

What we do in the shallows:

Natural and anthropogenic seafloor geomorphologies in a drowned river valley, New Zealand

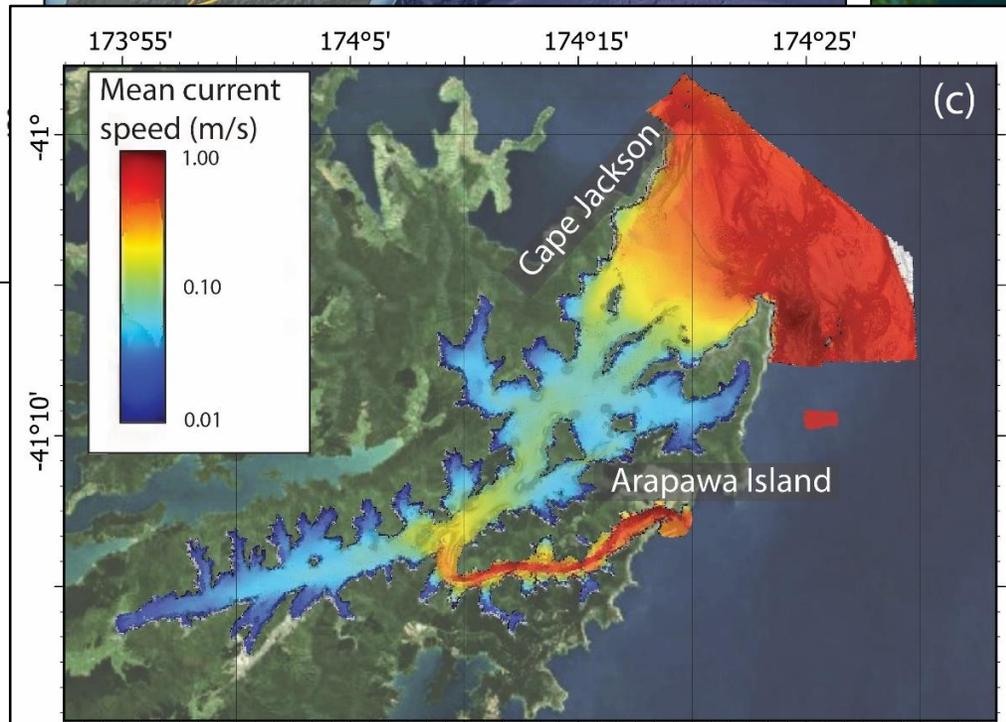
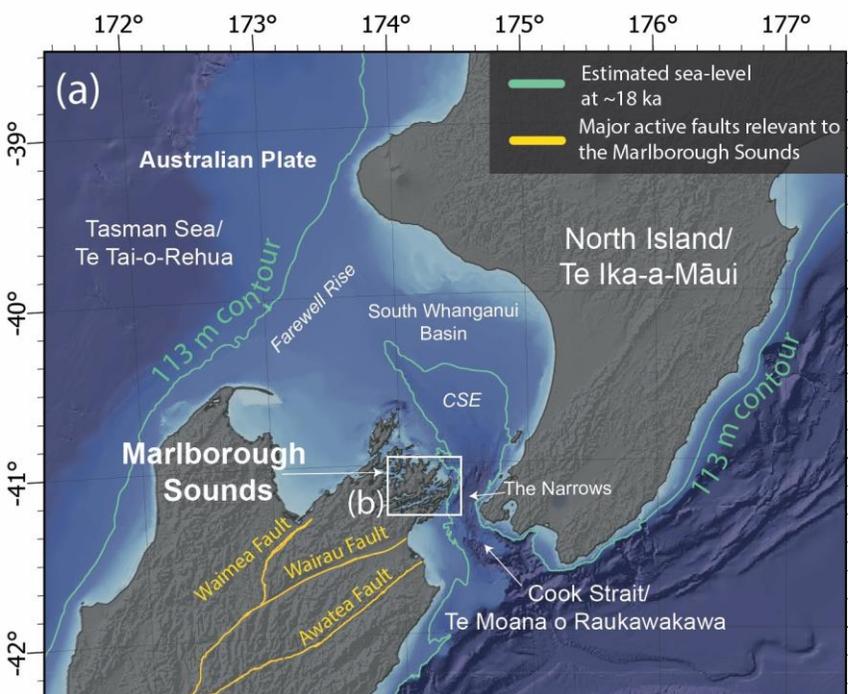
Sally J. Watson*, Helen Neil, Marta Ribó, Geoffroy Lamarche, Lorna Strachan, Kevin Mackay, Steve Wilcox, Tim Kane, Alan Orpin, Scott Nodder, Arne Pallentin, and Tilmann Steinmetz

Frontiers in Marine Science-Coastal Ocean Processes.

DOI: 10.3389/fmars.2020.579626

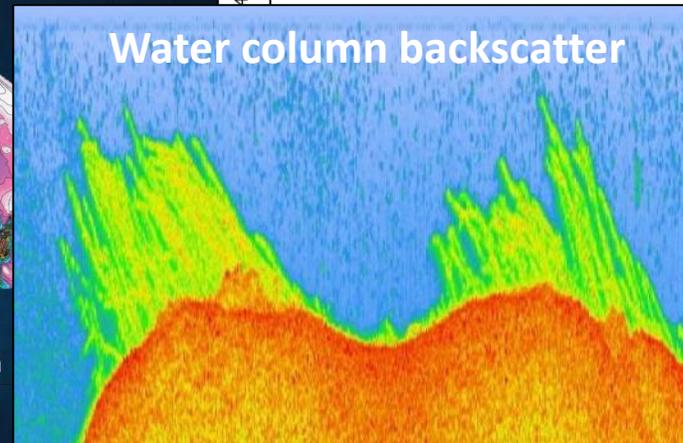
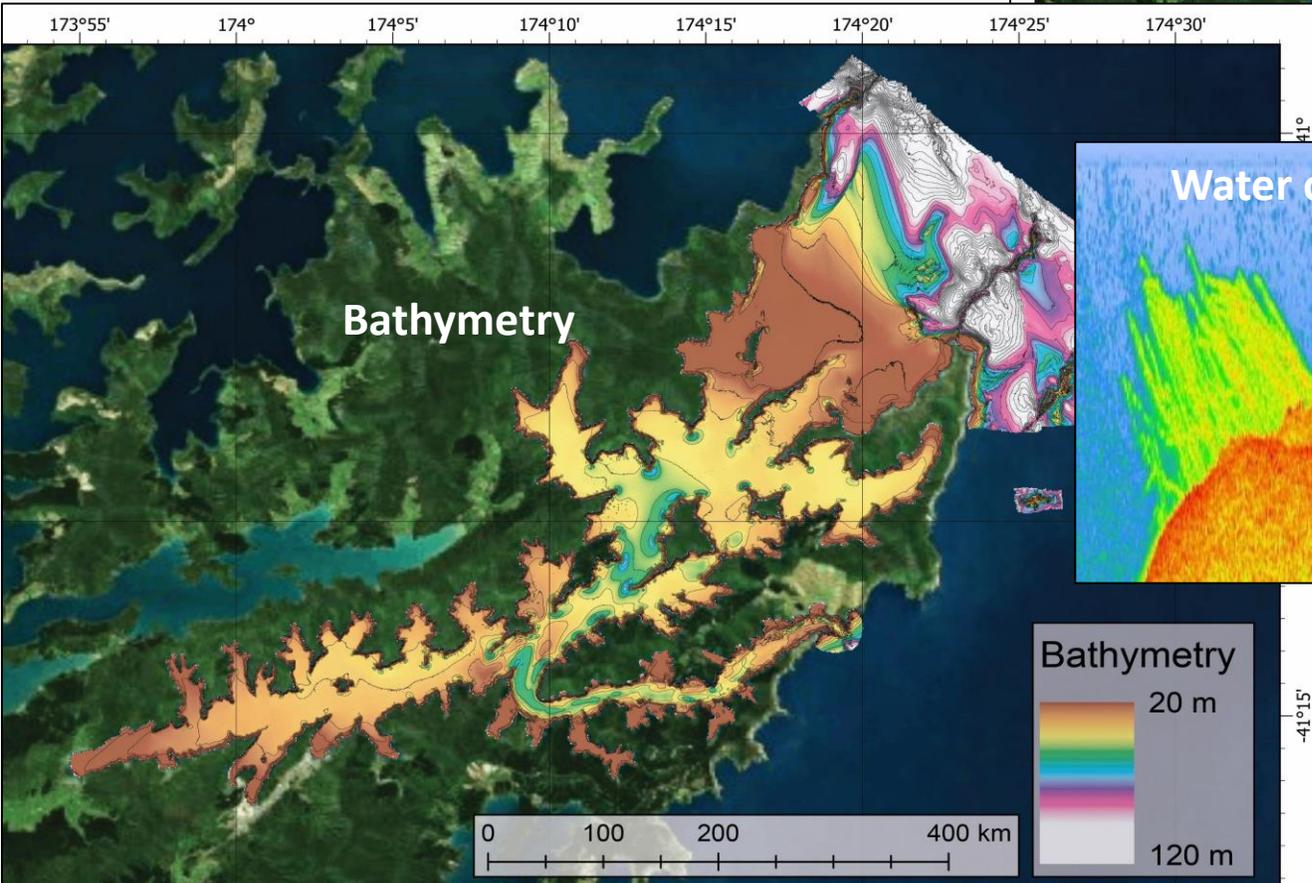
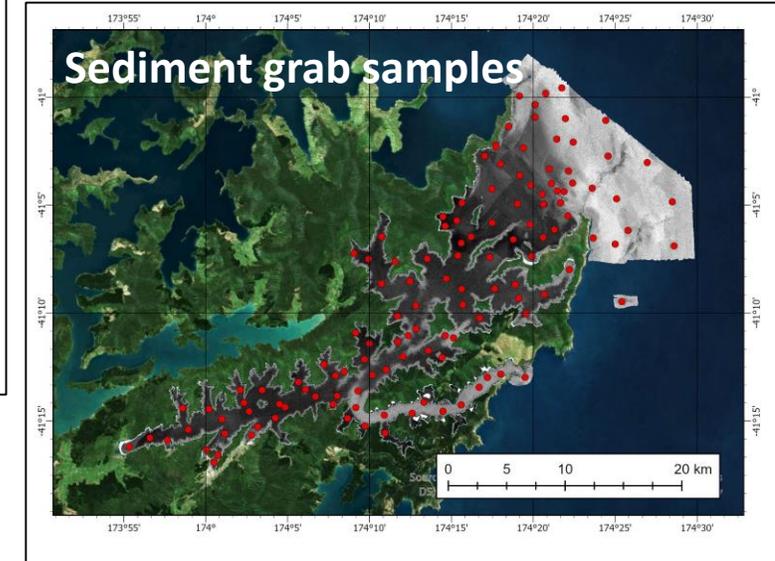
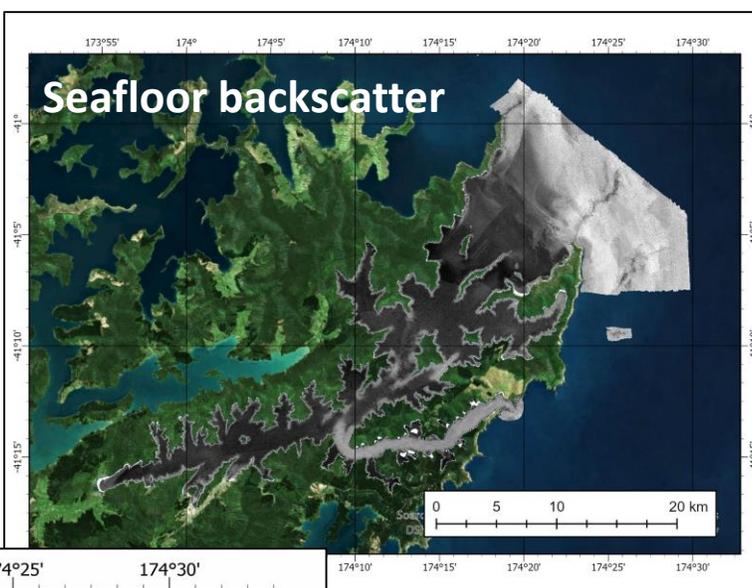
*sally.watson@niwa.co.nz

Queen Charlotte Sound and Tory Channel



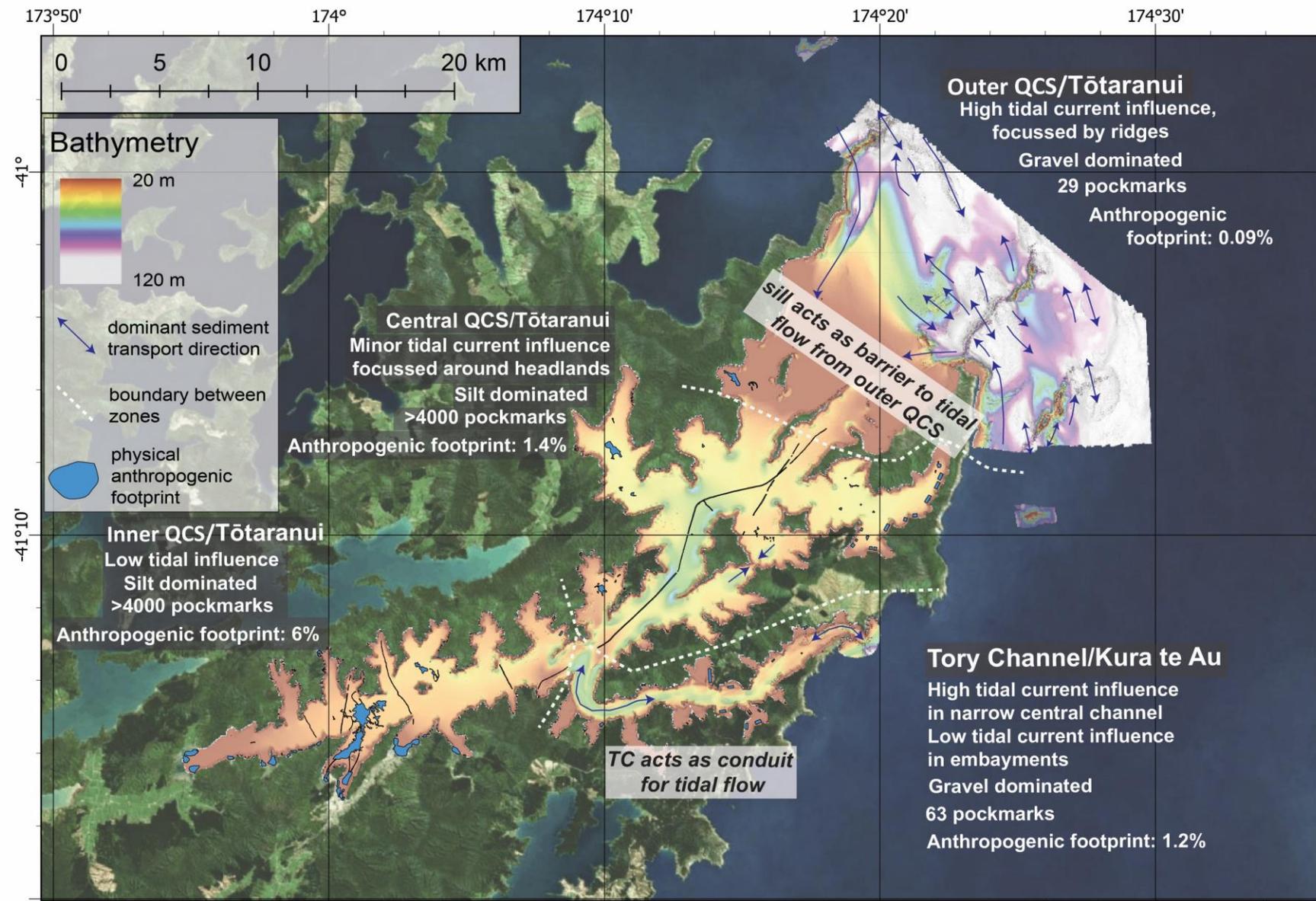
The HS51 project

Aim: To map and characterise seabed features and biological habitats within the entire HS51 area from the land-water interface to ~350 m water depth, derived from MBES bathymetry, seafloor and water column backscatter, geologic samples and video footage.

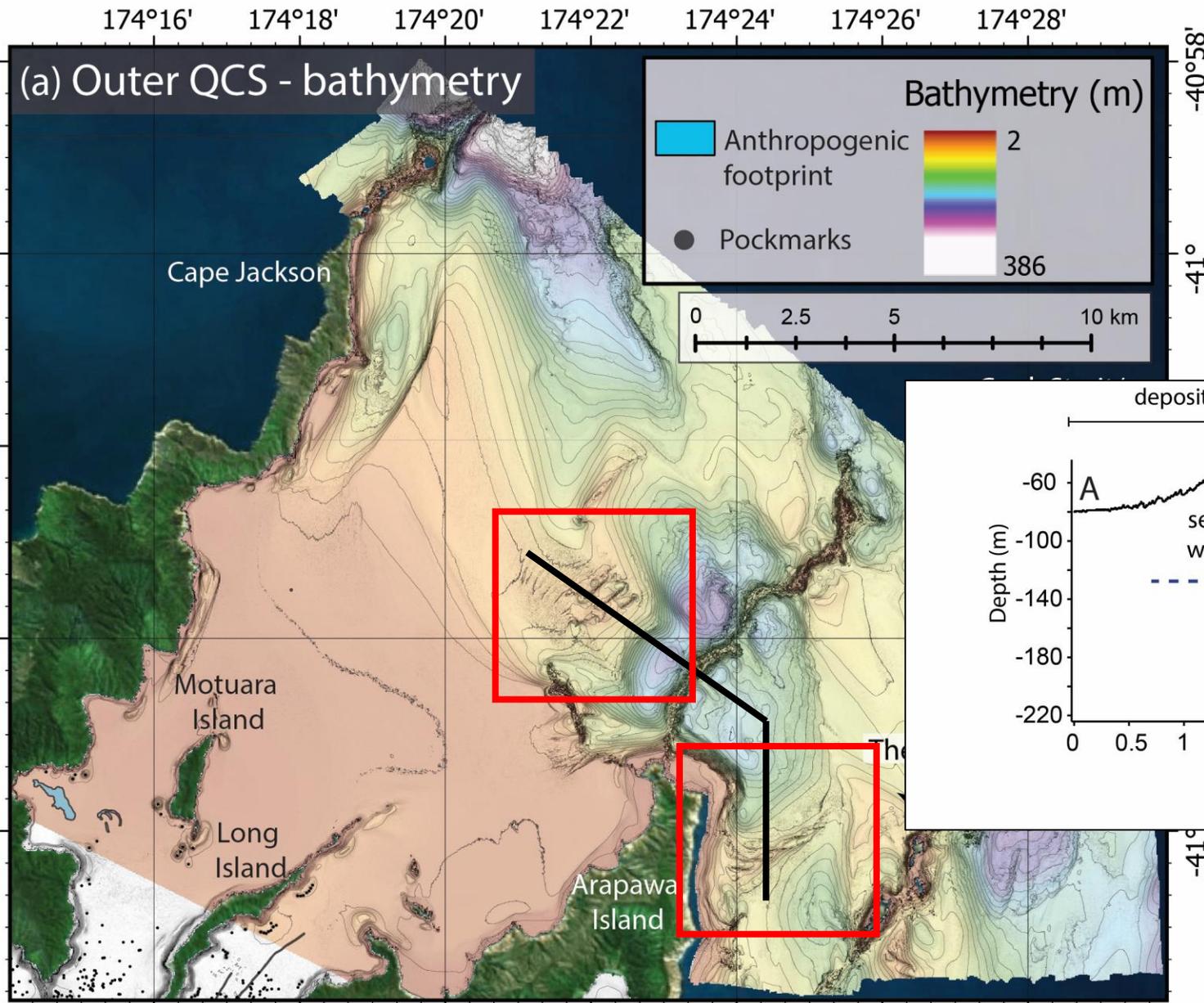


Seafloor geomorphology highlights from HS51 data

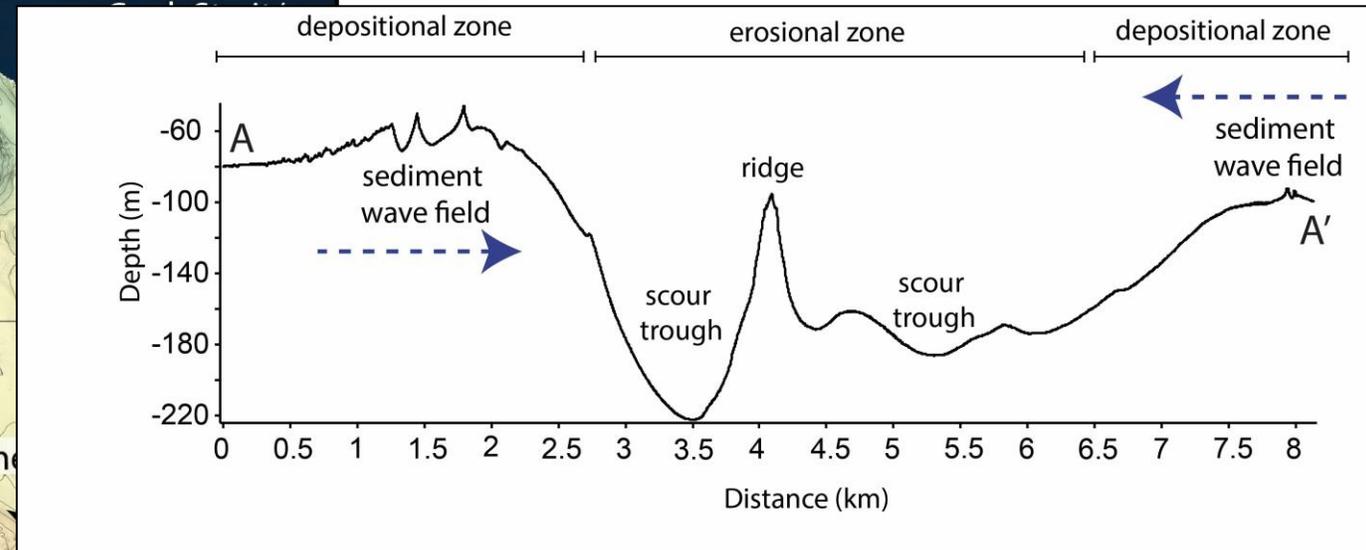
- Spatial patterns of natural and anthropogenic seafloor geomorphologies that vary from the inner, central and outer sound
- **Erosional and depositional sedimentary bedforms** related to tidal currents and coastal geometry
- Evidence for fluid seepage in **>8500 pockmarks**
- **Cumulative anthropogenic footprint covers 6.4 km²**, unevenly distributed throughout the sounds



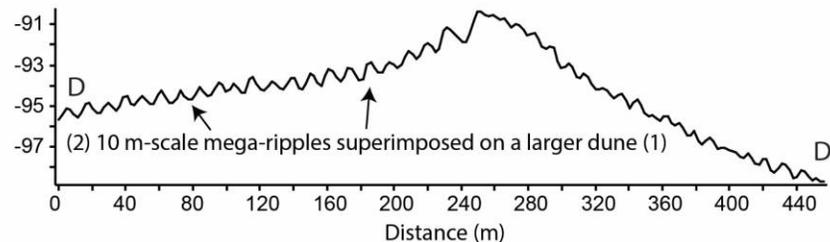
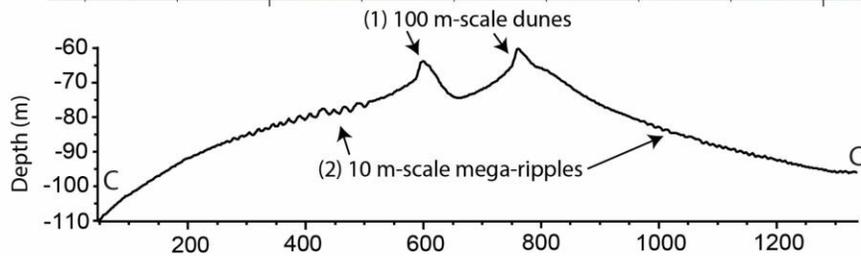
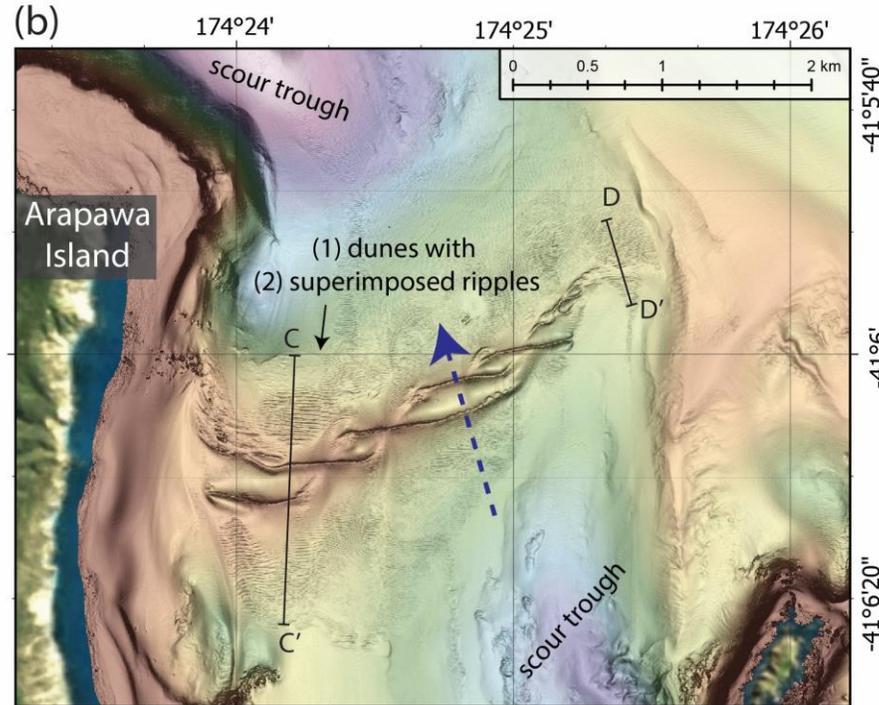
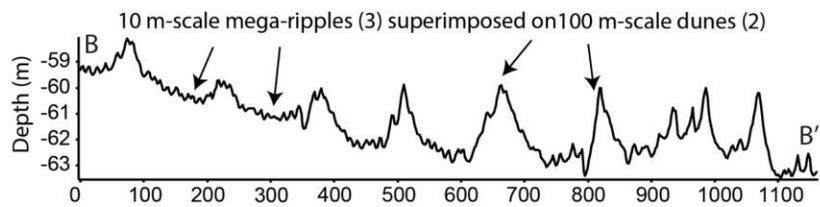
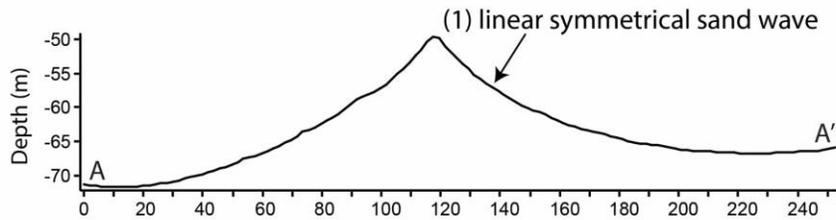
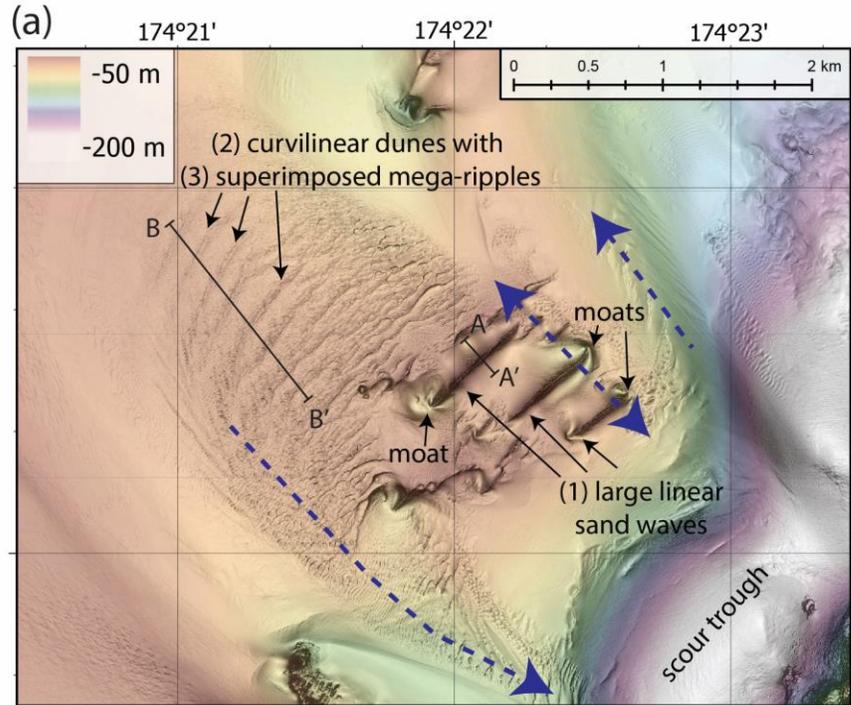
Erosional and depositional bedforms



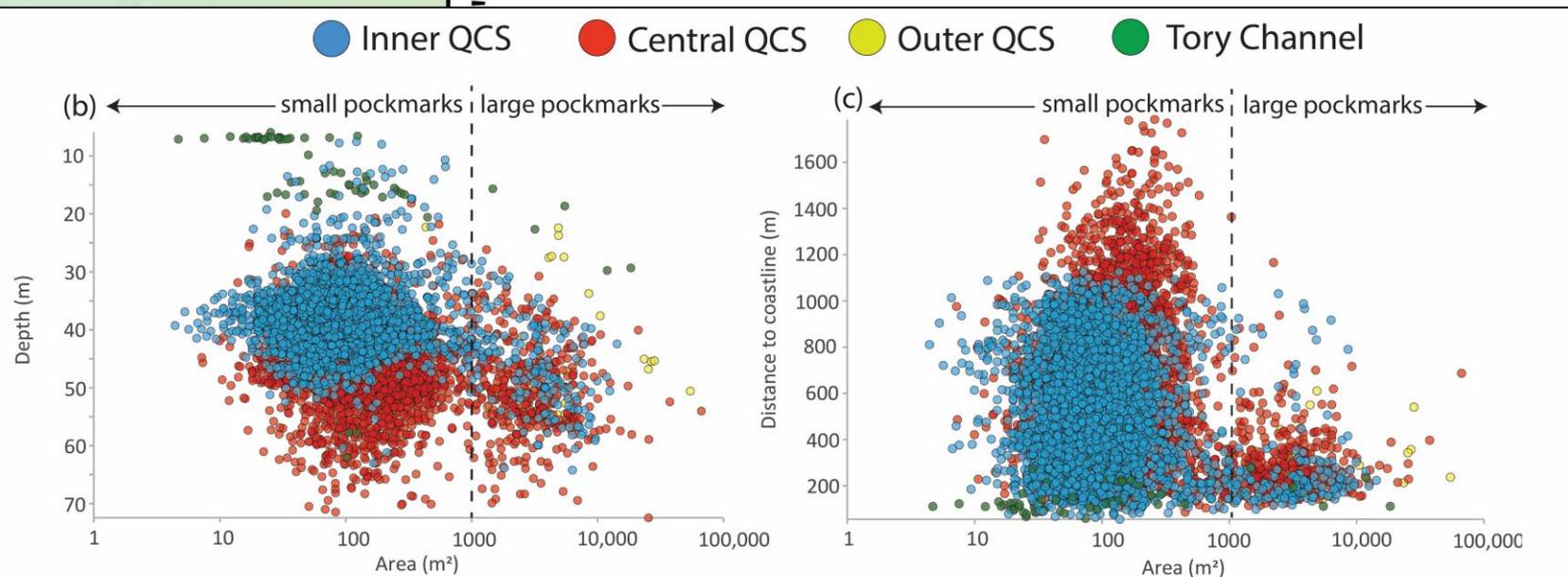
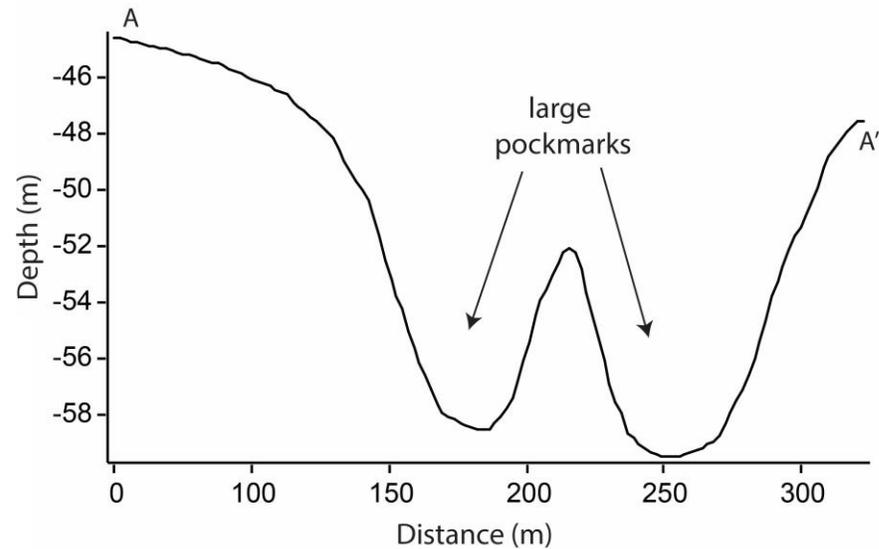
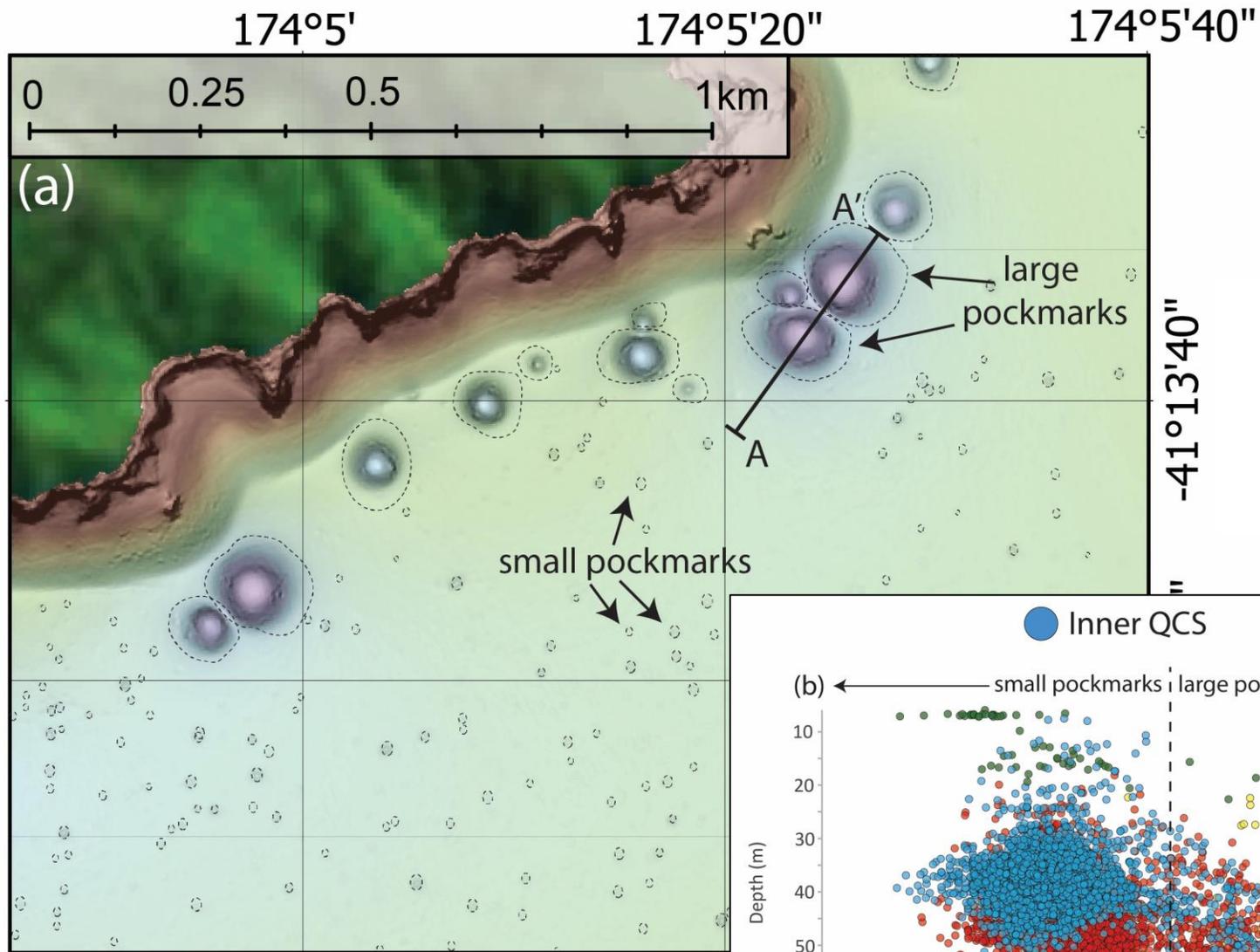
The spatial distribution of erosional features related to tidal currents is strongly determined by the **shoreline geometry**: erosion is concentrated around headlands, bathymetric barriers and through narrow passages.



The range of sedimentary bedform sizes, grainsizes and morphologies indicate formation under multi-directional flows that vary across a spatial and temporal scales.



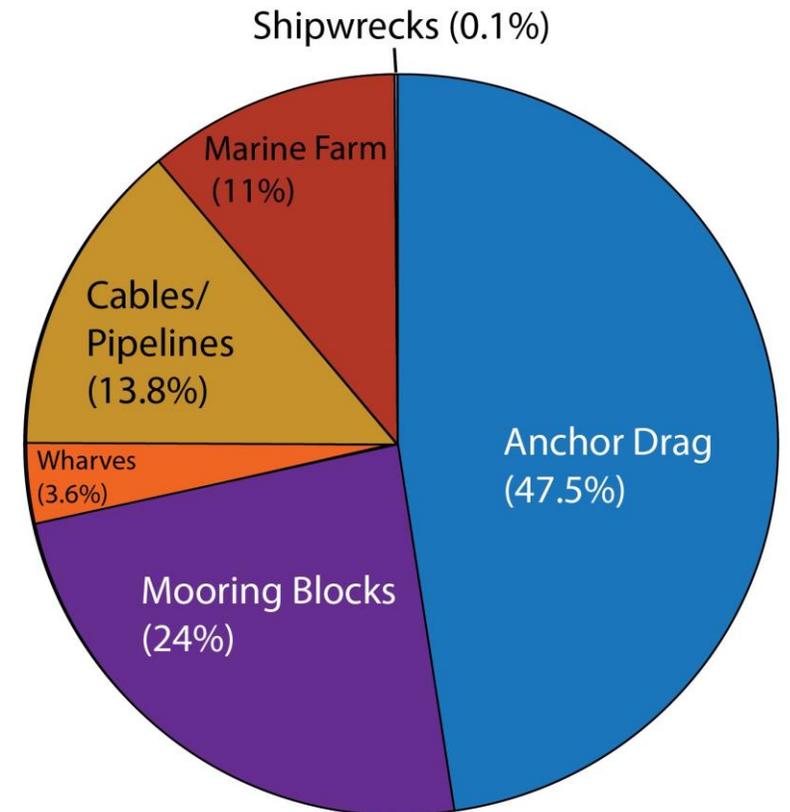
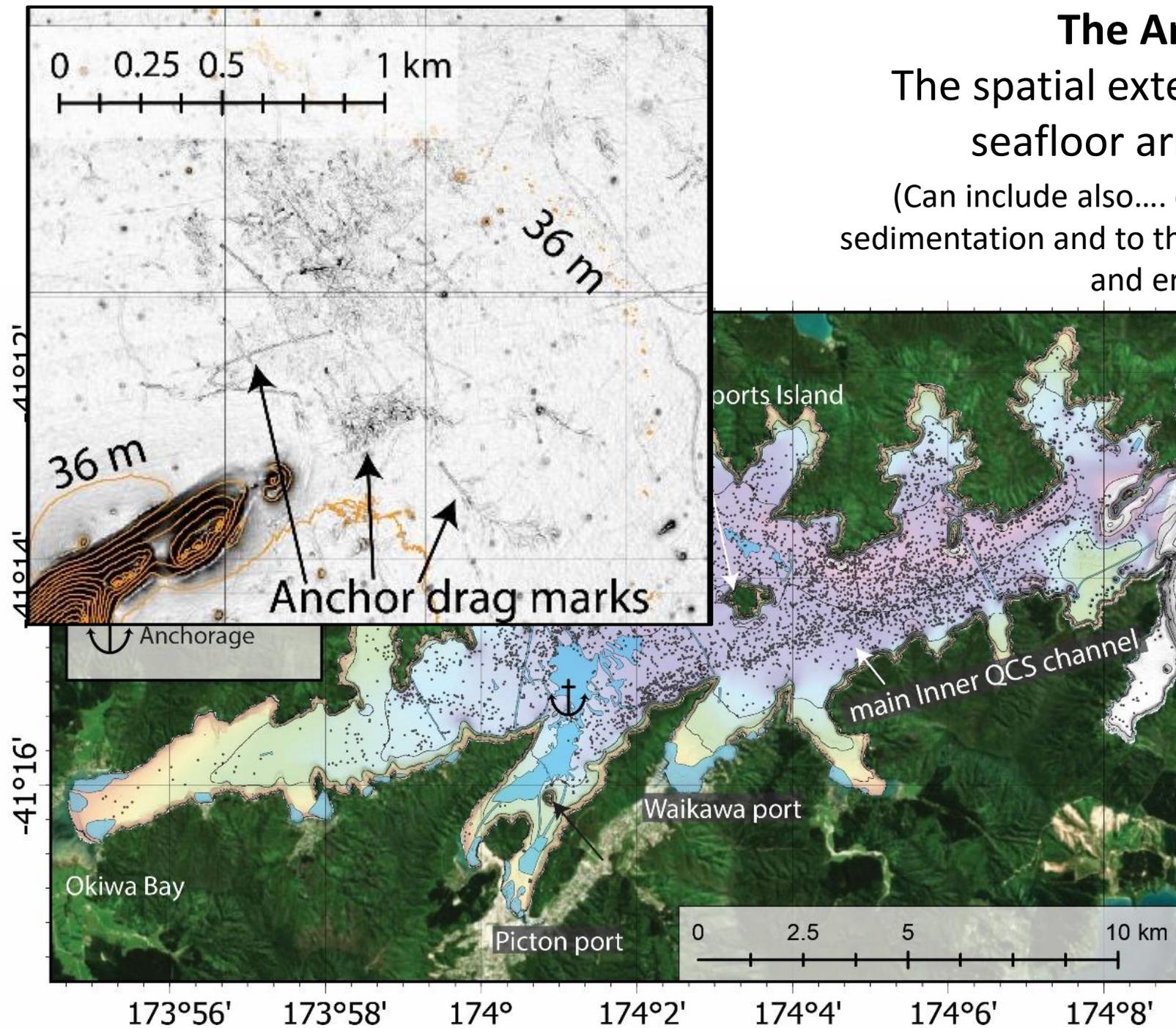
Pockmarks



The Anthropogenic Footprint:

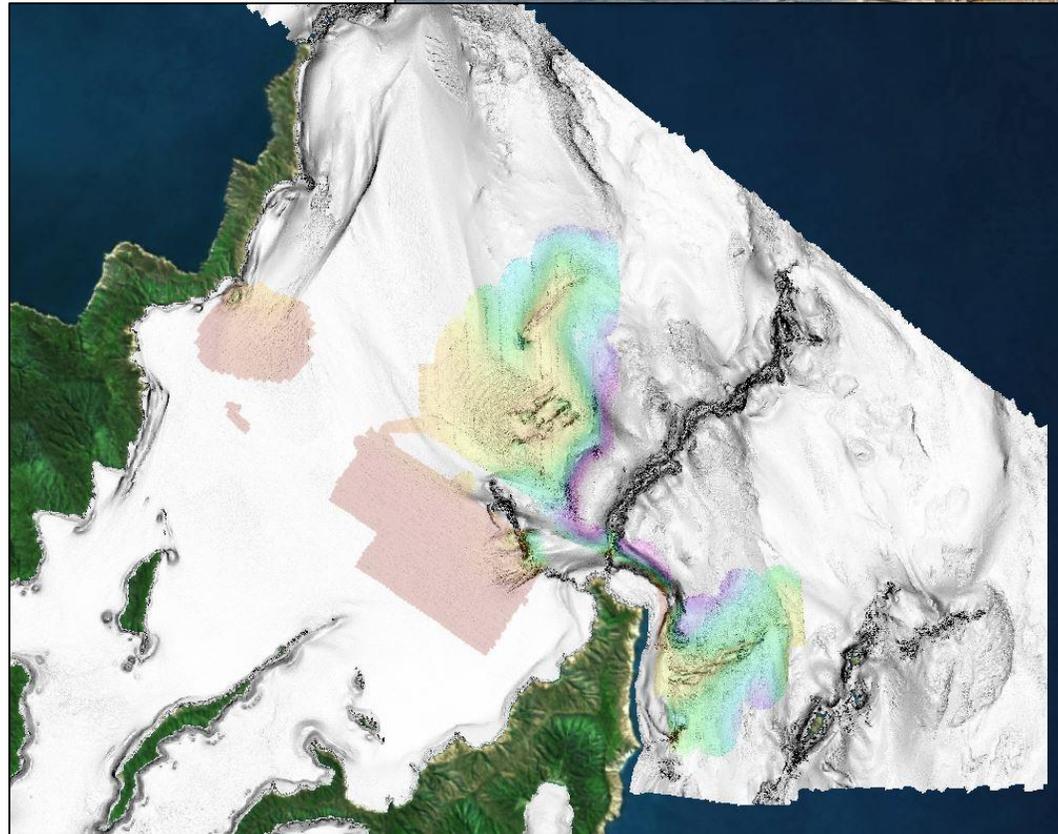
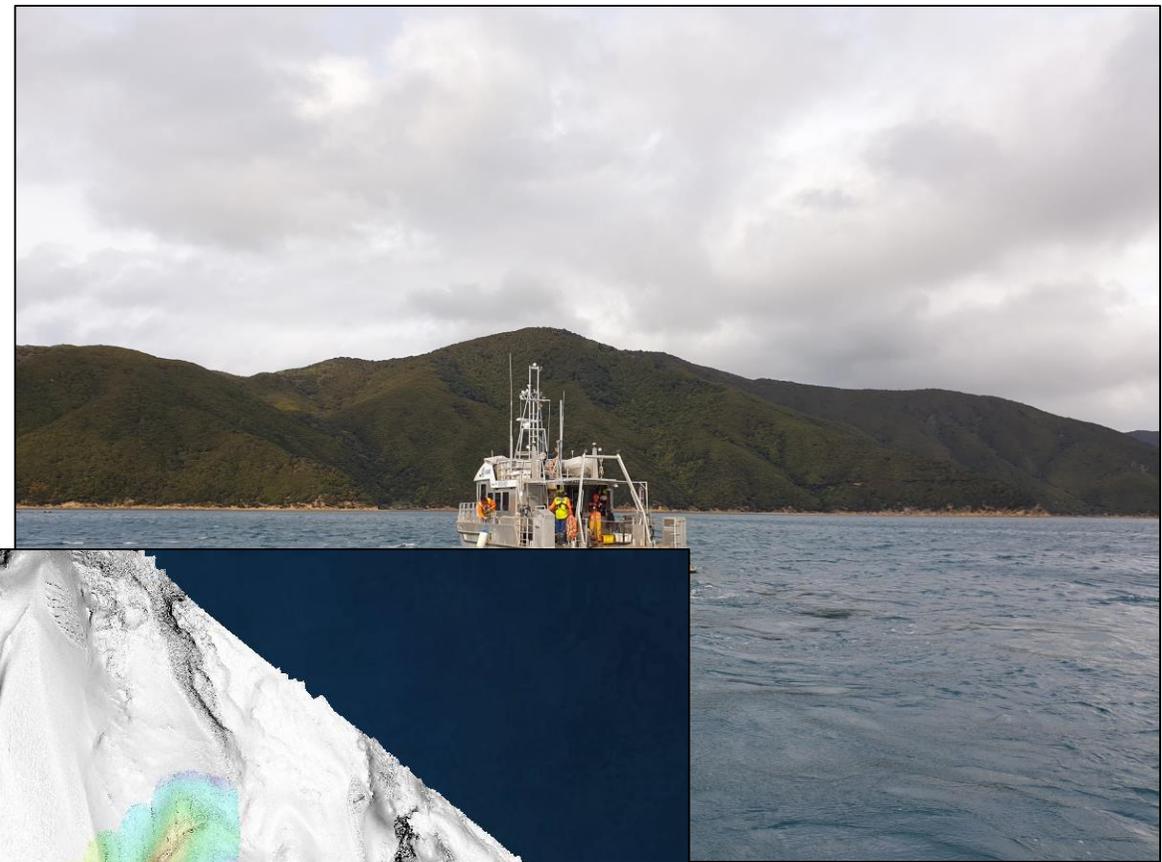
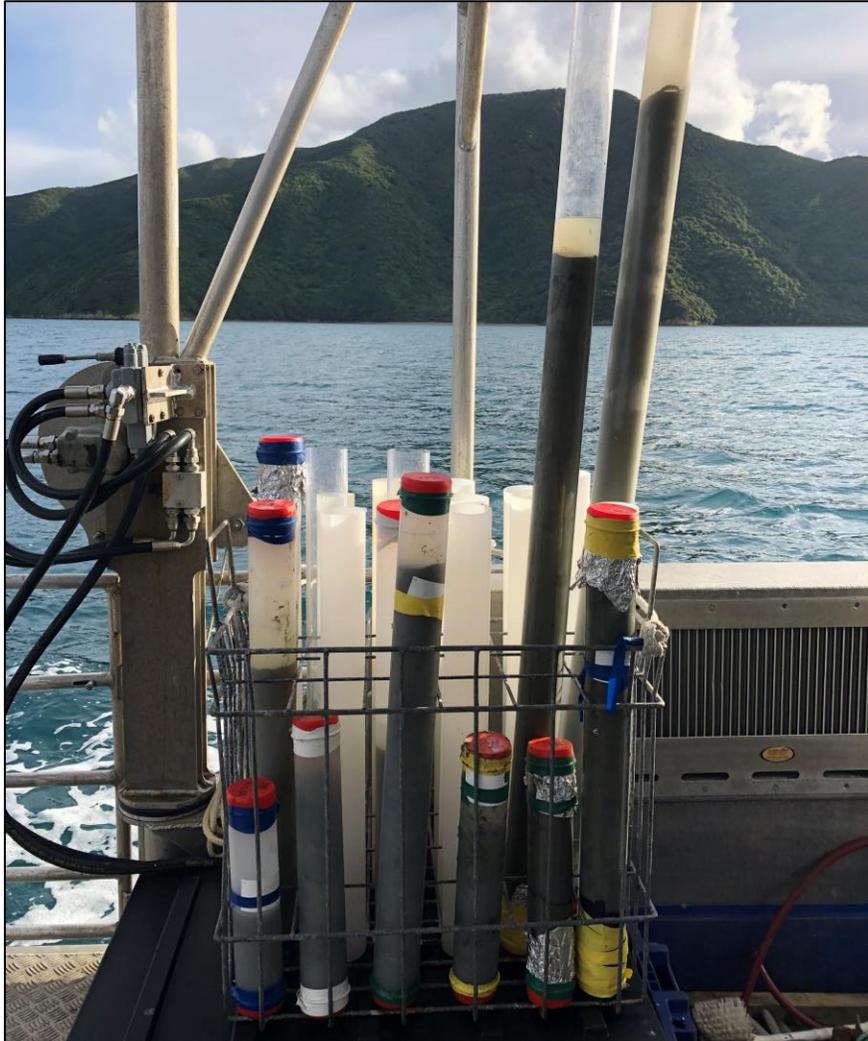
The spatial extent of physical disturbance to the seafloor arising from a human activities

(Can include also... chemical pollution, marine litter, changes in sedimentation and to the composition of sediments, and modifications and eradication of benthic habitats)



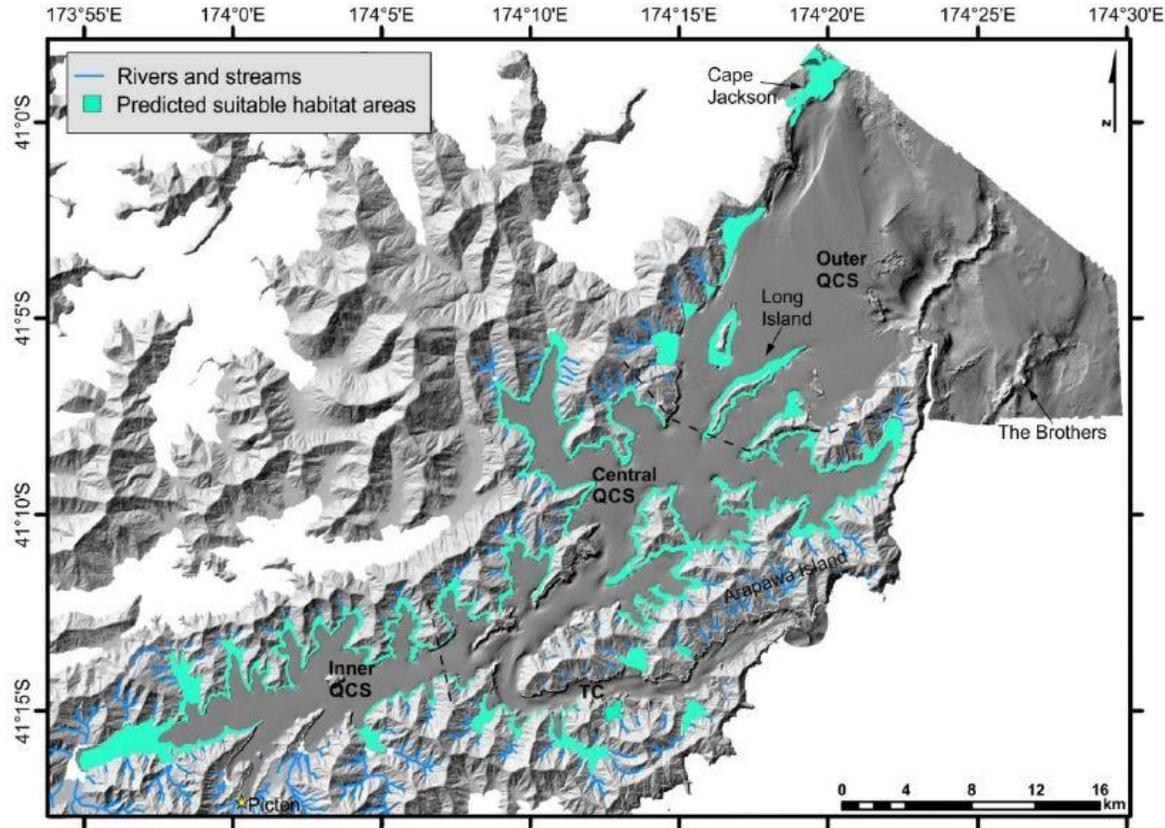
Additional data collection in 2020:

- 20 Cores (multicore and gravity cores) and 168 samples
- 5 TOPAS profiles
- Repeat MBES surveys across sedimentary bedforms



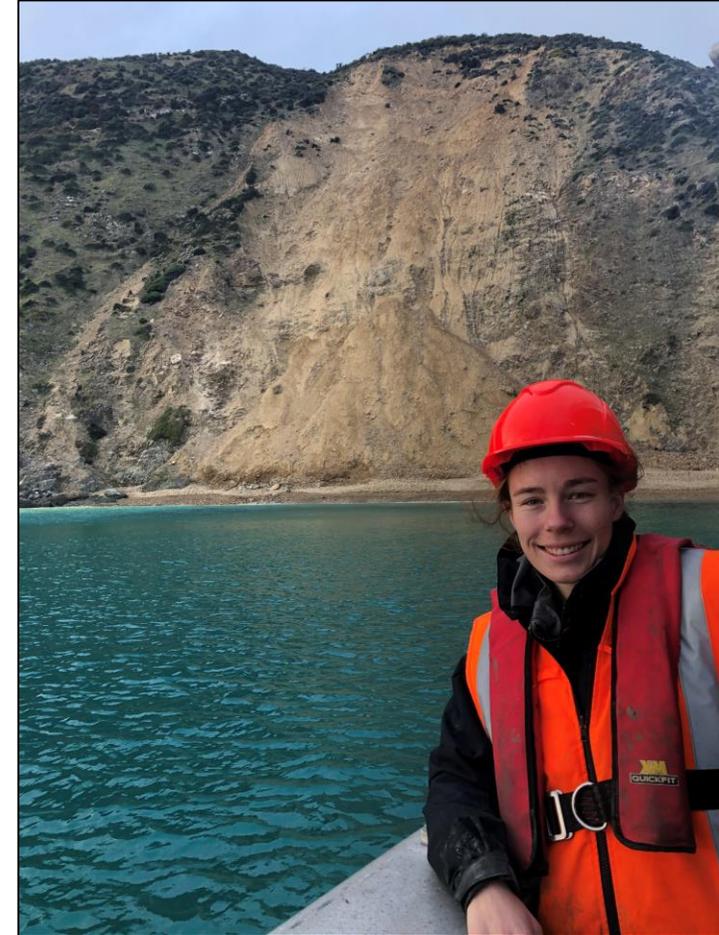
In the pipeline...

**Predicting habitat suitability of filter-feeder communities
in a shallow marine environment, New Zealand.**



Ribó, M. Macdonald, H., Watson, S.J., Hillman, J., Strachan, L.J., Thrush, S., Mountjoy, J.J., Hadfield, M., Lamarche, G. (In Review). Marine Environment Research

**Sedimentary processes and evolution of a Holocene drowned
river valley: Queen Charlotte Sound-Tōtaranui**



Honours Project (Alysha Jones)

What's next?

Dr Marta Ribó



Dr Lorna Strachan



Dr Sally Watson



Project EAST

Ecosystems:

Characterisation and classification marine ecosystems and interactions with geochemistry

Anthropogenic impact:

Measuring the influence of human activities in the shallow marine and changes in the nature and accumulation of sediment over the last ~150 years.

Sediment dynamics:

Assessing temporal changes in sedimentation and the influence of currents on seafloor using cores, repeat mapping and high resolution hydrodynamic models

Taiao:

Engage with local Māori to understand the oral histories and pre-settlement environment

Thank you

sally.watson@niwa.co.nz