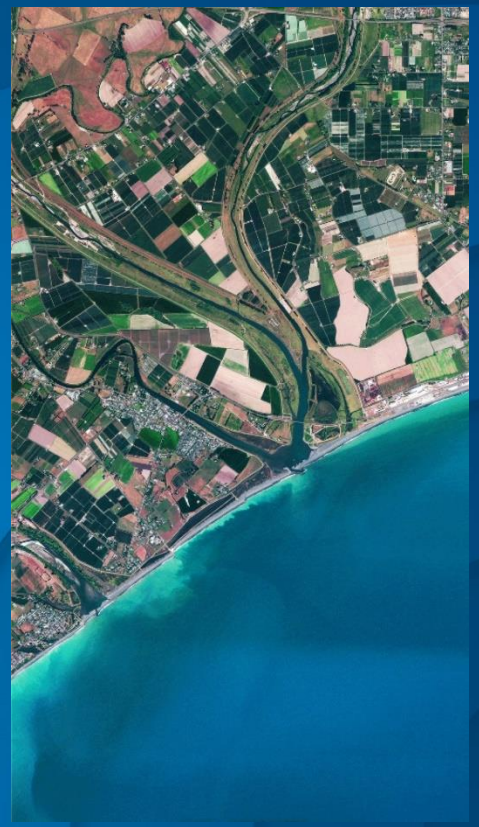
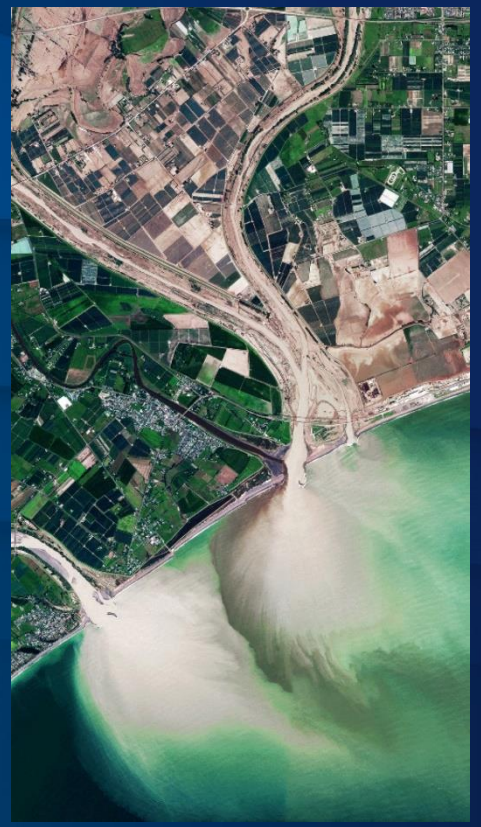
Cyclone Gabrielle Sediment and Impacts in Te Matau-a-Māui

Joshu Mountjoy
NIWA Wellington





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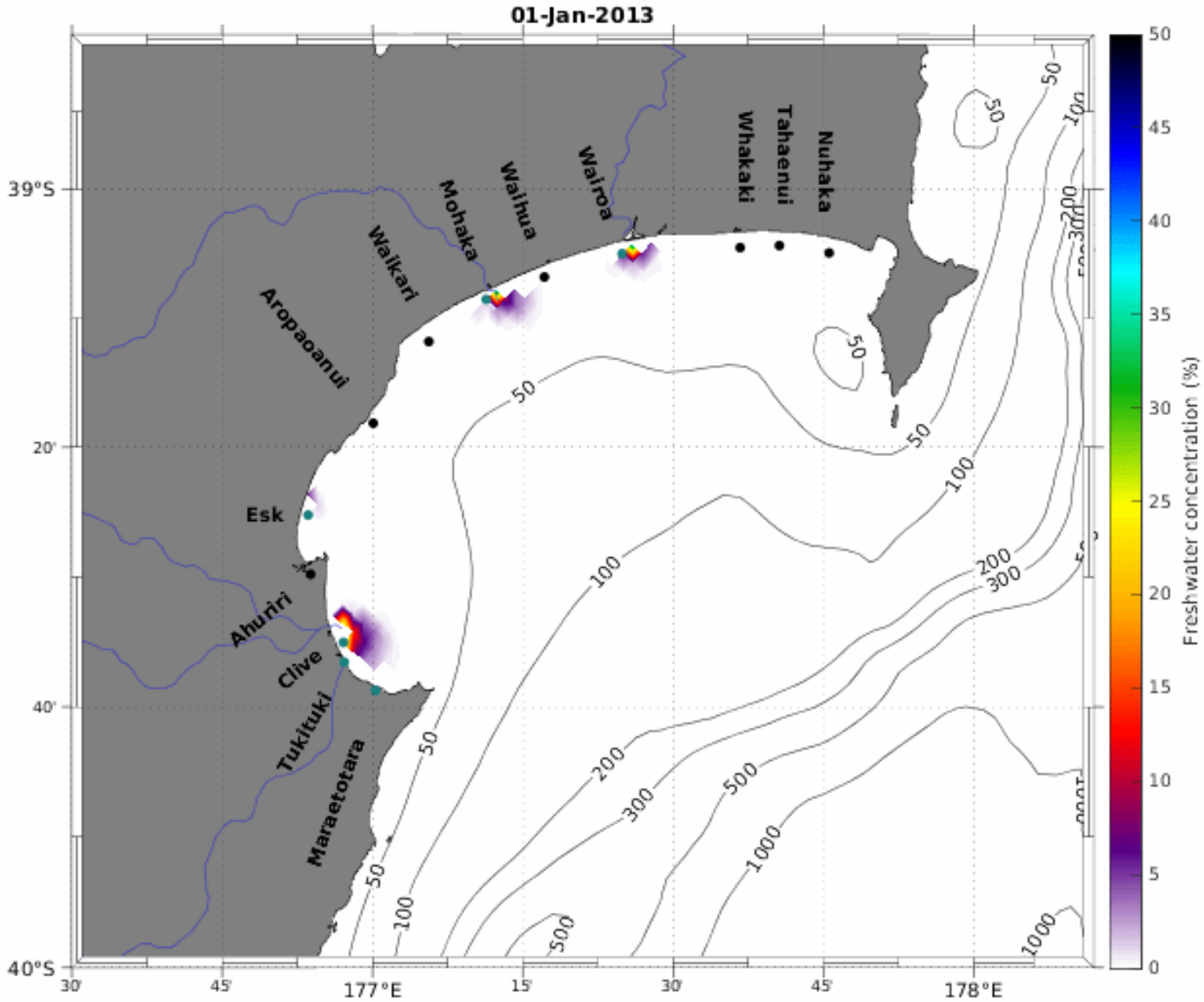
Modelling of freshwater input from main rivers

Sediment will follow different paths, but some similarities likely



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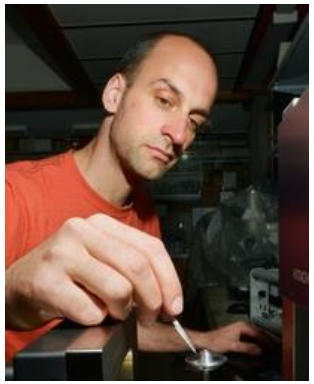
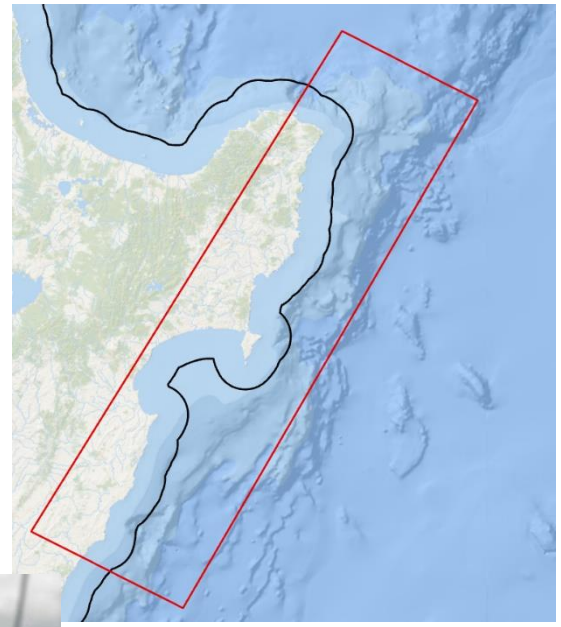
Model from Dr Charine Collins and Dr Helen MacDonald

Overall Project

Motivation: what is the impact of cyclone generated sediment on Seafloor habitats and ecosystems (incl fisheries ecosystems)

1. **Mapping in Hawke's Bay to detect Seafloor change**
    a) Completed in April 2023
2. **Glider deployment to map suspended sediment**
3. **Fisheries habitat impacts (Daniel Leduc)**
    a) Deeper water (>15 m)
    b) Project runs to end Dec. 2023
    c) Two RV Kaharoa Voyages (June and October)
4. **Assessment of nearshore habitat impact (Leigh Tait)**
    a) Working with Maungaharuru-Tangitū Trust
    b) Small boat focus on near shore reef habitats





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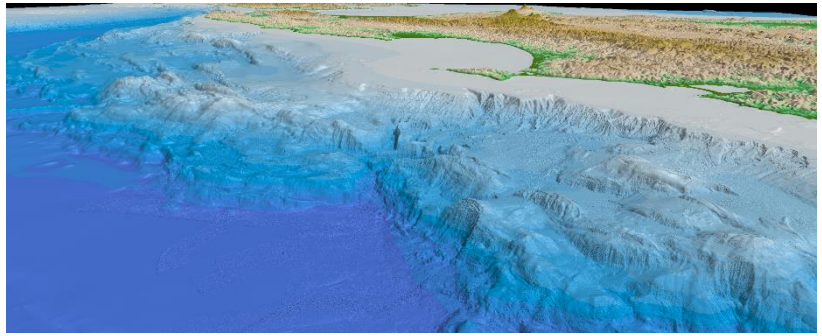
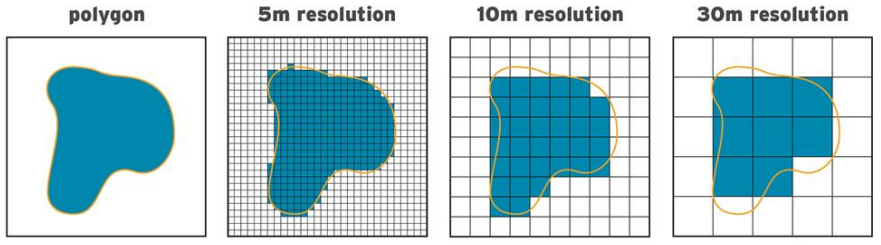
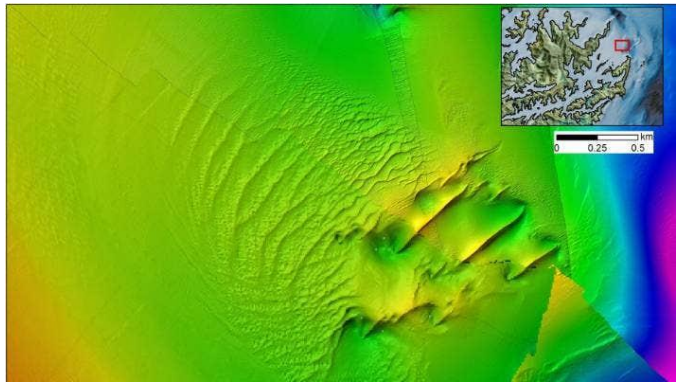
Techniques – multibeam bathymetry



Low resolution (1-25 m)
High coverage (4 x water depth)
(100 m water = 400 m wide swath)





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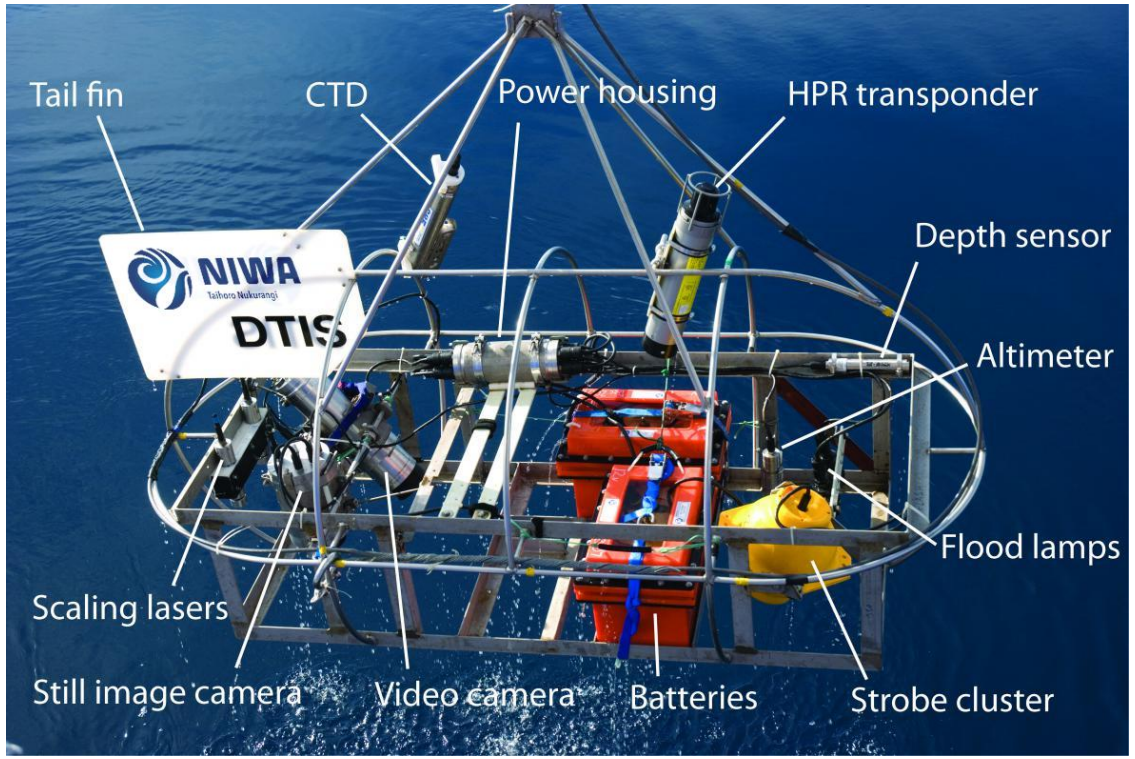
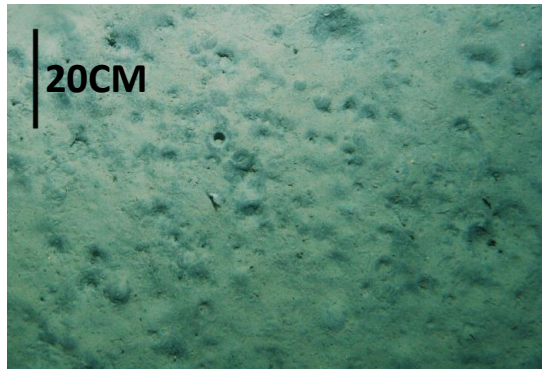
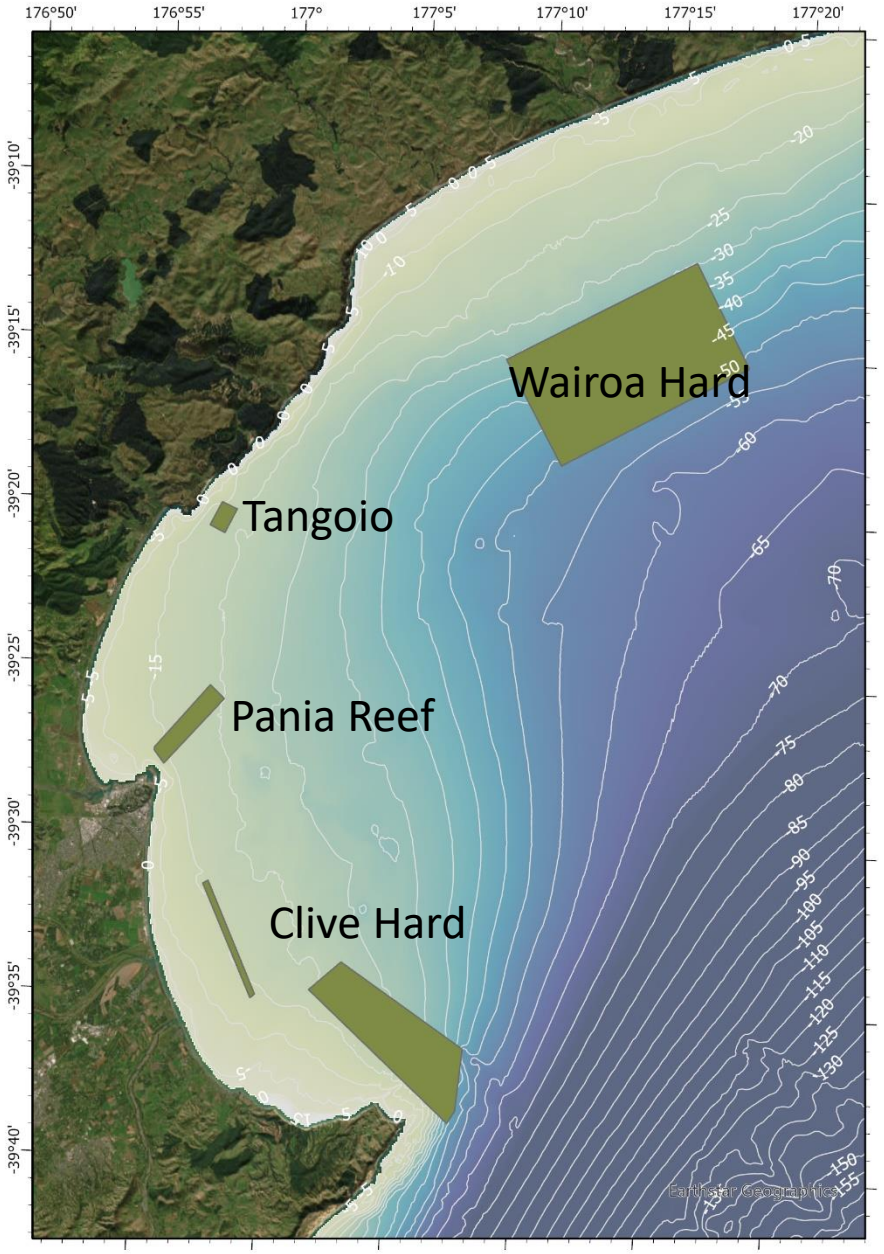
Techniques – Seafloor video



High resolution (mm-cm)
Low coverage (2 m swath for 1 km length)



Mapping coverage



Mapped 5 different areas in April 2023 (with previous multibeam coverage)

Processed at 1 m resolution

Data still being analysed – **can share some preliminary results**

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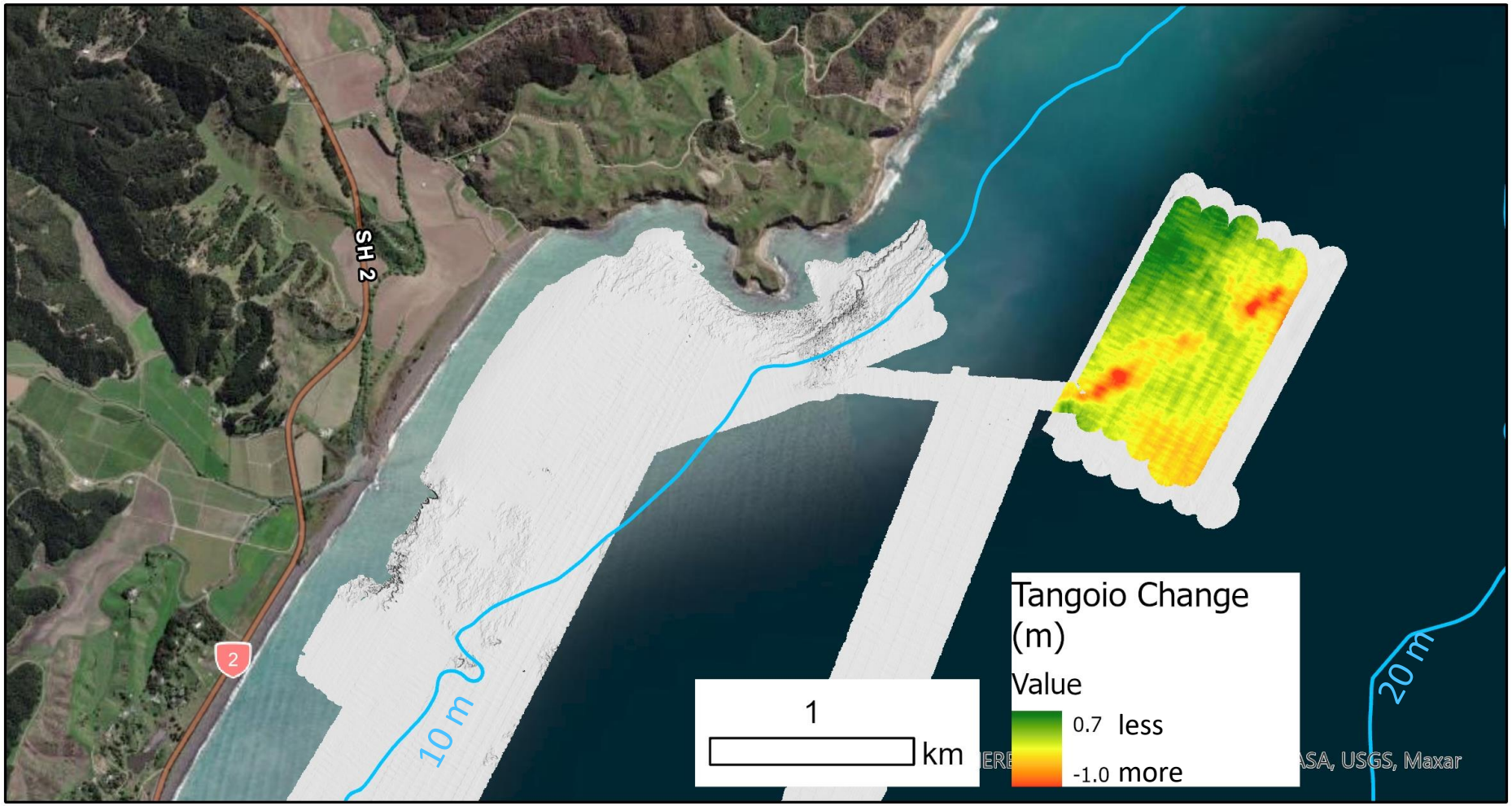
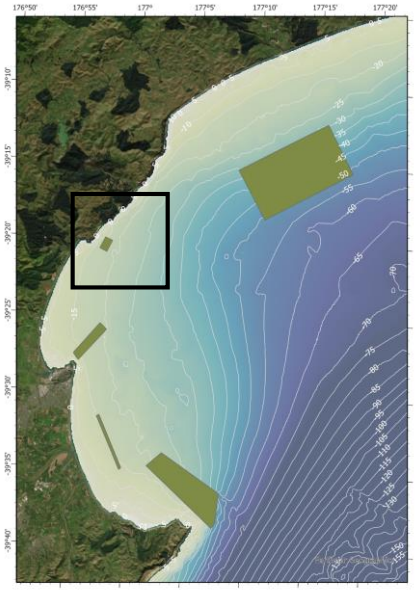
Tangoio Reef

2022 to 2023

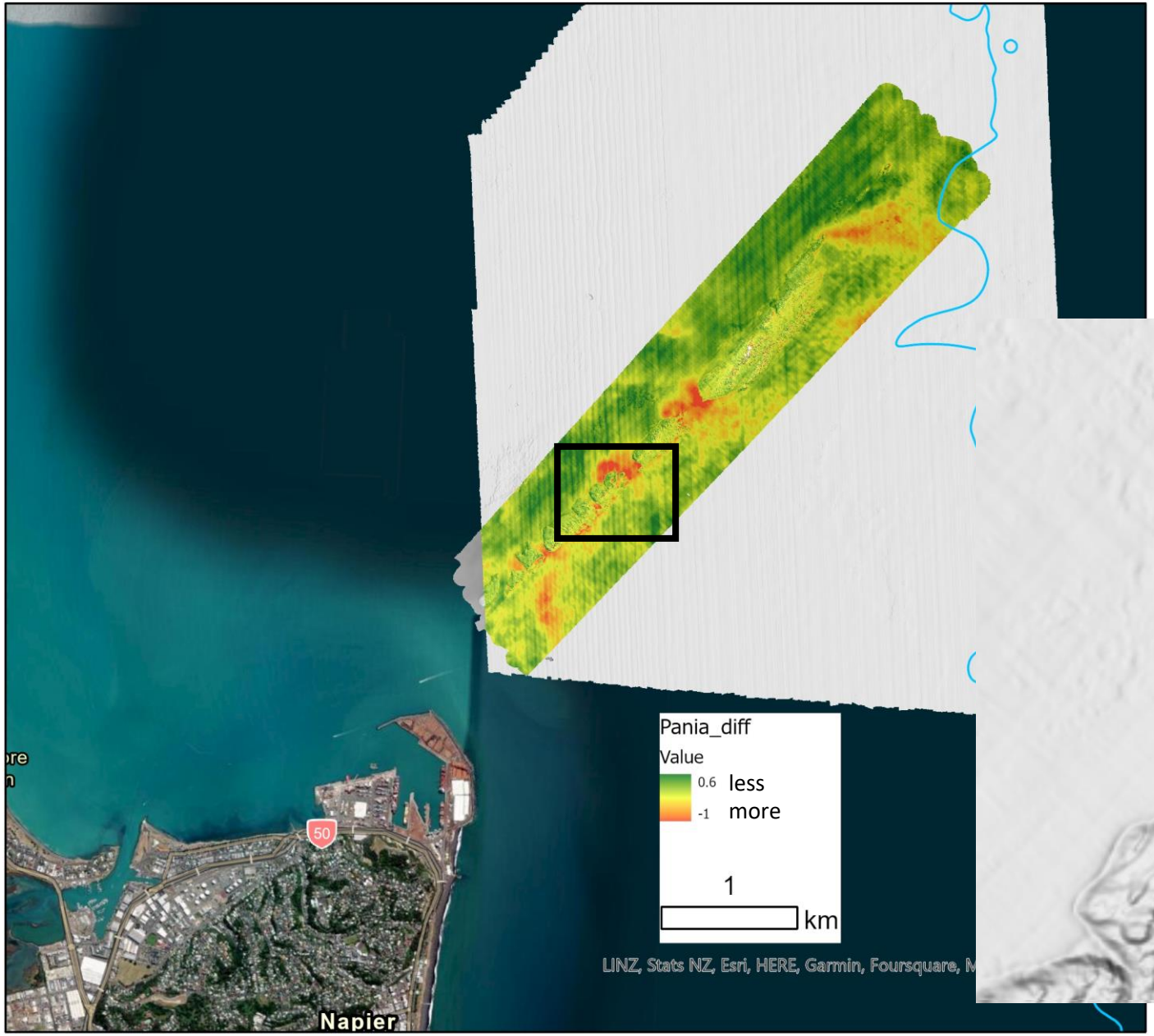




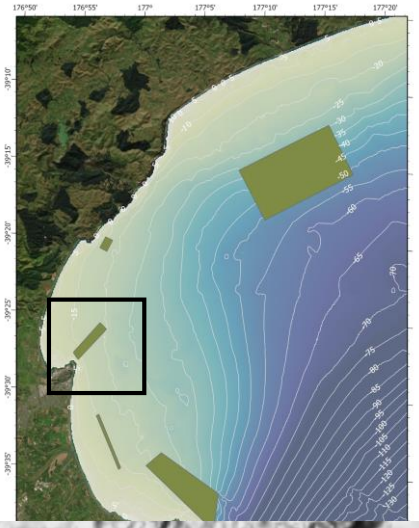
Deposition and erosion

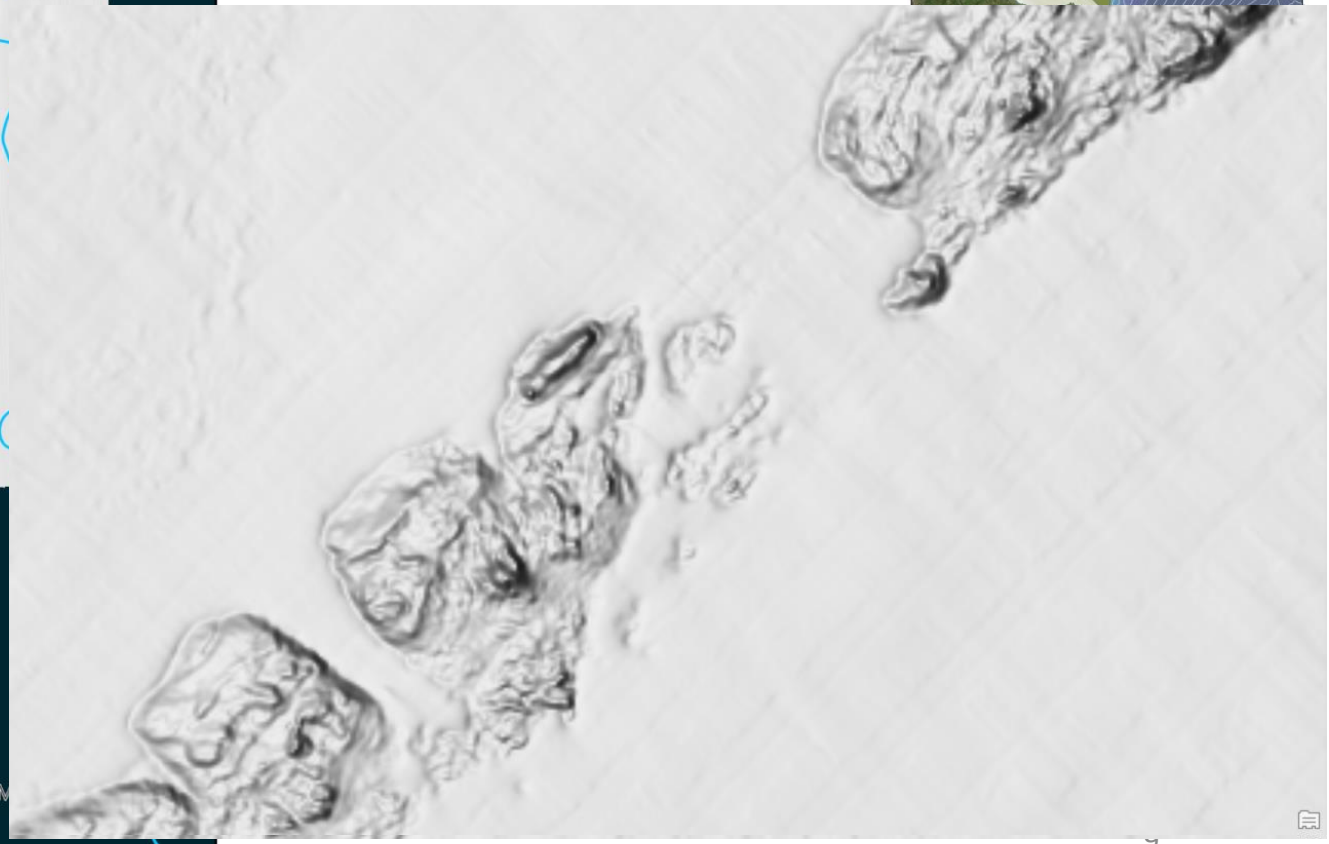
Pania Reef

2019 to 2023



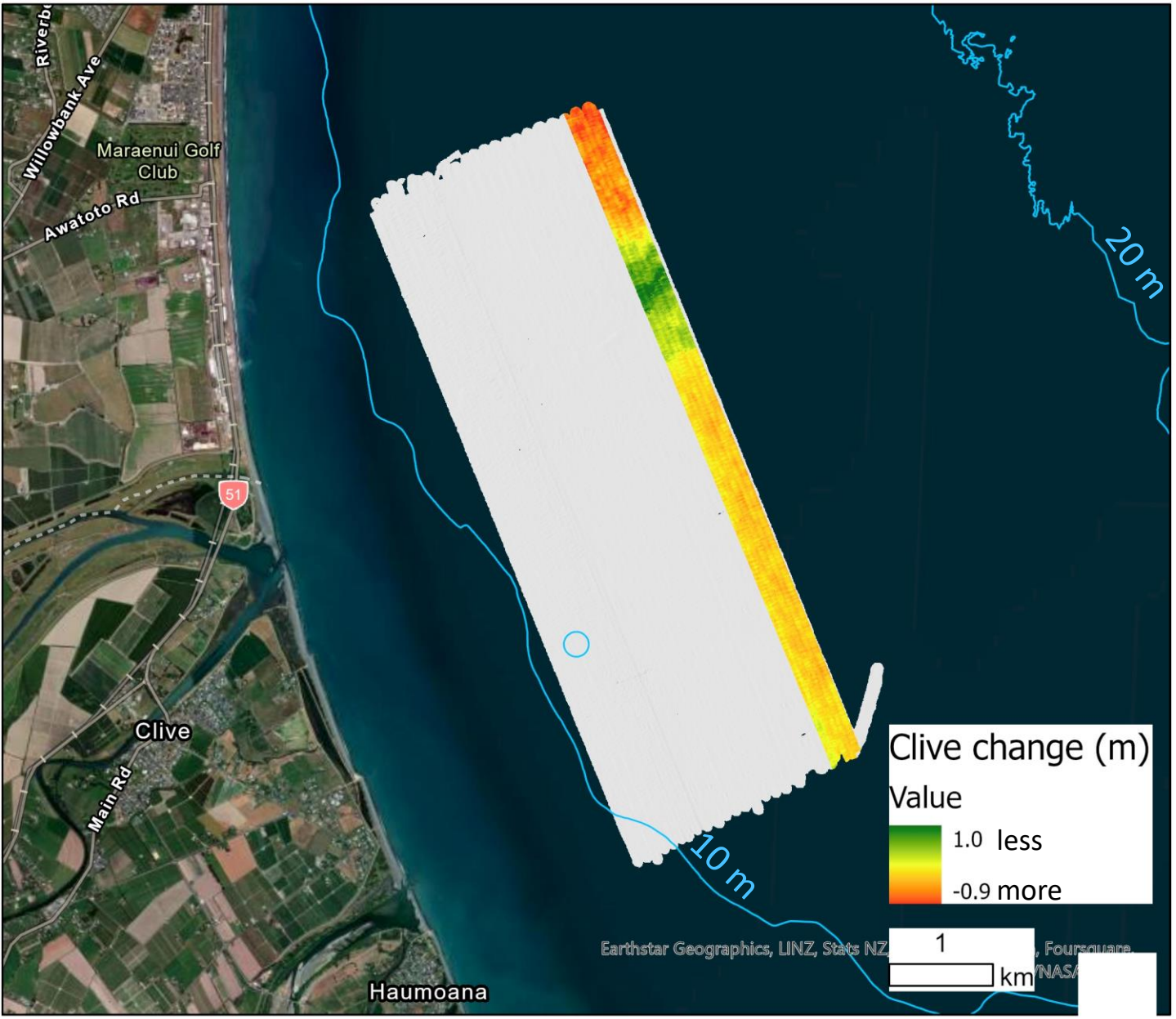
Deposition and erosion



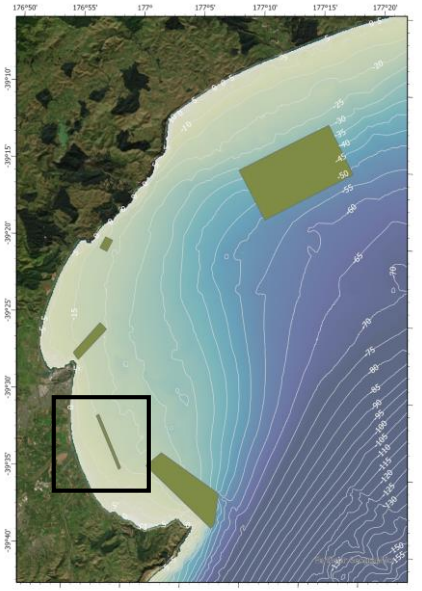


Clive outfall area

2021 to 2023



Deposition
Erosion of a channel



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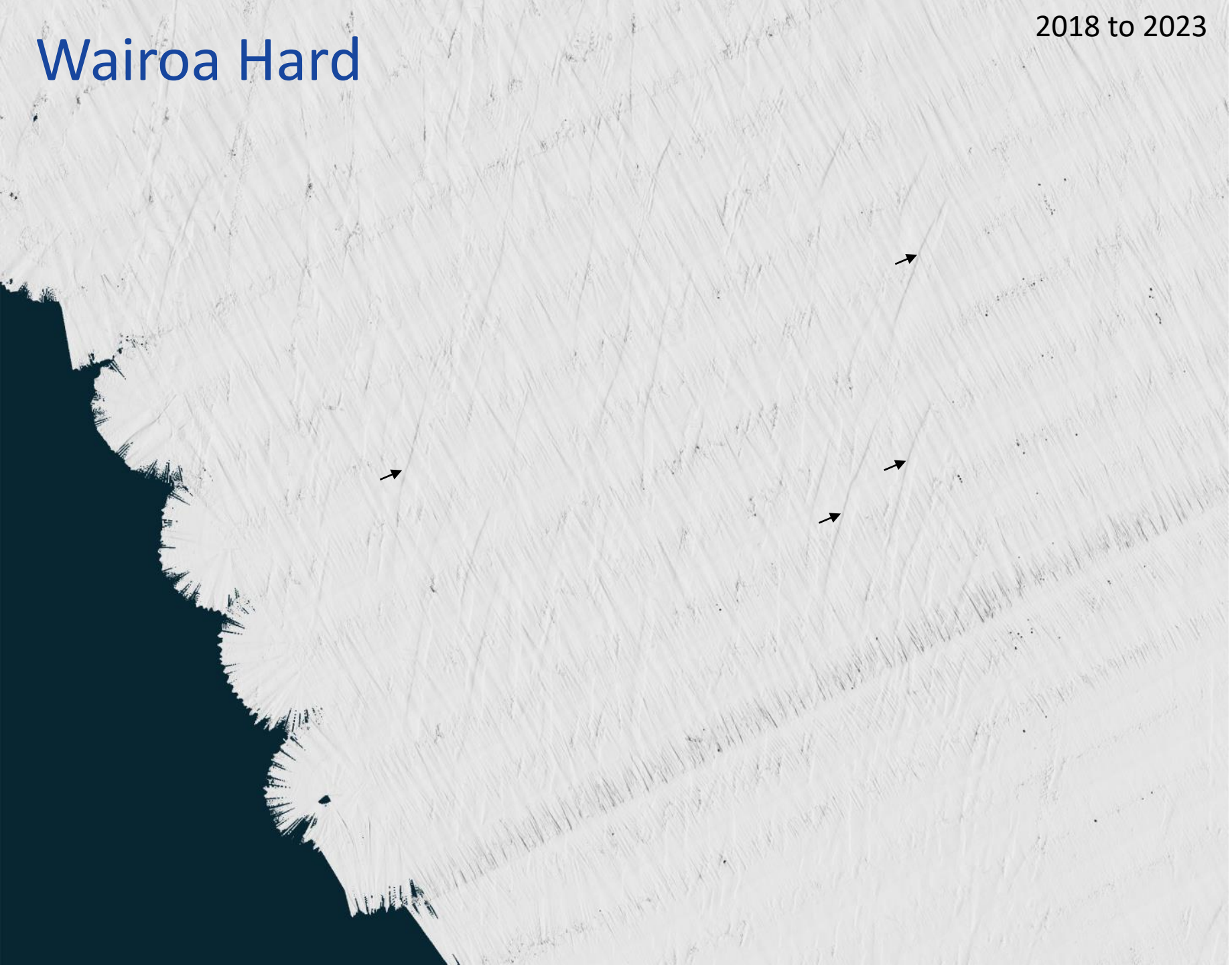
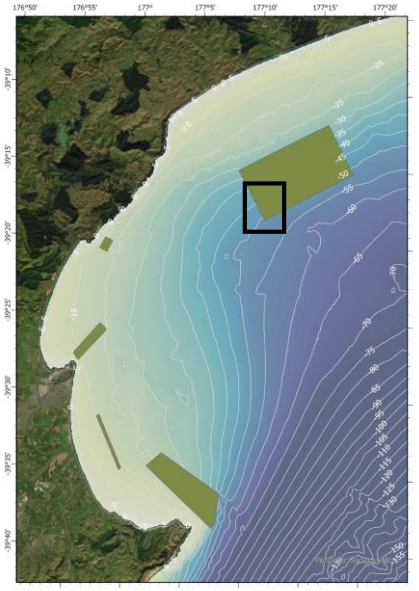
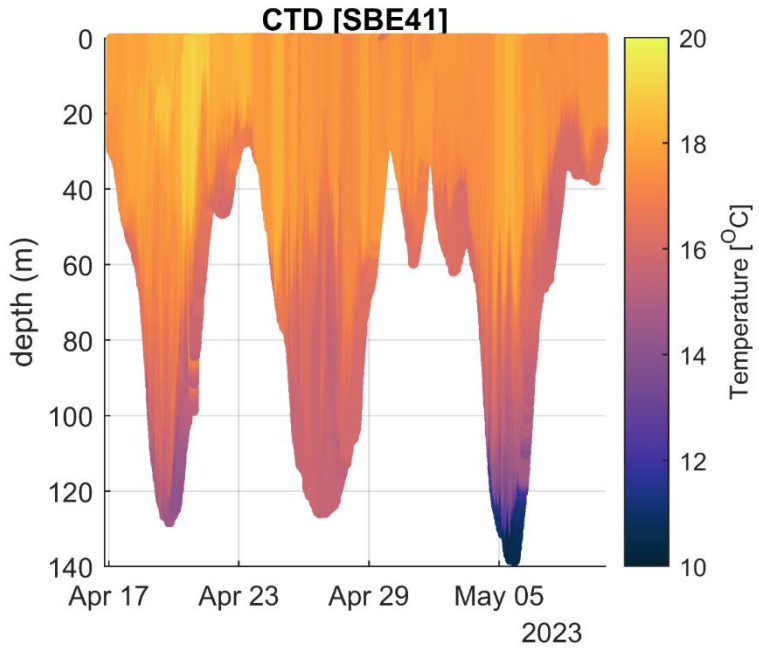
Wairoa Hard

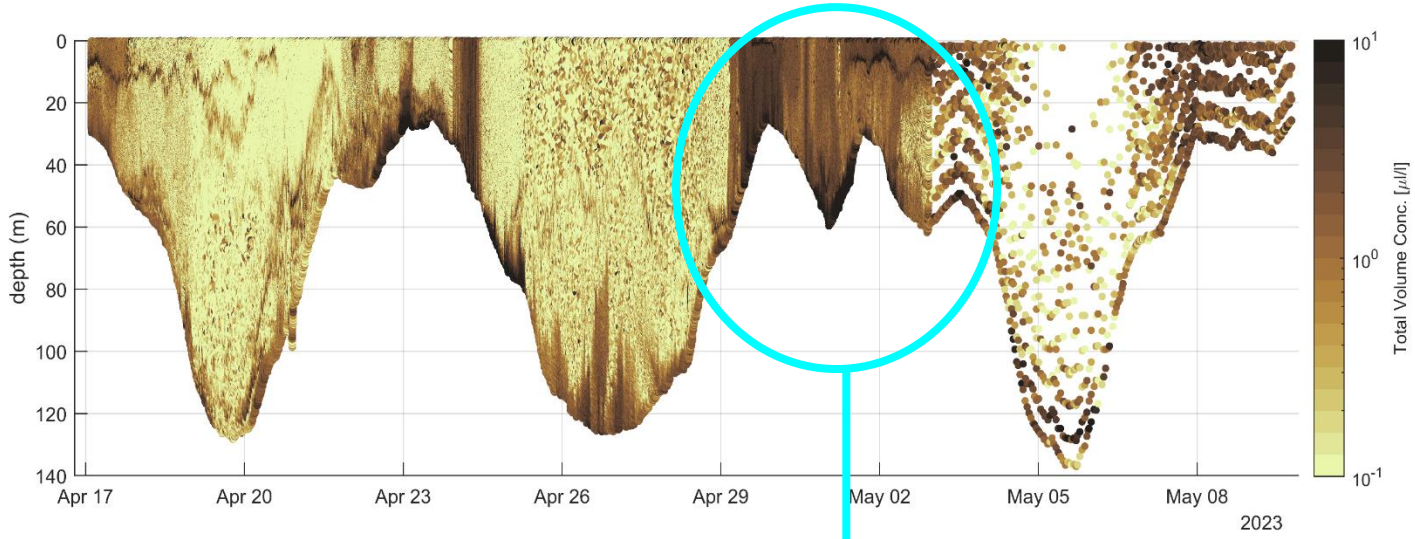
2018 to 2023



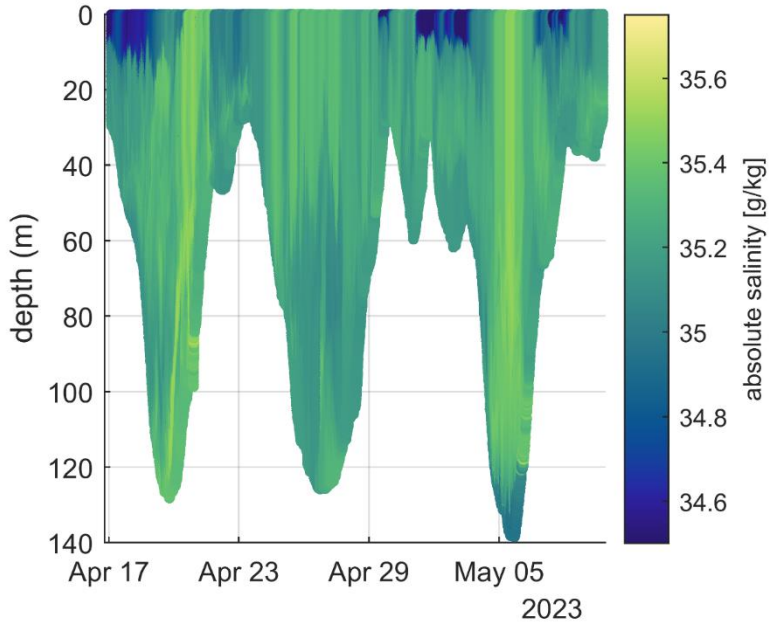


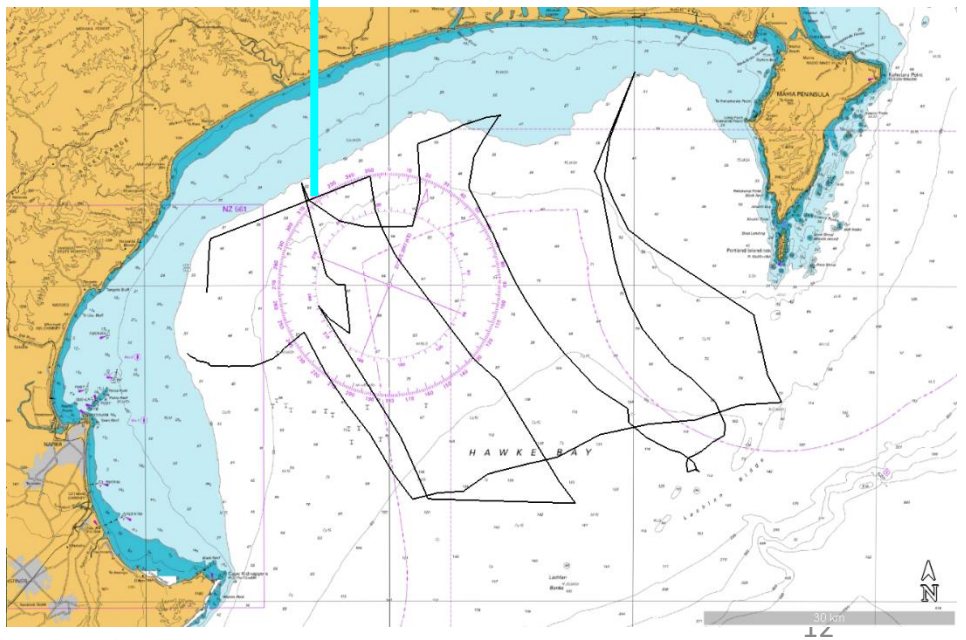
Very little change, but…





Glider Data

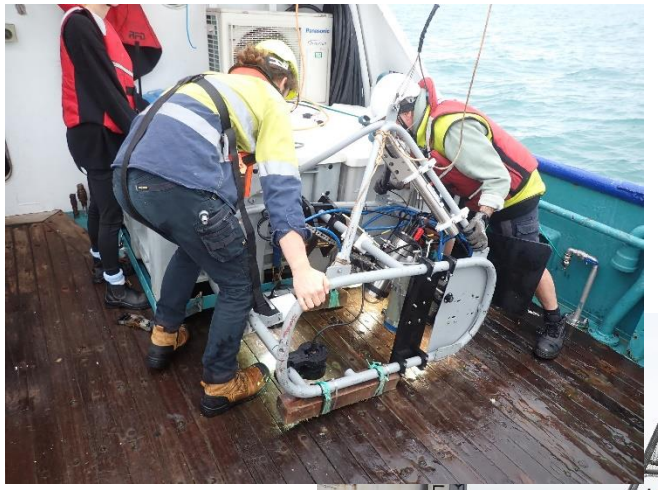




For more info: Jasmin McInerney & Alain de Verneil

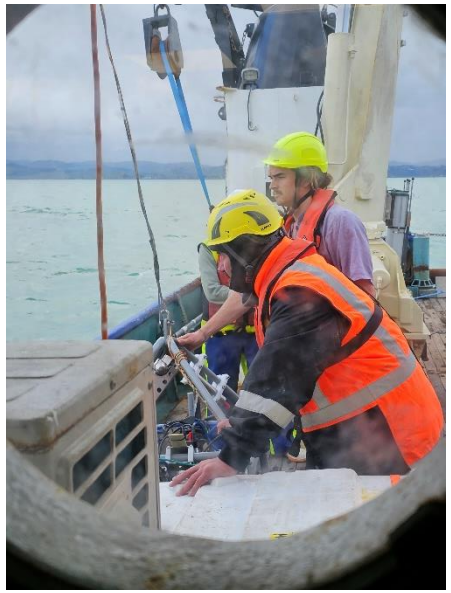
June RV Kaharoa Voyage

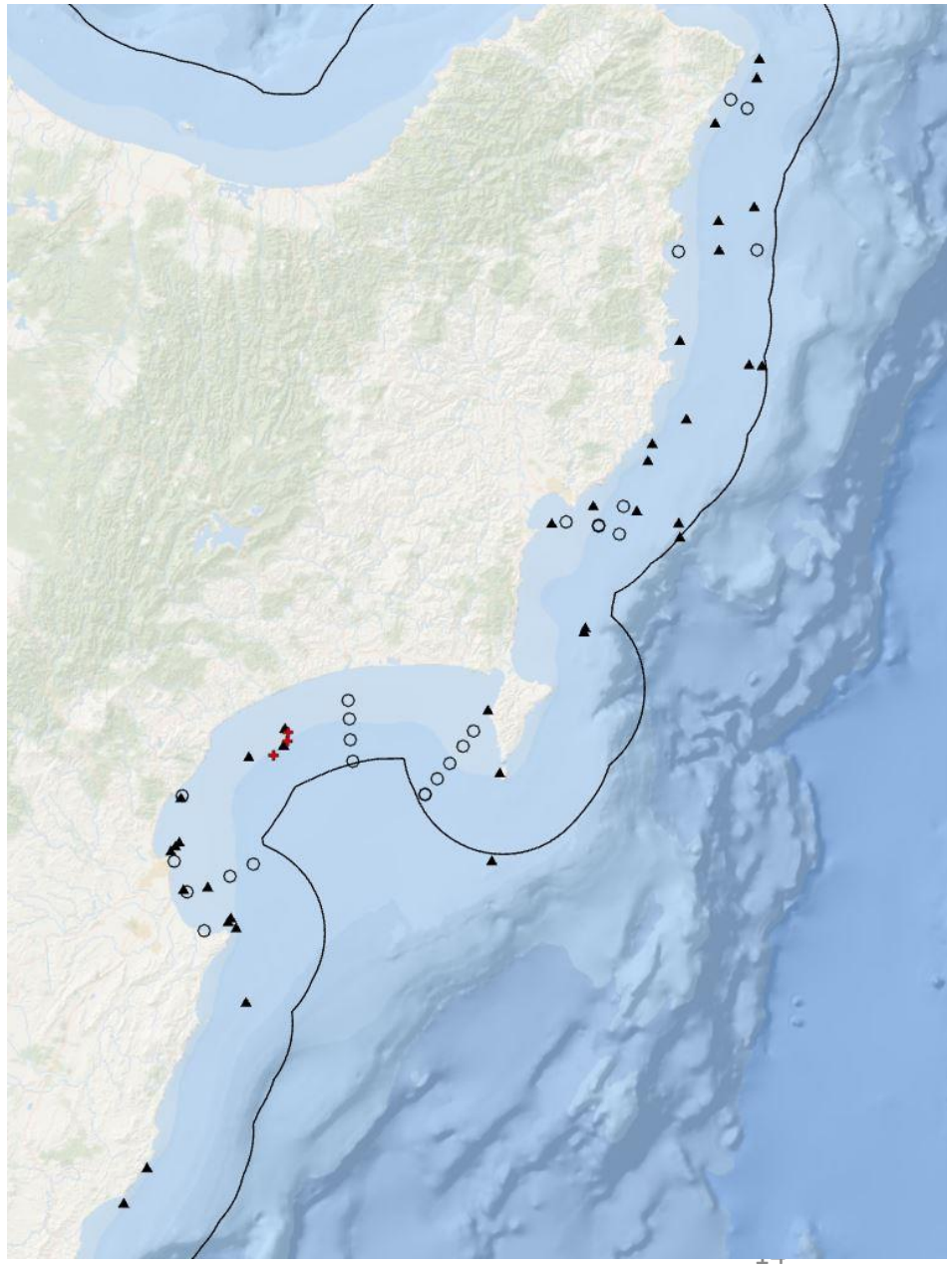
- Time-critical
- 19 days duration
- Science crew: Mark Morrison (NIWA lead), Justin Tibble (Ngāti Porou), Alan Orpin, Charlotte Bodie, Mark Fenwick, Kevin Mackay, Ethan Carson-Groom
- Three main tools: multibeam, towed camera, and multicorer
- Looking for evidence of sedimentation and potential ecosystem impacts
- Investigate sediment transport processes



June RV Kaharoa Voyage

- Challenging weather conditions during almost entire voyage
- 41 CoastCam (triangles)
- 23 multicorer (circles)
- 3 beam trawl (red crosses)





June RV Kaharoa Voyage

- Low visibility and high suspended sediments above seafloor especially at inshore locations
- Some large *Ecklonia* kelp seen protruding out of turbid layer off Mahia (likely survived Cyclone)
- Suggestion that fauna at Pania Reef not catastrophically impacted
- Limited fauna in beam trawl tows at Wairoa Hard, but a lot of wood debris. No visibility on video

Follow up work:

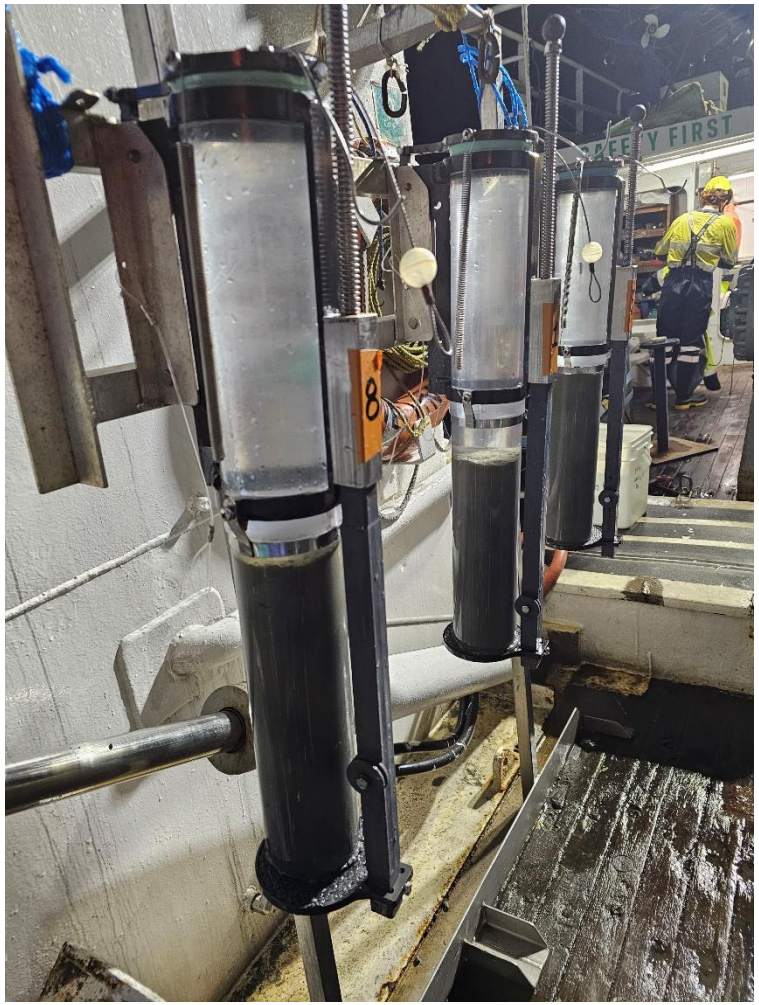
- Sediment core analyses: infauna, CT scans, grain size, organic matter, bulk isotopes

→ Characterise seafloor event deposits, input of land organic matter, potential impacts on infauna

- Compound-specific stable isotope analyses

→ Tracing origins of sediment organic matter back to river catchments (Gibbs et al. 2020)

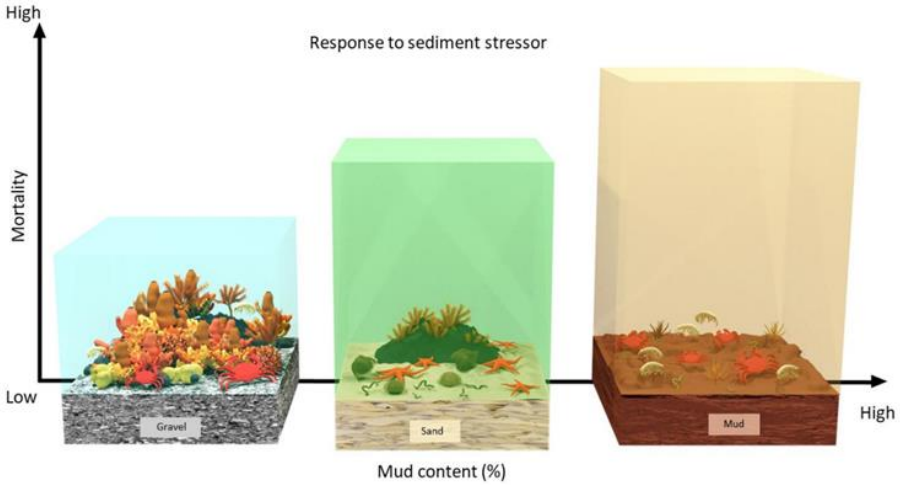
→ Developing a proposal to expand on this work to include land-use specific sampling and deep-sea



Follow up work:

- Adapt the seafloor model of disturbance impacts (Hawke's Bay)

→ Spatially explicit decision support tool that explores how the spatial extent and frequency of disturbances (by sediment or fishing) impact on the abundance and distribution of animals living on the seafloor

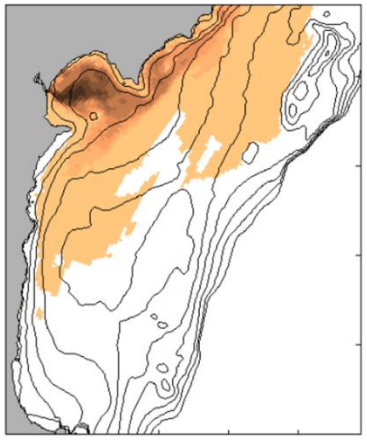


Lundquist et al. (2022)

- Hydrodynamic and sediment modelling

→ Spatial and temporal extent of freshwater plume, sediment transport and deposition

- Satellite image analyses – plume extent



Modelled sediment deposition (% of riverine load) from Waipaoa River off Poverty Bay (Moriarty et al. 2014)

Thanks and welcome questions and discussion

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