



Mapping Northern Ireland's Coastal Zone

with Airborne Bathymetric Lidar

Charles de Jongh



Field



Field delivers geodata acquisition, analysis and visualization services.



~220 employees, 13 offices in 5 countries. Headquarters in Oslo, Norway.



5 survey aircraft, 3 mobile mapping systems & several helicopter setups.

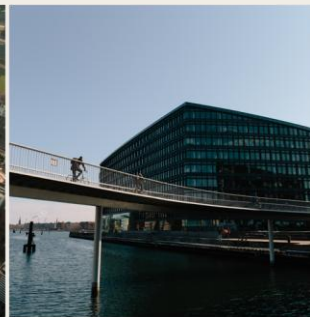


State-of-the-art lidar- and camera sensors, including bathymetric lidar.

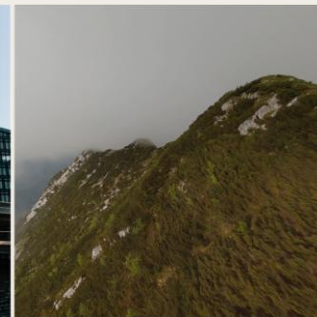
Cities



Municipalities



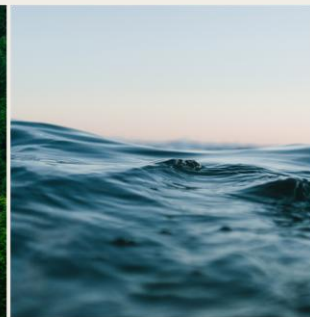
State



Forest



Coastal



Agriculture



Buildings & properties



Energy & Utilities



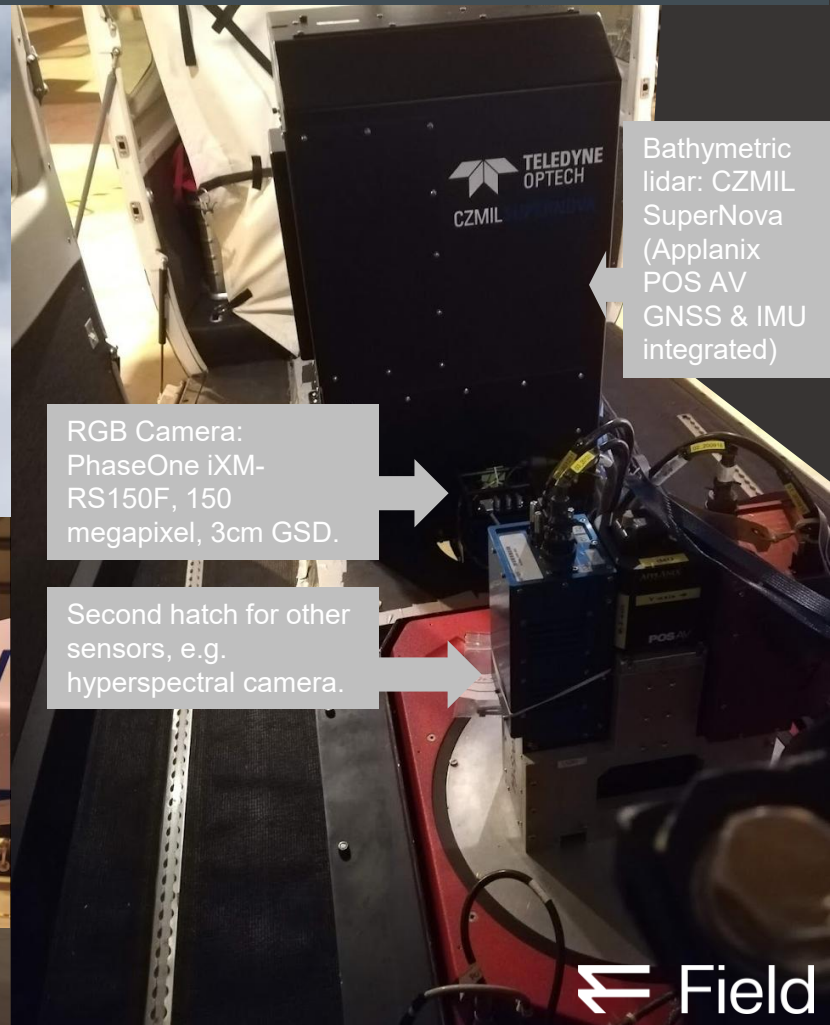
Road & Rail



Field Airborne Lidar Bathymetry Equipment



2x Cessna 208b Grand Caravan aircraft with 2 hatches.
ALB Speed: 120-140 knots (220-260km/h). ALB Flying Height: 400-600m.



Bathymetric
lidar: CZMIL
SuperNova
(Applanix
POS AV
GNSS & IMU
integrated)

RGB Camera:
PhaseOne iXM-
RS150F, 150
megapixel, 3cm GSD.

Second hatch for other
sensors, e.g.
hyperspectral camera.

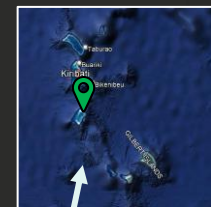
Field – Airborne Bathymetric Lidar Surveys 2021-2025

Types of ALB survey work:

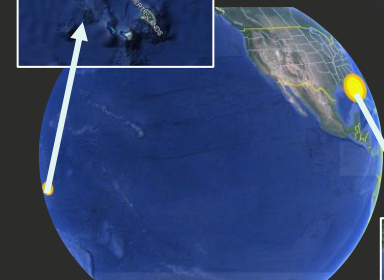
- Coastal zone surveys
- River surveys
- Lake surveys
- Underwater construction sites

 Executed

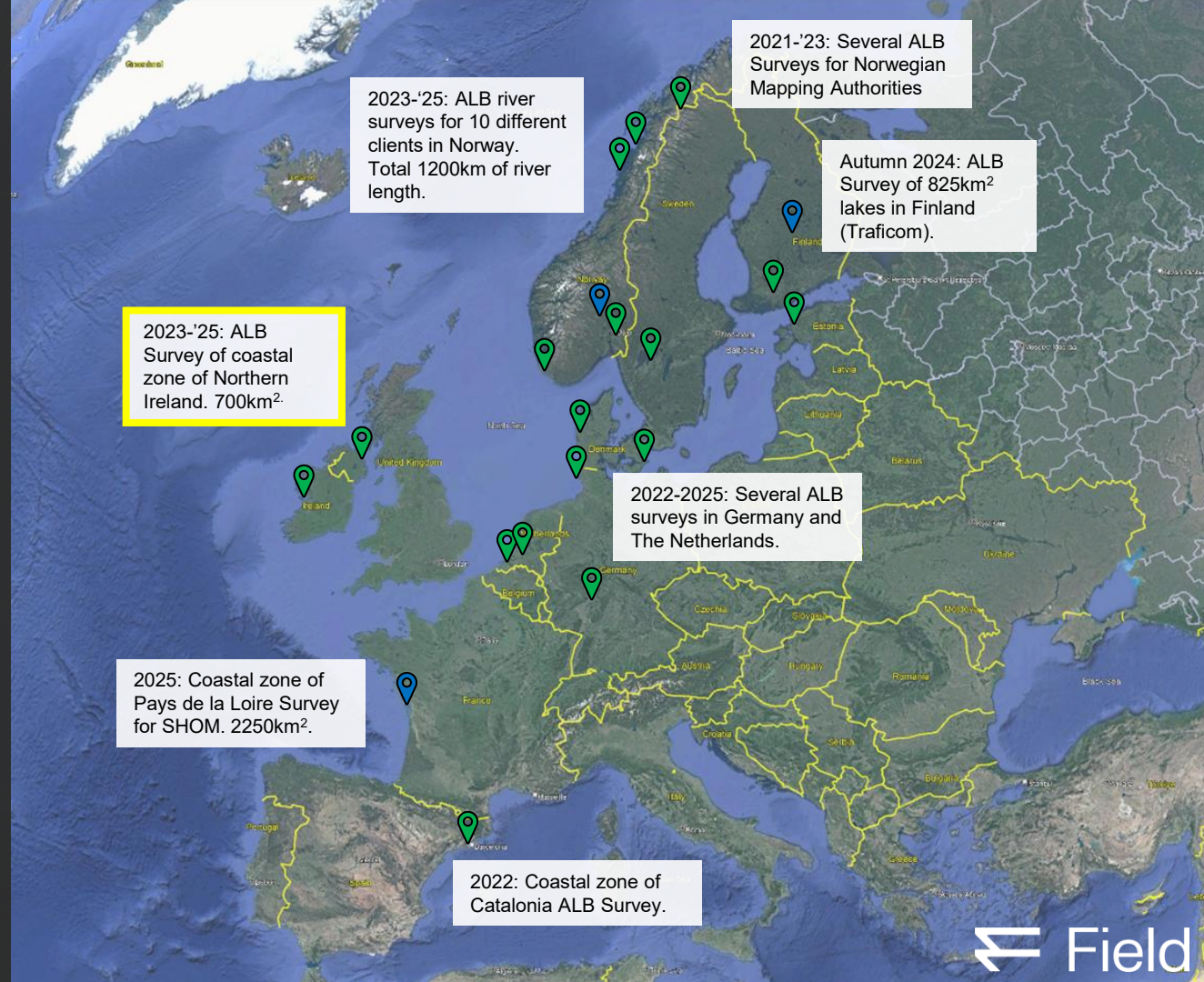
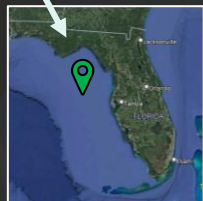
 In progress/to be executed



Winter 2022-23: 2.250km² survey of Kiribati islands in the Pacific. Cooperation with IIC Technologies and Landpro.

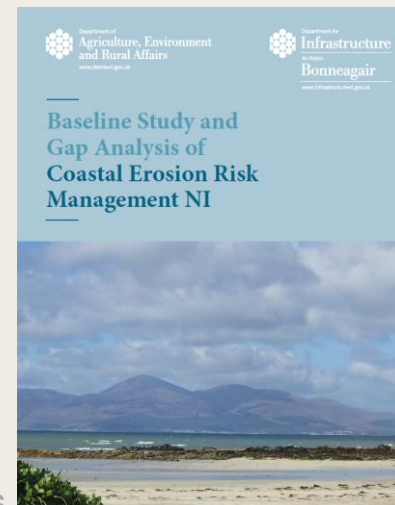


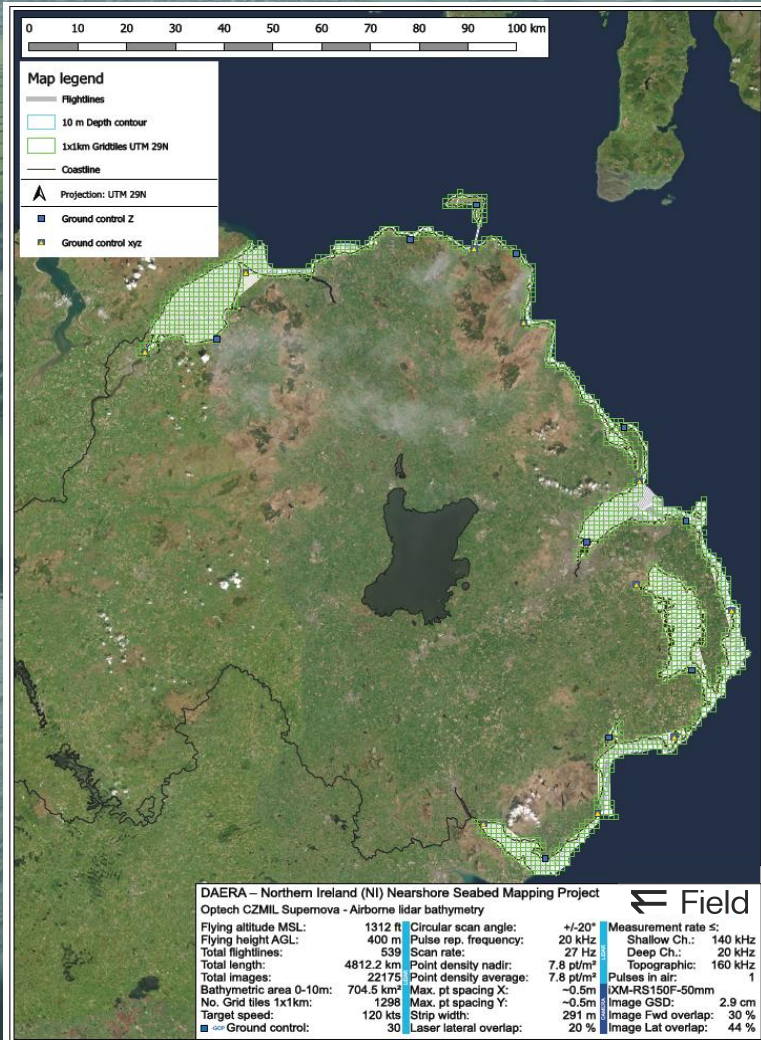
Winter 2024 & 25: >11.000km² survey of the coastal zone in Florida, USA. Cooperation with Dewberry.



Northern Ireland Nearshore Seabed Mapping Project

- **Northern Ireland's coastal ecosystems are hugely valuable natural capital assets** that are important for biodiversity and provide a suite of other ecosystem services, including coastal protection from storm surges and flooding.
- The nature and scale of the issues arising from coastal erosion and sea level rise in NI are currently not known, and **insufficient baseline data is available**.
- Multi-beam echo sounders (MBES) have been used as the predominant methodology for mapping the Northern Irish seafloor, however, it is often **too difficult and dangerous for traditional bathymetric survey vessels** to map nearshore shallow areas. This has resulted in this **nearshore area being largely unmapped**, with minimal to no bathymetric data being collected. These areas where no data is available have subsequently been coined "**white ribbon areas**".
- **The mapping of this white ribbon area is crucially important for managing our coastal zone.** As sediment dynamics and coastal processes operate across boundaries it is important that the mapping of terrestrial and nearshore marine systems is uninterrupted to help build a full image of how this highly dynamic area works.

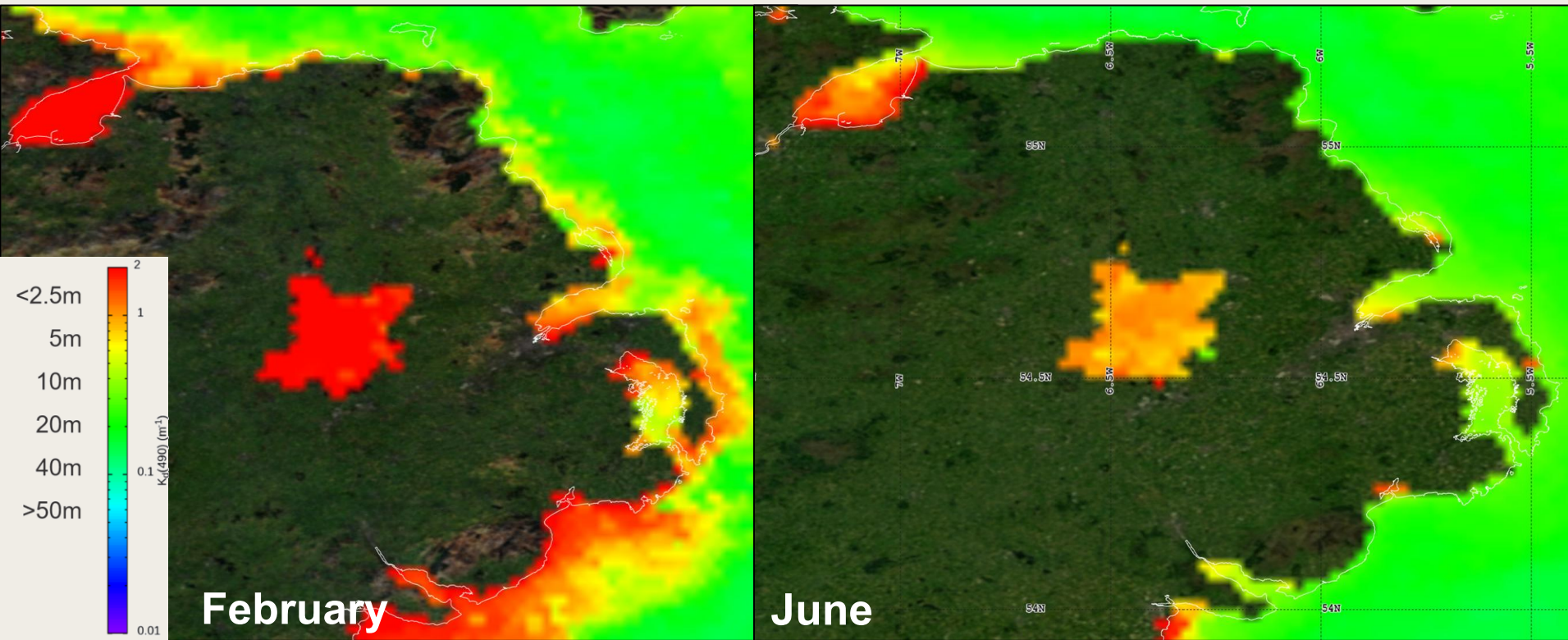




Northern Ireland ALB Survey execution:

- ~700km² 0-10m depth bathymetry. 539 flight lines of ~5000km in total.
- During the survey there should be no rain, not too much wind and as little turbidity in the water as possible. Good timing is essential.
- Survey executed in 5 separate mobilizations in the period of June 2023 to May 2025.
- Covered many flight lines multiple times, total of 1300 flight lines flown.

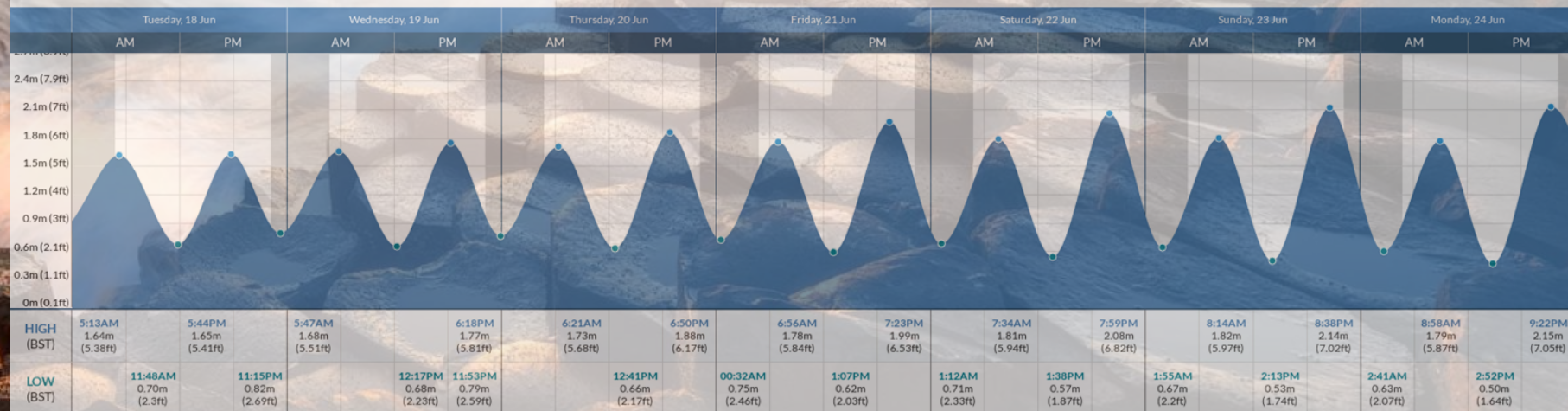
Turbidity (water clarity) in Northern Ireland



- The graph shows (approximate) water depths that can be reached with the CZMIL SuperNova bathymetric lidar sensor, given a specified turbidity.
- Turbidity on the maps is based on diffuse attenuation coefficient for downwelling irradiance at 490 nm (K_d_{490}), derived from sensors on 4 satellites. Source: NOAA Star Ocean Color.

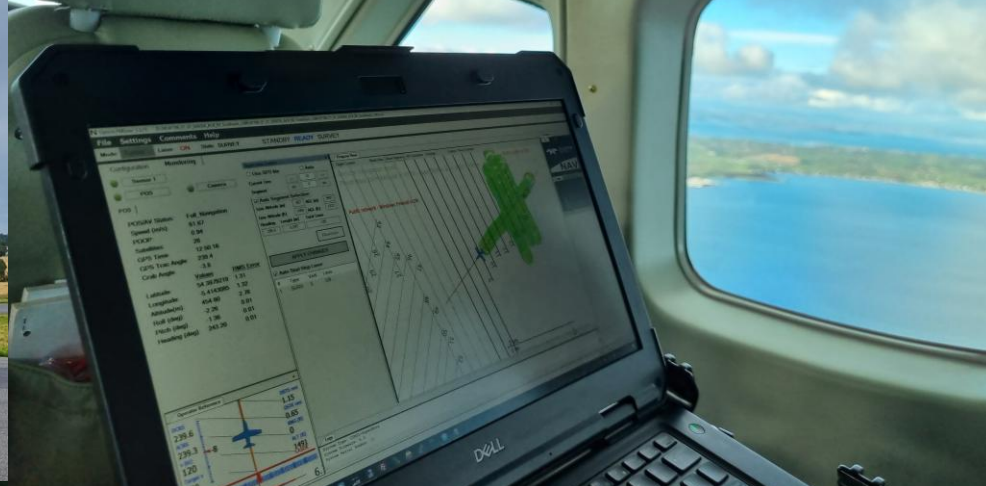
Portrush, Northern Ireland, Tide Times. Times are BST (UTC+01:00)

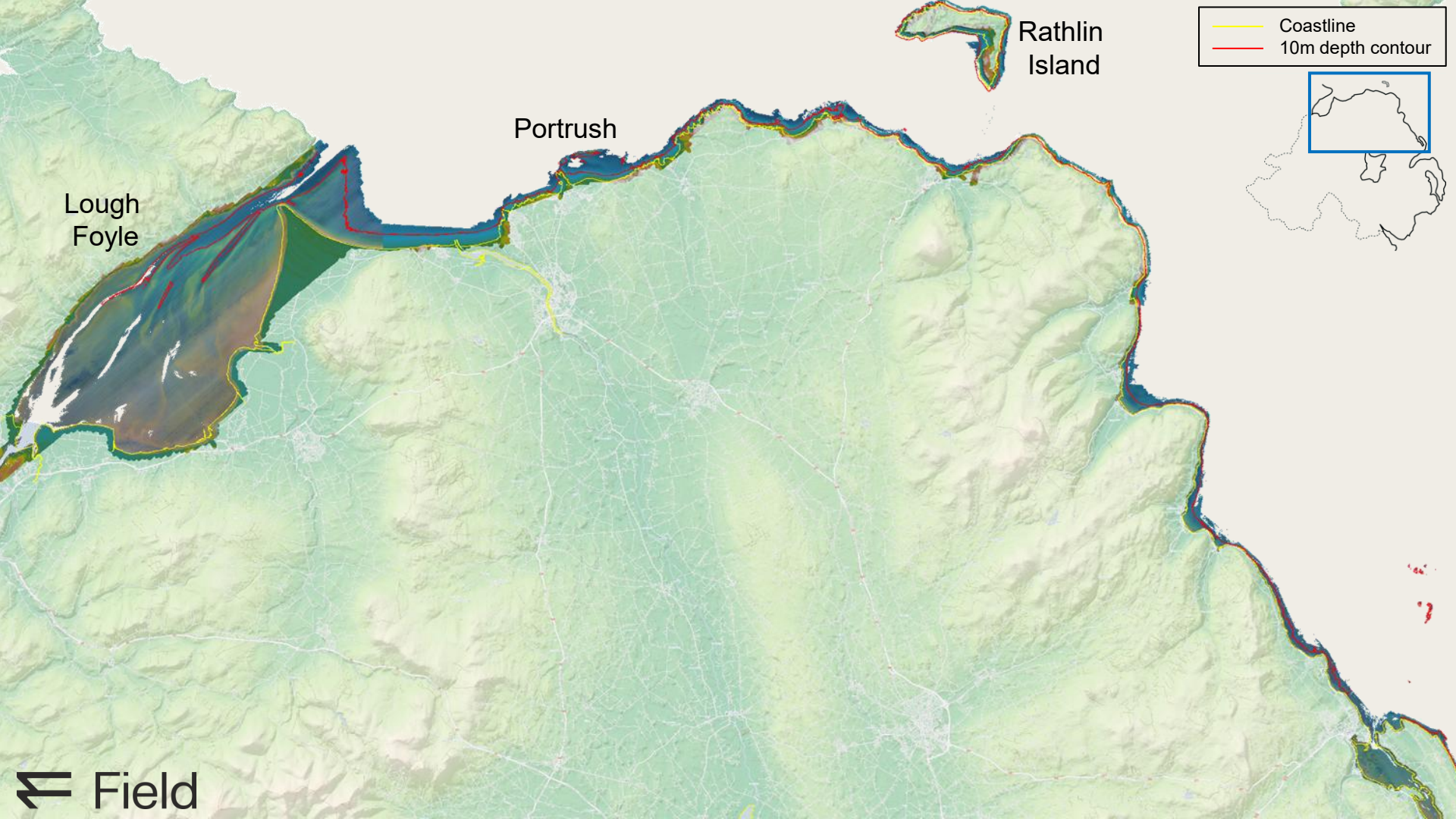
Powered by [Tide-Forecast.com](https://www.tide-forecast.com)



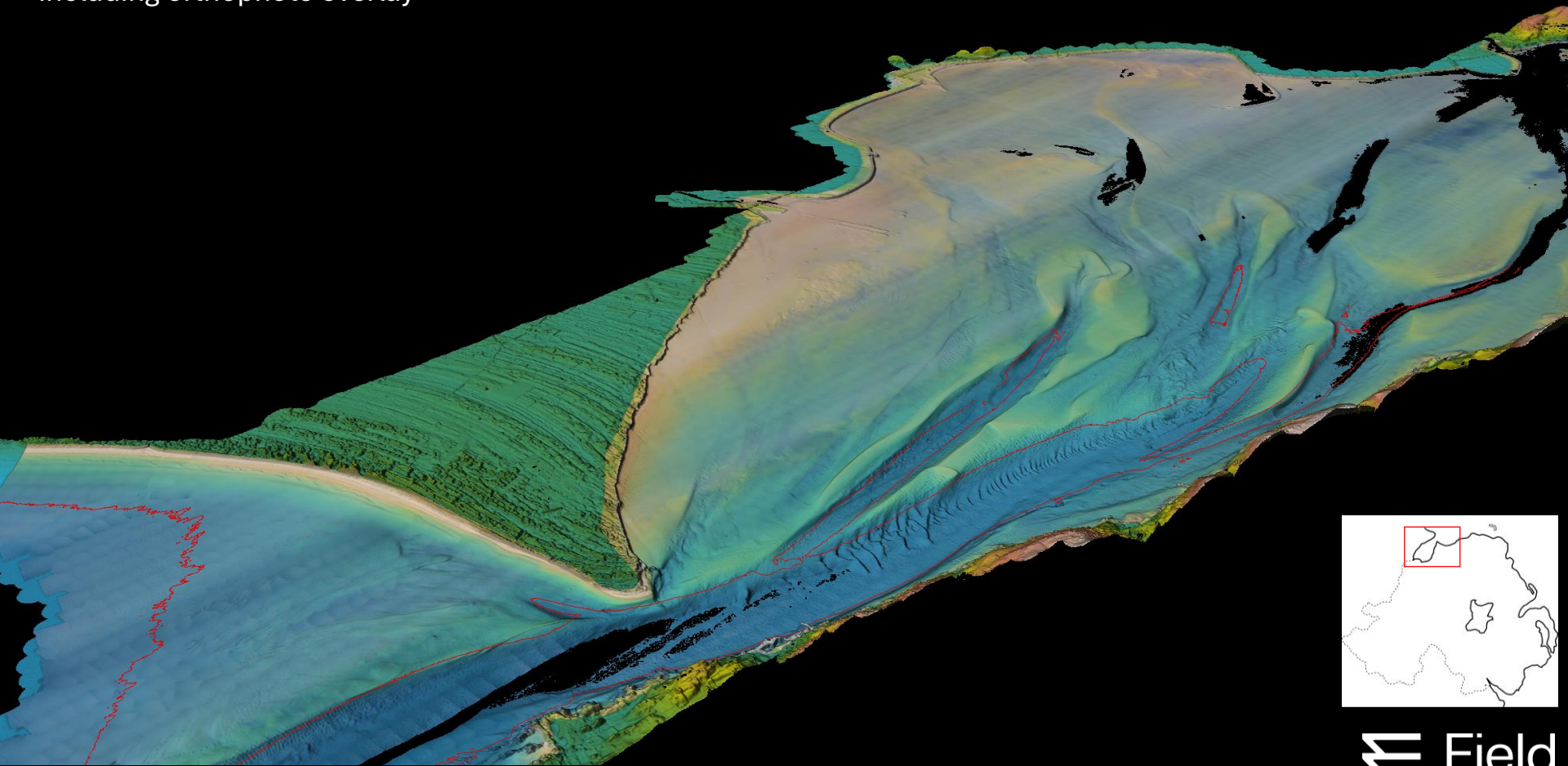
Turbidity caused by dredging in Belfast Lough



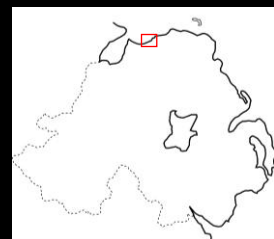
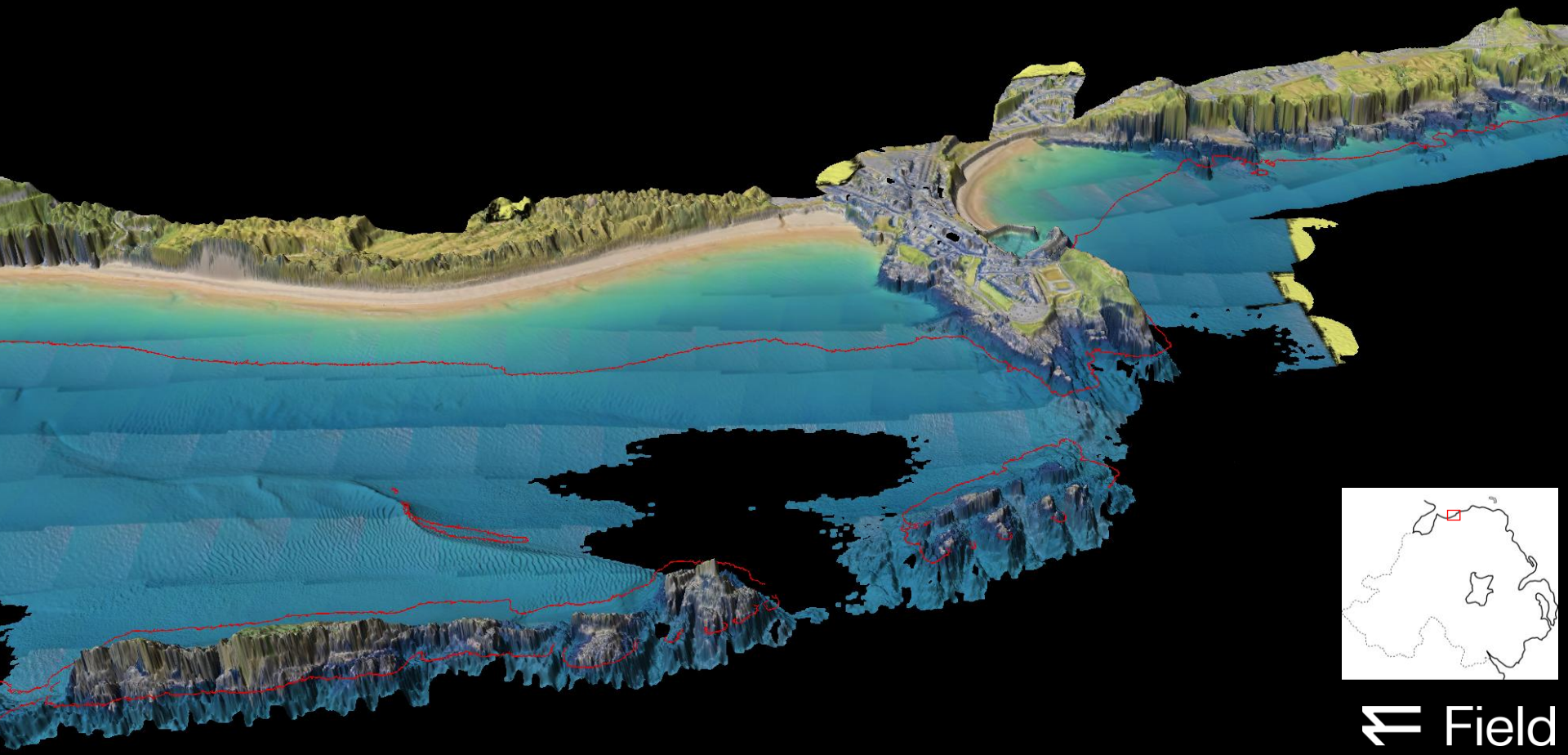




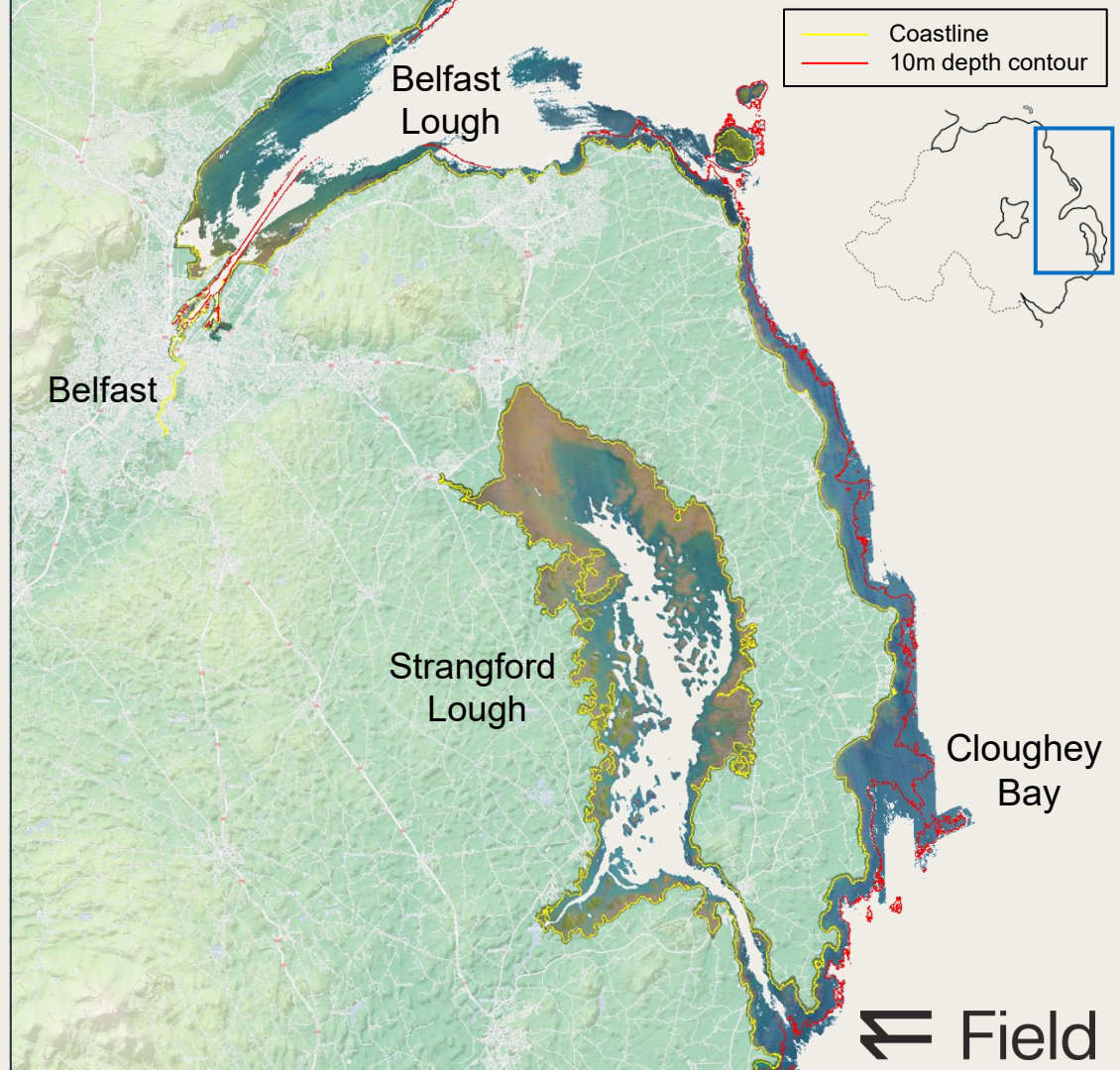
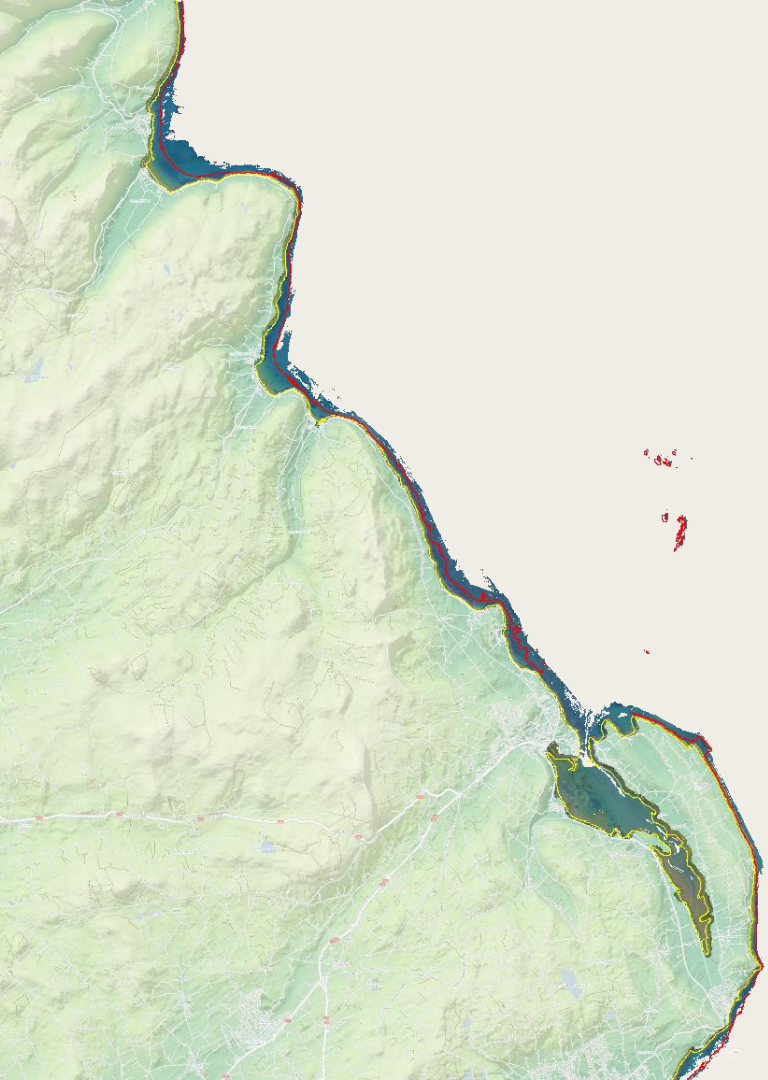
3D view of Lough Foyle from the northwest
Including orthophoto overlay

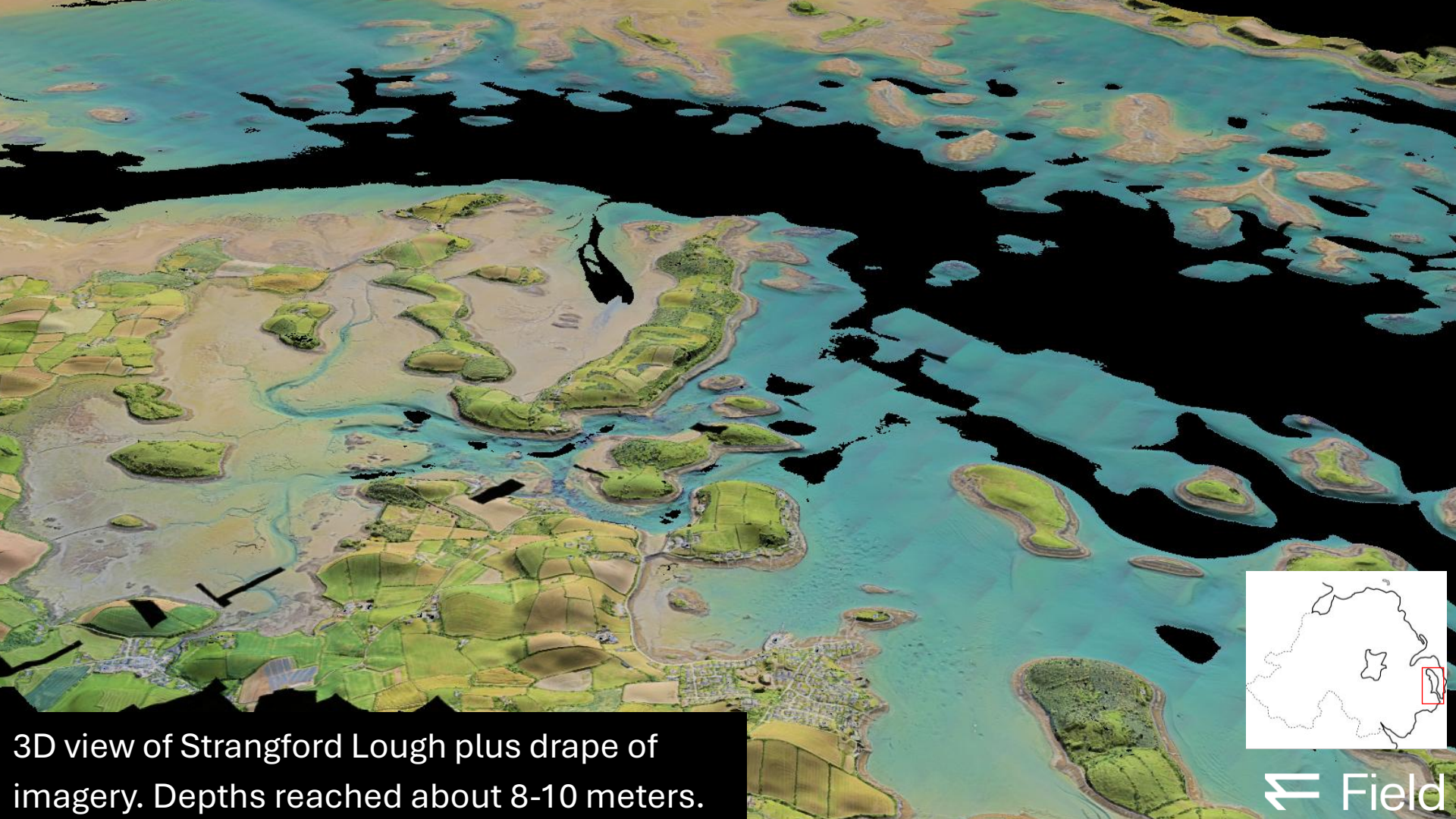


Area around Portrush, with maximum depths around 25m.



Field

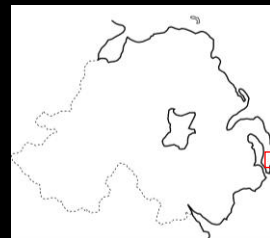
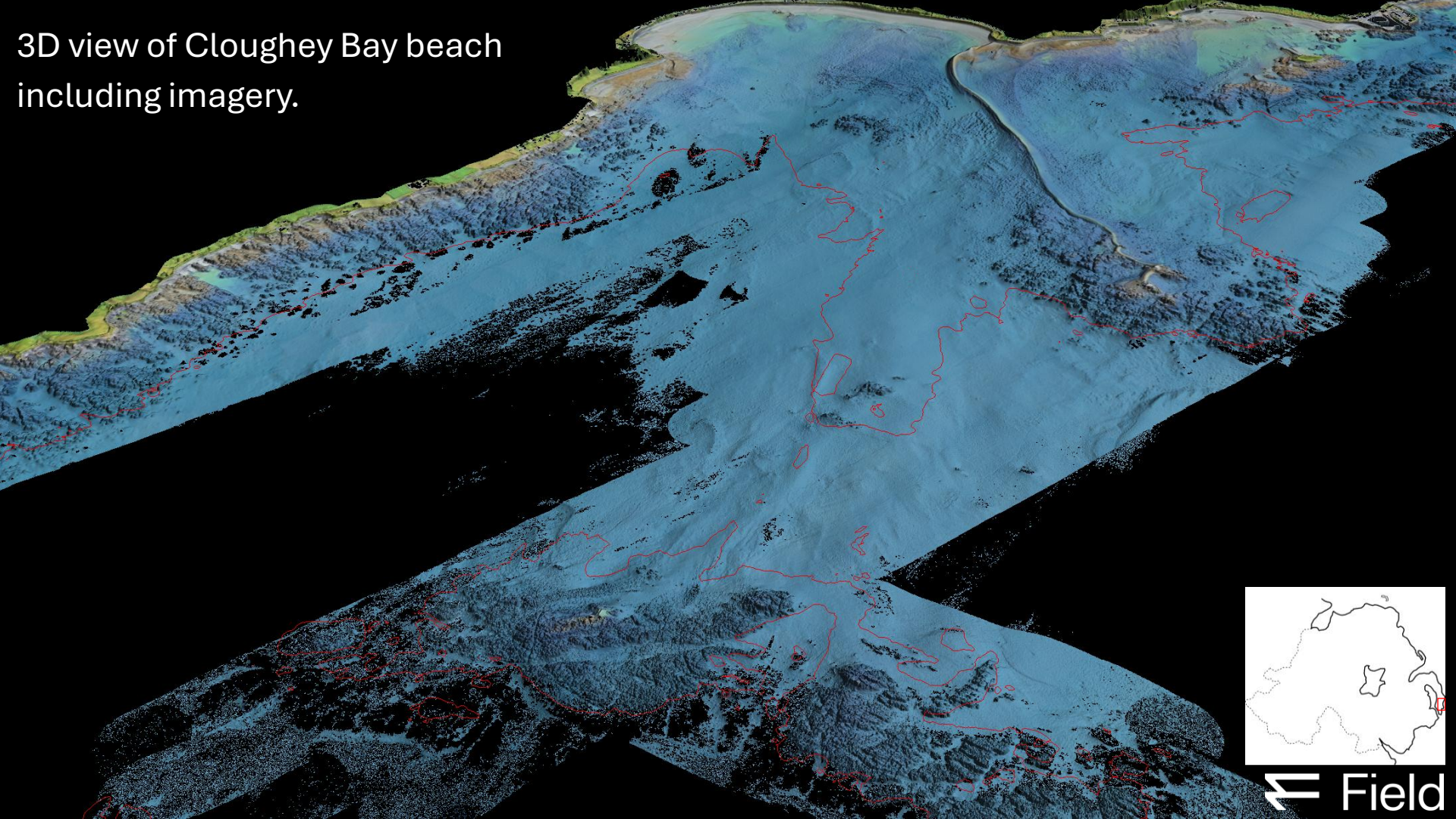




Field

3D view of Strangford Lough plus drape of imagery. Depths reached about 8-10 meters.

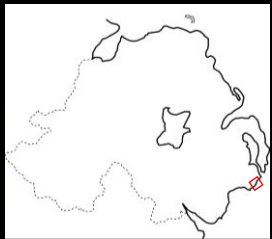
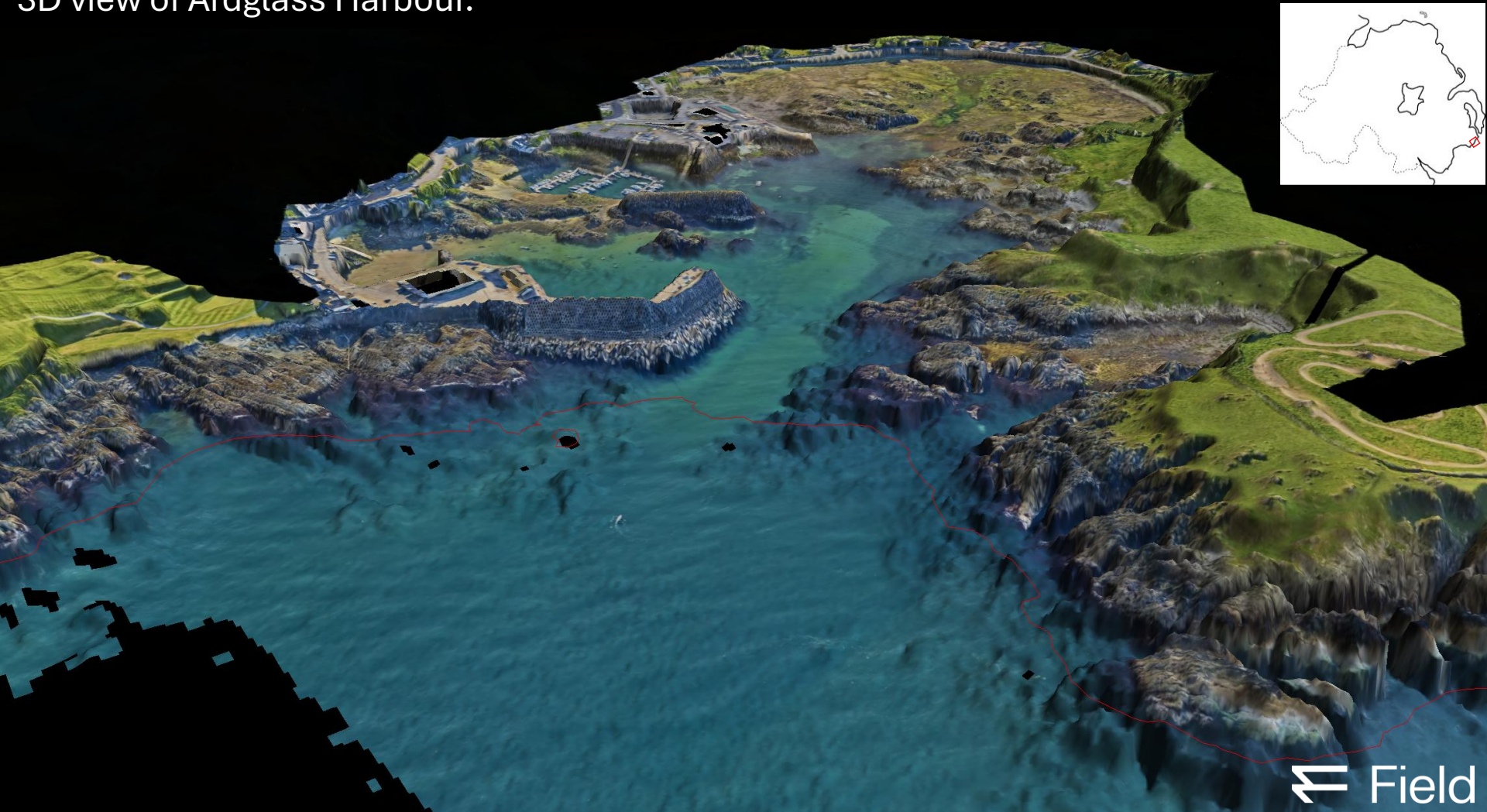
3D view of Cloughey Bay beach
including imagery.



Field

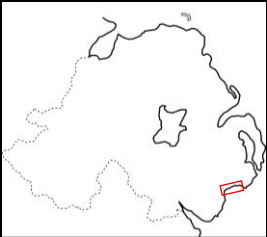
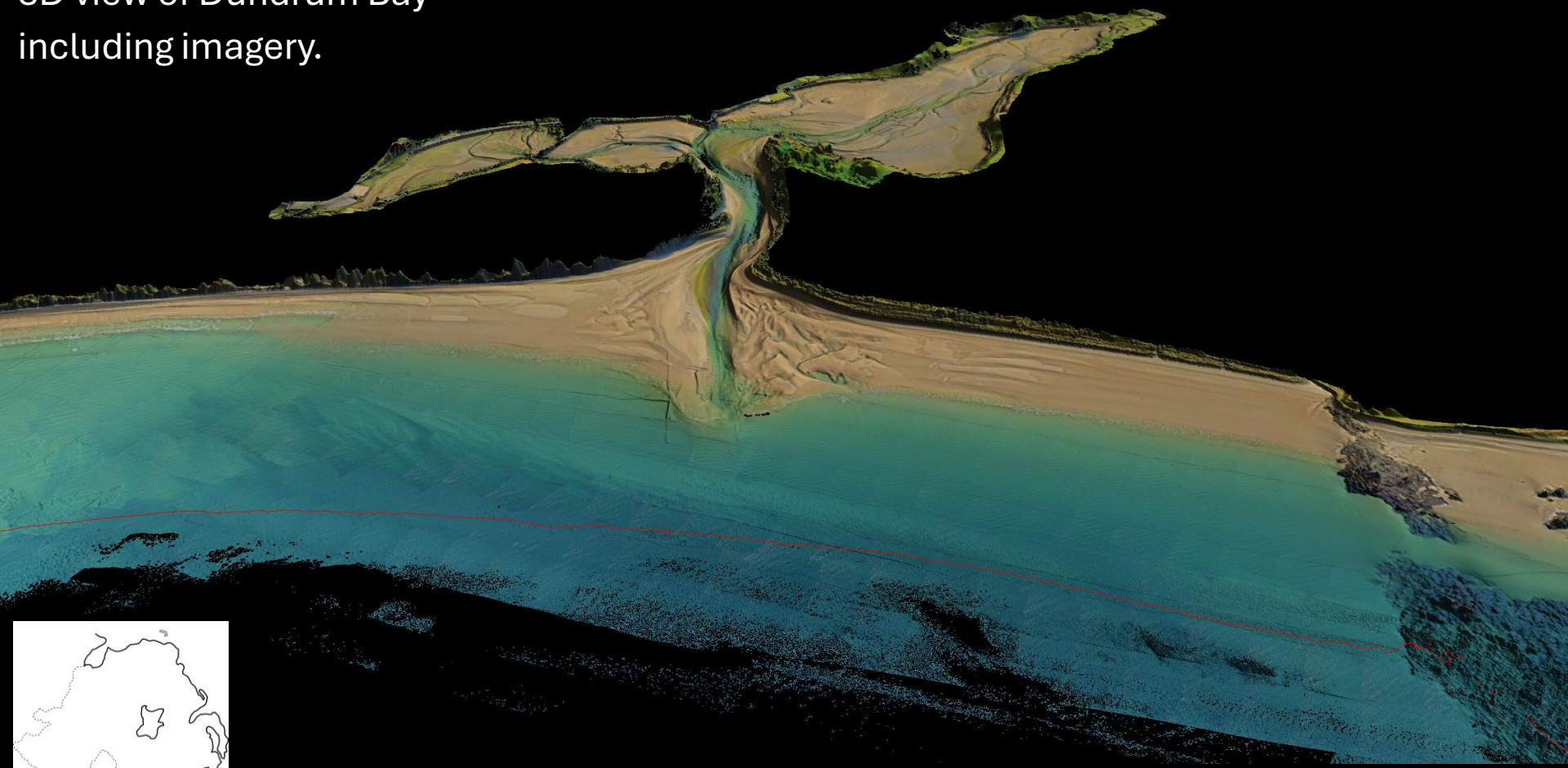


3D view of Ardglass Harbour.



Field

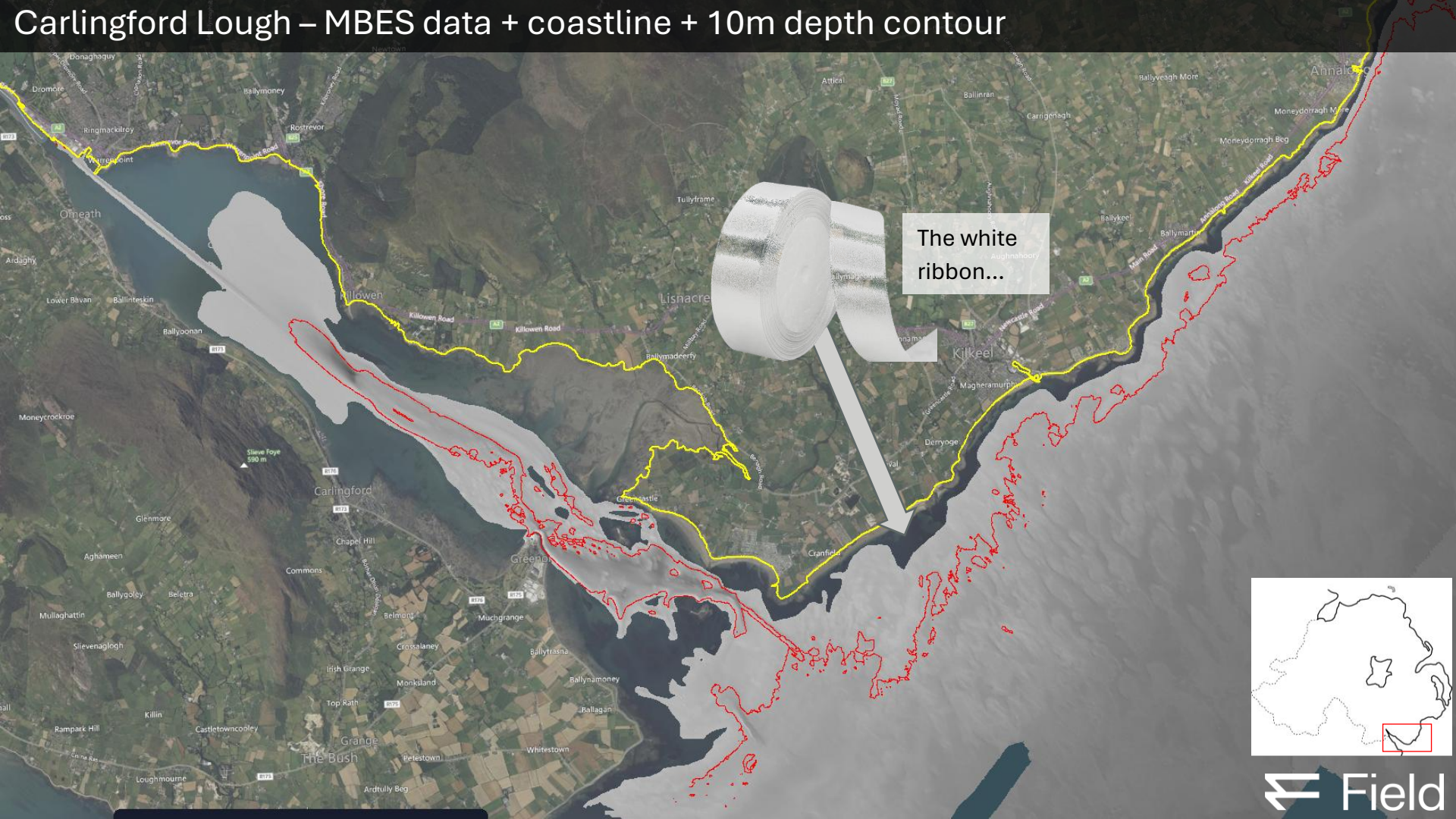
3D view of Dundrum Bay
including imagery.



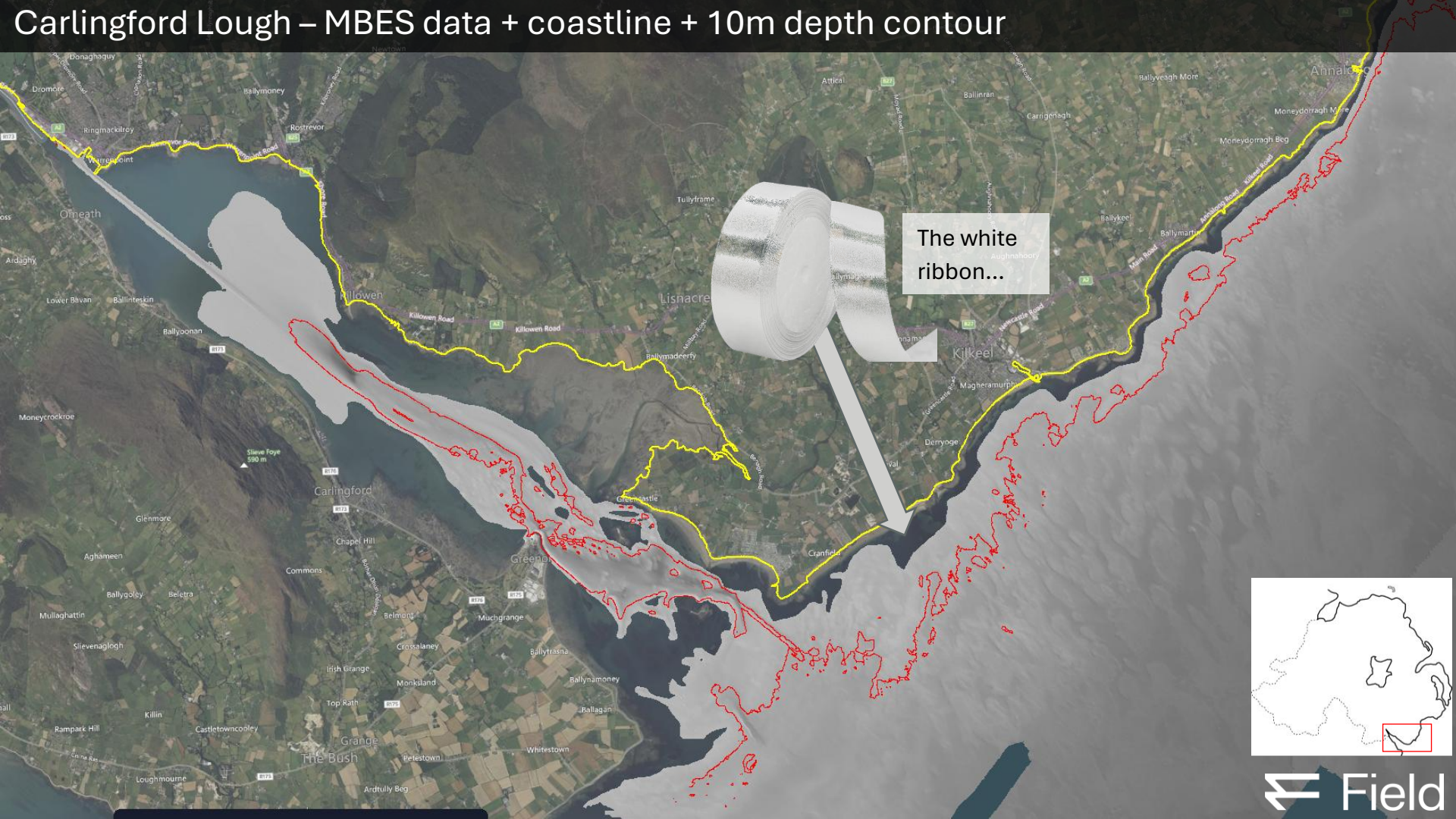
Carlingford Lough – MBES data + coastline + 10m depth contour

The white ribbon...

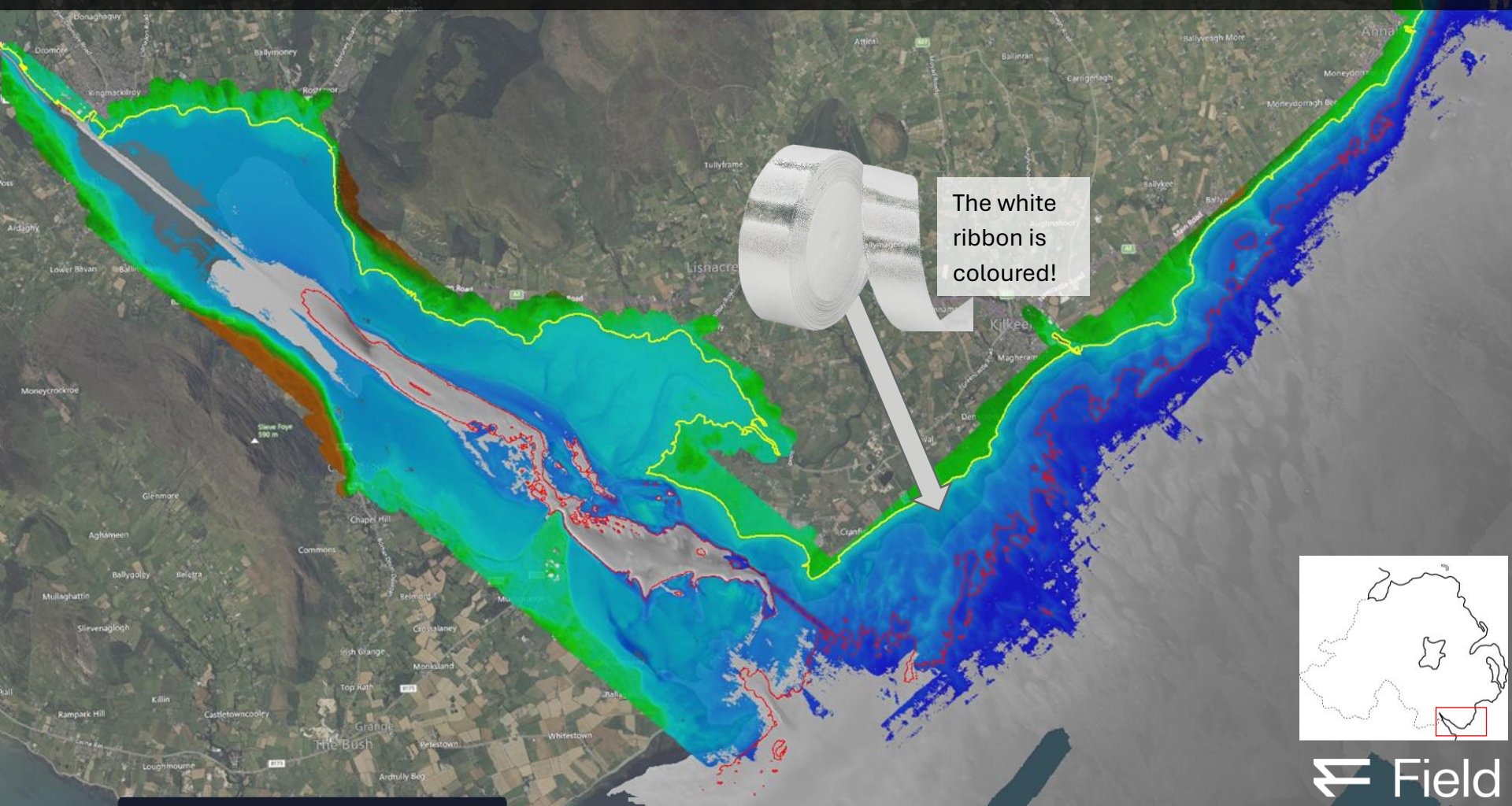
Field



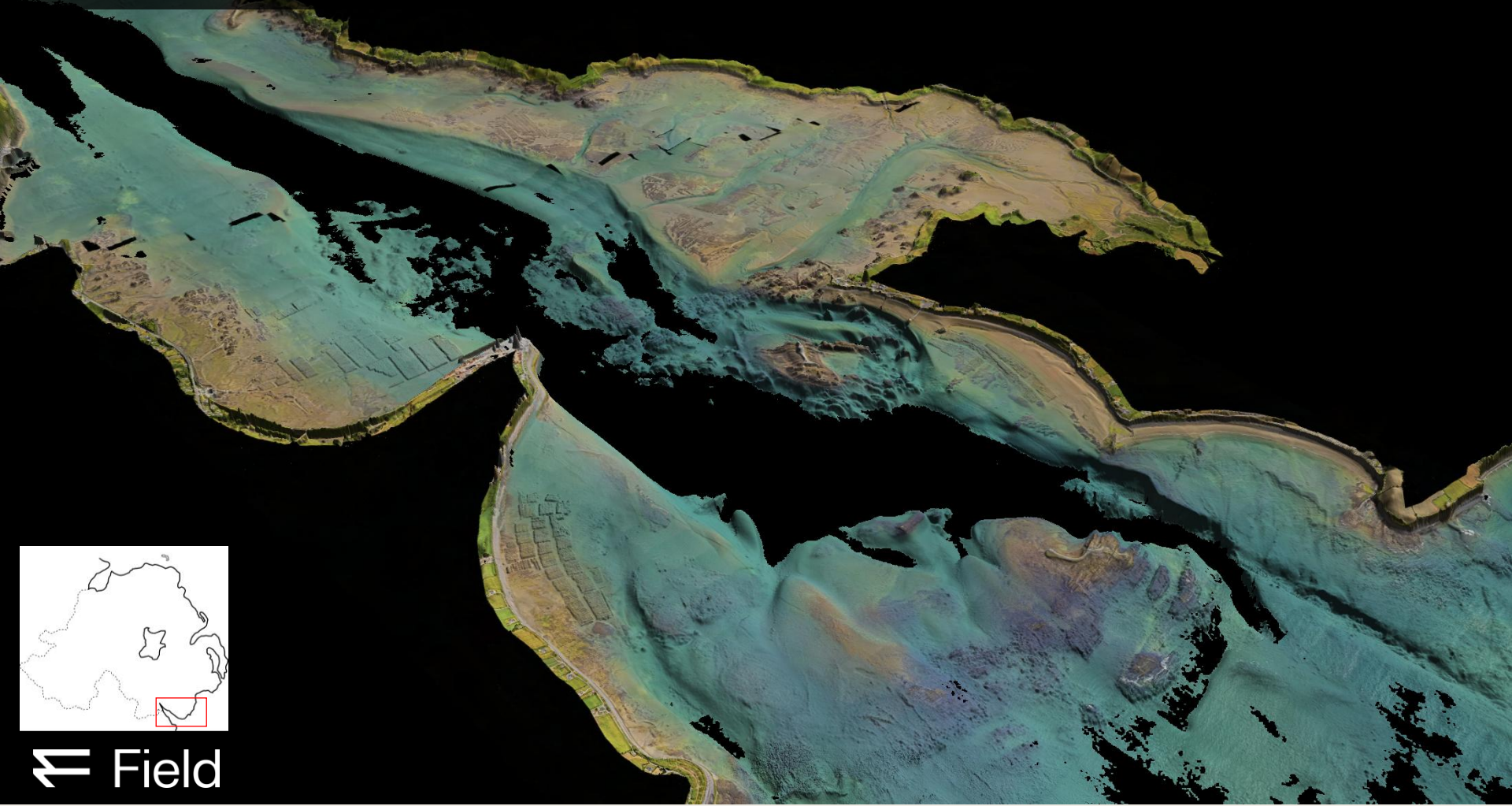
The white ribbon...



Carlingford Lough – MBES data + coastline + 10m depth contour + ALB data

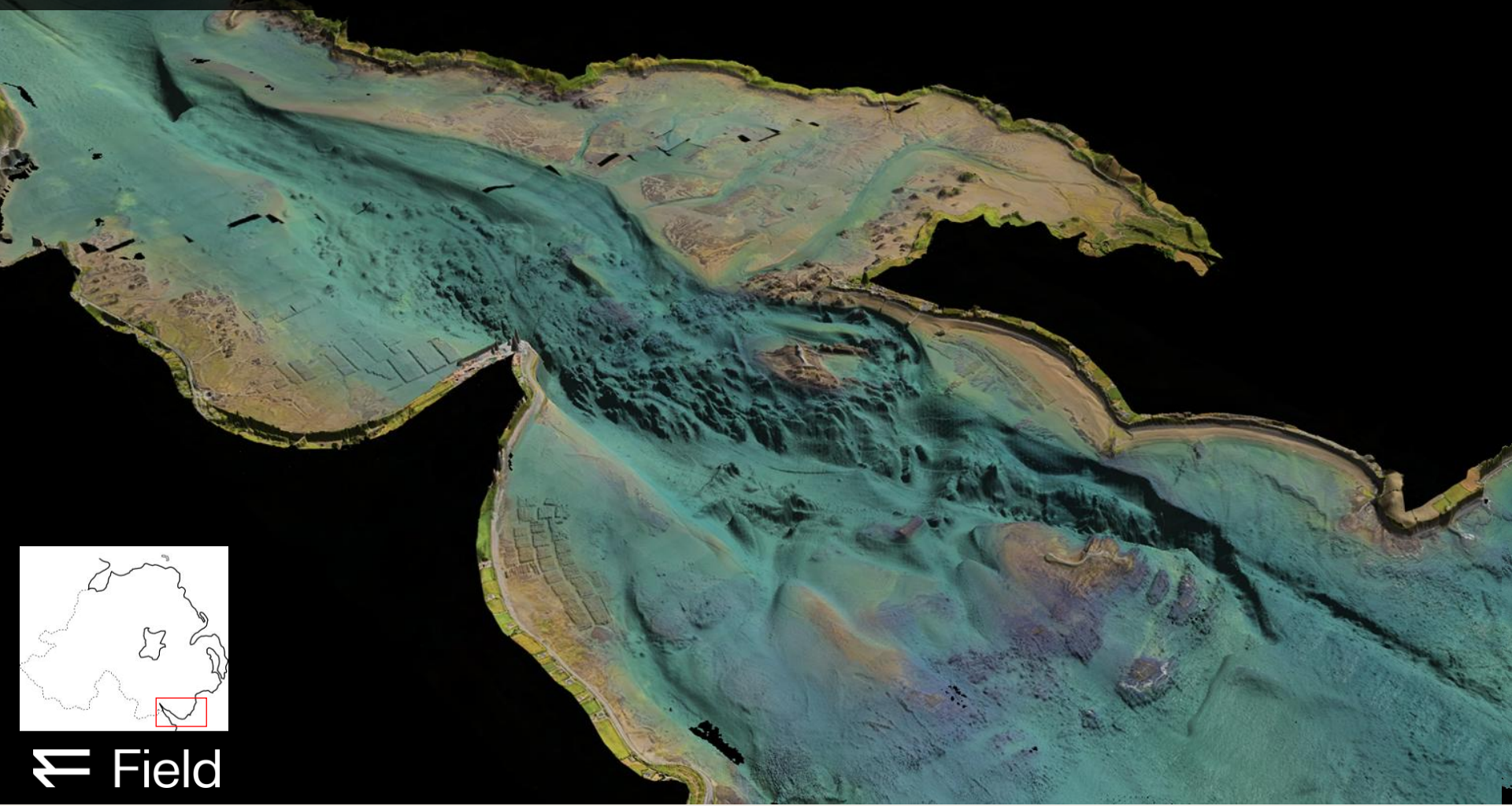


Carlingford Lough – Complementarity between ALB & MBES



Field

Carlingford Lough – Complementarity between ALB & MBES



Field

Project status & conclusion

- Field's data acquisition and processing work are finalized. UKHO is currently validating the data before final delivery to DAERA.
- Despite challenges with turbidity, tides, and weather, a coverage of about 85% of the 0-10m depth area in the coastal zone of Northern Ireland was eventually achieved.
- Airborne lidar bathymetry is a very good solution to survey the nearshore area. Field successfully mapped the 'white ribbon' in Northern Ireland.
- The resulting dataset will be a great baseline for better coastal zone management in Northern Ireland.



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