x SEA-ROVER ROV surveys over 3 years
- €2 Million, depth from 500 to 2600m, 1,000 nm sailed, >150 hrs HD video transects, 147 specimens, 330 samples

Outputs

- Data contributed to the provision of MPA conservation objectives. Increasing offshore MPA designation from 2% to 10%



Case studies - National Geomorphological Map of Ireland's EEZ

The first high-resolution geomorphological atlas of Ireland. Maps integrate 30 years of multibeam acquisition and brings together all previously published fragmented research.

Continental Margin

- Shelf down to ~200
- Porcupine Seabight
- Goban Spur
- Porcupine Bank
- Rockall Trough & Bank
- Edoras Bank

Mass Movement

- Marine landslides
- Debris flows
- Turbidite systems
- Slump scars

Bedforms & Sediment

- Sand waves
- Tidal ridges

Volcanic & Tectonic

- Seamounts
- Fault escarpments
- Carbonate mounds
- Pockmarks
- Knolls
- Moats

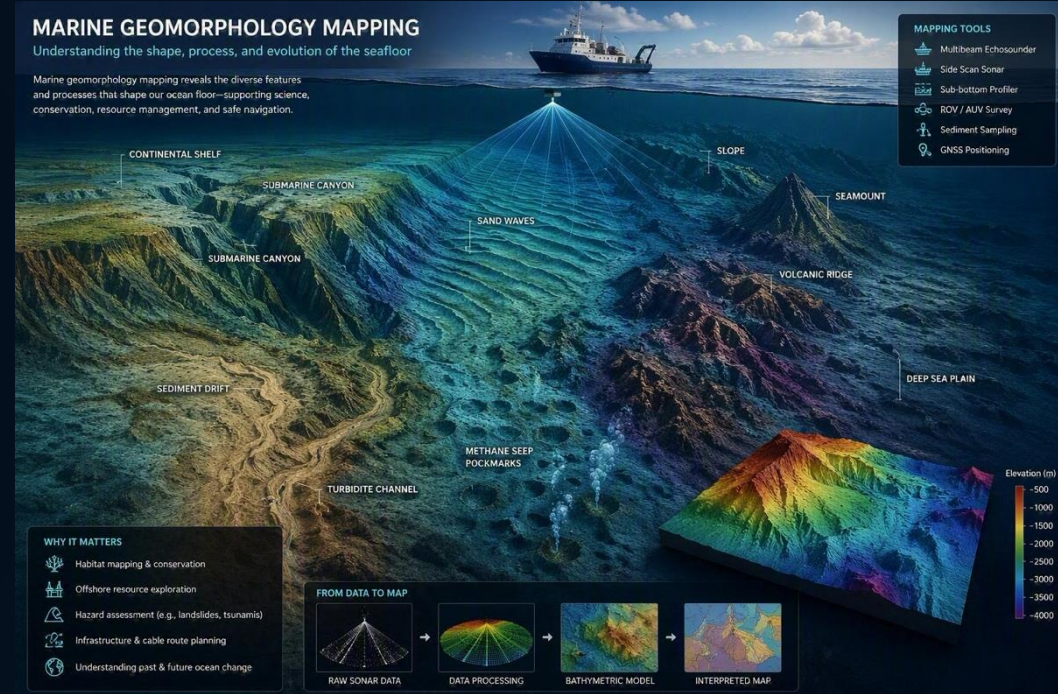
Glacial Landforms

- Drumlins
- Moraines
- Mega-scale glacial lineations
- Ice-marginal fans
- Iceberg scours
- Eskers

MARINE GEOMORPHOLOGY MAPPING

Understanding the shape, process, and evolution of the seafloor

Marine geomorphology mapping reveals the diverse features and processes that shape our ocean floor—supporting science, conservation, resource management, and safe navigation.



Case studies - National Geomorphological Map of Ireland's EEZ

These Geomorphological maps and GIS layers (**freely available**) are essential reference tools that support a wide range of national priorities, including:



Marine Spatial Planning

Supports effective planning for offshore development and resource allocation.



Renewable Energy Projects

Aids in identifying suitable locations for renewable energy infrastructure.



MPA Designation

Facilitates the designation and management of Marine Protected Areas.



Habitat Protection

Helps in protecting sensitive deep-sea habitats like coral reefs.



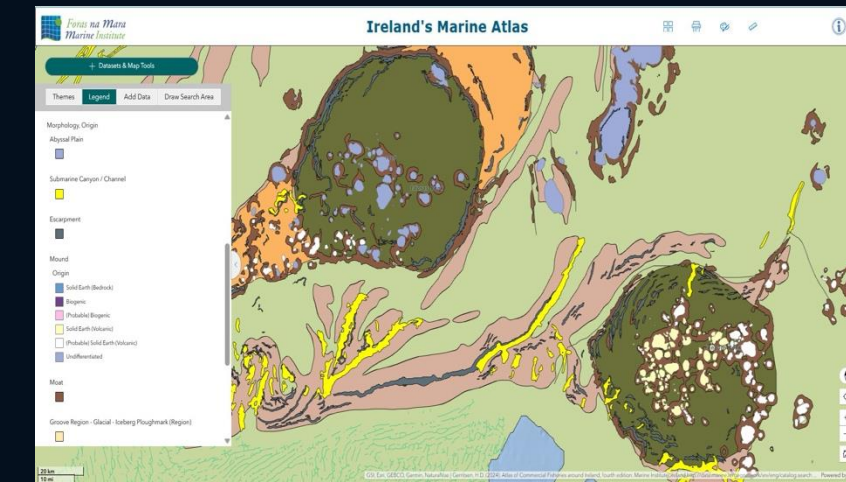
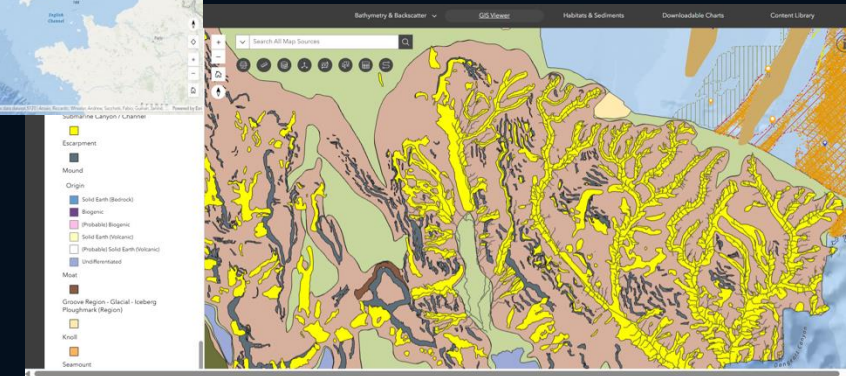
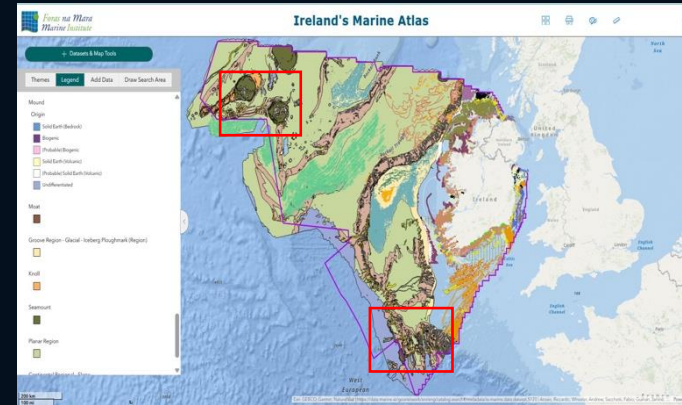
Cable/Pipeline Routing

Assists in routing submarine cables and pipelines efficiently.

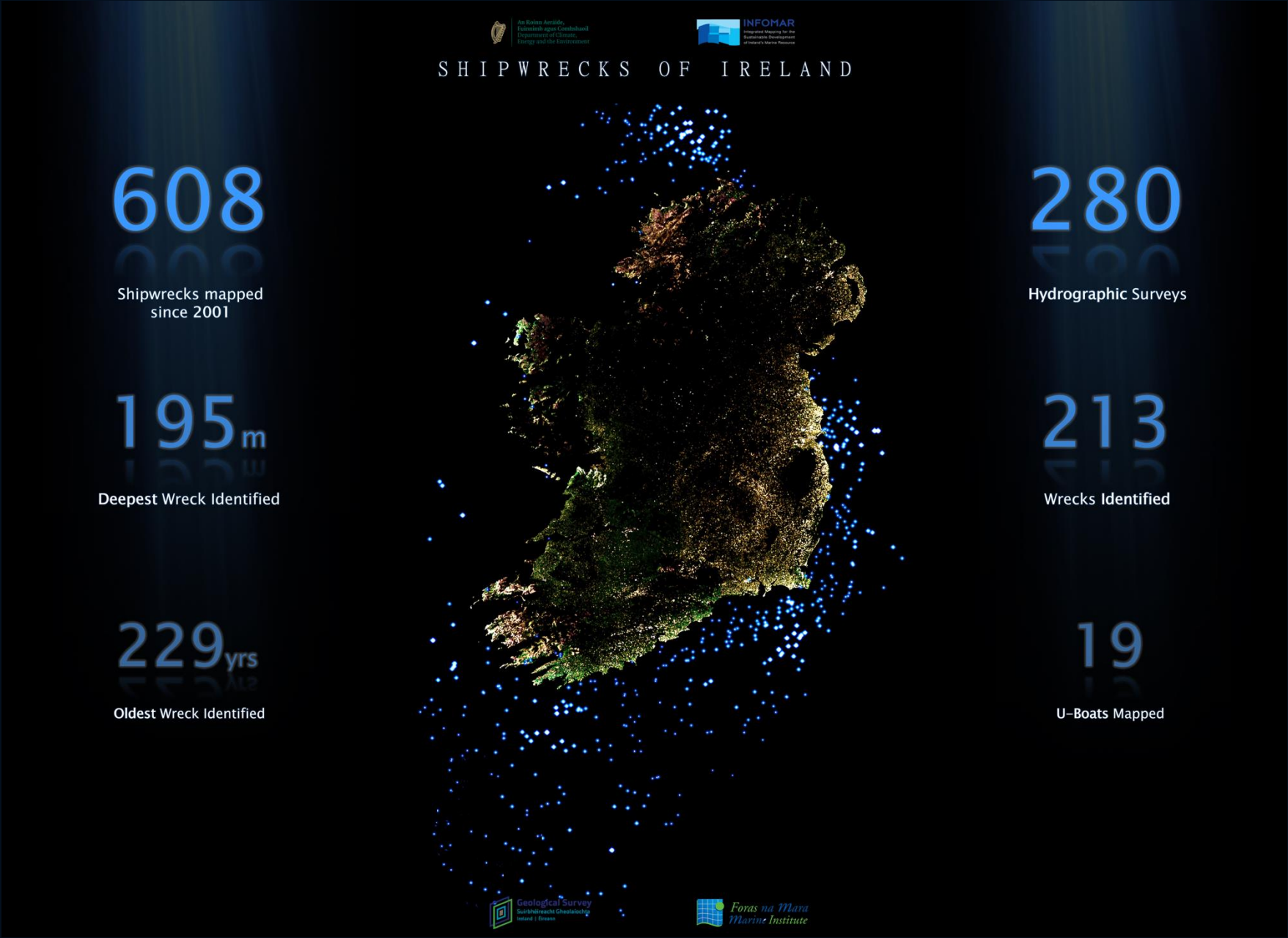


Environmental Monitoring

Supports monitoring and reporting under marine legislation.



Case study - Maritime heritage. 600+ shipwrecks and their pollution legacy



Why we map wrecks?



[Link to INFOMAR sketchfab](#)

National-scale assessment
of Potential Pollution Risks

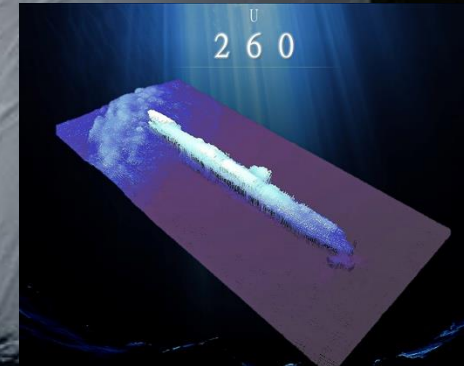
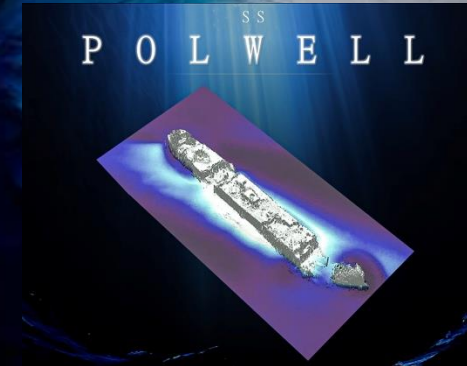
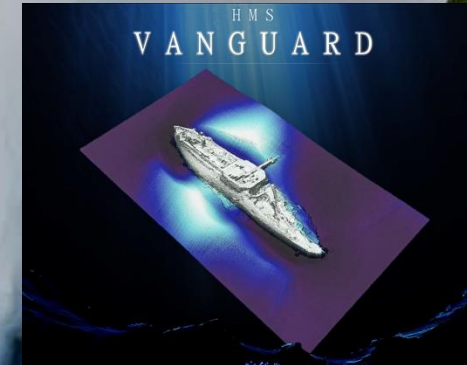
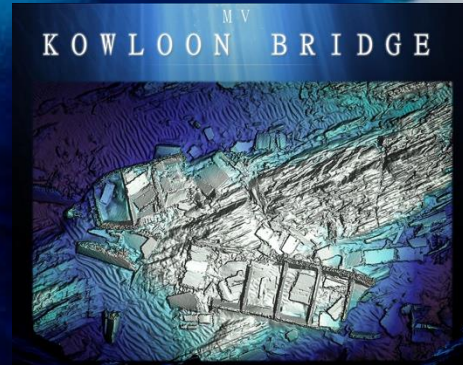
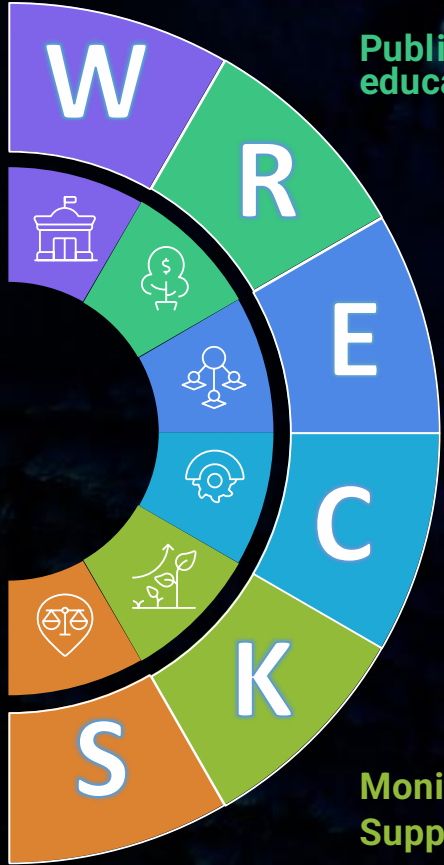
Public engagement,
education

Cultural heritage,
historic preservation

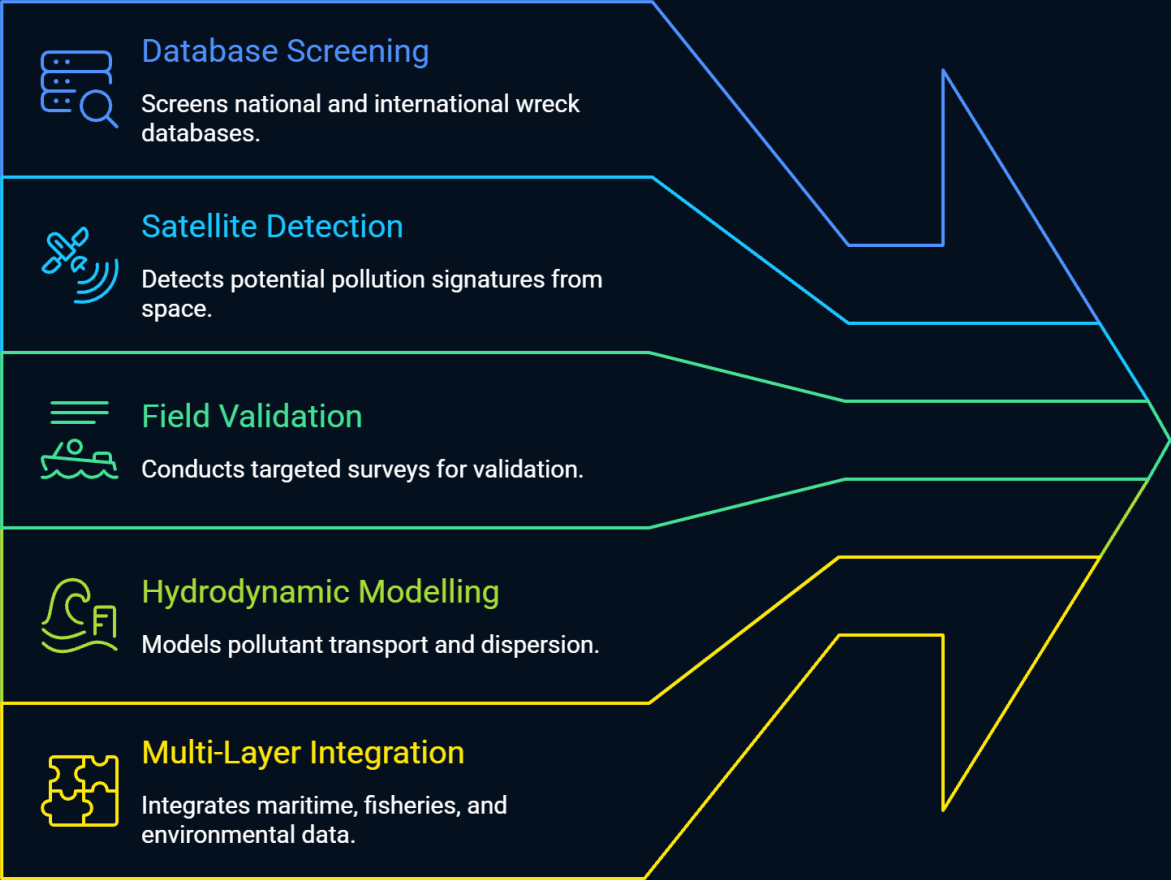
Archaeological
research, discovery

Monitoring changes
Support preservation

Maritime safety,
navigation



I-Point Postdoc —A novel, multi-layered approach



National Risk Map

Risk assessment of impact on release

Distribution of Potentially Polluting Wrecks (PPW) in the Irish Designated Continental Shelf Area

Total PPWs: 184

- Top 25 PPW – Confirmed Location (13)
- Top 25 PPW – Unconfirmed Location (12)
- Other PPW (159)

0100200300 km

EPSG:32629
WGS 84 / UTM zone 29N



Risk assessment of likelihood of release per wreck

1.8 Risk Assessment for the Likelihood of Oil Release				
Risk assessment criteria	Risk category	Weighted risk score	Evidence for confidence	Confidence score
Shallowest depth (2)	Wreck is located at a depth of 86 m	4	UKHO position and INFOMAR (https://www.infomar.ie/maps/interactive-maps/data-viewer)	3
History of leaks (1)	No evidence has been found of oil leaks from this vessel	3	ADM 137/3393. With J tank ruptured, there must have been an oil spill, but this is not mentioned in any account.	2
Integrity of wreck (3)	Good conditions	6	The slow sinking of the ship (which lasted 20 minutes) does not seem to have been accompanied by any major explosion or by the break-up of the hull, so the vessel could have reached the sea-bed in a relatively strong and intact condition (ADM 137/3993)	2
Age at time of loss (2)	24 years	2	Construction date and date the vessel sunk are available.	3
Years submerged (3)	101 years	9	Record of sinking	3
Oil storage method (2)	Eight oil tanks; each tank was divided by a longitudinal bulkhead, creating 16 separate tank units	4	BT 110/249/40	3
Cause of sinking (2)	Struck by a torpedo	2	The master's loss report from 1917 notes that the torpedo hit 'J tank' on the starboard side abaft the engine room (ADM 137/3993).	3
Seabed stability (2)	Unknown	4	Limited data available. Seabed consists of coarse sand on the area of loss (INFOMAR)	1
Overall scores	Weighted risk score	34	Confidence score	20

SEE THINGS DIFFERENTLY



SHIPWRECK OIL SLICK MAPPING AND MONITORING ACROSS THE IRISH EEZ PREPARED FOR INFOMAR

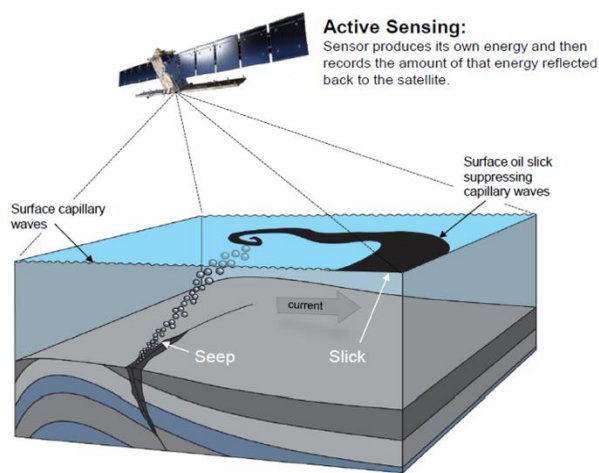
SEASCOPE PROJECT UPDATE – 09/04/2026

Geoffrey Thiemann, Offshore Technical Lead – Viridien Satellite Mapping

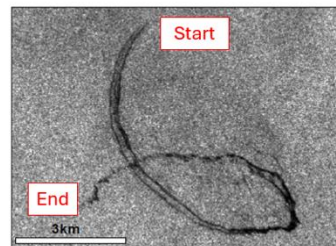
viridiengroup.com

VIRIDIEN

Observing Oil Slicks – Synthetic Aperture Radar Imagery



As seen from aircraft

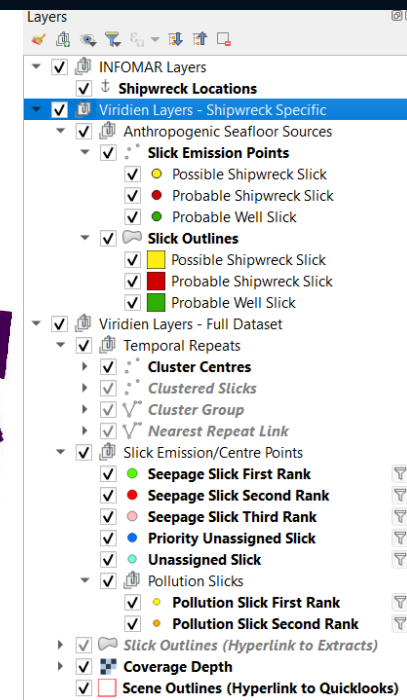
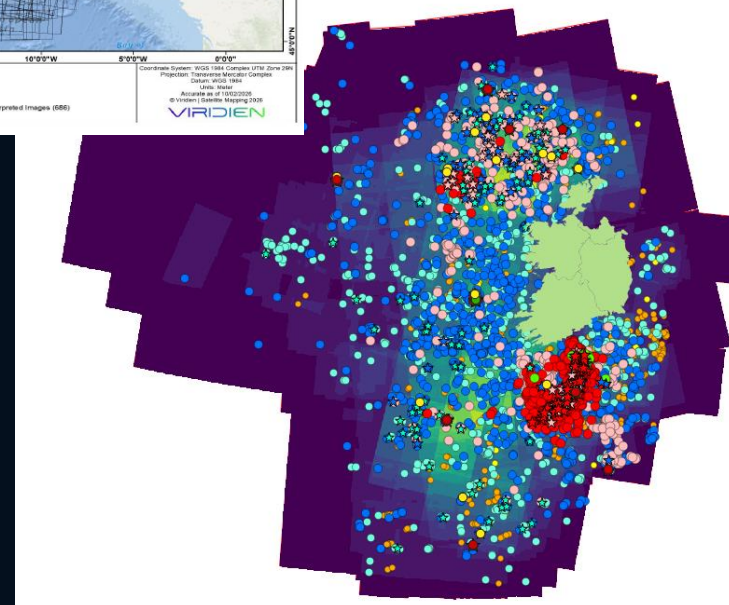
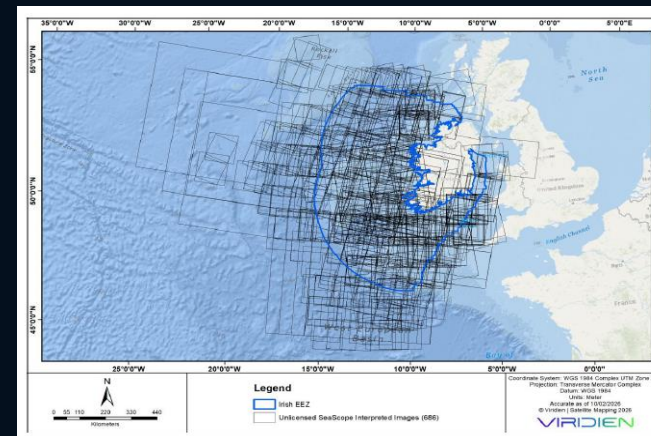


As seen from satellite-borne SAR

Image credit: contains modified Copernicus Sentinel data (2016)

Not all oil slicks are from shipwrecks!!

- Looked at 34 years-worth of past satellite data (over 1000 images).
- All confirmed or potential slicks cross references against known wrecks positions
- Leaking wrecks included in the risk analysis matrix



Case study - Offshore Renewable Energy & Marine Spatial Planning

INFOMAR as the foundation for Ireland's green energy transition

- **Climate Action Plan 2019 — INFOMAR completion listed as ORE action**

5 GW offshore wind target by 2030 requires seabed baseline

- **Bathymetry: 5m shelf grids**

Foundation-type selection for fixed/floating turbines

- **Backscatter & sediment maps**

Scour risk & sediment mobility; cable burial feasibility

- **Sub-bottom profiler data**

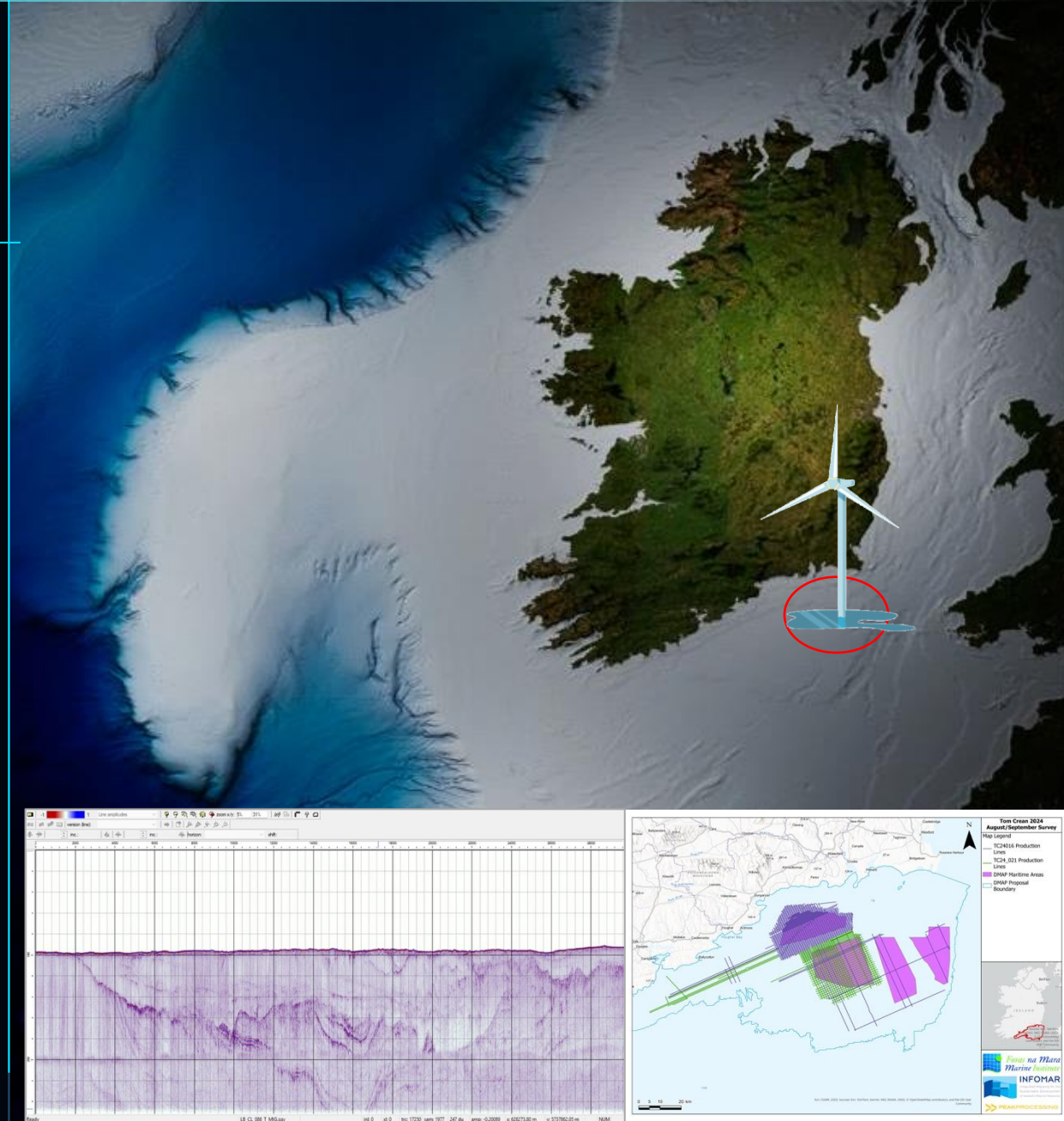
Shallow geology 0–30m; geotechnical constraint mapping

- **Irish Sea ORE constraints map**

Glacial till, scours, tunnel valleys, sensitive habitats all flagged

- **Marine spatial planning (MSP)**

'Plan-led' development; environmental impact avoidance



Case studies -Supporting seabed mapping in Small Island Nations. Barbados EEZ



Bilateral Partnership between Ireland's Marine Institute and Barbados' Coastal Zone Management Unit (CZMU).



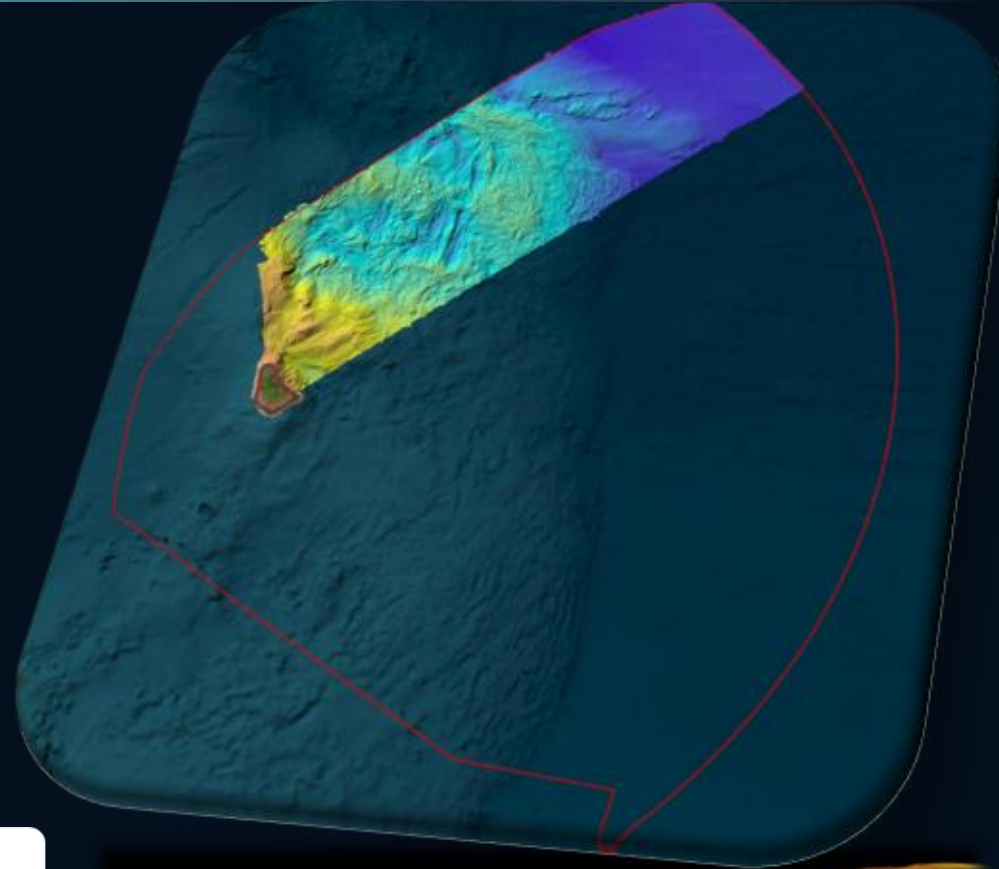
Multi-Year Scope: a planned 5 to 7 year full seabed mapping project.



2025 Survey summary

Area Covered: 44640 km² (24% of EEZ)

Survey Line Kilometres: 11,134 km



Seabed & Resource Mapping

Chart water depth and assess seafloor resources by applying proven expertise from Ireland's INFOMAR programme.



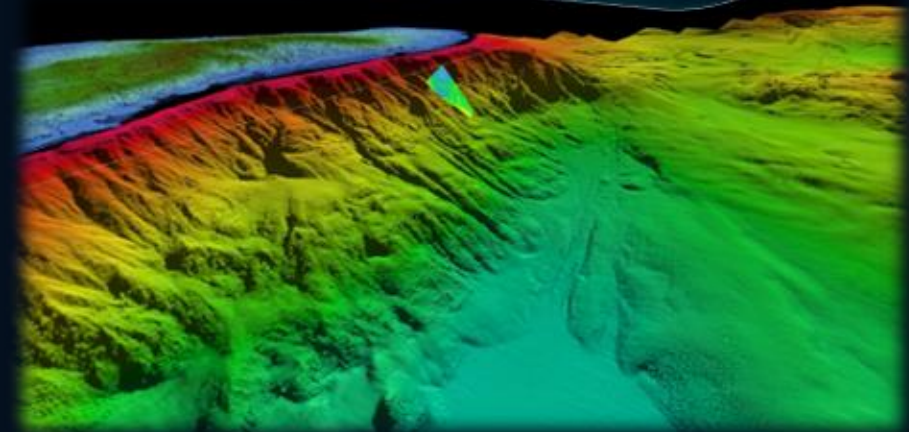
Marine Spatial Planning

Deliver baseline bathymetric datasets to empower Barbadian policymakers in creating a sustainable Marine Spatial Plan (MSP)



Knowledge Exchange & SDGs

Enable direct collaboration between Barbadian personnel and Irish scientists, driving mutual learning and contributing directly to UN Sustainable Development Goals.

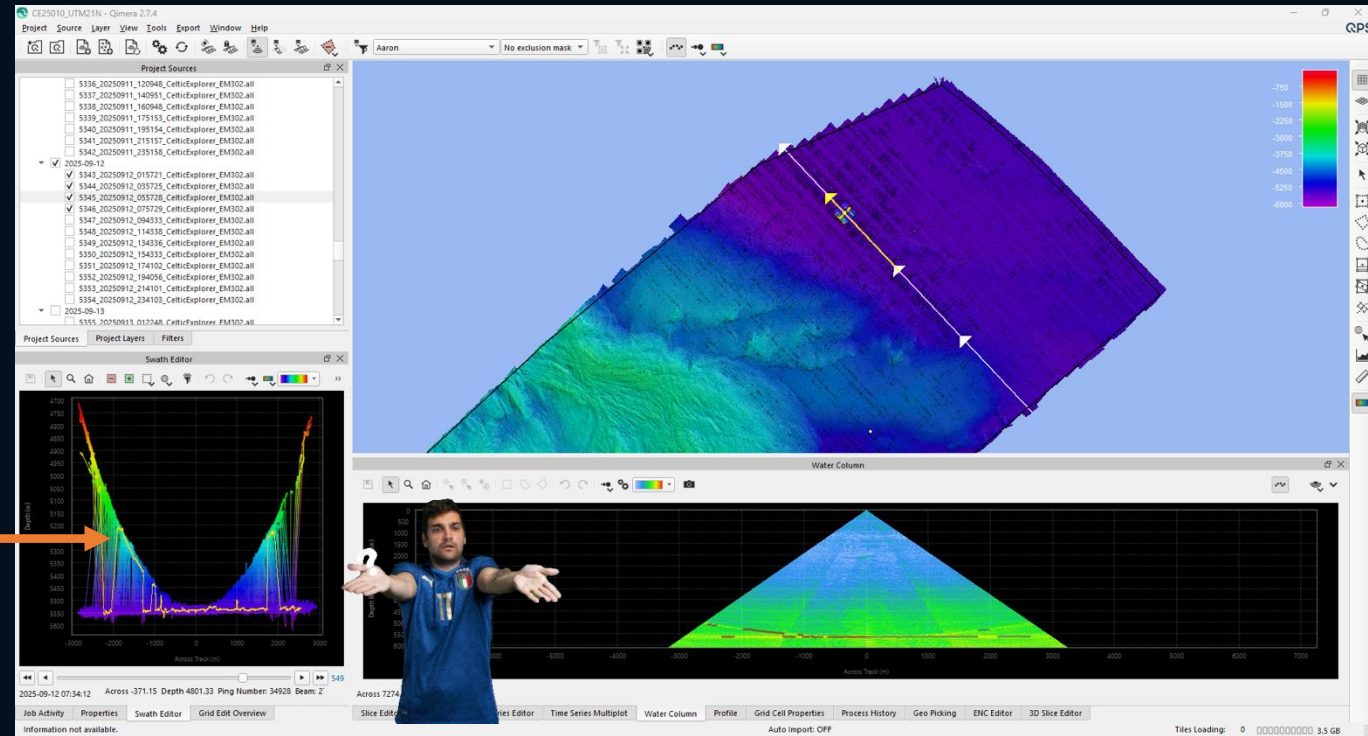


Case studies -Supporting seabed mapping in Small Island Nations. Barbados EEZ

2025 Survey summary

Main issue: EM302 performance not as good as hoped for in very deep water.

Huge “HORNS” on either side of the nadir. The yellow line is what the EM302 picks as the seabed

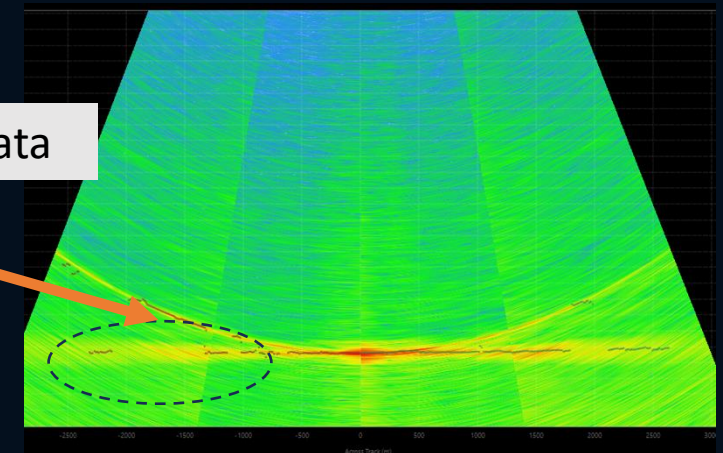


~~Old tricks~~

- ~~• Small transducer tilt (for example, 1–3°)~~
- ~~• Changing bottom-detection parameters~~
- ~~• Changing penetration/spike filters~~

NEW TRICKS NEEDED! ☺

Manual seabed extraction from WC data



Thank You

Dr Fabio Sacchetti | fabio.sacchetti@marine.ie

Advanced Mapping Services — INFOMAR · Marine Institute, Ireland



Acknowledgements

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www.infomar.ie

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