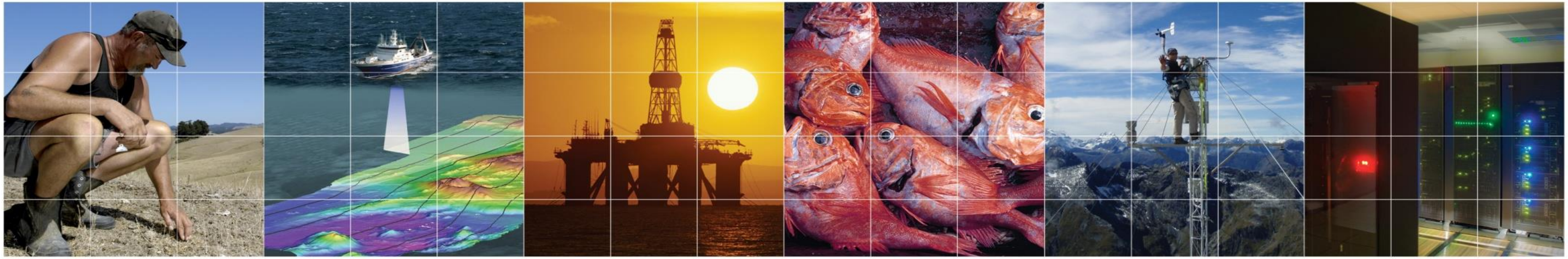
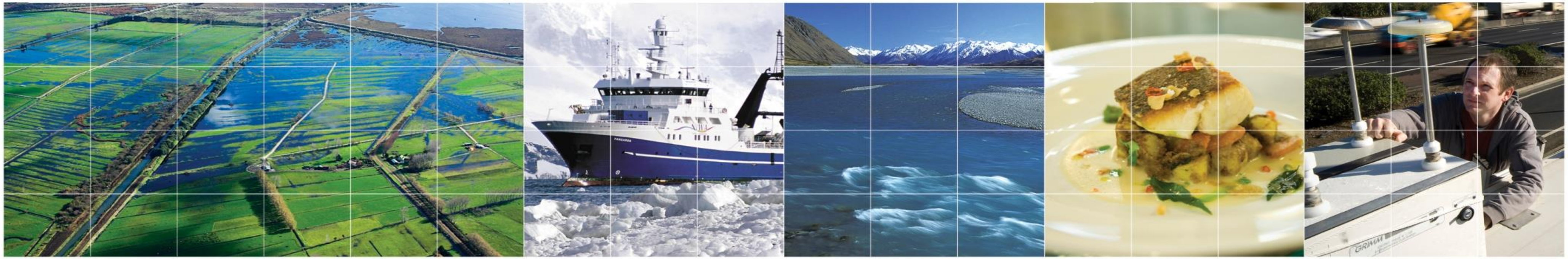
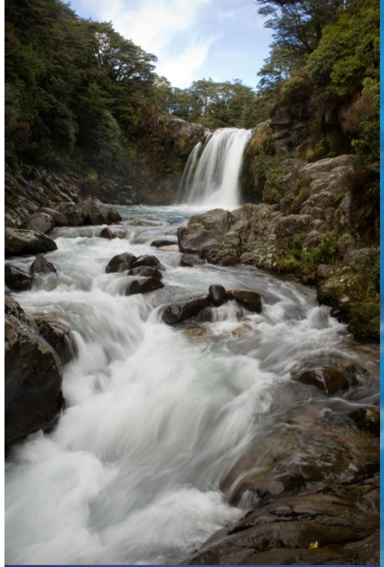


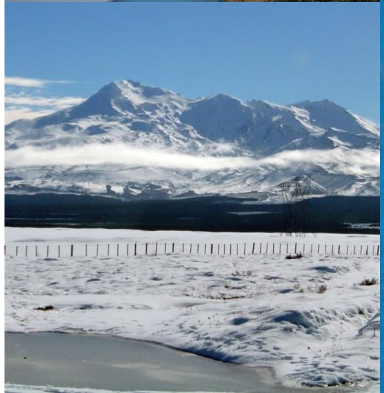
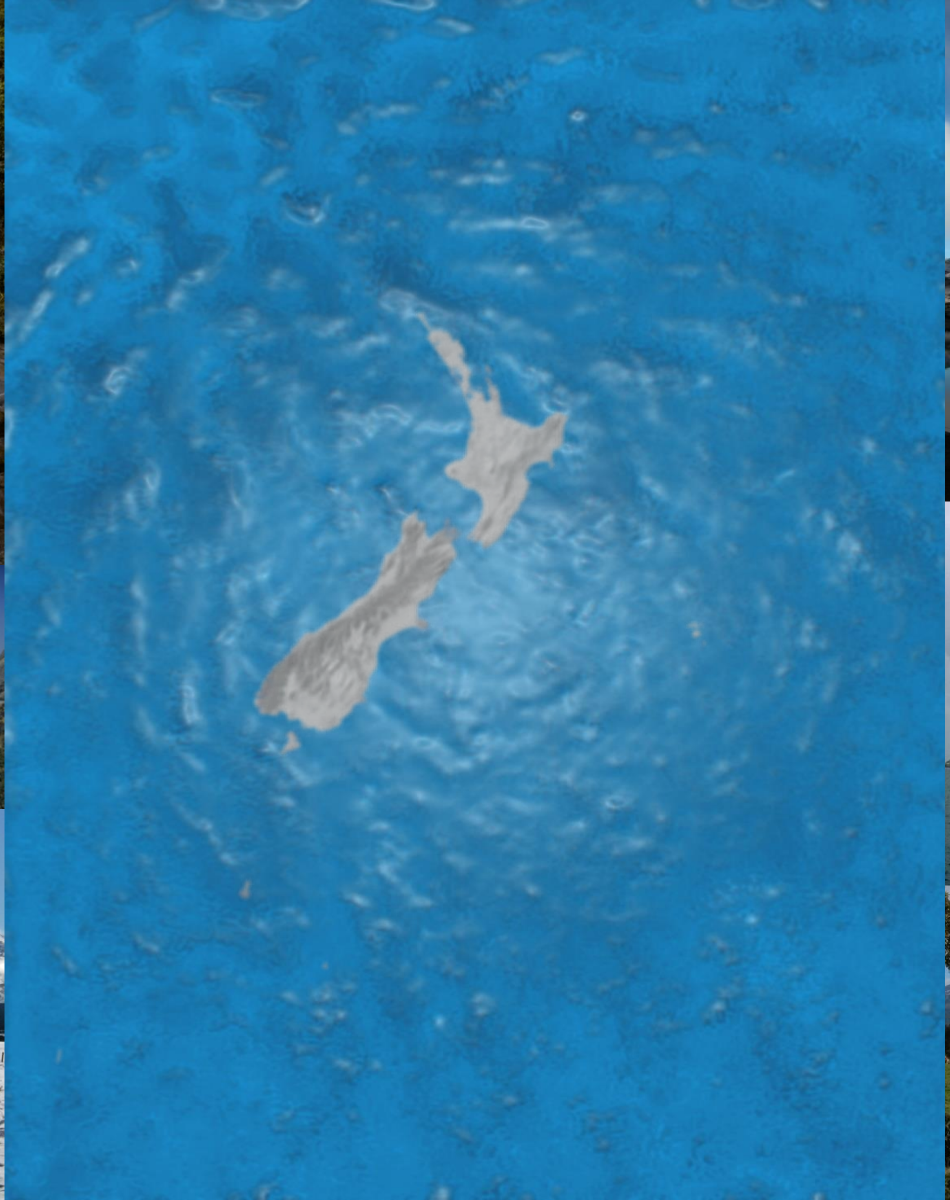
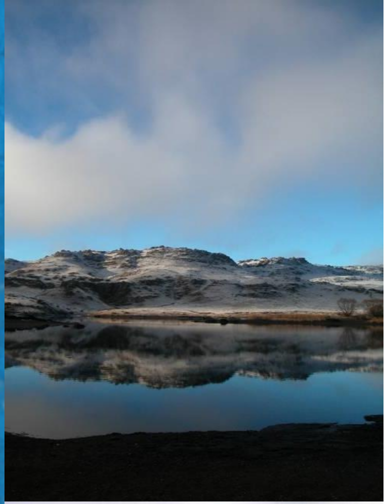
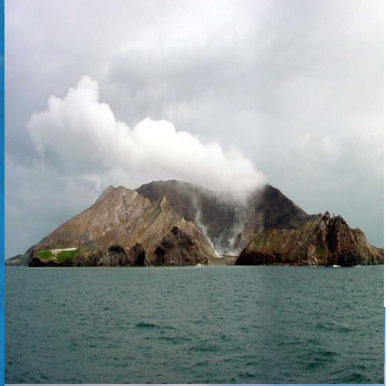
NIWA
Taihoro Nukurangi

Multibeam echosounder mapping to identify seafloor habitats

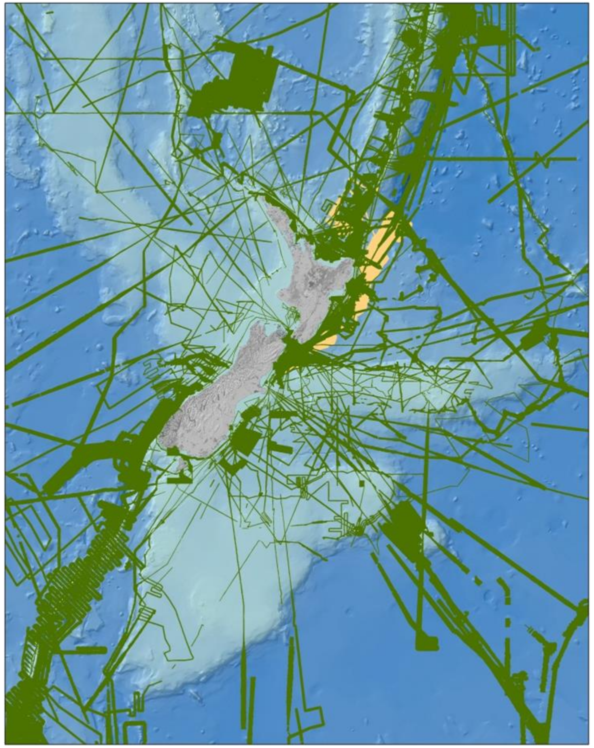
Helen Neil, Kevin Mackay, John Mitchell, Arne Pallentin

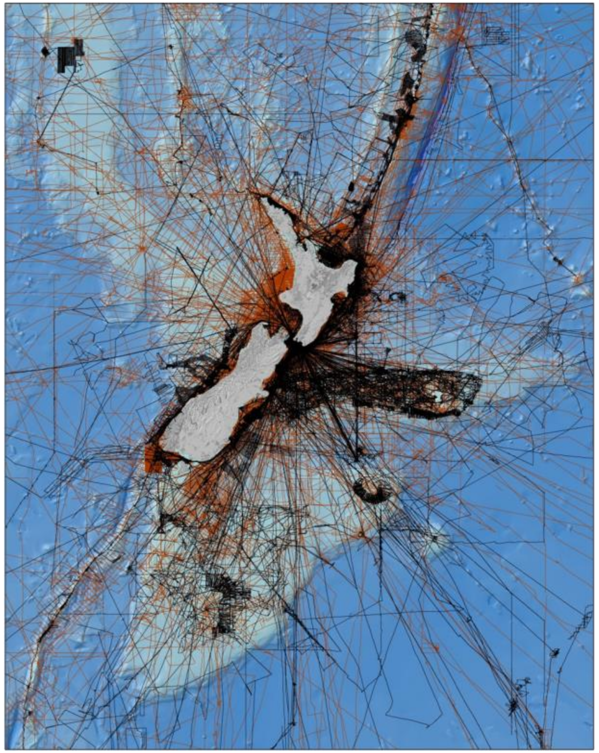




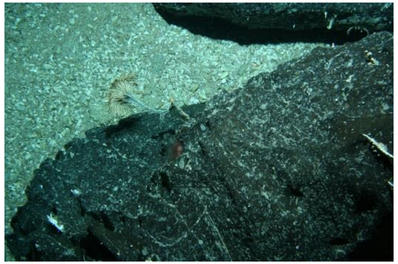

Data coverage

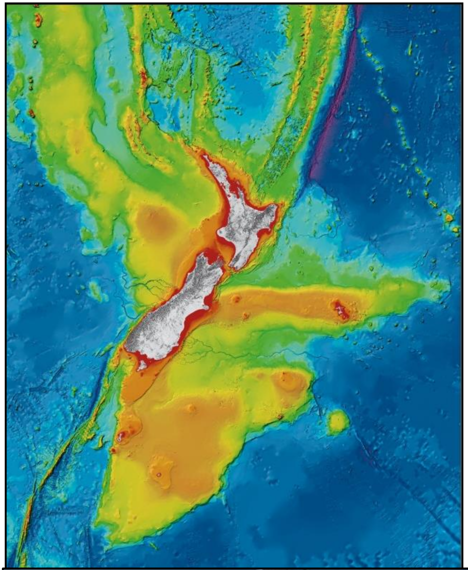


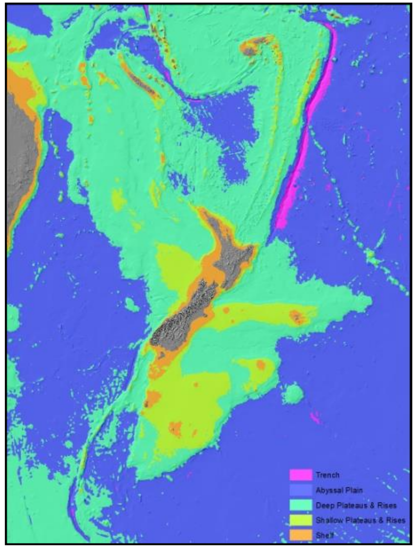


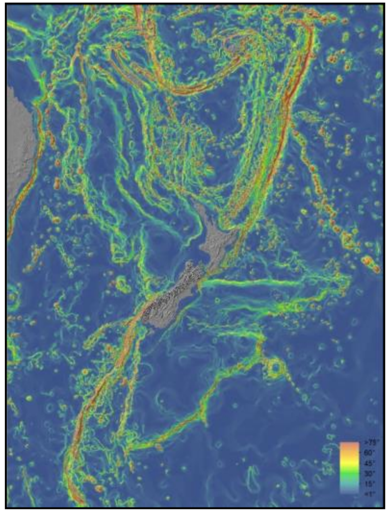
- Kongsberg EM302, 30kHz
- 7000 m swath in 2500 m water depth
- Dual swath giving 864 soundings per ping
- Water column data recording

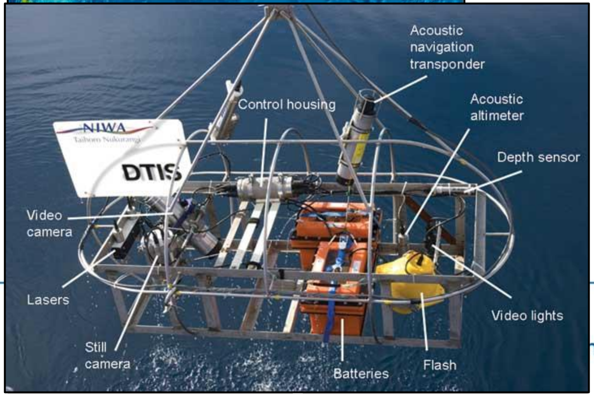
Bathymetry - where geology meets biology

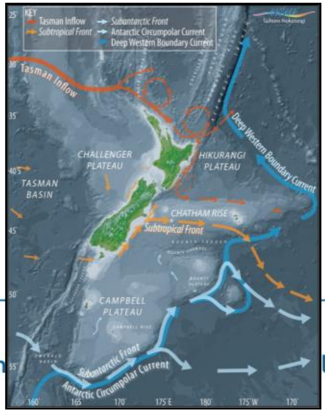


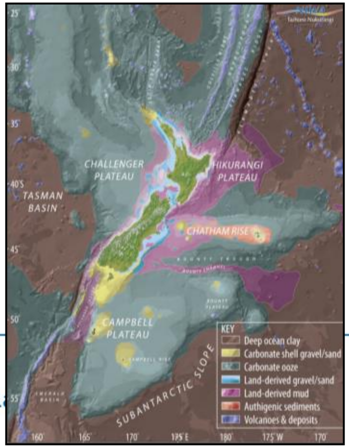


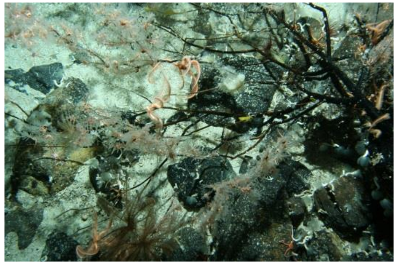












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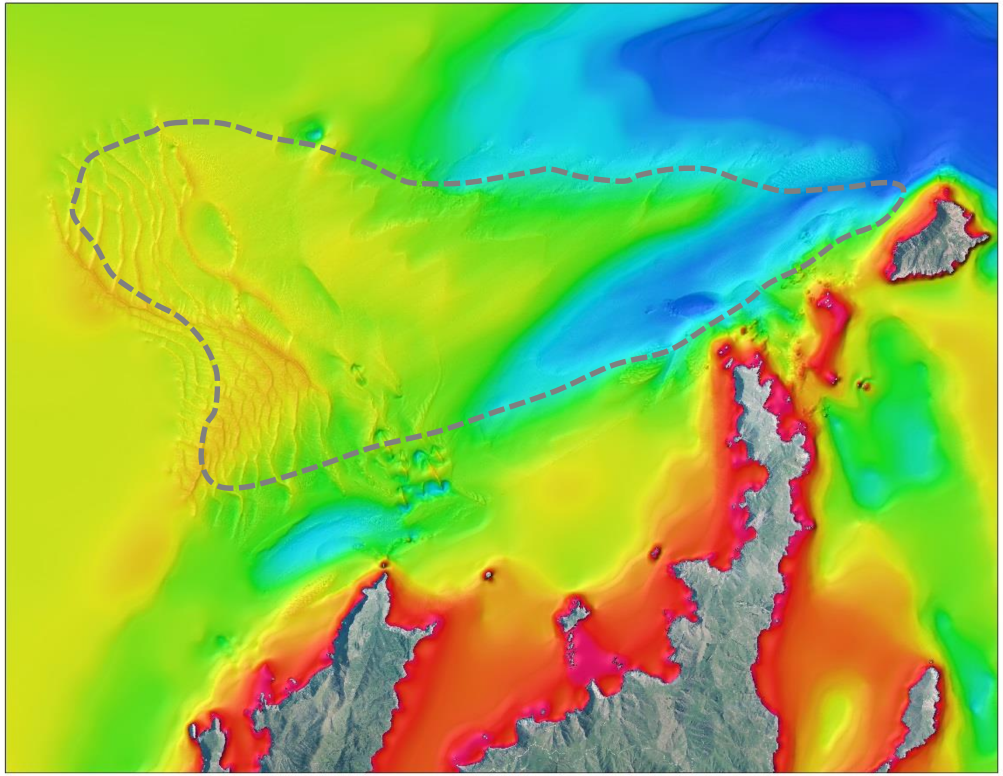
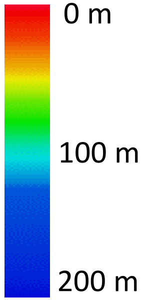
Northwest D'Urville

Site 2.3:
- bathymetry data reveal the shape and depth of the seafloor
- grid resolution of 10 m and 2 m

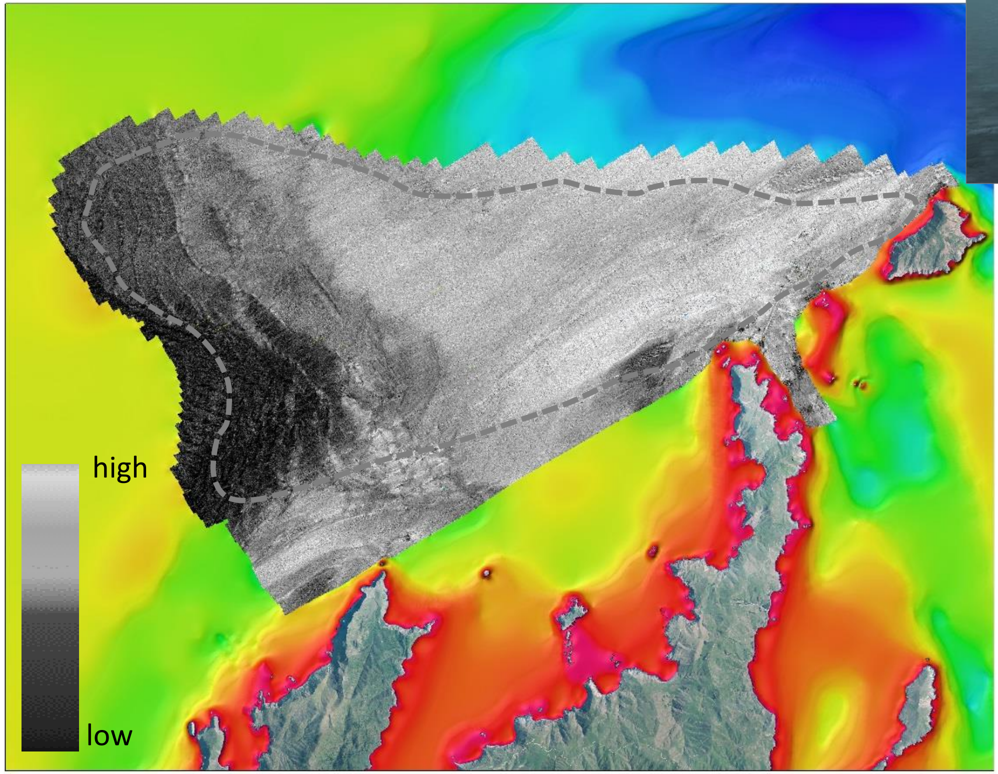


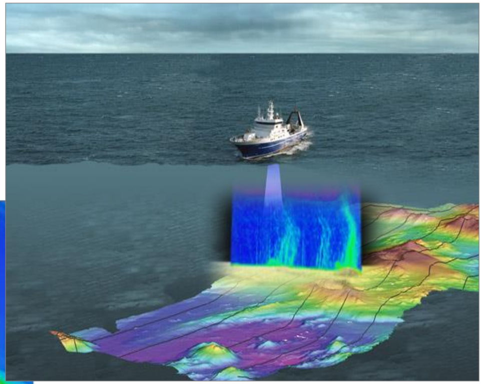


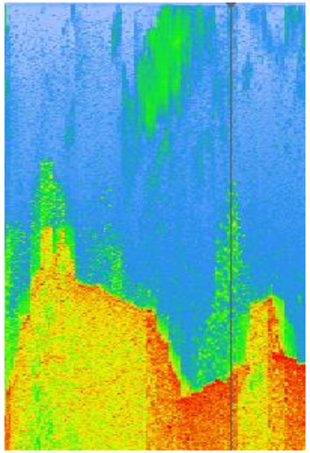
Northwest D'Urville

Site 2.3:

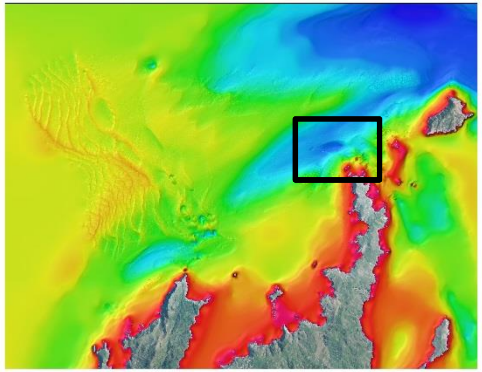
- strength of the return signal (backscatter) provides valuable information on the bottom types
- data recorded throughout the full water column can characterise water masses, fish schools, other features

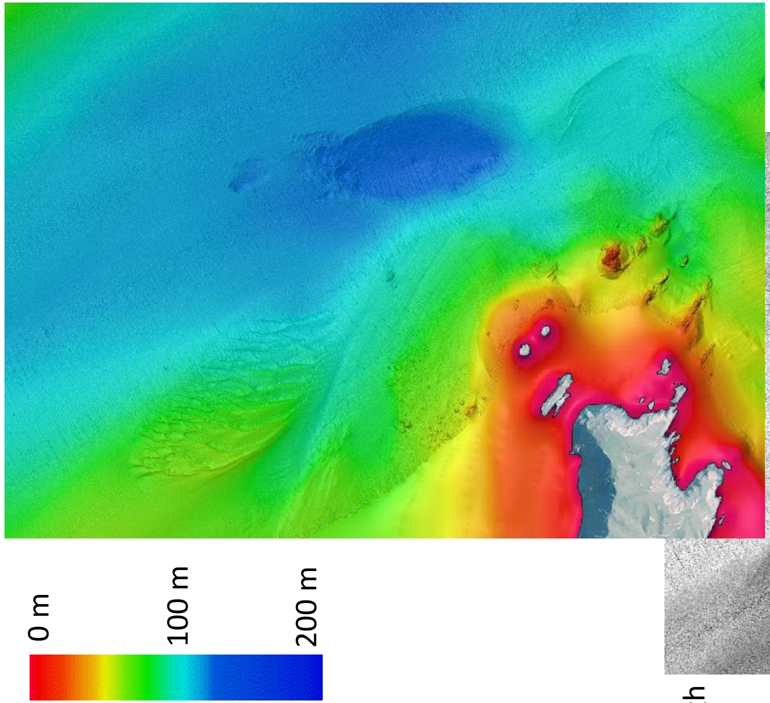


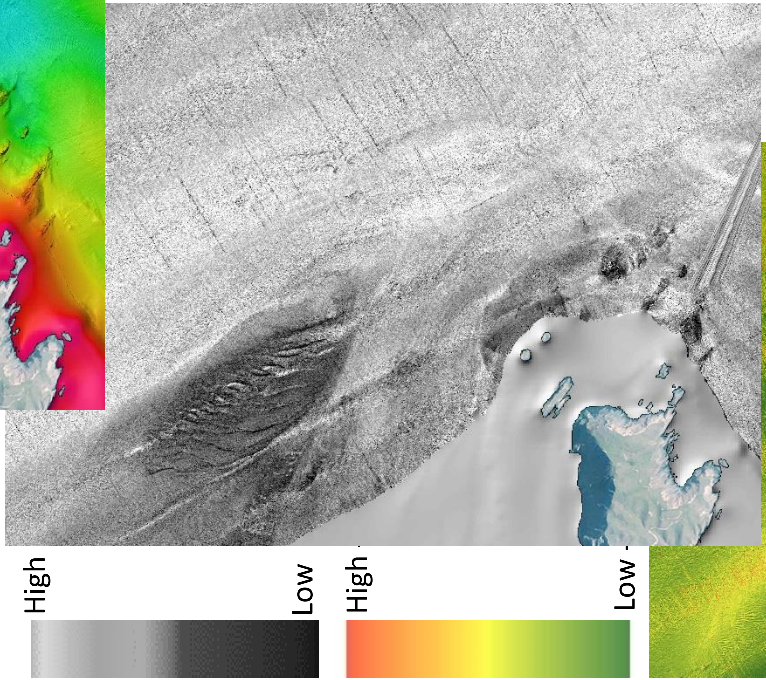


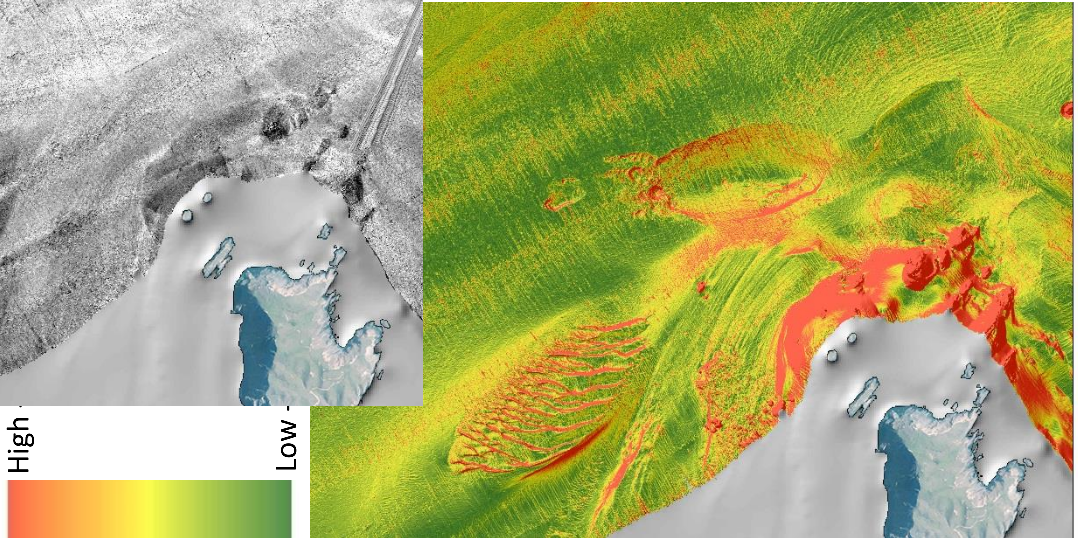


Seafloor depressions

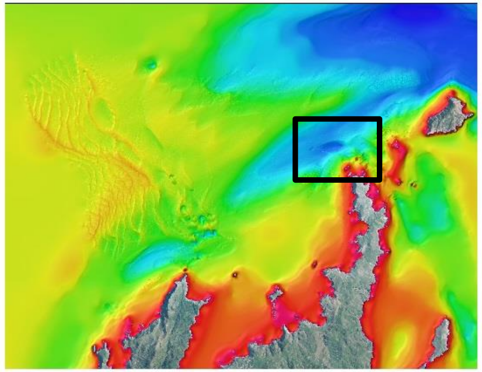


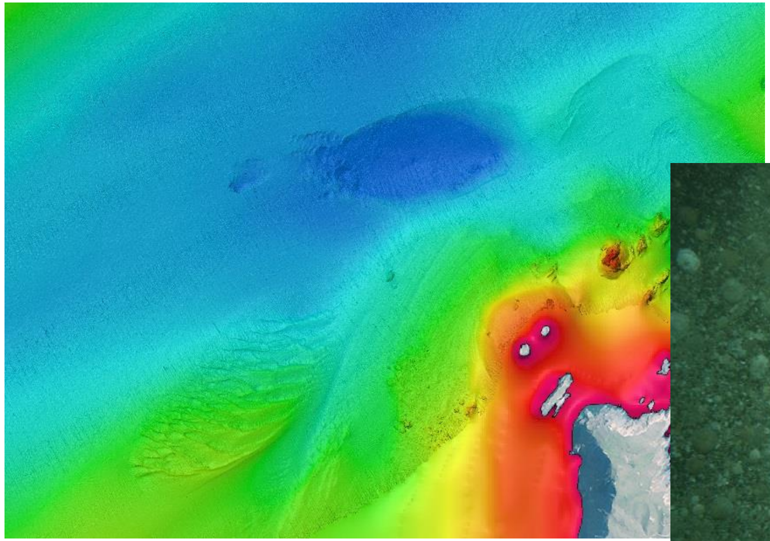


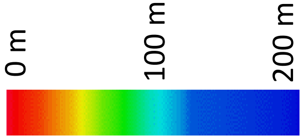


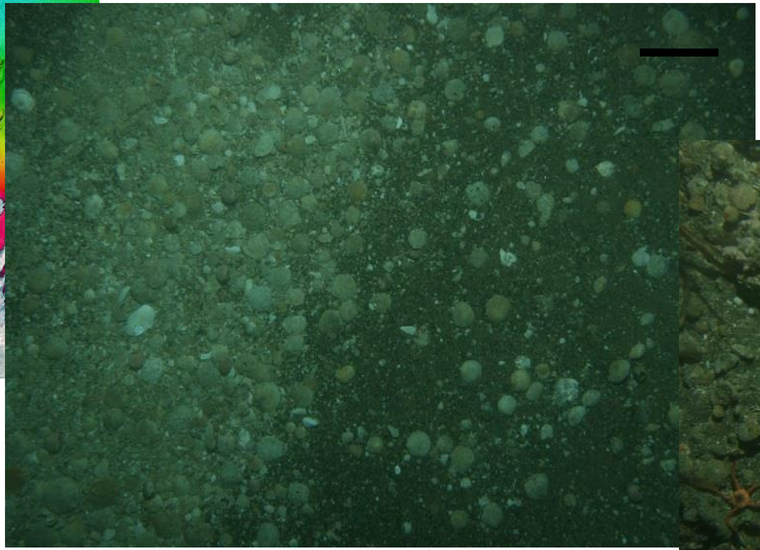


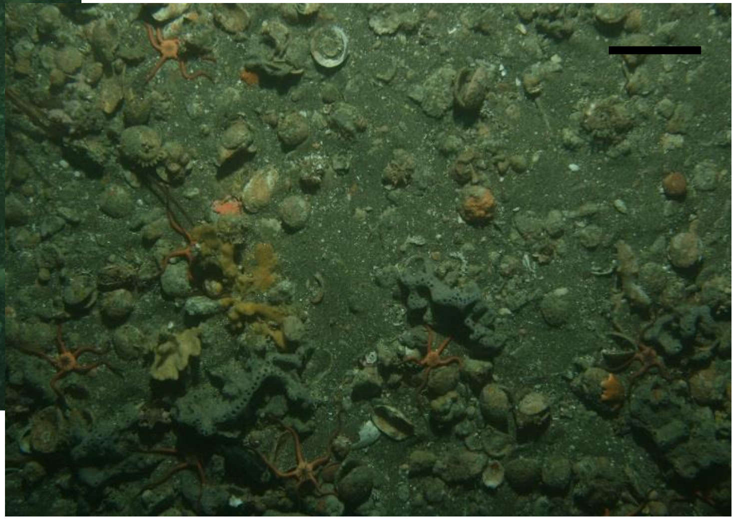
Seafloor depressions



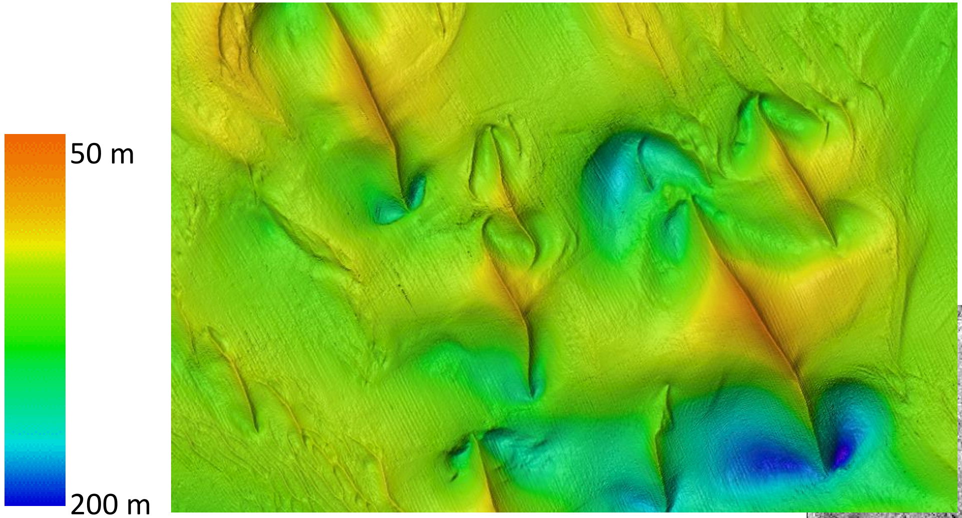


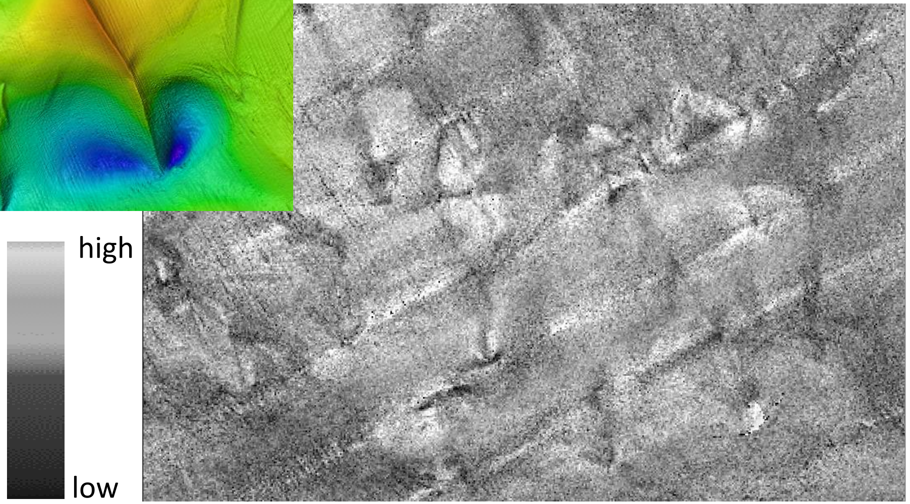


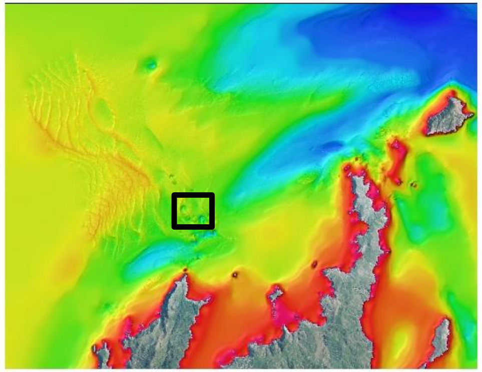


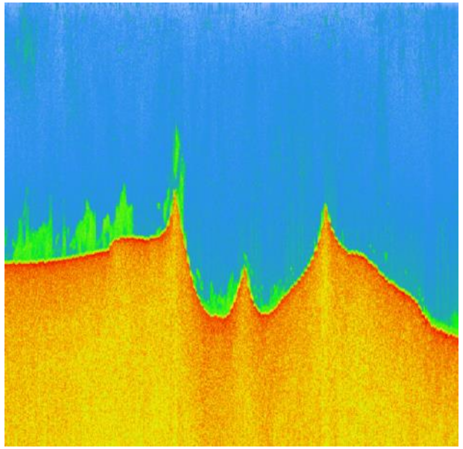


Strike Ridges

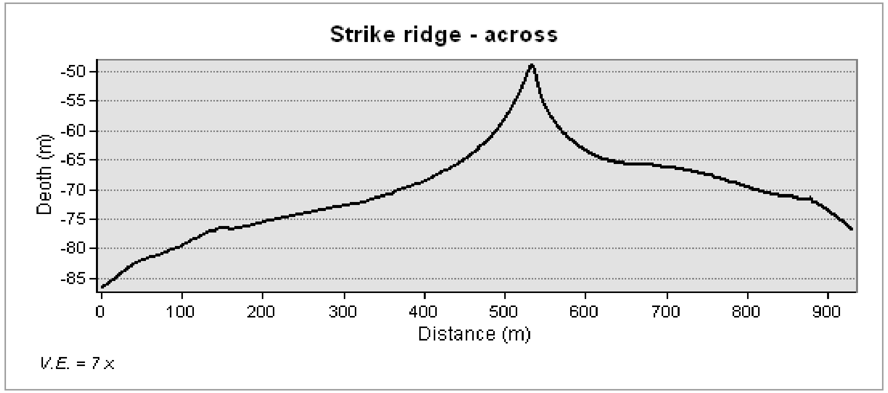


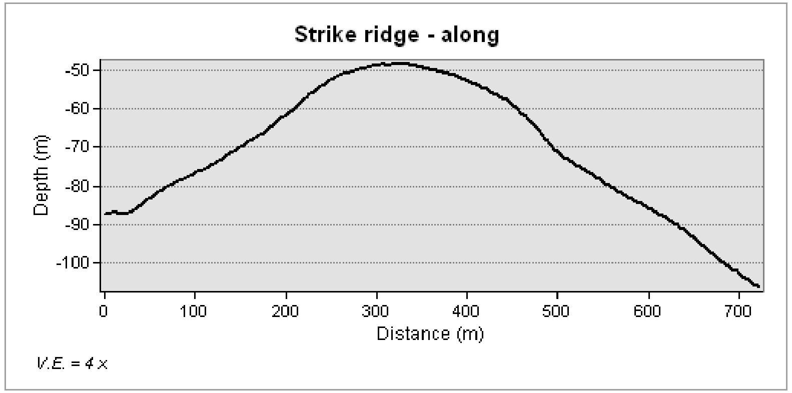


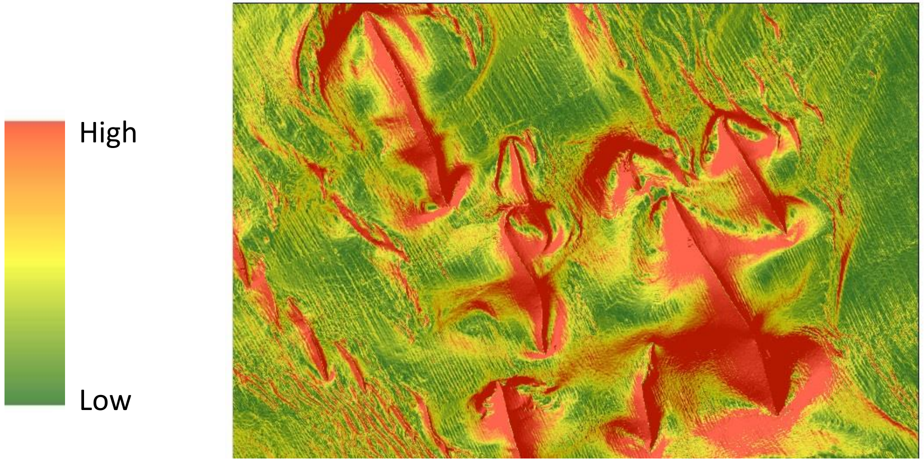


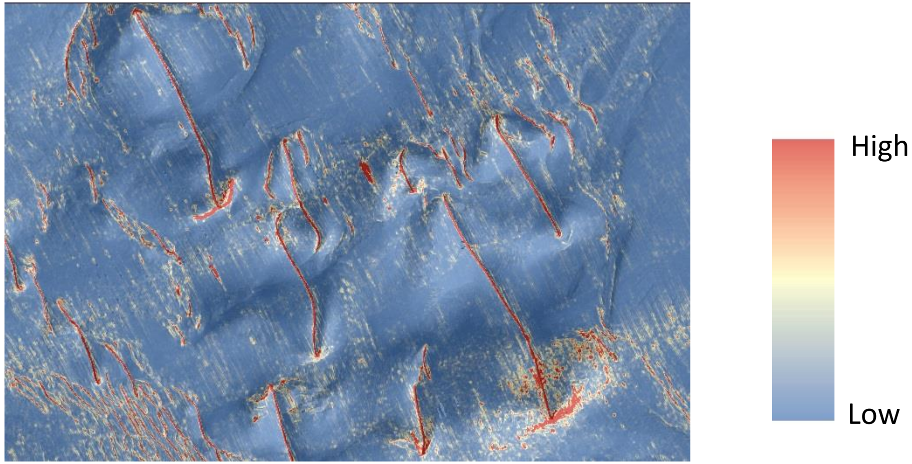


Strike Ridges

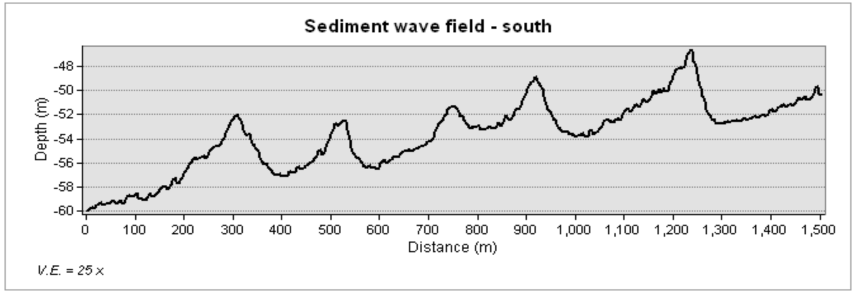


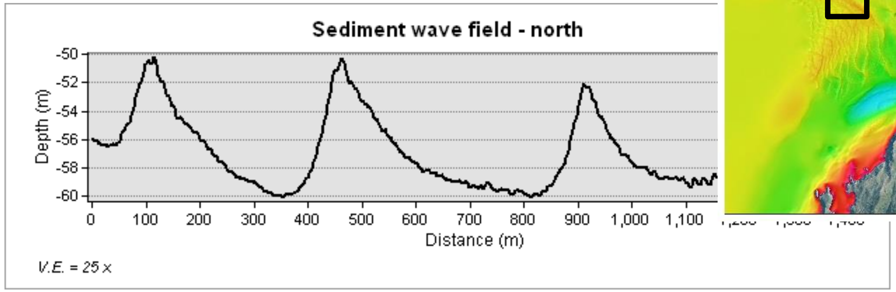


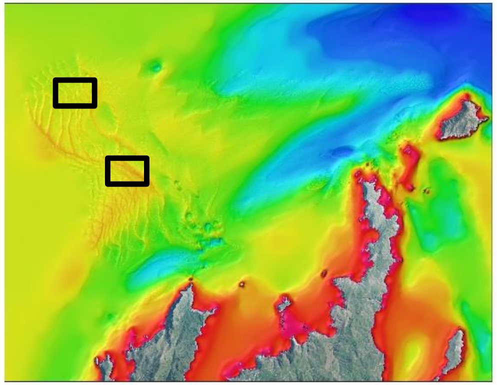


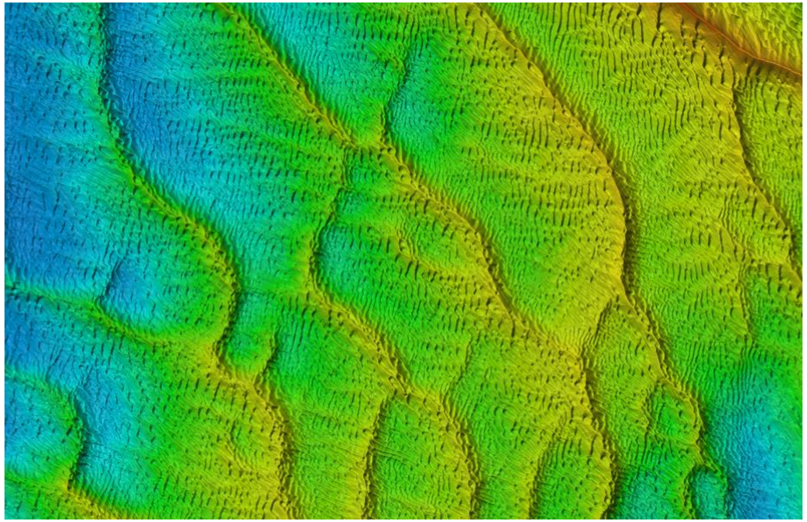


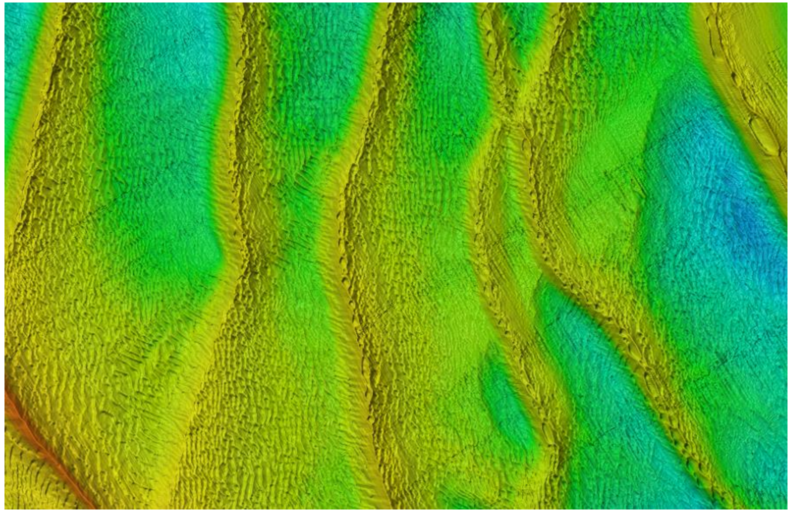
Sediment Waves

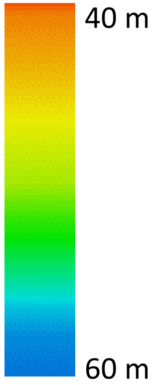




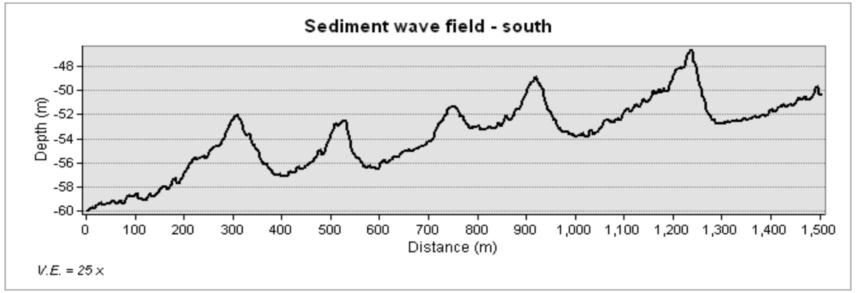


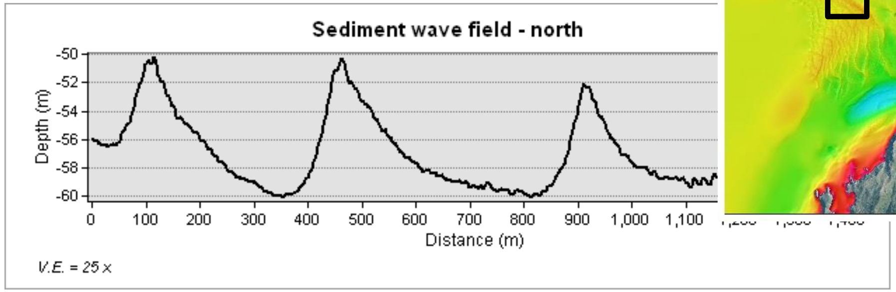


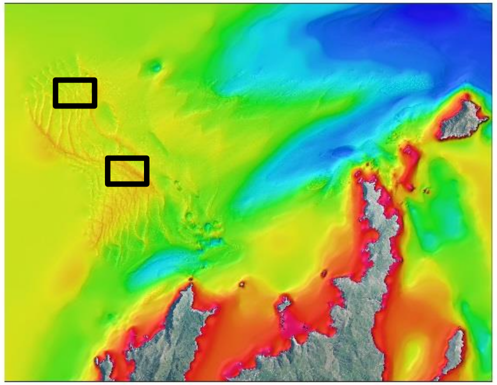


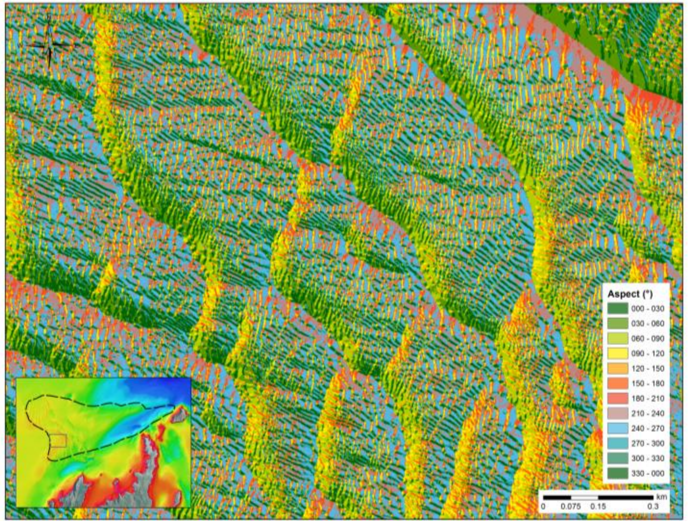


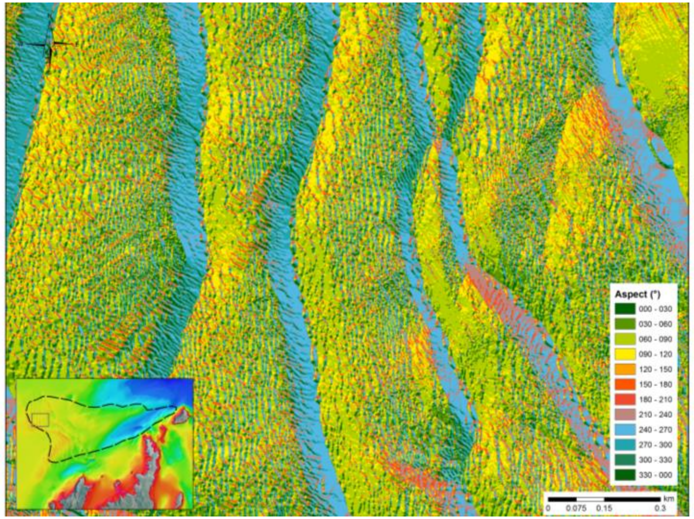
Sediment Waves



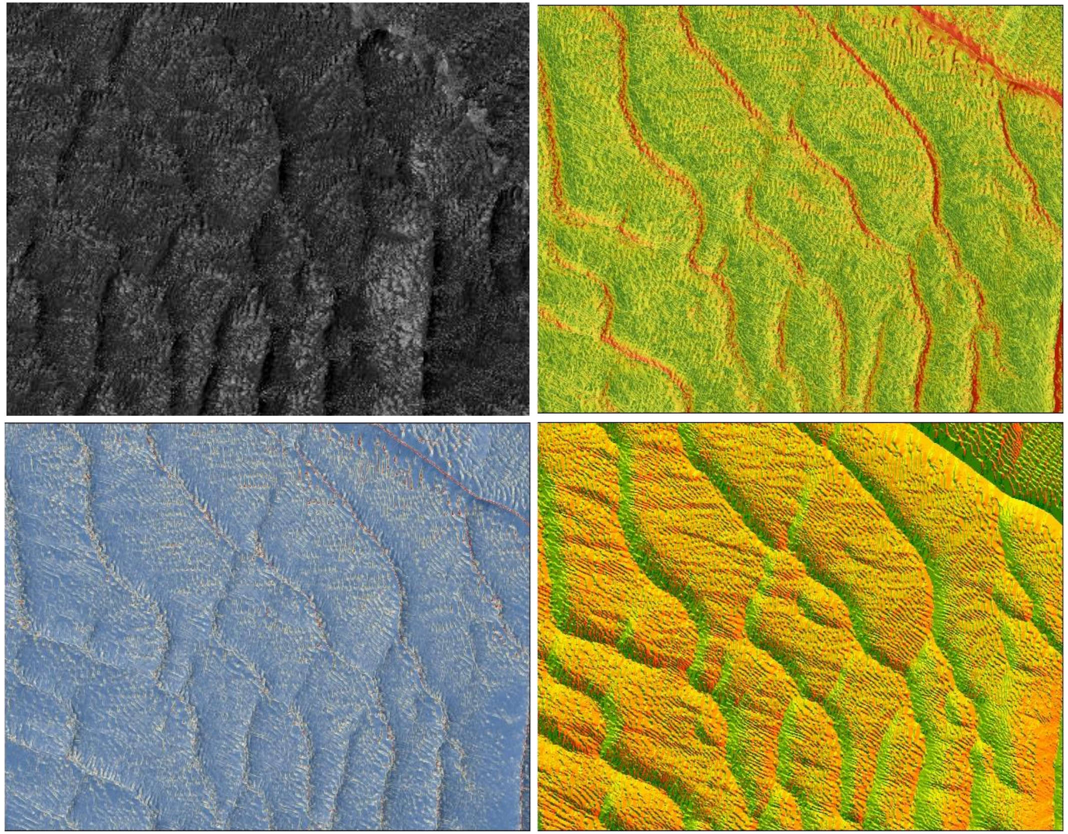


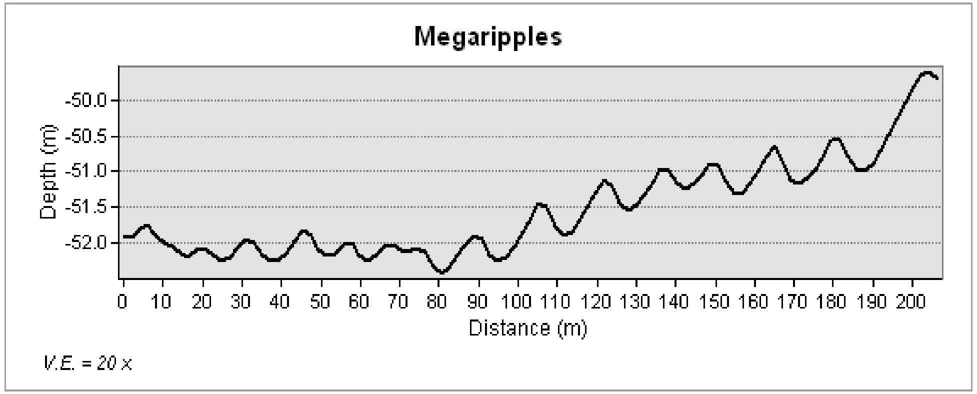


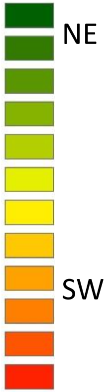


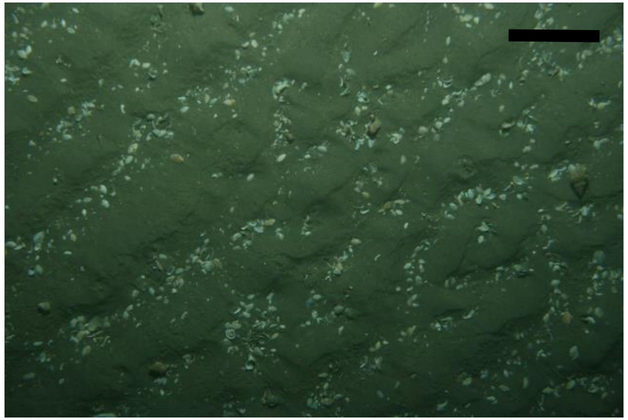


Sediment Ripples



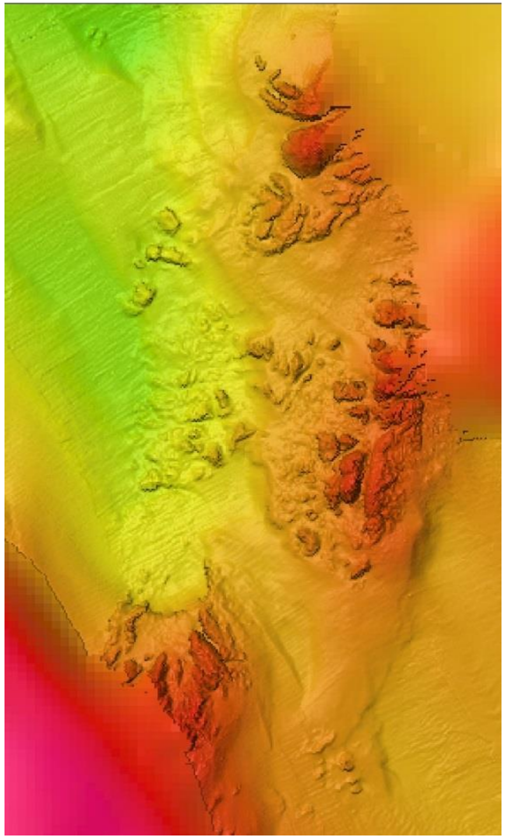


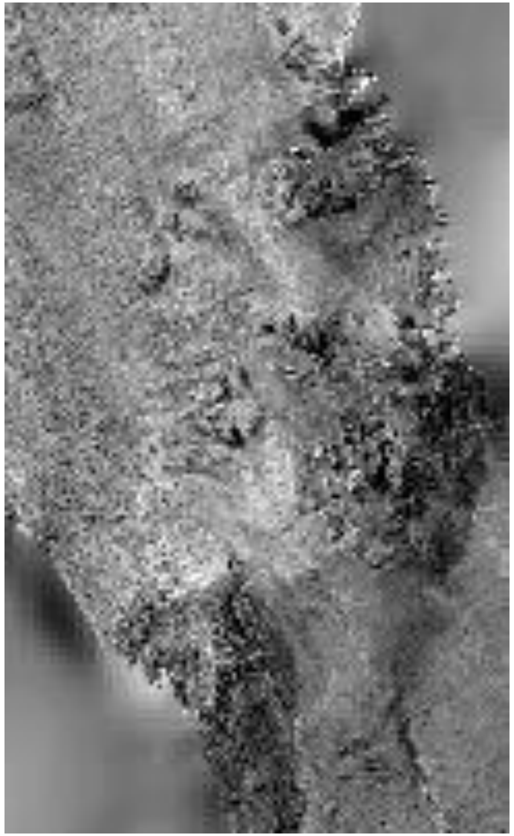


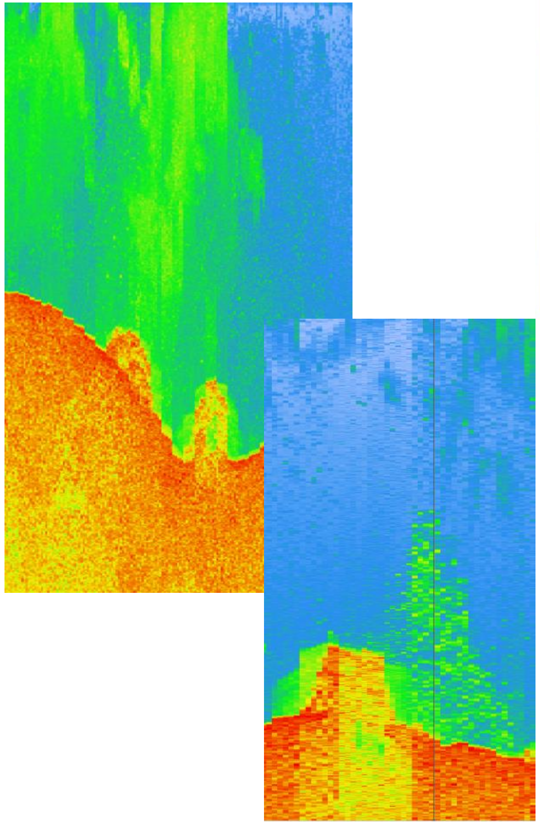


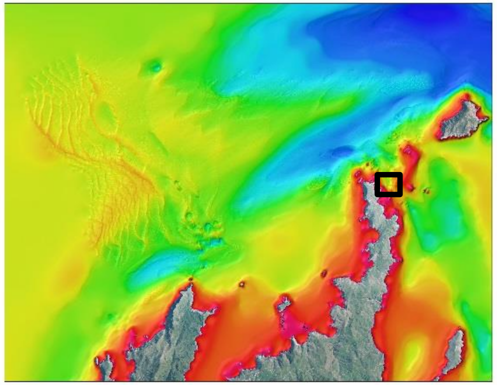
Images from Biogenic Habitats on the Continental Shelf project

Stephens Passage





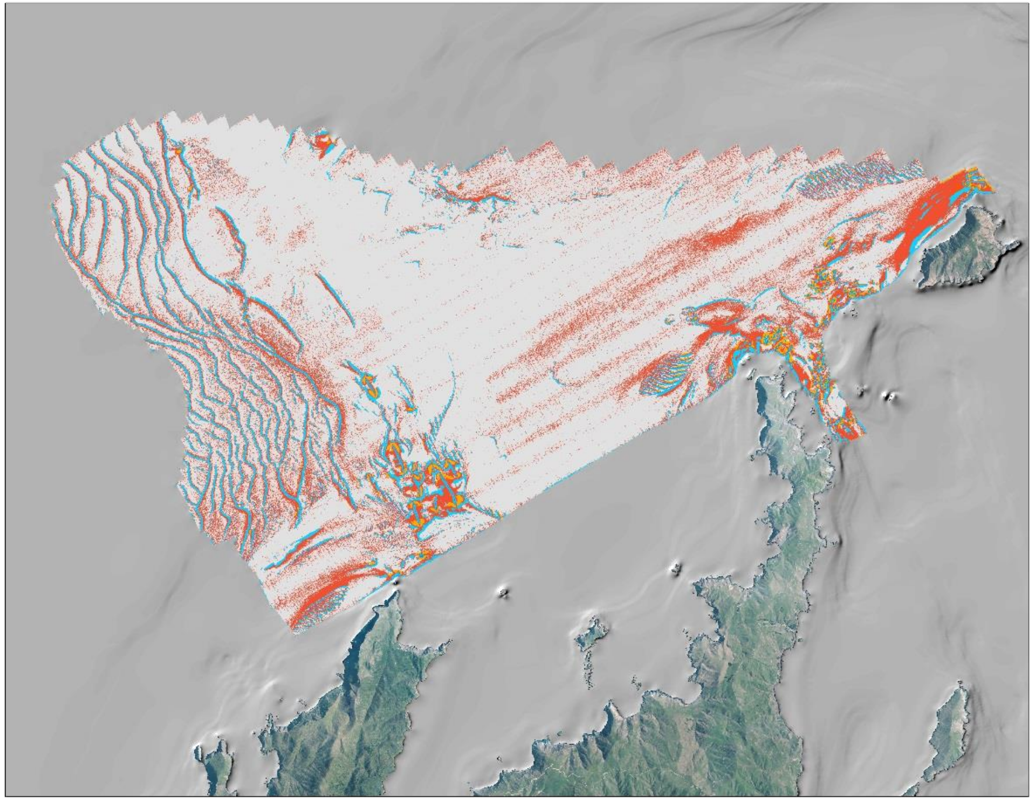


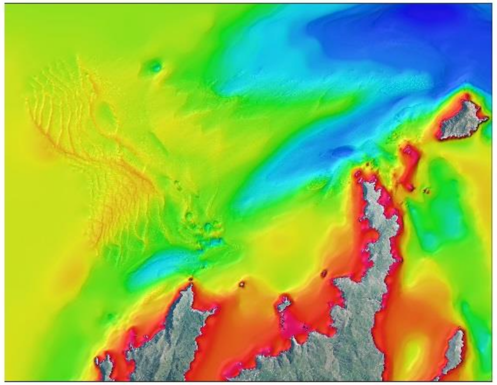


Images from Malcolm Francis

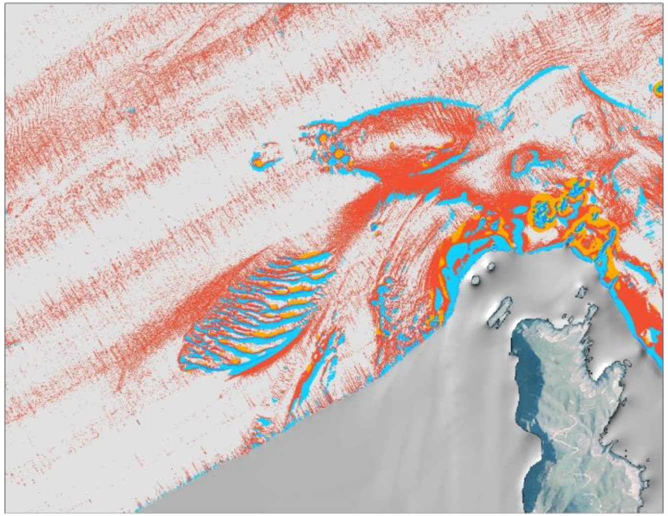
Benthic Terrain Model

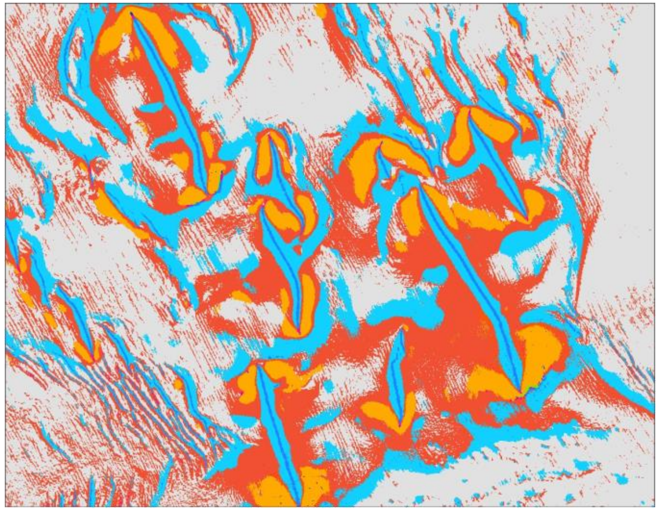
- Flat Plains
- Broad Slopes
- Steep Slopes
- Broad Depressions
- Lateral midslope depression
- Scarp, Cliff
- Depressions
- Crevices, Narrow Gullies over elevated terrain
- Flat Ridge Tops
- Rock Outcrop Highs, Narrow Ridges
- Local Ridges, Boulders, Pinnacles in Depressions
- Local Ridges, Boulders, Pinnacles on Broad Flats
- Local Ridges, Boulders, Pinnacles on Slopes
- Local Depressions, Current Scours

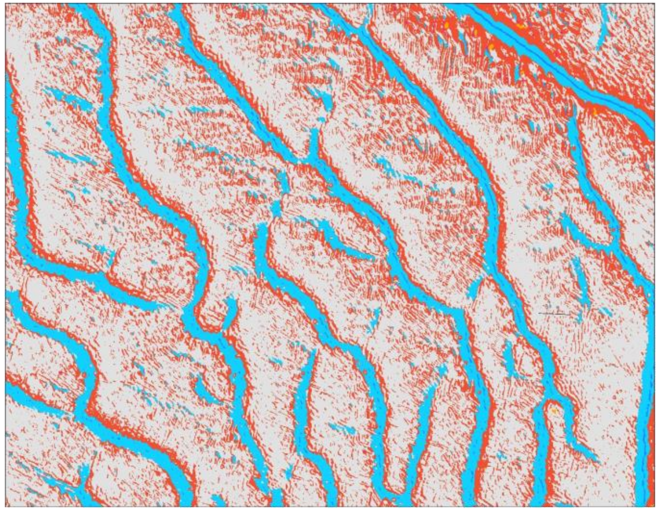




BTM – Seafloor depression, Strike Ridges & Sediment Waves







- Flat Plains
- Broad Slopes
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- Broad Depressions
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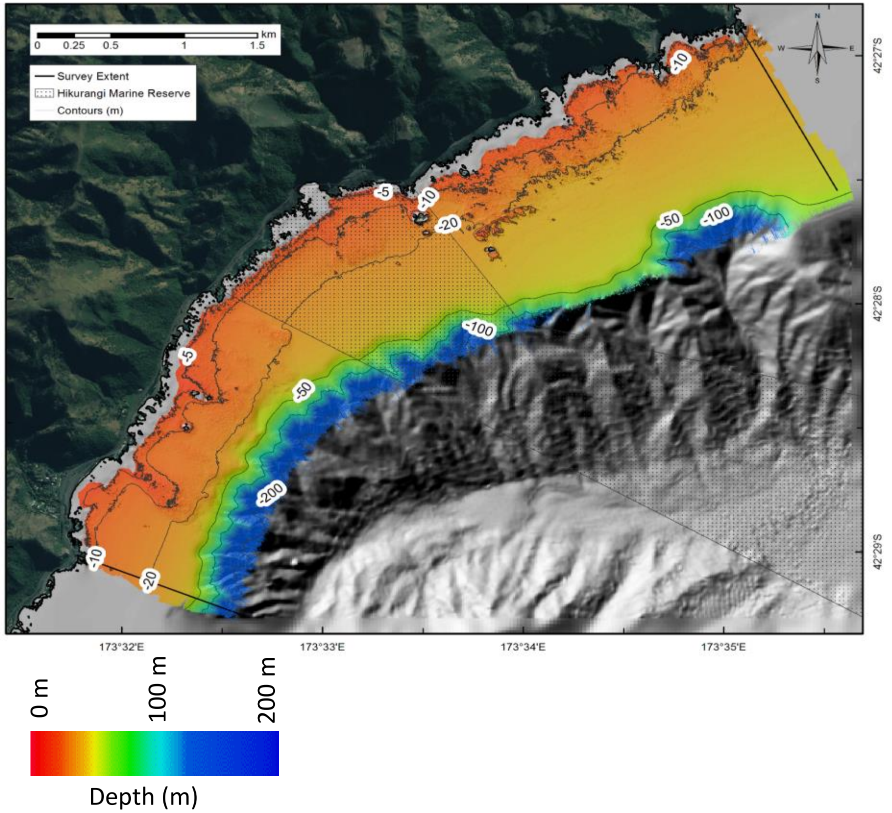
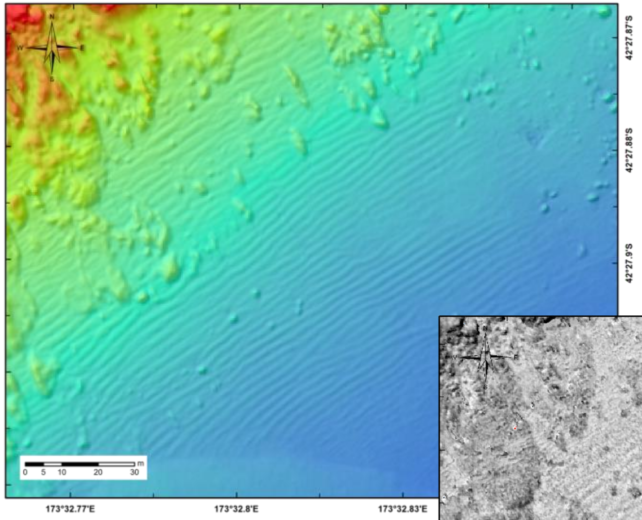
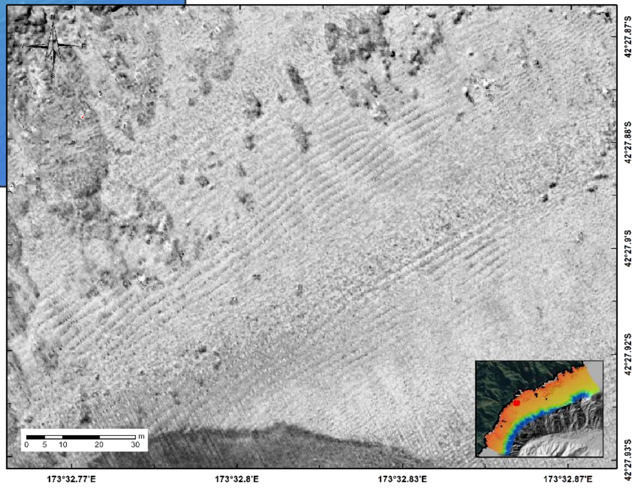
- Local Depressions, Current Scours
- Depressions
- Crevices, Narrow Gullies over elevated terrain

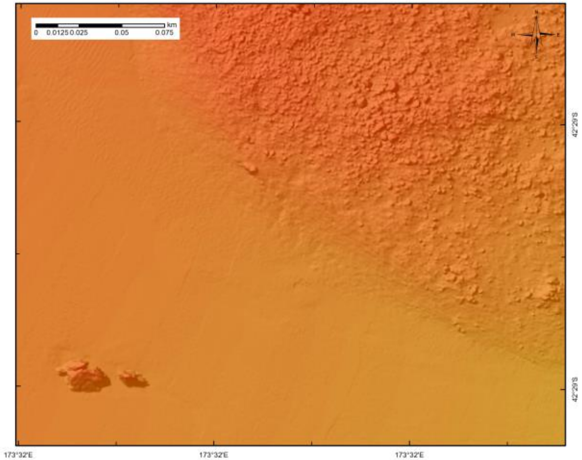
Hikurangi Survey

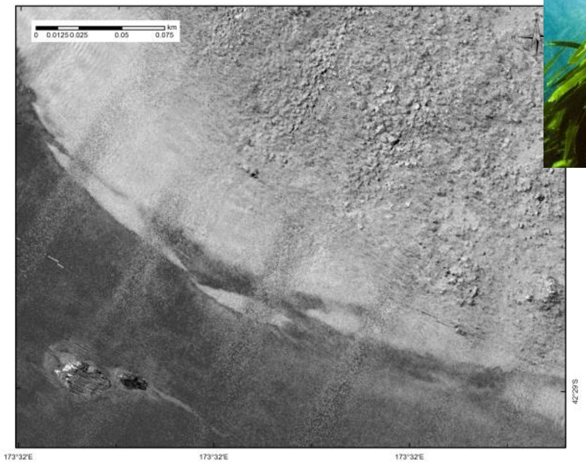


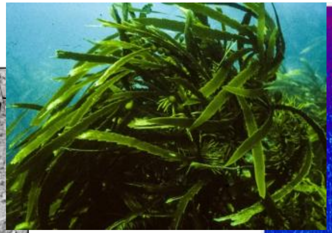


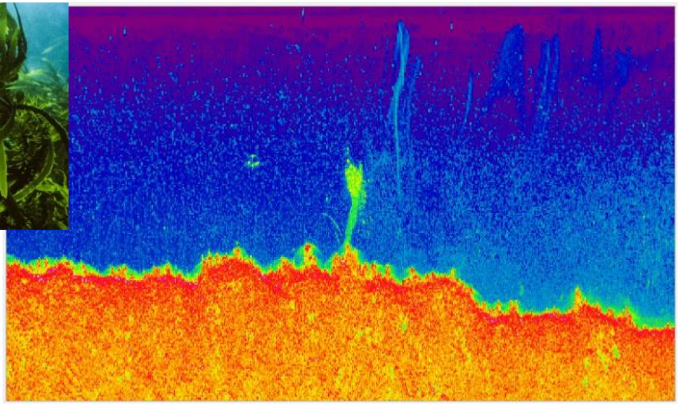


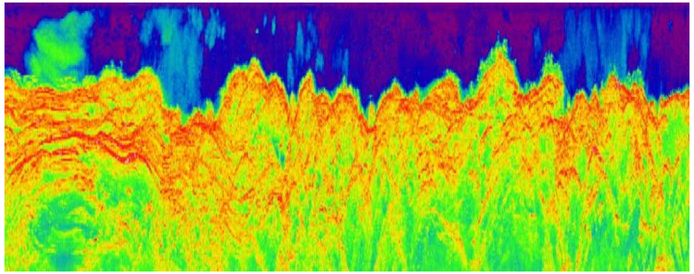
Hikurangi Survey

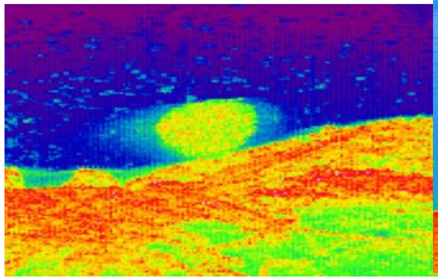


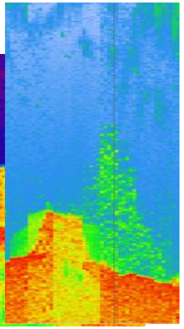


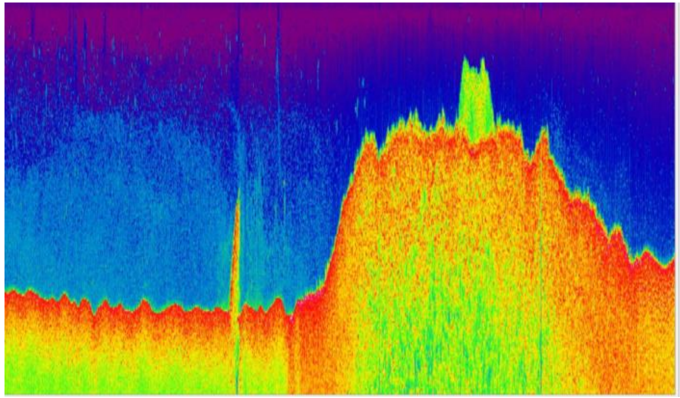




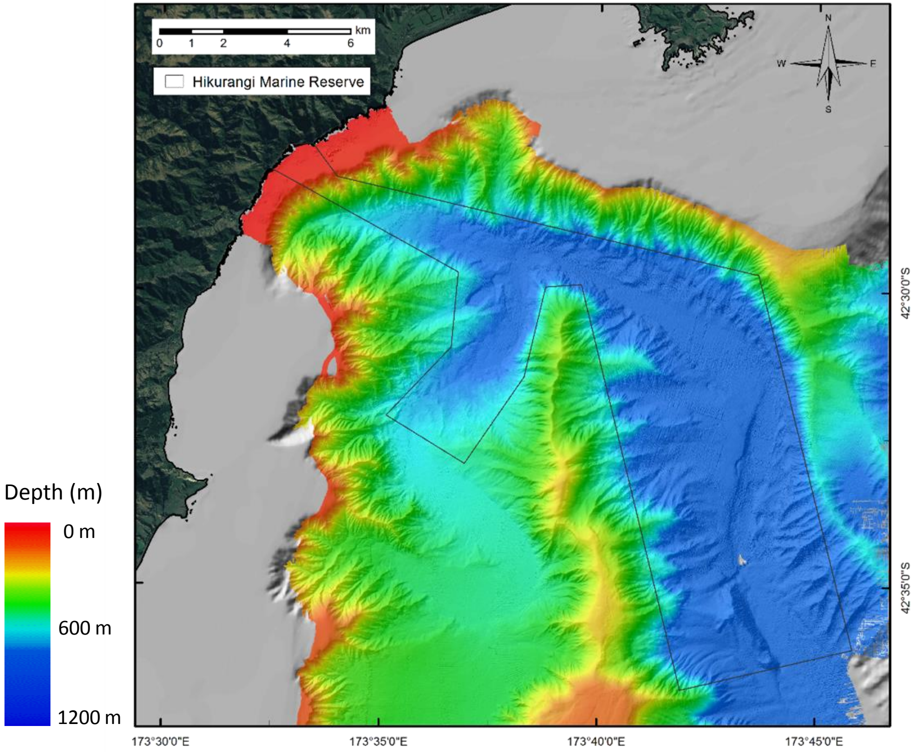


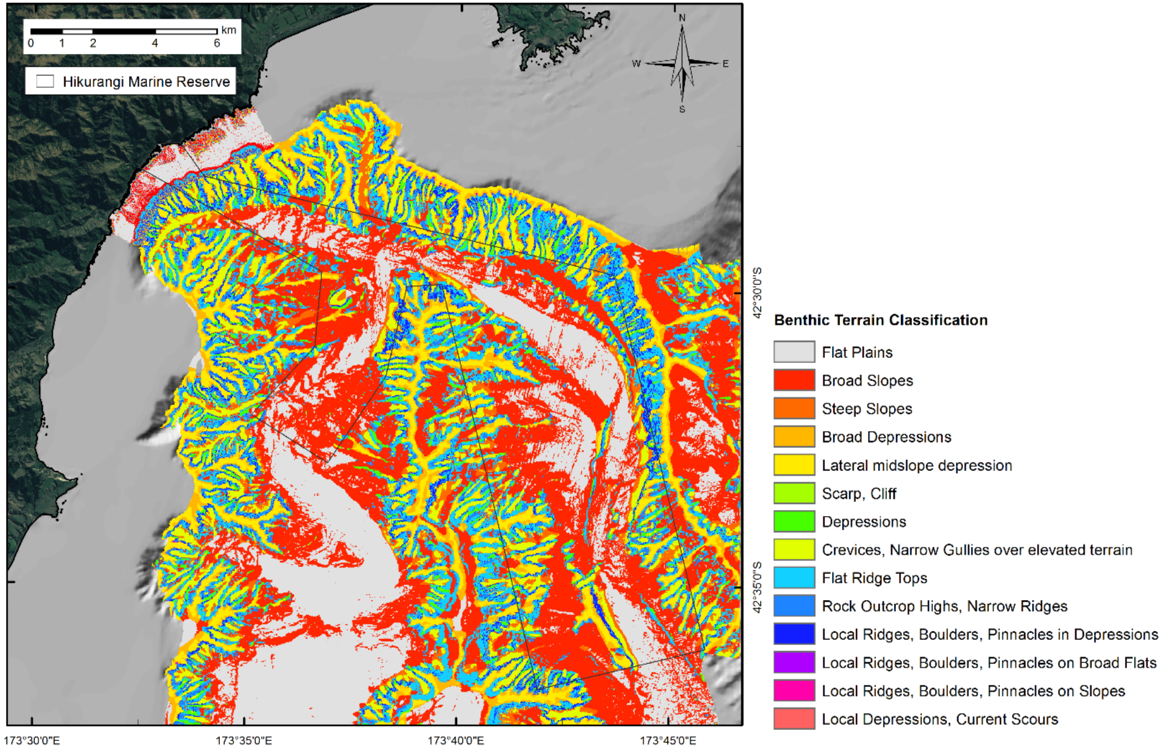






Hikurangi Survey





Summary

- A mapping initiatives using both NIWA's shallow-water and deep-water, high-resolution multibeam echo-sounders have been undertaken to map the seafloor bathymetry and identify habitat types.
- Bathymetry, backscatter, water column data and derivatives of bathymetry (benthic terrain models) can be interpreted together to describe a variety of geomorphic features and classify the seafloor into mappable zones with distinct environmental conditions.
- NIWA has produced a range of digital and charting products that can be used to define habitat types, aid habitat demarcation, and inform future sampling around New Zealand.
- The approach used herein can help endusers to better characterise marine areas and plan for the preservation of indigenous biodiversity.
- Identifying and characterising important habitats for biodiversity will improve ongoing monitoring of the state of the coastal and marine environment.

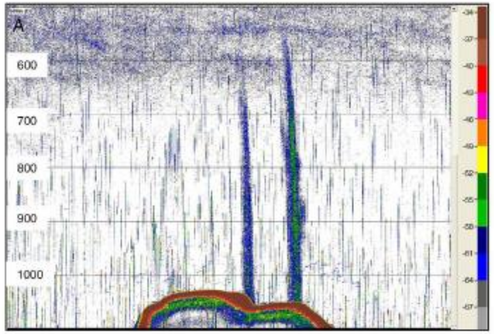
Acknowledgements

The D'Urville survey was co-funded by MDC, NIWA Core Funding ('Marine Physical processes and Resources' programme, Coasts and Oceans Centre) and an MBIE Envirolink Grant ('Mapping reefs using MBES to identify habitats for marine biodiversity').

The Hikurangi suvey was funded by New Zealand Department of Conservation. Legacy multibeam data (TAN0616 & TAN1111) used in the Hikurangi survey were sourced from NIWA data catalogue and were originally collected during voyages funded by New Zealand Foundation for Research, Science and Technology and Oceans Survey 20/20 RV Tangaroa days funded by Land Information New Zealand.

Legacy data sourced form NIWA data catalogue

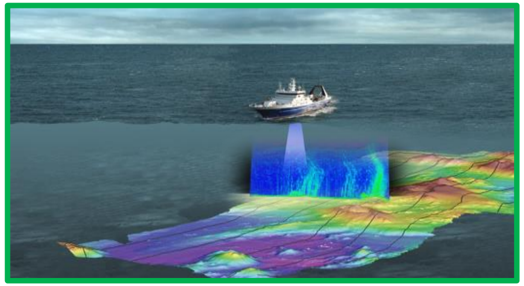
Imaging fluid seeps using water-column backscatter data

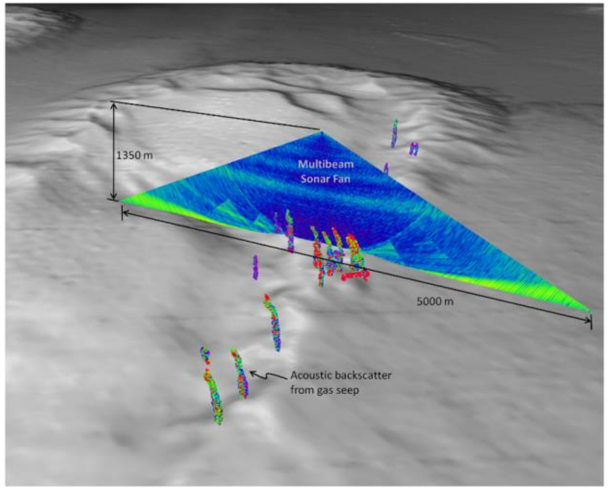


Law et al 2010

Single beam echo sounders:
Limited spatial coverage
Serendipitous

Imagery: Local details

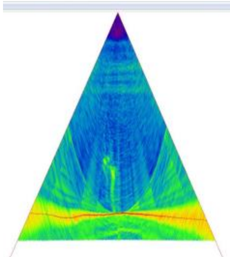
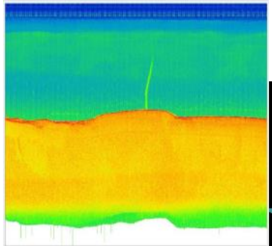
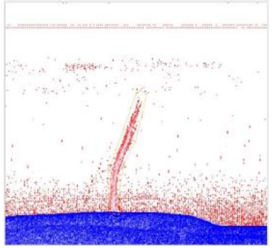
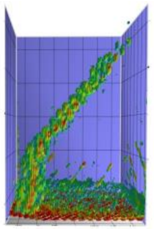
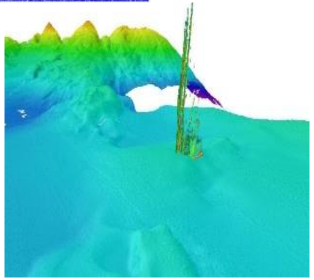
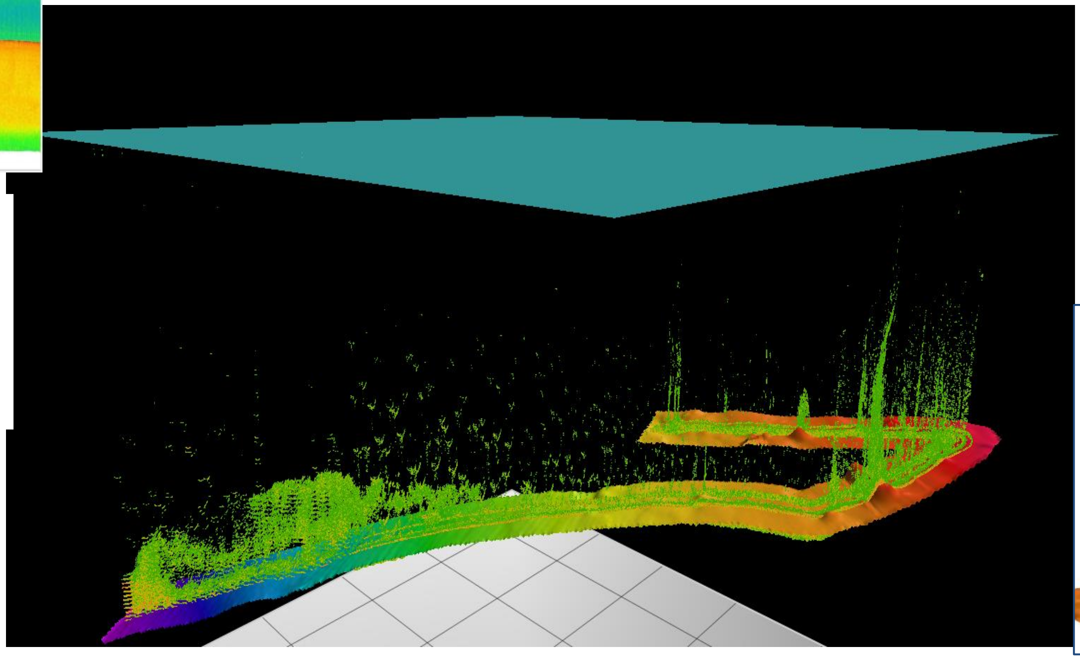
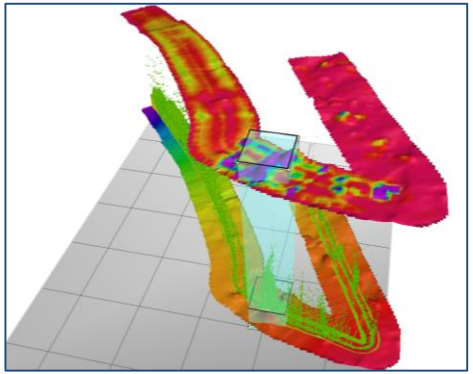
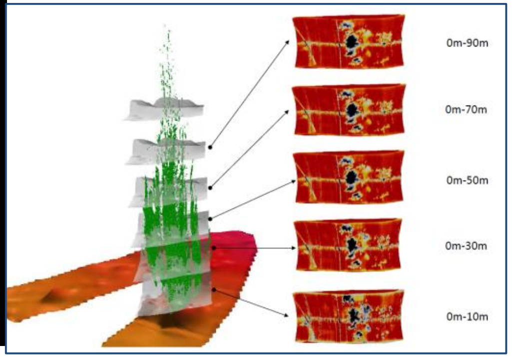




noaa.gov

Multibeam echo sounders:
Broad spatial coverage
Complete seafloor bathymetry
Full imaging of flares

Water column database

RV Ikatere

- 14m inshore survey catamaran
- EM2040 installed on Ikatere
- Retractable pole mount
- Diver fitted to Tangaroa

NIWA Kongsberg EM2040

- 2040-04 Single TX/RX System
- 0.4° TX   0.7° RX
- Frequency range of 200, 300 & 400 kHz
- 300 kHz used for normal survey operation
- Dual swath giving 800 soundings per ping
- Water column data recording