

# Submarine canyons: how important are they for connecting coastal and deep-sea ecosystems?

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# Ecosystem connectivity

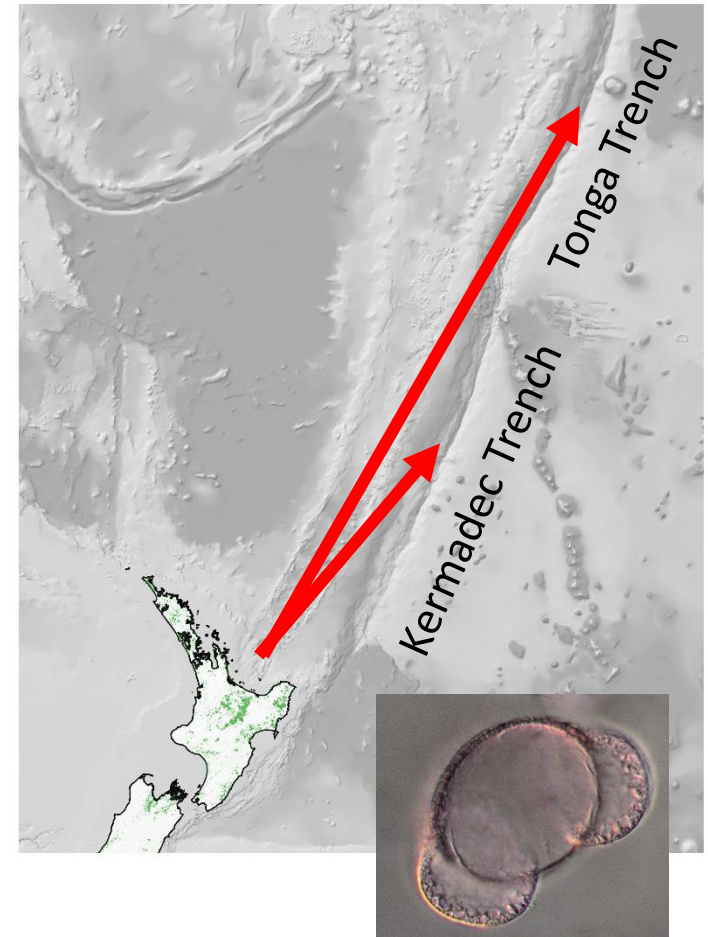
Well-known connection between catchments, rivers/lakes, and coastal ecosystems

Does this connectivity extend beyond the coast?



# Ecosystem connectivity

Recent evidence\* shows accumulation of NZ *Pinus radiata* pollen in deepest parts of Kermadec and Tonga trenches



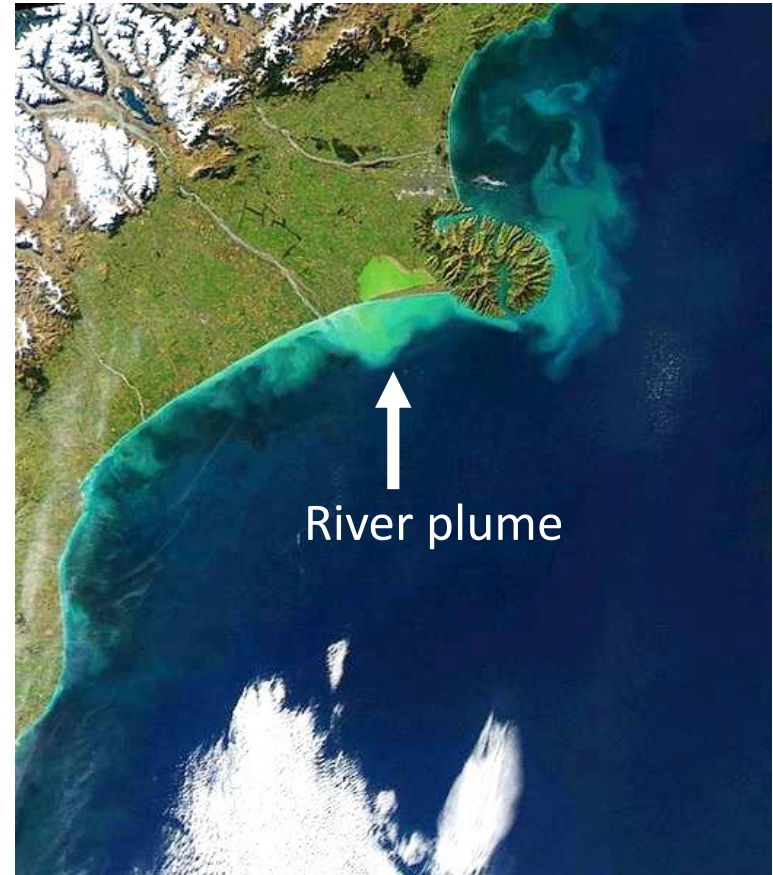
(Leduc & Rowden, in press; *Ecosystems*)

# Ecosystem connectivity

More than 200 million tons of sediment washed out to sea by rivers around NZ every year

Much of the organic material likely decomposed or ingested within coastal areas

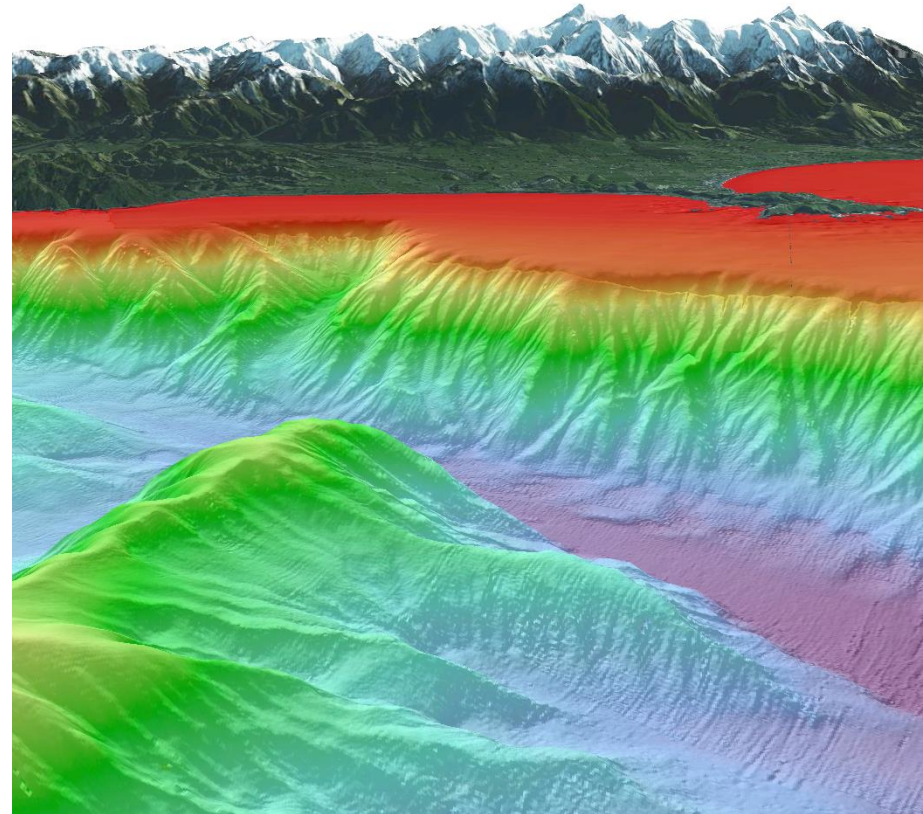
However the fate of this material is not always clear



# Ecosystem connectivity

Over 270 submarine canyons are found along NZ's continental margin

Presence of submarine canyons may accelerate downslope transport of material to the deep

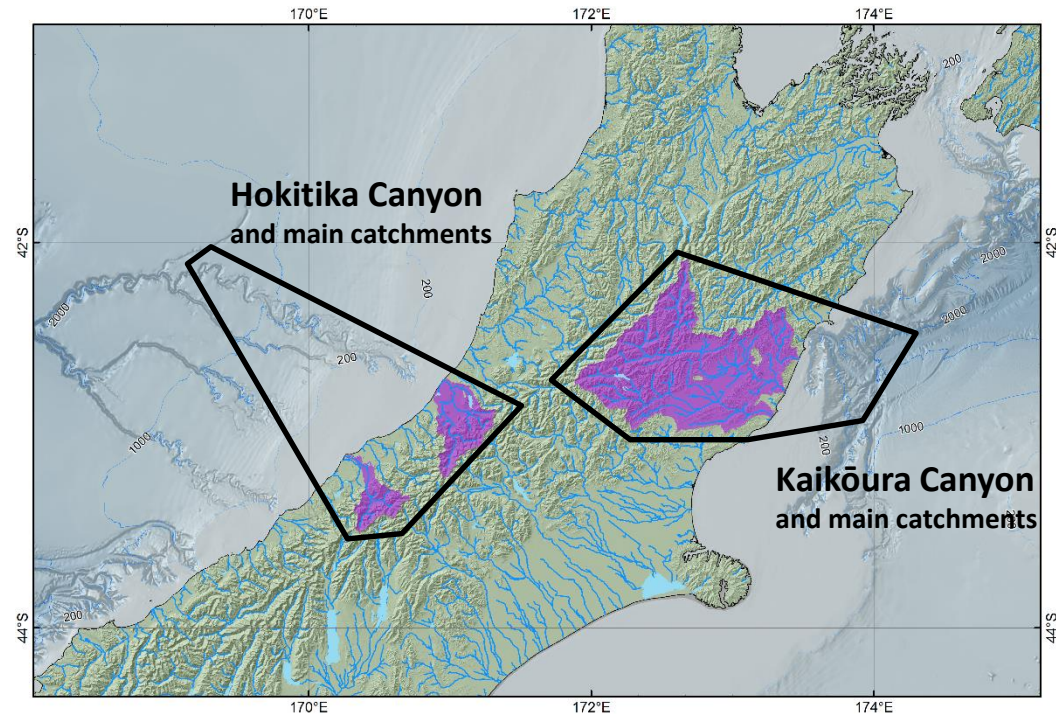


# Our approach

1. Quantify connectivity between land and deep sea in two canyons
2. Extrapolate findings from two study canyons to other NZ canyons

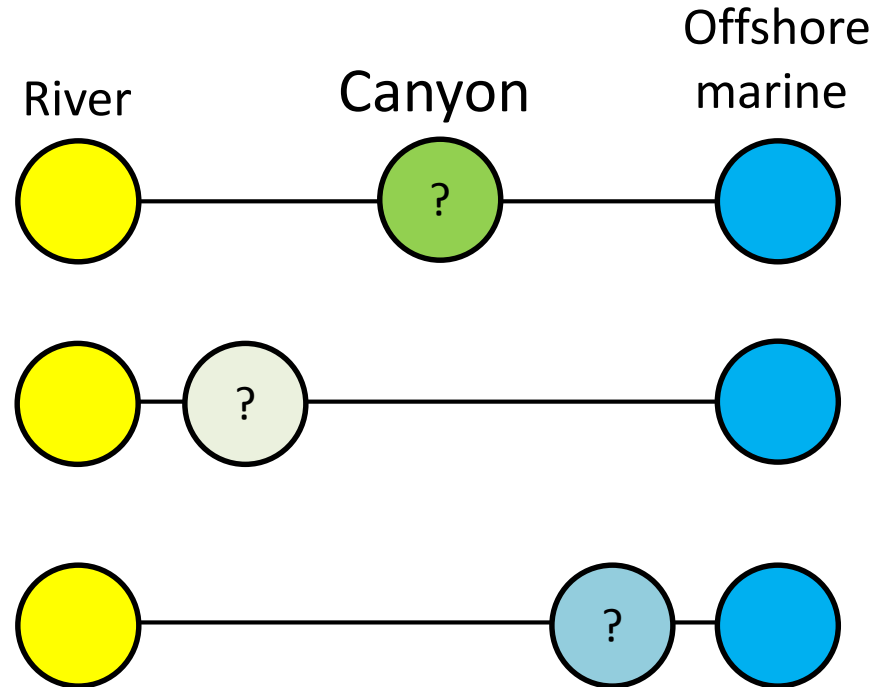
# 1. Quantifying connectivity

- Comparative approach focusing on two canyons with different productivity levels
- We will compare sediment organic matter levels and abundance of seabed fauna



# 1. Quantifying connectivity

- Use chemical tracers to study origins of organic matter in canyon sediments
- We sampled riverine source of land-derived organic matter and offshore sediments
- We will also analyse some of the fauna (food web)





# 2. Extrapolating to other canyons

Complete a New Zealand wide quantification of canyons, and produce a canyon classification

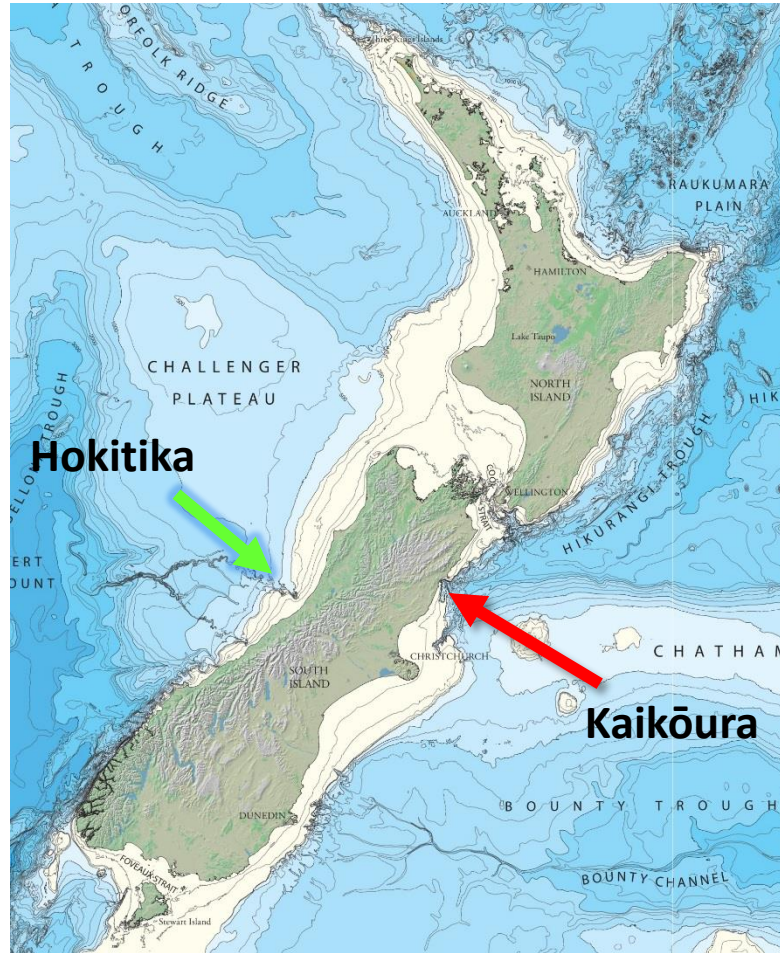
	Area (km <sup>2</sup> )	Length (km)	Head depth (m)	Mouth depth (m)	Sinuosity	Distance from coast (km)	Roughness	Length: Width ratio
<b>Kaikōura</b>	515	61	50	1916	1.52	1.5	8.0	3.3
<b>Hokitika</b>	2725	533	410	3687	1.74	23.7	9.3	31.4

Morphometric and biological variables

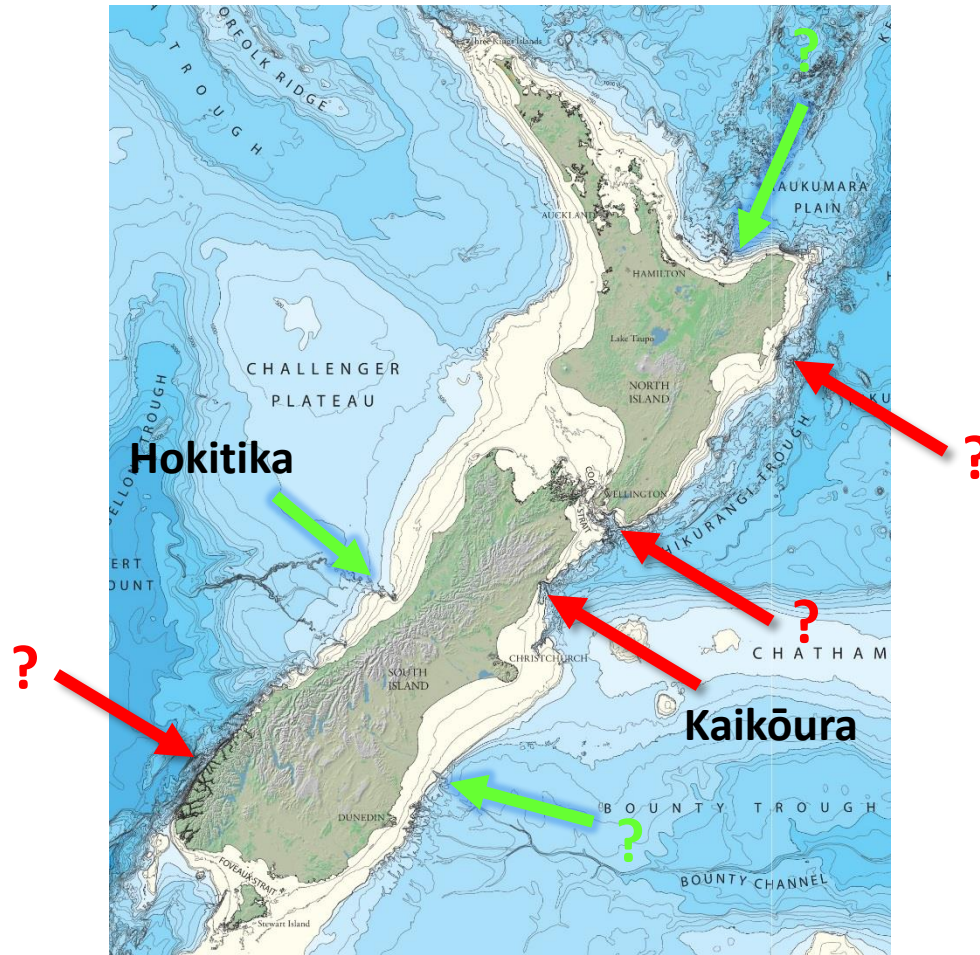


All 270 canyons

## 2. Extrapolating to other canyons



# 2. Extrapolating to other canyons

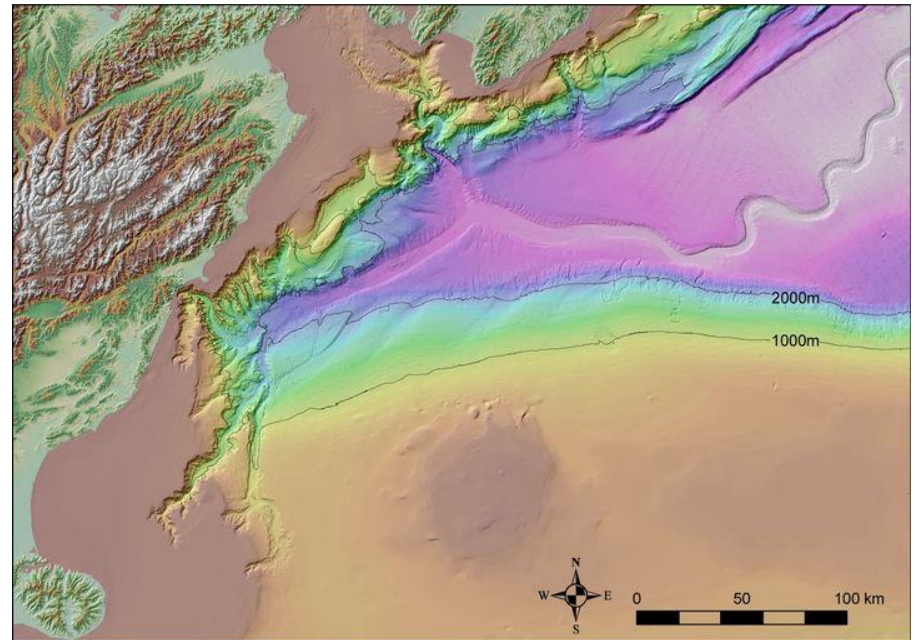


# Consequences of connectivity between land and deep sea

Deep-sea food webs and  
productivity

Pollutants

Export of carbon



# Ki uta ki tai: mountains to the sea

A holistic approach to environmental management, similar to concepts of EBM

Unprecedented magnitude of change on land means that it may be necessary to extend this concept beyond the coast



# Links to other Dynamic Seas programmes

- Ecosystem connectivity: tracking biochemical fluxes to inform EBM
- Stressor footprints and dynamics

# Thank you

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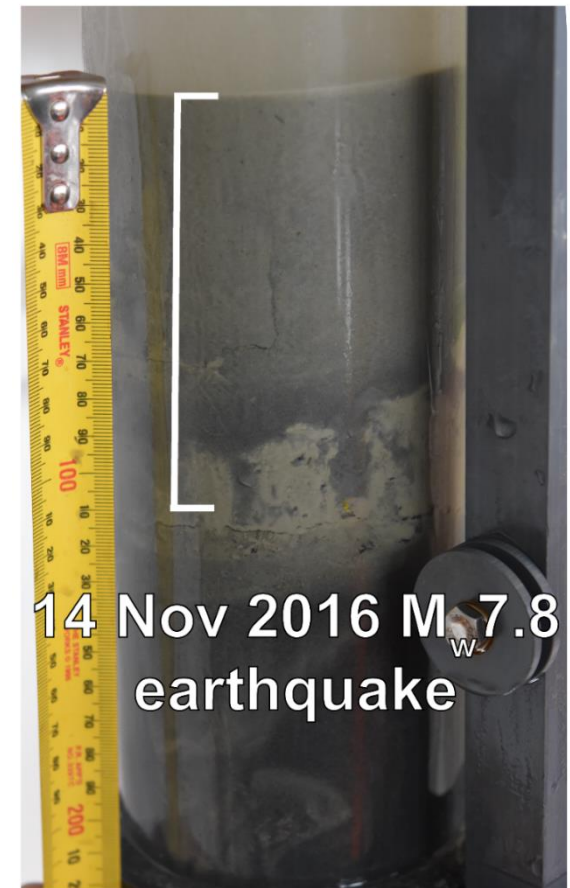
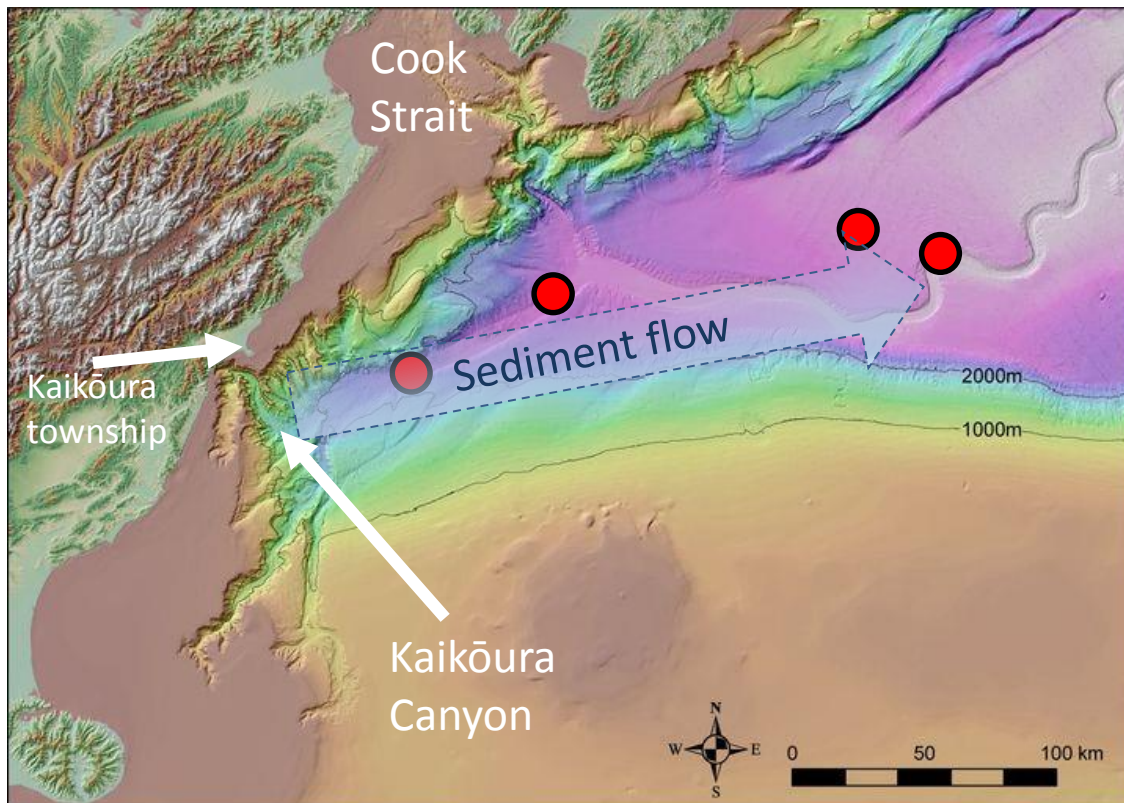






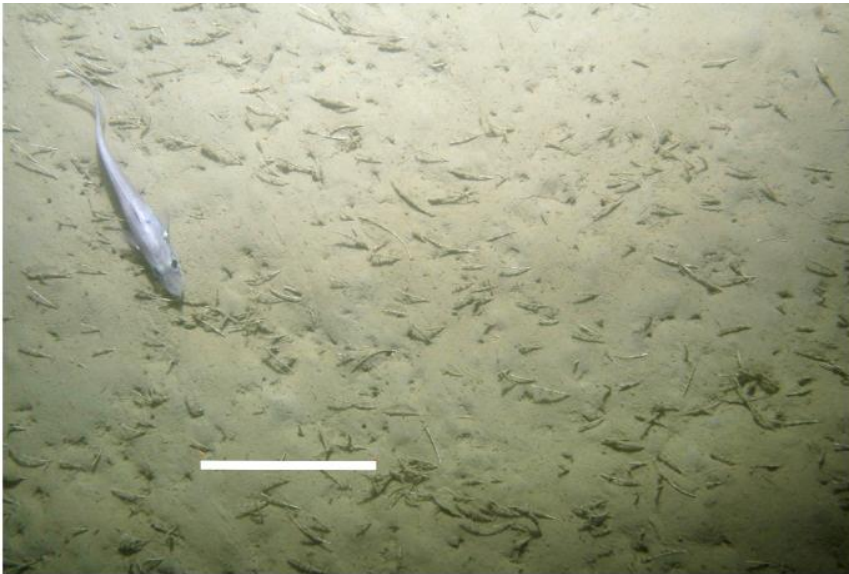
# Kaikōura earthquake

Opportunistic sampling by NIWA shortly after earthquake shows evidence of sediment flows (turbidite) extending 300 km from Kaikōura coast

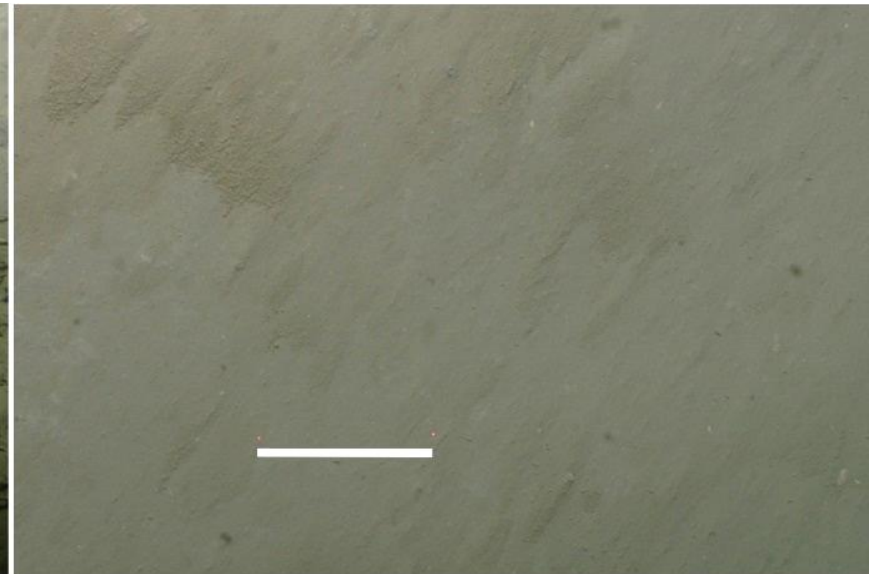


# Kaikōura earthquake

Comparison of seabed images taken in 2006 and January 2017 from Kaikōura canyon show stark contrast – vast areas buried under fresh sediments transported from shallow part of canyon



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