



# Using Multibeam Technology to Detect Seabed Changes In Dynamic Environments on the West Coast of Scotland

Oban, Scotland

- In late 2020, NORBIT partnered with the Scottish Association for Marine Science (SAMS) to study the evolution of the seabed off the west coast of Scotland.
- A survey was performed using the NORBIT iWBMSH integrated multibeam survey system, mounted on a vessel of opportunity. The survey was performed over the course of 2 days.
- Two areas were mapped:
  - Falls of Lora (a tidal rapid)
  - Wreck of the *SS Breda*, sunk in 1942 in Ardmucknish Bay.
- Data was acquired with NORBIT DCT and processed using Teledyne CARIS. The data was fed into signal analysis models and compared with previous data to quantify sediment movements.



- Situated on the west coast of Scotland, the Falls of Lora is a tidal rapid at the mouth of Loch Etive, approximately 6 miles from Oban. It is popular with divers, kayakers and tourists.
- The surrounding area contains a number of well-known ship wrecks which have become popular diving sites. Most of these wrecks sunk during the early 20<sup>th</sup> century.
- NORBIT surveyed the wreck of the *SS Breda*, a Dutch cargo-passenger ship that was bombed and sunk during World War II. The wreck remains largely intact on the seabed.



*Ardmucknish Bay, Argyll and Bute*



*The town of Oban*



*SS Breda Cargo Ship*

- NORBIT iWBMSH benefits:
  - Frequency agile 200-700kHz.
  - $0.5 \times 0.5^\circ$  beam width resolution at 700kHz.
  - Up to  $210^\circ$  swath width (single head) as standard.
  - HD beamformer providing 512 beams per ping.
  - High performance integrated GNSS/INS system.
  - Integrated sound velocity probe.
  - Small form factor and low power consumption.
  - Designed for rapid mobilization on any platform.
  - Bathymetry and various backscatter and water column data as standard deliverables.
  - Optional integrated LiDAR.
- For full specifications, visit [www.norbit.com/susbea](http://www.norbit.com/susbea)



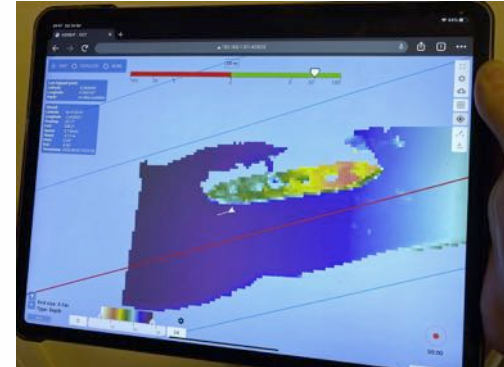
*The entire system fits in 1 pelican case.*



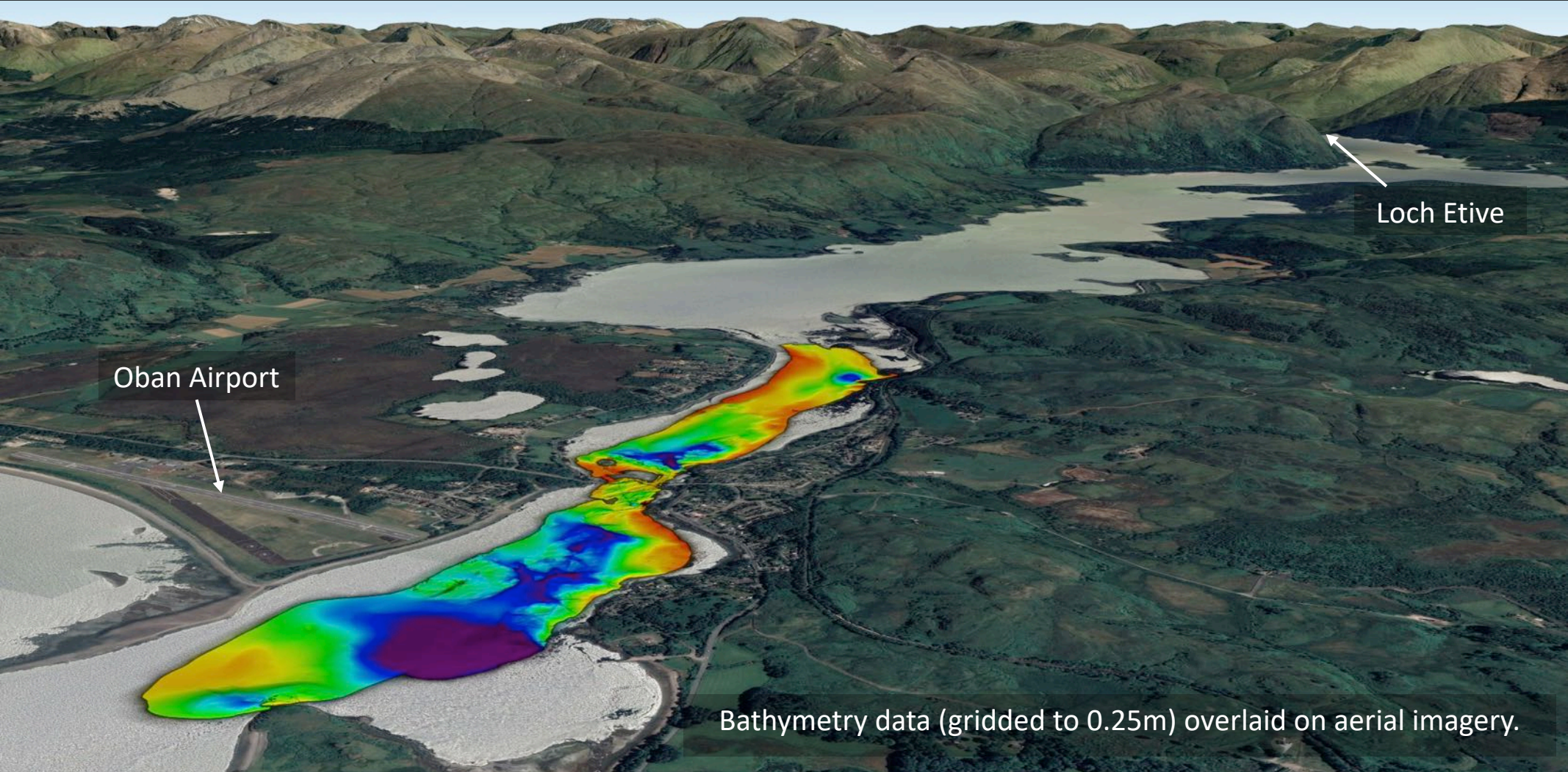
- The NORBIT iWBMSH was installed on an over-the-side pole mount and configured for operation in less than 1 hour.
  - Line planning and data acquisition was performed on a tablet device using NORBIT's Data Collection Tool (DCT), a simple to use web-based interface that requires minimal setup (no complex project setups, offsets or geodetic configurations required.)
  - DCT outputs the complete sonar and navigation solution to the well-known s7k data format, which is fully supported by all hydrographic processing software packages.



*Survey vessel and hardware installation on an over-the-side mount.*



*NORBIT DCT on a tablet device.*

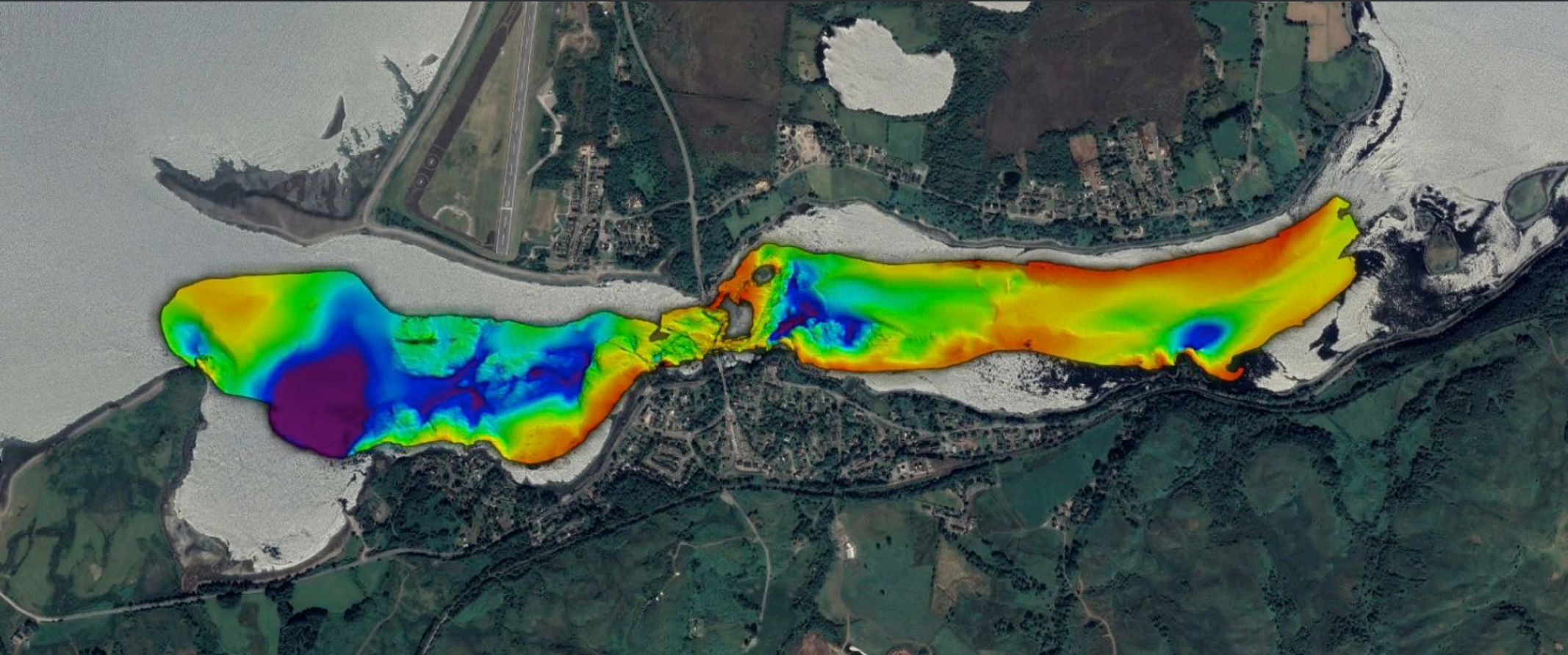


Oban Airport

Loch Etive

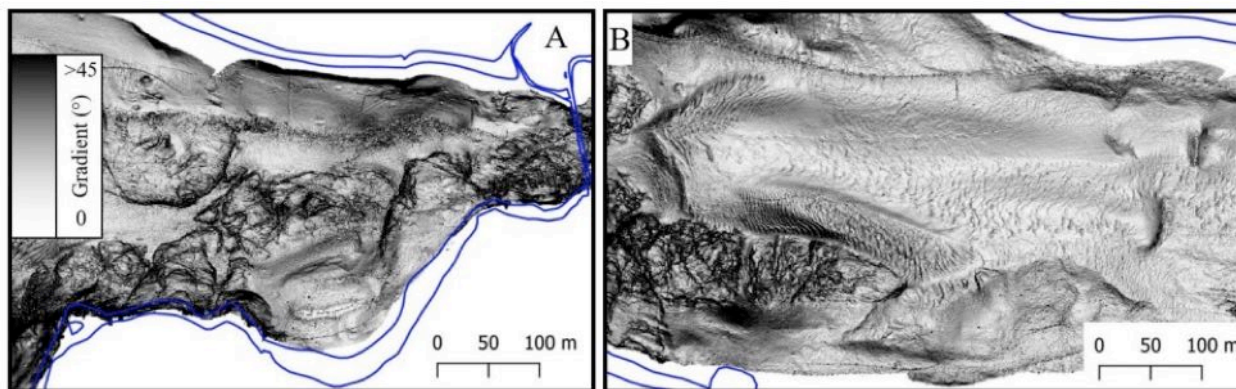
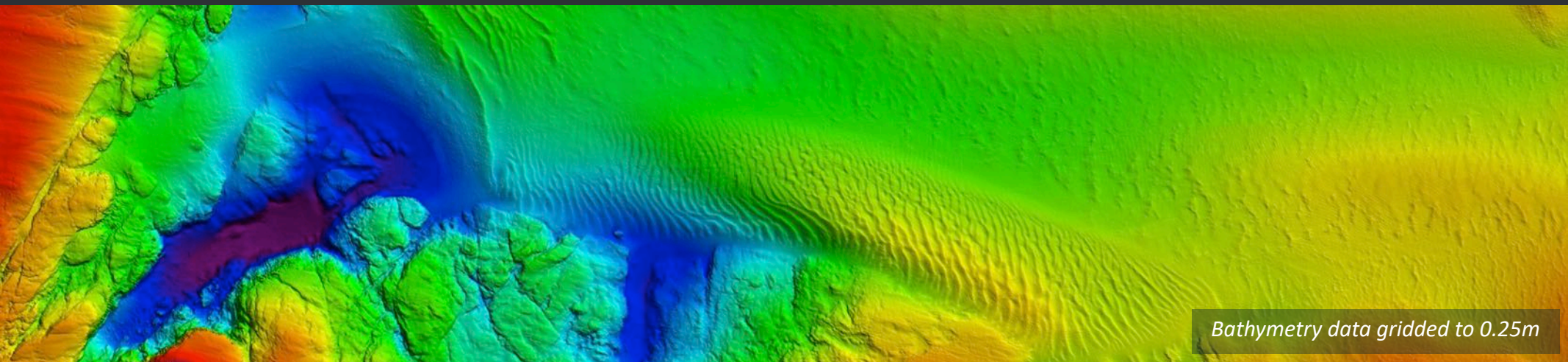
Bathymetry data (gridded to 0.25m) overlaid on aerial imagery.





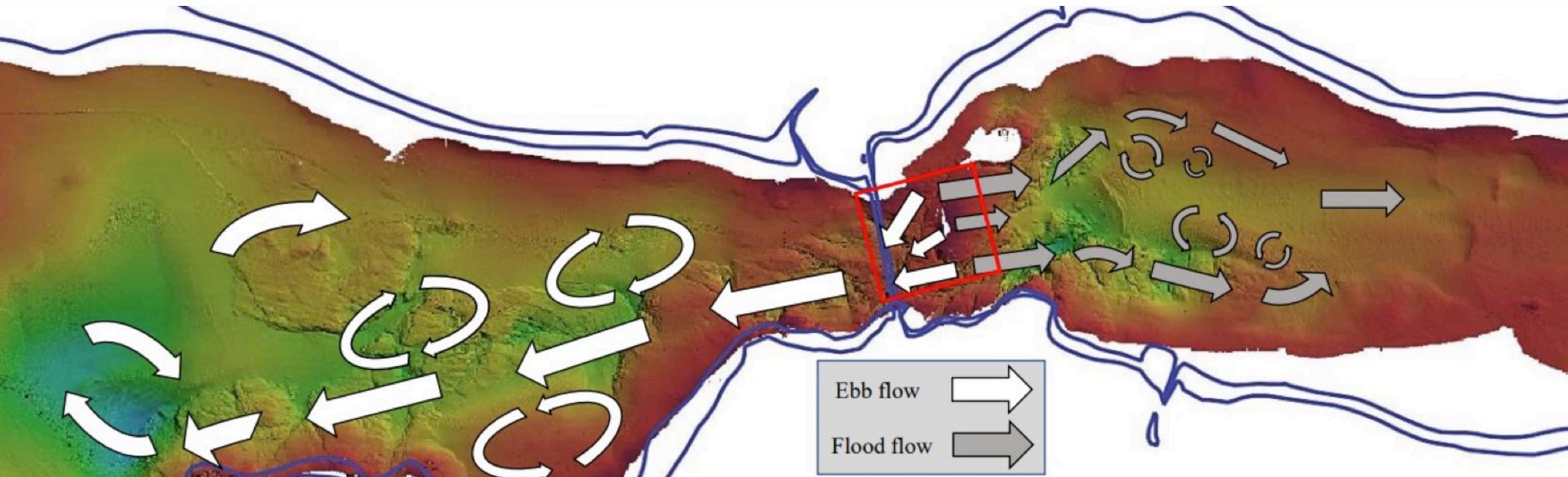
Bathymetry data (gridded to 0.25m) overlaid on aerial imagery.



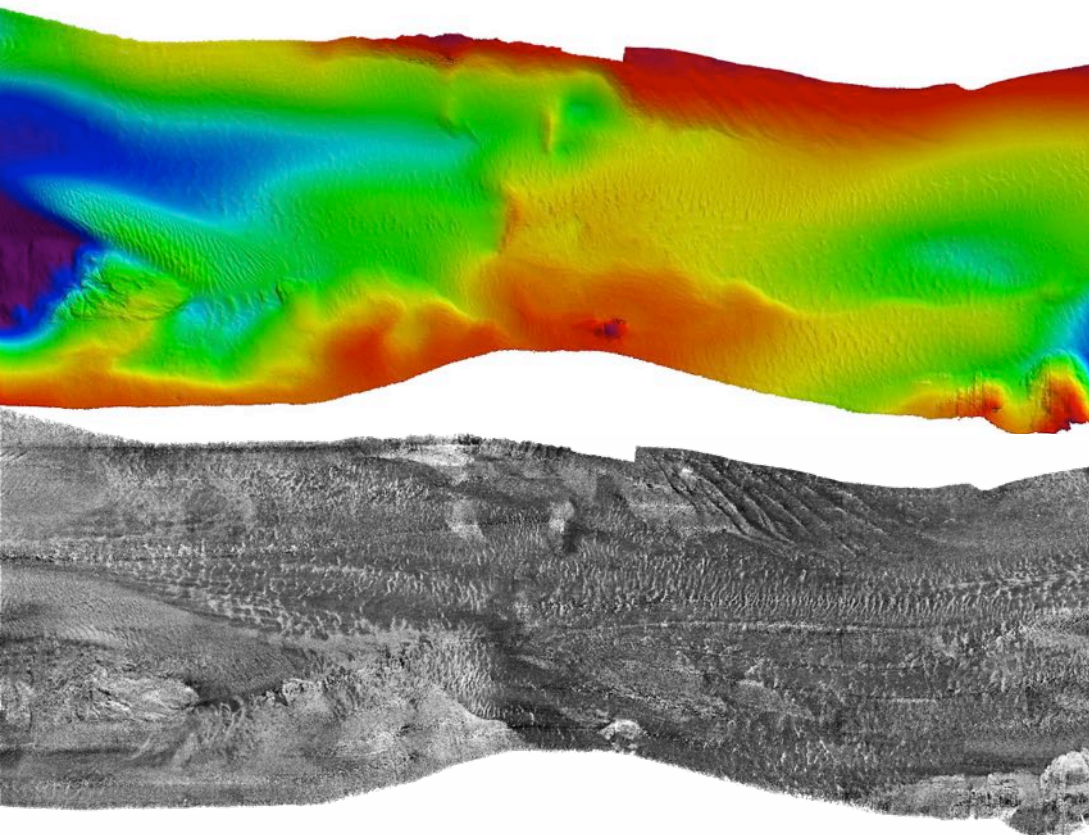


The high resolution bathymetry data (top image) was processed using Teledyne CARIS and used by scientists to generate the slope rasters pictured above (Credit: SAMS)





This image shows the direction of ebb flow and flood flow overlaid on bathymetry data (Credit: SAMS)

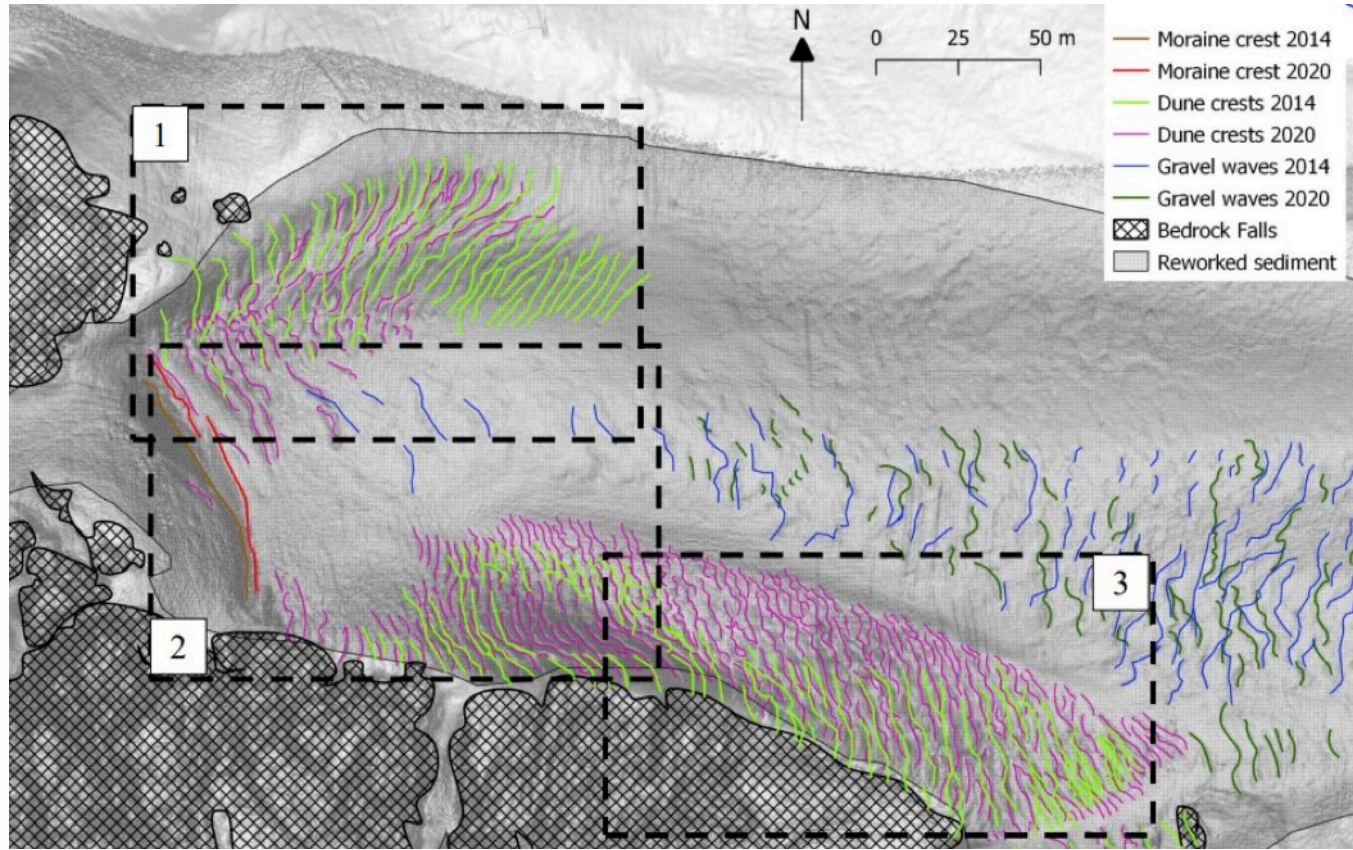


← Bathymetry data gridded to 0.25m resolution. The depth range is 5-30 meters.

← Corresponding backscatter mosaic generated from Snippets data, which provides information about seabed composition.

Bathymetry and backscatter data were collected simultaneously. NORBIT's automated signal gain settings ensure optimal quality for both data types without compromise.



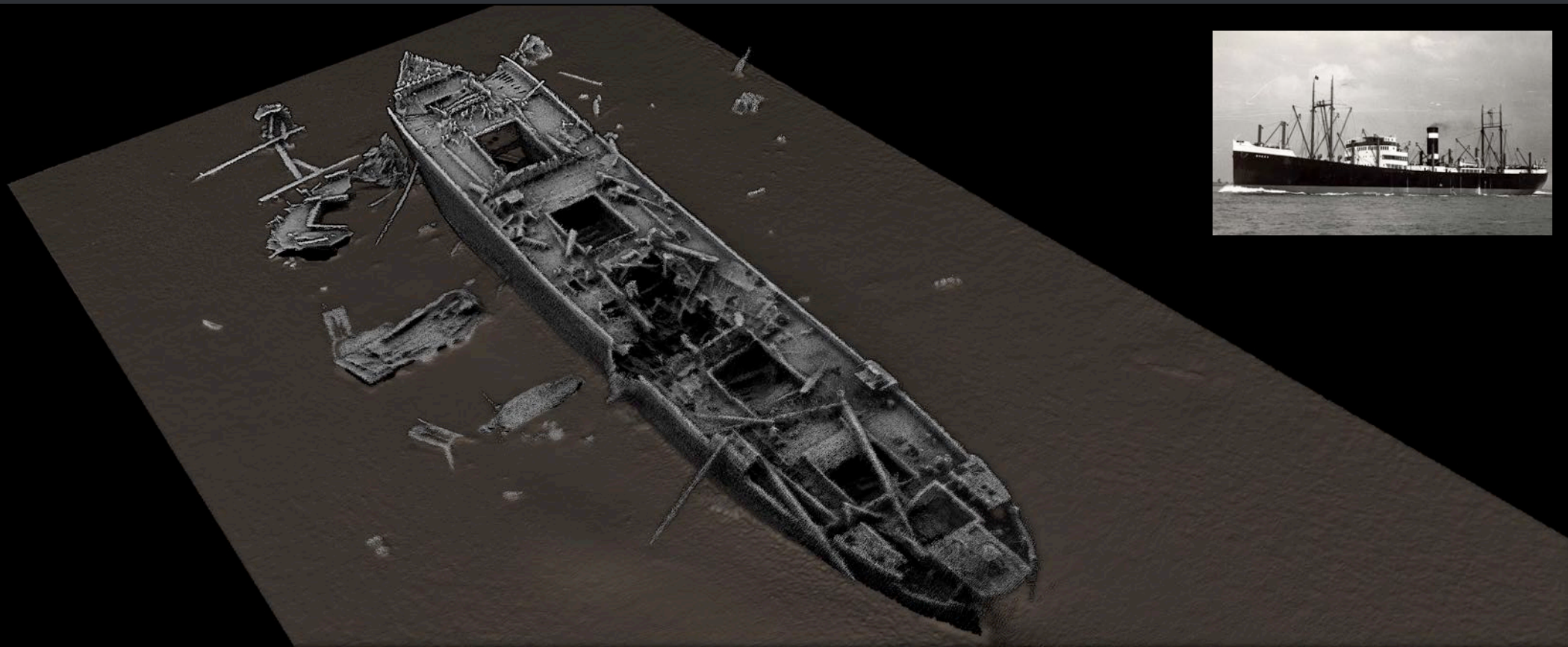


Comparing collected data with previous surveys from 2014 allowed scientists to model sediment movements (Credit: SAMS)

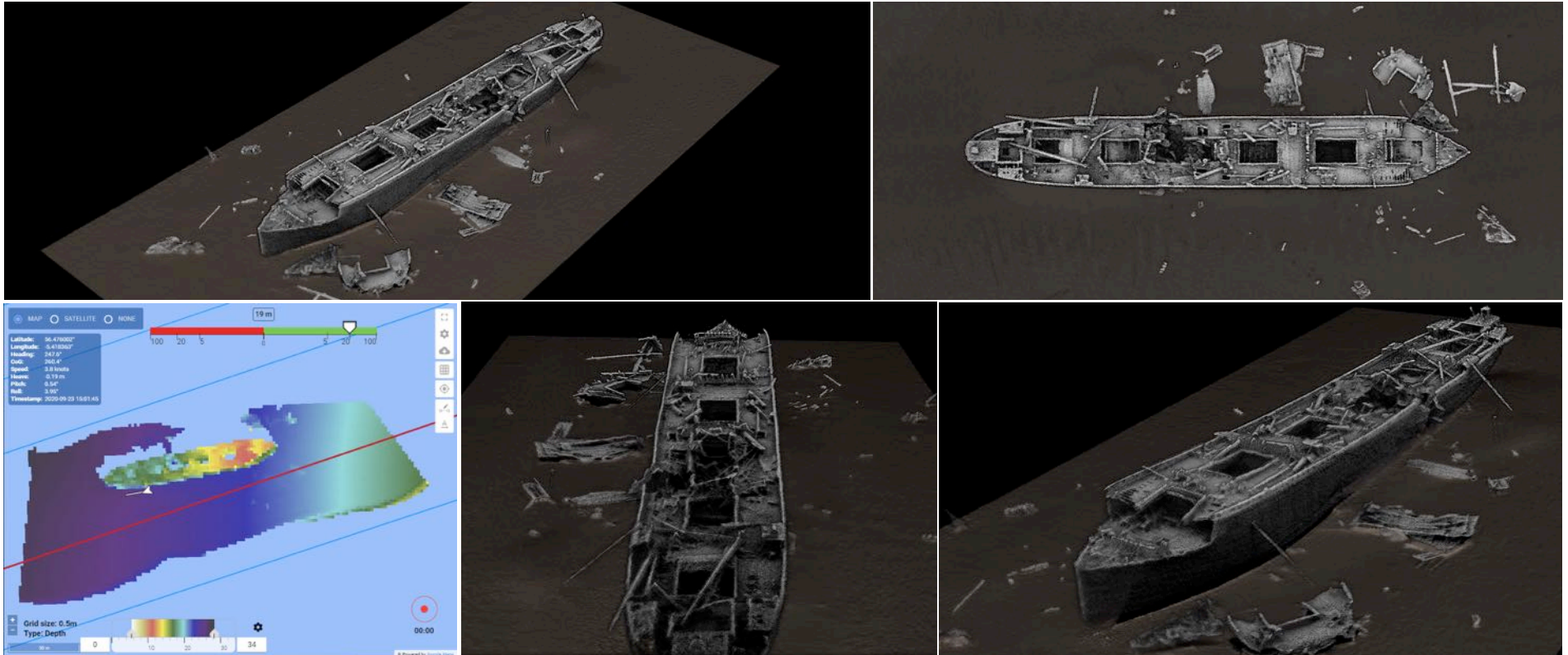


This image shows the magnitude and direction of sediment displacement in the Falls of Lora. The length of the arrows represent the magnitude of displacement (Credit: SAMS)





The *SS Breda* was a cargo ship, 123m in length, which sank during World War II. It rests on the seabed at approximately 26m depth. The above image shows raw point cloud data collected from multiple passes over the wreck.



The above images show raw point cloud data from additional angles, collected from multiple passes. The DCT real time acquisition display is shown on the bottom left.





Produced with thanks to Christian Armstrong and Dr. John Howe at the  
Scottish Association for Marine Science.

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*- explore more -*

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