

In situ seabed image showing some sedimentation of fauna can be natural

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The resilience of deep-sea benthic communities to the effects of sedimentation

Tēnā koutou katoa, nau mai hoki mai ki tō tātou pānui. Ma te waka eke noa, kia mahitahi ai!



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Sedimentation Effects

The ROBES team is busy checking, processing, and analysing data from the 2018 and 2019 surveys. This will help guide the 2020 survey, but in the meantime, there is a pause in outputs, and an opportunity to remind ourselves what we are trying to address: the effects of sedimentation.



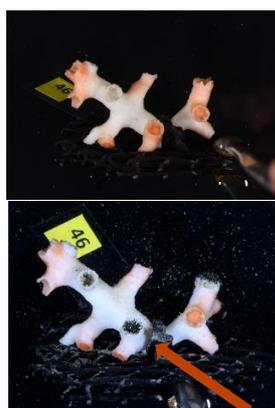
Human activities on the seafloor, such as deep-sea mining or bottom trawling, disturb sediment. In addition to direct physical impact, clouds or "plumes" of fine sediment (as shown in the image above), are created which extend into the water column before eventually settling back on the seafloor.

This suspended and settled sediment can have four main effects on animals living in the area:

- Enhanced suspended sediment and increased turbidity can reduce light penetration for visual predators, affect primary production in surface waters, and clog the feeding structures of pelagic plankton and benthic suspension and filter feeders. e.g., corals and sponges.
- Physical smothering and burial of animals and new layers of fine sediment

that cap existing sediment and can reduce oxygen penetration causing anoxic conditions.

- Changing grain size of the sediment affects the porosity and stability of the upper layers of the seafloor, biochemical fluxes through the sediment, as well as the type of animals able to live there, and their ability to move through the sediment.
- Changing organic content of the sediment and its value as food, and there can also be release of toxic substances or contaminants.



Top image shows a coral branch photographed prior to a sedimentation experiment; bottom image shows the same colony after being exposed to 500 mg/L of sediment. Note the dead polyps (black) and loss of pink tissue in the mouth region (see arrow).

How strong are the effects?

Sedimentation effects can vary depending on the types of animals and their characteristics e.g., physical structure,

feeding mode, mobility, living position, and size.

Many sub-lethal effects can occur including decreased health or fitness, reductions in reproductive success, and lower larval or juvenile survival rates.

And there are other concerns about how sedimentation can affect the overall structure and function of invertebrate communities that live on the seafloor, or in the sediment just below the seafloor surface (e.g., corals, sponges, worms).



Marine worm or polychaete, another animal that can be affected by sedimentation

However, it is largely unknown how such animals on the Chatham Rise respond to sedimentation, and that was the motivation for ROBES.

2020 Survey

The 3rd and last in the project is to monitor changes from our previous disturbance events in 2018 and 2019.

The time series (together with laboratory experiments) will hopefully provide major insights into the resilience of deep-sea communities to sedimentation and inform options for effective management of the impacts of human activities. Watch this space.