



Quantifying Benthic Biodiversity: a factual voyage report \*  
from RV *Tangaroa* voyage TAN1701 to Chatham Rise \*  
4 January – 2 February 2017 – Supplemental Material \*

New Zealand Aquatic Environment and Biodiversity Report No. 185

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## EXECUTIVE SUMMARY

**Bowden, D.A.; Davey, N.; Fenwick, M.; George, S.; Macpherson, D.; Ray, C.; Stewart, R.; Christensen-Field, C.; Gibson, K. (2017). Quantifying Benthic Biodiversity: a factual voyage report from RV Tangaroa voyage TAN1701 to Chatham Rise, 4 January – 2 February 2017.**

***New Zealand Aquatic Environment and Biodiversity Report No. 185. 98 p. + supplemental material***

Uncertainty about the environmental effects of deep-sea resource use, including bottom trawling, is an escalating issue for New Zealand. Species-environment models, which use correlations between environmental variables and records of species' presence to predict distributions, are proposed increasingly to aid management of environmental risk in the deep sea. However, quantitative data on the distribution and abundance of seabed fauna are sparse in New Zealand waters. This situation has resulted in high levels of uncertainty associated with predictive models of communities and species distributions, which in turn have resulted in precautionary management decisions in relation to proposed seabed resource use. Key knowledge required to reduce uncertainty associated with such models is quantitative baseline information about the distribution and abundance of benthic habitats, communities, and species.

The survey reported here (RV *Tangaroa*, TAN1701) was designed to acquire quantitative data about benthic habitats and fauna across Chatham Rise, an oceanic rise extending to the east of New Zealand's South Island, using a towed camera system with high-definition digital video and still image cameras, and a multicorer. Effort was concentrated in areas substantially under-sampled in previous comparable surveys of the area, with the aim of generating data that would improve future predictive models of distributions. A secondary objective to collect seabed camera transects and sediment cores at the head of Kaikōura Canyon was included in the voyage programme in response to the November 2016 Kaikōura Earthquake.

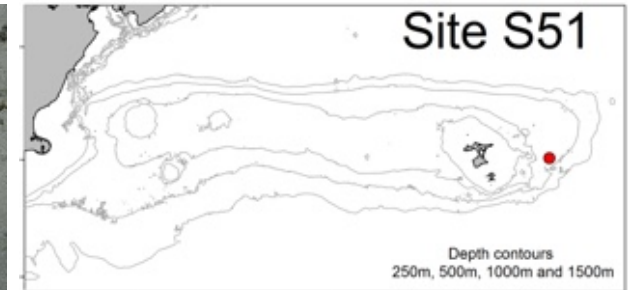
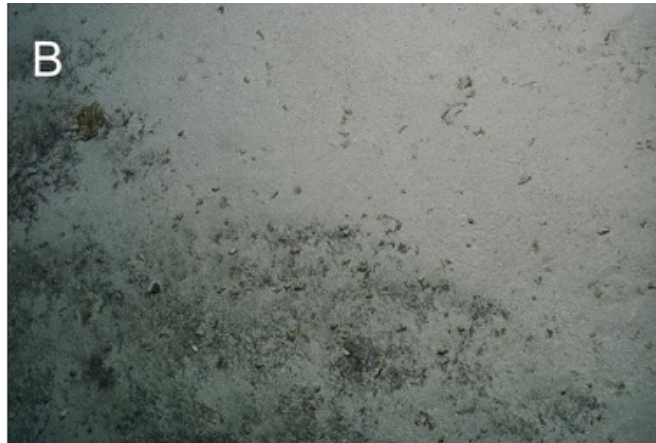
Photographic transects, each of approximately 1 km seabed distance, were completed at 142 sites across Chatham Rise, in depths from 130 m to 1407 m. This effectively doubles the number of sites on Chatham Rise from which high-resolution seabed photographic data are available. Five additional sites were sampled in Kaikōura Canyon, with overall totals of 152 towed camera and 27 multicorer deployments completed successfully. The total seabed distance covered in photographic transects was 161.4 km (approximately 600 000 m<sup>2</sup> seabed area), with 152 hours of seabed video and 36 500 still images recorded, and more than 70 000 individual observations of fauna recorded to log files. Multicorer deployments yielded a total of 101 individual sediment cores, which will be processed for sediment properties (27 cores), macro-infauna (retained on 300 µm sieve, 49 cores), and meiofauna/genetics (un-sieved, 24 cores). Multibeam echosounder data and CTD data were also collected routinely throughout the voyage.

This report presents details of activities, timings, samples, and data collected during the survey, together with preliminary descriptions of seabed habitats and faunal distributions across the study area, and a catalogue of representative images from each site. Data from the voyage will take several months to analyse in detail, yielding finer-level taxonomic identifications and more precise population density estimates than were possible at sea. Meticulous auditing and cross-checking will then be required before these data can be combined with those from earlier surveys from Chatham Rise. When this work is complete, however, the combined dataset will provide a spatially extensive, taxonomically detailed, and internally consistent resource for further study of benthic faunal distributions in what is arguably the most commercially and ecologically important deep-sea area of New Zealand's Exclusive Economic Zone.

This supplement consists of a continuation from the main document of Appendix 3; site summary pages.



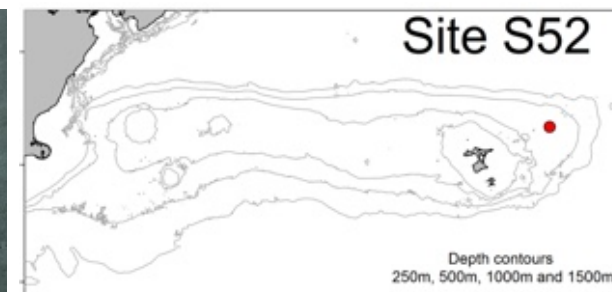




**Station 080**  
**Stratum 004**

Small knoll with current-scoured moat. Bare bedrock substrata at summit, mixed coral rubble, sand, gravel, cobbles on flank with lava outcrops. Crinoids, stylasterids, anemones, bryozoans, some small scleractinian coral colonies.





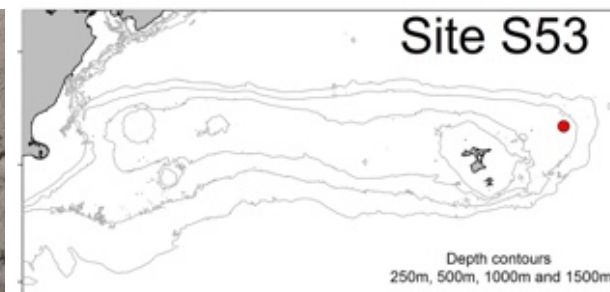
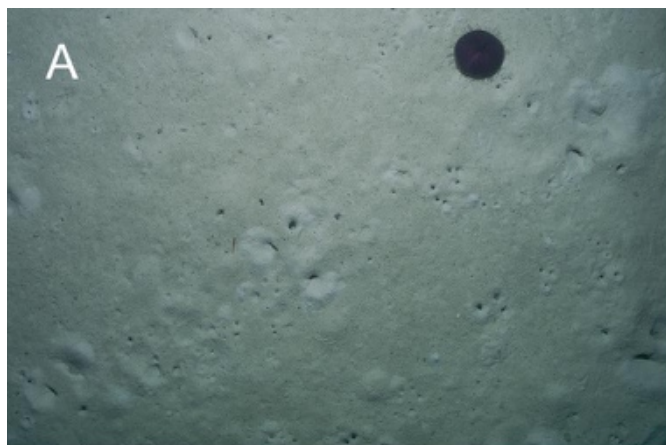
**Station 067**  
**Stratum 02B**

Level muddy sediment with numerous burrows and tracks. Small, feathery bryozoans present throughout.





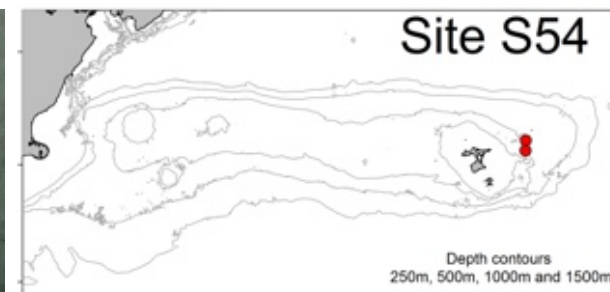
TAN1701 - Chatham Rise !



**Station 072**  
**Stratum 21B**

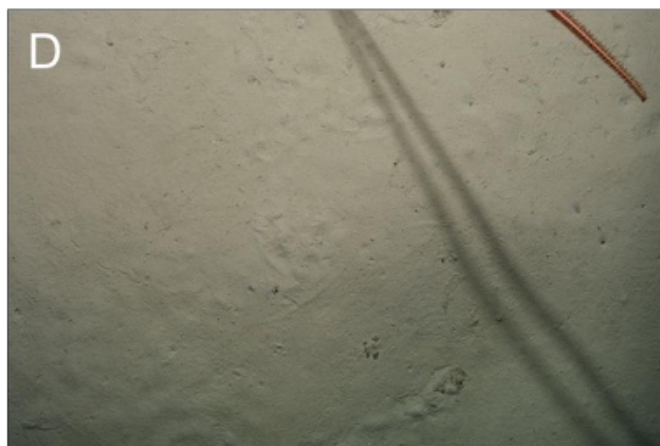
Level muddy sediments with many burrows.  
Some echinothuroid urchins and brisingid sea stars.



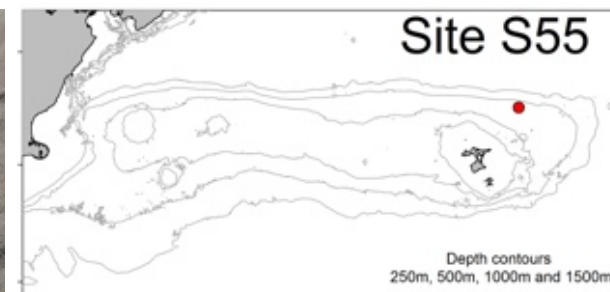


**Station 064**  
**Stratum 012**

Level muddy sand with burrows, tracks and weak current ripples. High density of cerianthid anemones, some quill worms, burrowing urchins, sea pens



## TAN1701 - Chatham Rise !



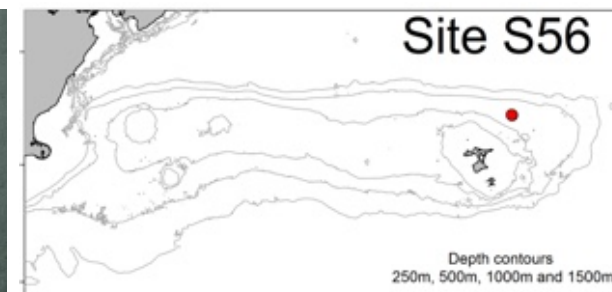
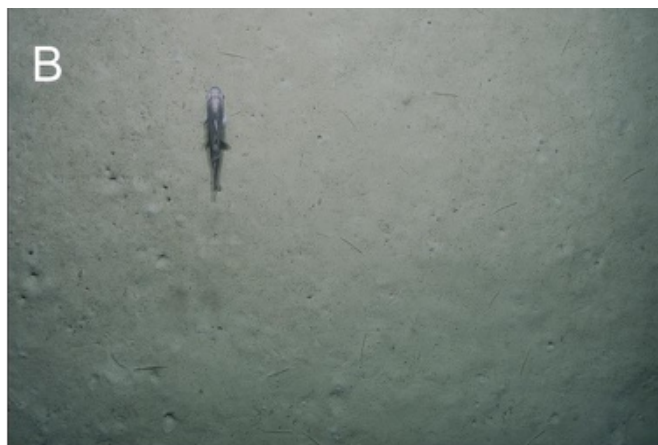
### Station 062 Stratum 21B

Level muddy sediments with high density of burrows and tracks, some trawl marks. Some quill worms, ophiuroids, echinoids, macroalgae debris.



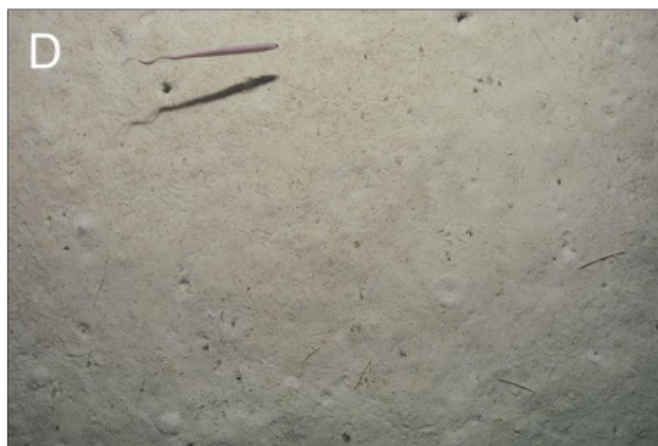


## TAN1701 - Chatham Rise !

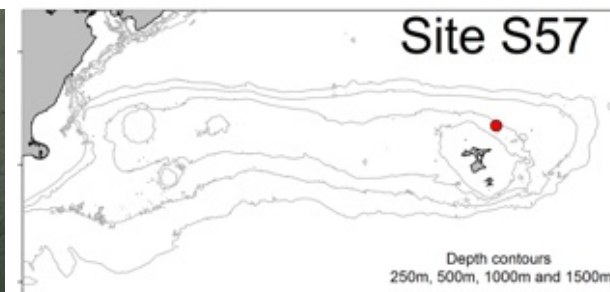


### Station 060 Stratum 02B

Level muddy sediment with burrows, mounds, and tracks. Quill worms abundant. Oreos, halosaurs, dogfish.



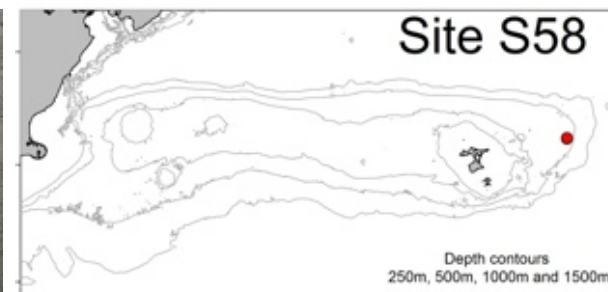
## TAN1701 - Chatham Rise !



### Station 057 Stratum 011

Muddy sediments with burrows, mounds, pits, and tracks. Burrowing urchins, crabs, many juvenile fishes.





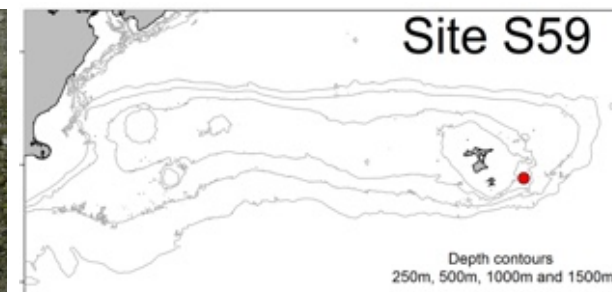
**Station 073**  
**Stratum 025**

!Sensitive Habitat! Level muddy sediments with burrows. Many Xenophyophores throughout transect, some *Anthomastus*, shrimps, and bryozoans. Xenophyophore density possibly indicative of Sensitive Habitat.





## TAN1701 - Chatham Rise !

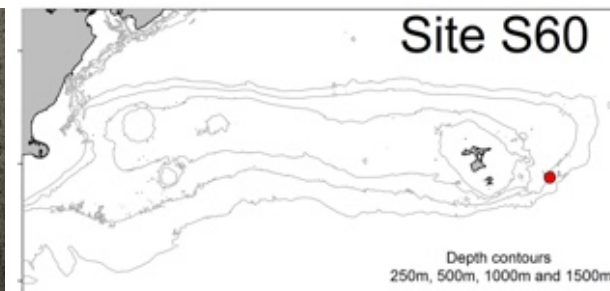


### Station 084 Stratum ---

Shallow knoll, from summit down to level seabed. Bedrock at summit, with diverse sessile fauna and flora; zoanthids(?), stylasterid corals, encrusting red algae, and fishes. Sand and shell hash deeper.



TAN1701 - Chatham Rise !

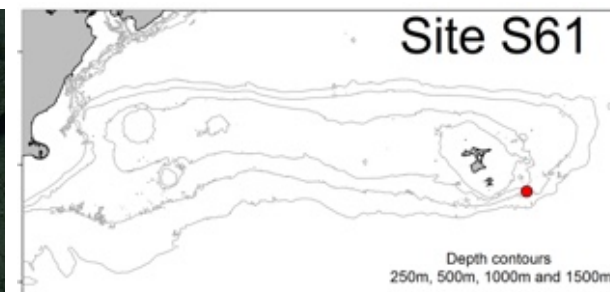


**Station 081**  
**Stratum 028**

Traversing base of a steep bluff. Rippled sand, shell hash and coral rubble with black lava boulders and rock. Sparse fauna.

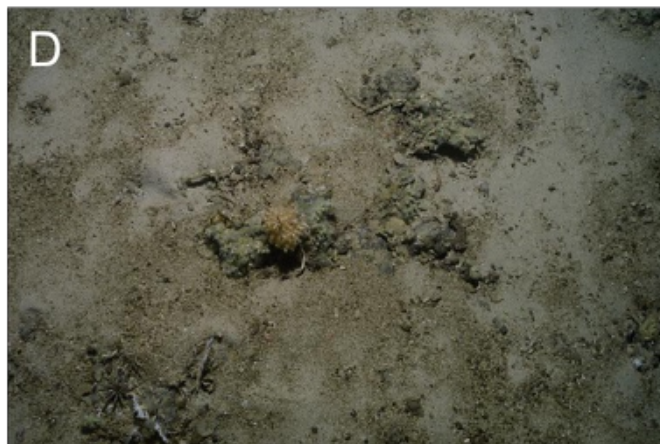


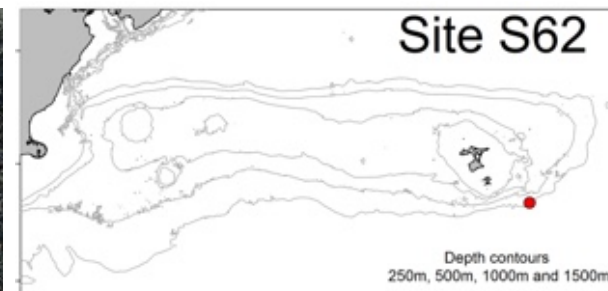
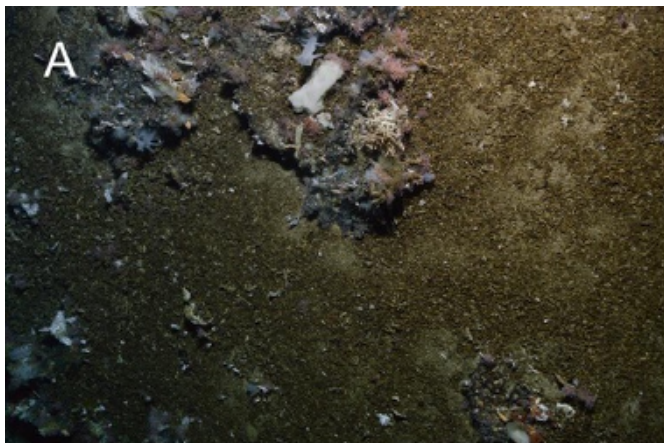




**Station 086**  
**Stratum 025**

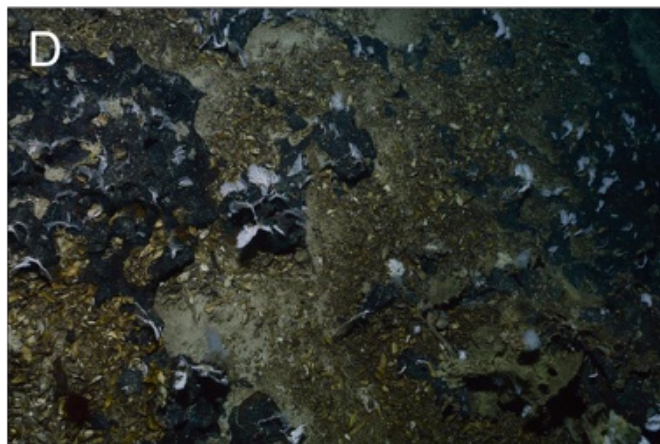
Knoll summit out on to open sediments. Pale rock, cobbles, boulders and shell hash with anemones, sponges, stylasterids. Group of large hapuka following DTIS. Sand, shell hash, and cobbles with sponges and bryozoans deeper.



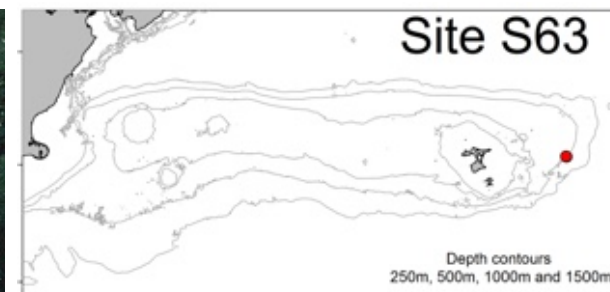
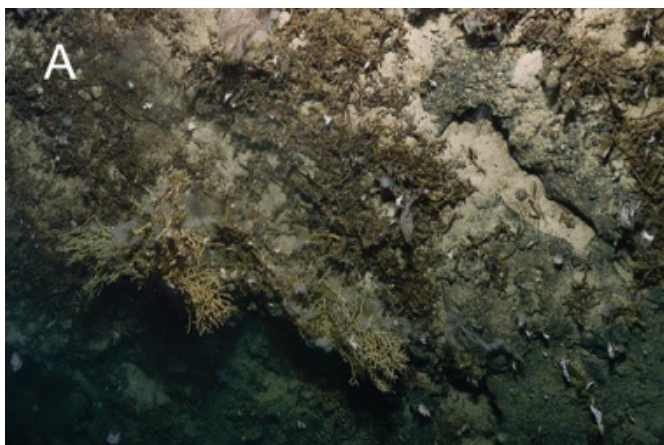


**Station 088**  
**Stratum 028**

Little Chief seamount. Mostly rock and coral rubble near summit. Some trawl marks, Baxter's dogfish common. Rippled sand at base. Running onto ridge to the W, barnacles plates, lava, and many stylasterid corals.



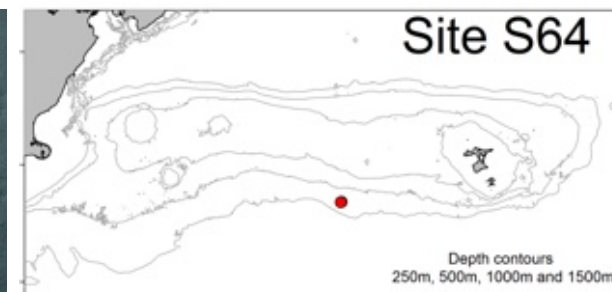
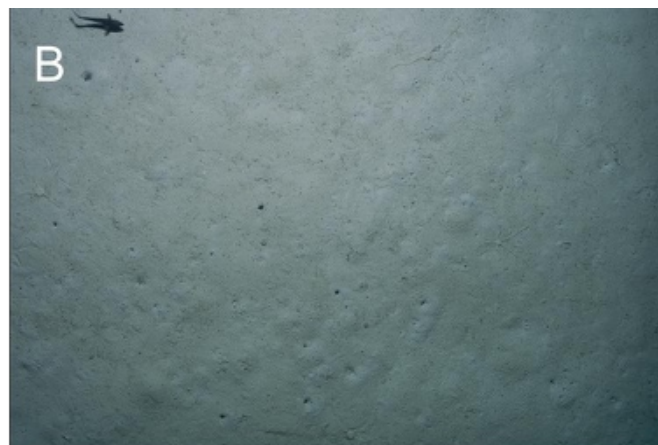




**Station 078**  
**Stratum 028**

!Sensitive Habitat! Summit of knoll; rugged bedrock with scleractinian coral thickets (*S. variabilis* and *E. rostrata*), sponges, primnoids (*Narella* sp. and others), stylasterids. Transect stopped when video link lost after impact.



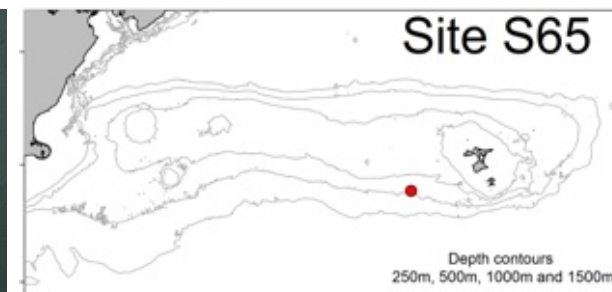


**Station 115  
Stratum 028**

Level muddy sediments with small burrows and tracks. Sparse epifauna; ophiuroids, echinothurid urchins, some spherical sponges.



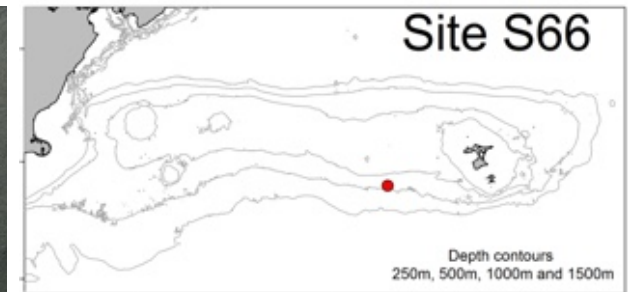




**Station 105**  
**Stratum 025**

Firm, level, muddy sand without burrows.  
Sparse fauna, *G. multidentatus*, asteroids,  
rattails, very high density of new-recruit  
holothuroids visible in still images (C, D).





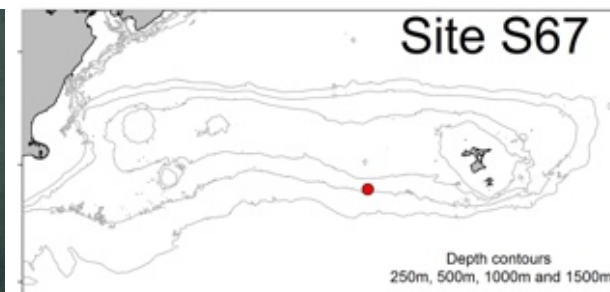
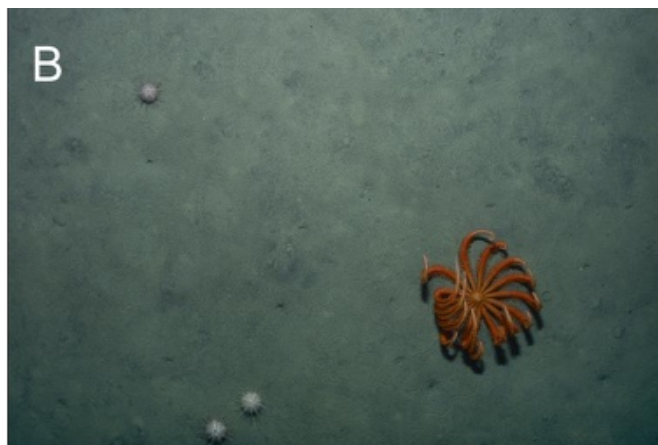
**Station 109**  
**Stratum 025**

Level muddy sand sediment with some burrows. *G. multidentatus* common, some oreo, little else observed.



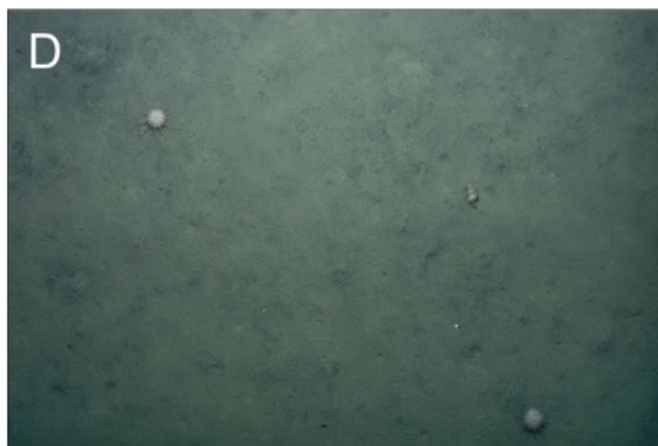
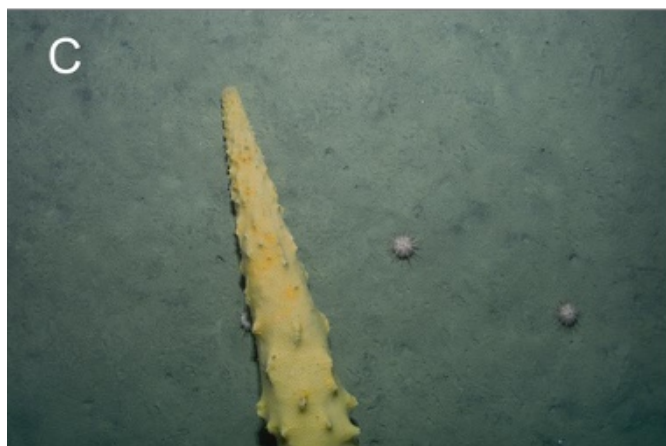


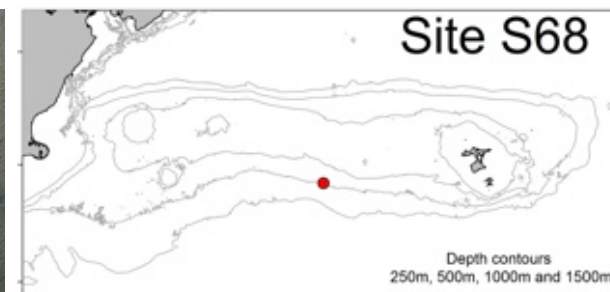
## TAN1701 - Chatham Rise !



### Station 114 Stratum 028

Level muddy sand sediment with tracks but little other bioturbation. *G. multidentatus* common throughout, one large *Hyalascus* sp. Sponge, occasional cobbles with small sponges.



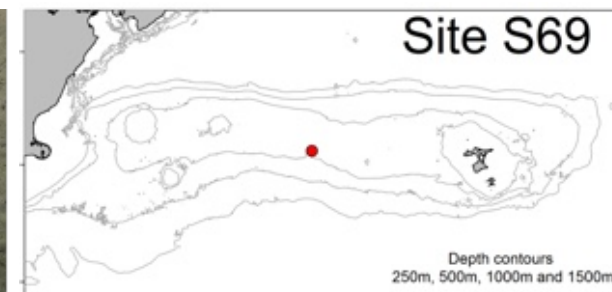


**Station 119**  
**Stratum 029**

Level muddy sand sediment, black sand. Few burrows or other bioturbation, *G. multidentatus* throughout transect, some asteroids, echinothuroid urchins, and spherical sponges.



## TAN1701 - Chatham Rise !



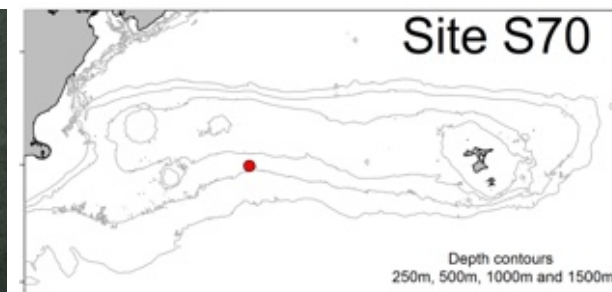
### Station 025 Stratum 014

Level muddy sediments with numerous small burrows. Anemones abundant, munida, flabellum, Anthomastus, one large Hyalascus sponge.



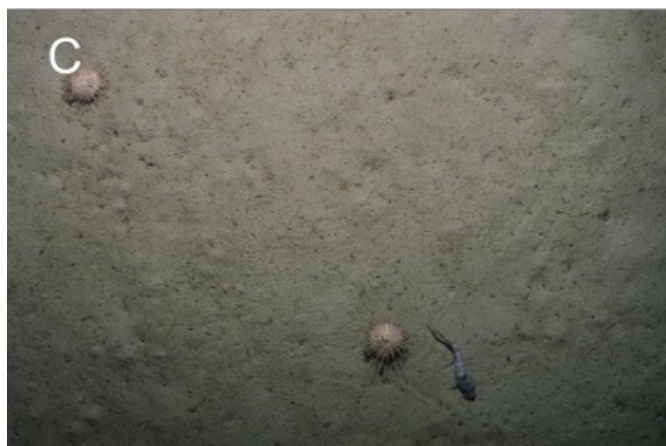


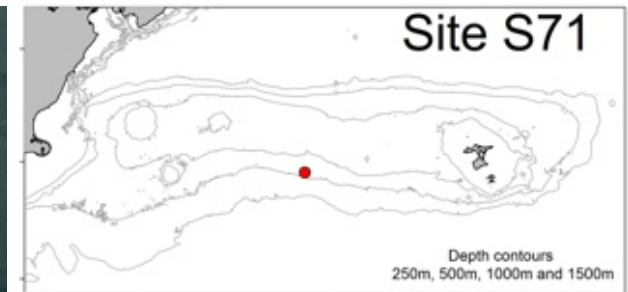
## TAN1701 - Chatham Rise !



### Station 123 Stratum 026

Level green-brown muddy sediments with burrows. Flocculated phytoplankton deposits throughout transect. *G. multidentatus* common, some holothuroids.

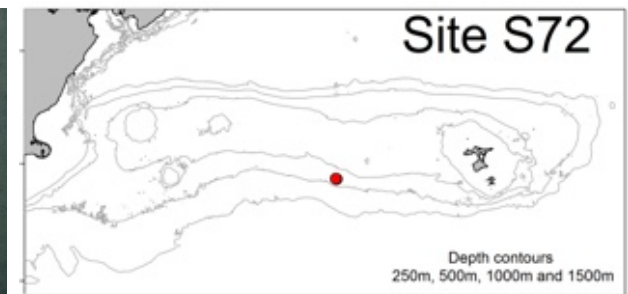
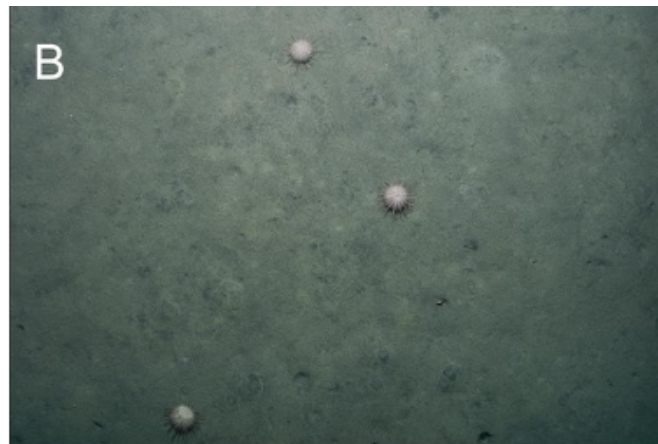




**Station 120**  
**Stratum 026**

Level muddy sand sediment, black sand. Few burrows or other bioturbation, *G. multidentatus* throughout transect. [manually-driven transect]





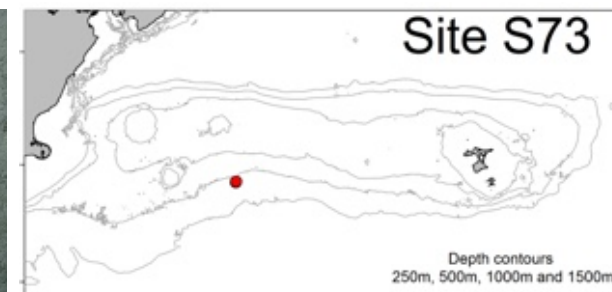
**Station 117  
Stratum 004**

Level muddy sand sediment, black sand. Few burrows or other bioturbation, *G. multidentatus* throughout transect.





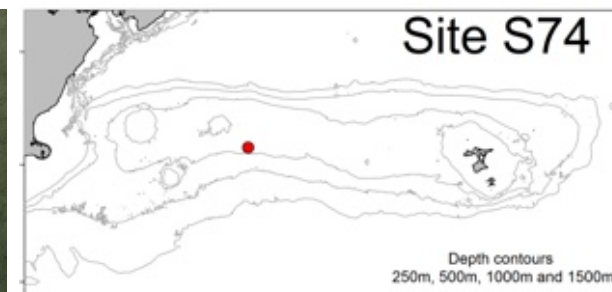
TAN1701 - Chatham Rise !



**Station 126**  
**Stratum 029**

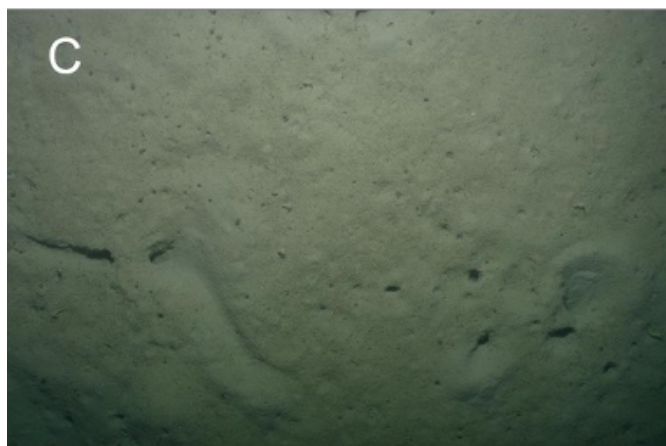
Level green-brown muddy sediments with few burrows. *O. lymani* abundant, some *G. multidentatus*, holothuroids, and spherical sponges.



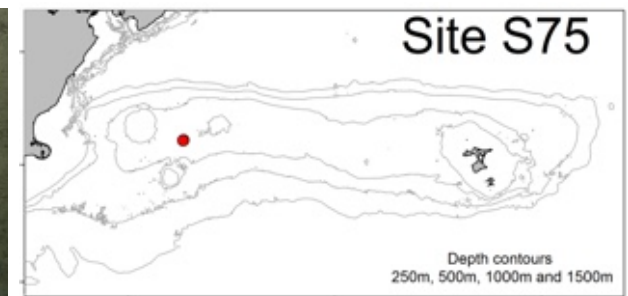


**Station 122**  
**Stratum 015**

Muddy sediment, green-brown, with many burrows, including scampi burrows, tracks, and pits. Few epifauna seen; asteroids, *T. tauhou*, hydroids. Old trawl marks at one point. Marginal sea state for DTIS.



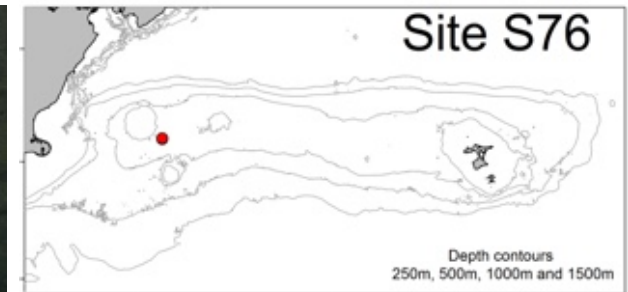




**Station 005**

Muddy sediments with burrows, mounds, *M. gracilis*, seapens.



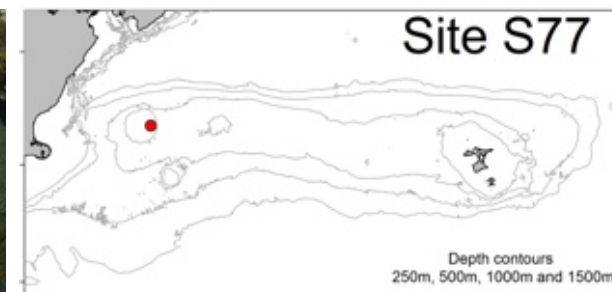
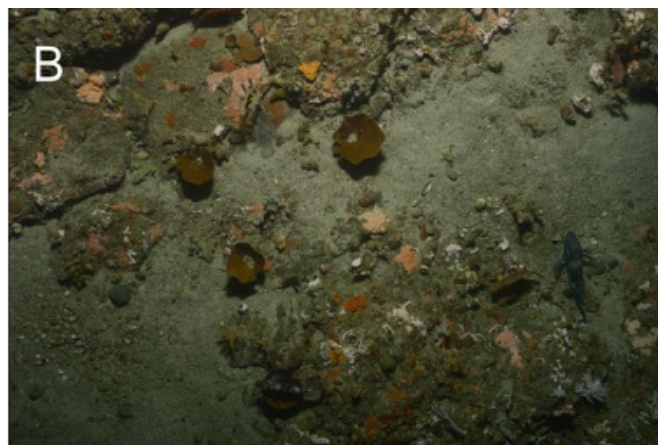


**Station 155**  
**Stratum 018**

Black muddy sand with many deep pits, burrows, and mounds. Scampi, sea-pens (white, whip-like), and *Munida* sp. Common.



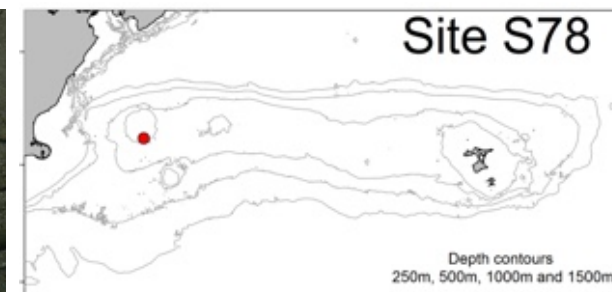
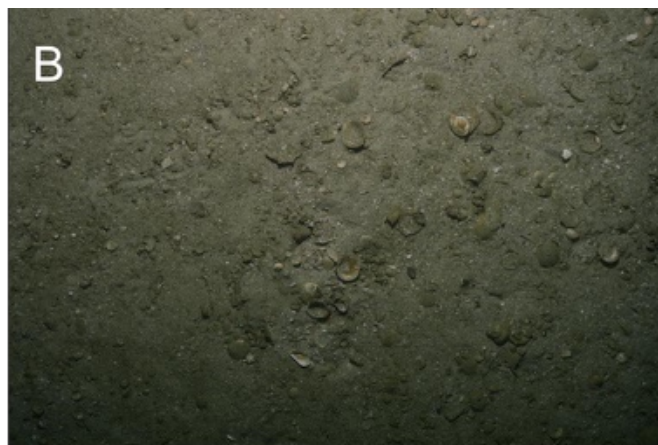
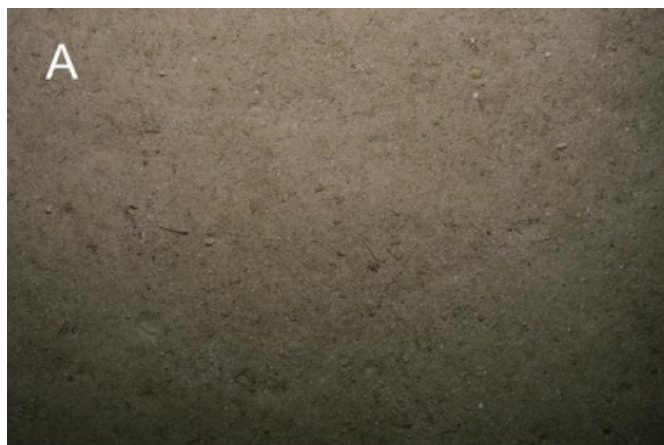




**Station 158**  
**Stratum ---**

Shallow rocky outcrop on E rim of Mernoo Bank. Bedrock then rippled sand. Diverse sponges, stylasterids. Cloud of mysids in floodlights through much of transect. No lasers.



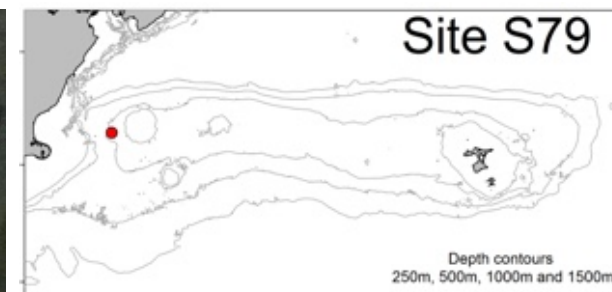


**Station 156  
Stratum 018**

Shell hash, muddy sand and gravel, rippled sand at end. Sparse fauna, few large blue sponges.



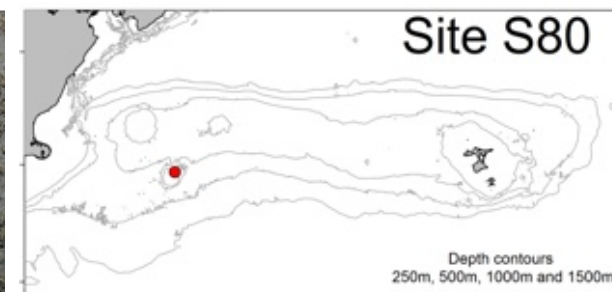




**Station 170  
Stratum 07A**

Muddy sediments with dark sand. Burrows, tracks, mounds, pits. Seapens (white whip and spiral) common throughout, burrowing urchins, and scampi. Trawler operating up-current.



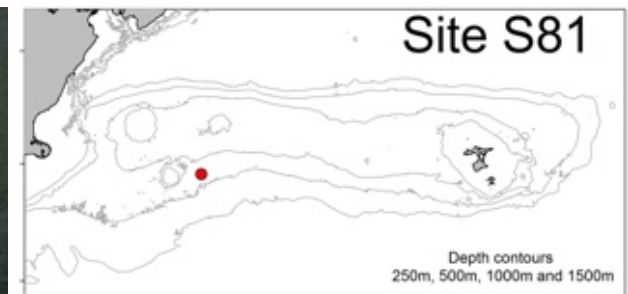


**Station 153**  
**Stratum 017**

Veryan Bank. Shell hash and worm tubes with brachipods, *Munida* sp., and some asteroids. Numerous juvenile hoki.





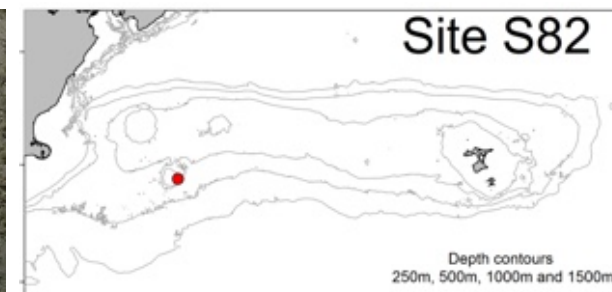


**Station 128**  
**Stratum 004**

Level muddy sediment with few burrows.  
Sparse epifauna; *G. multidentatus*,  
holothuroids, some burrowing urchins.



## TAN1701 - Chatham Rise !



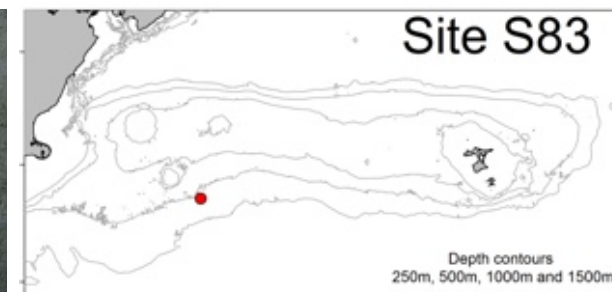
### Station 135 Stratum 017

Veryan Bank. Video recording not on at start; transect extended to compensate. Bivalve shell hash, pale sand, patches of bedrock. Fauna of sponges, tube worms, anemones, stylasterids. Squid beak in image #157.



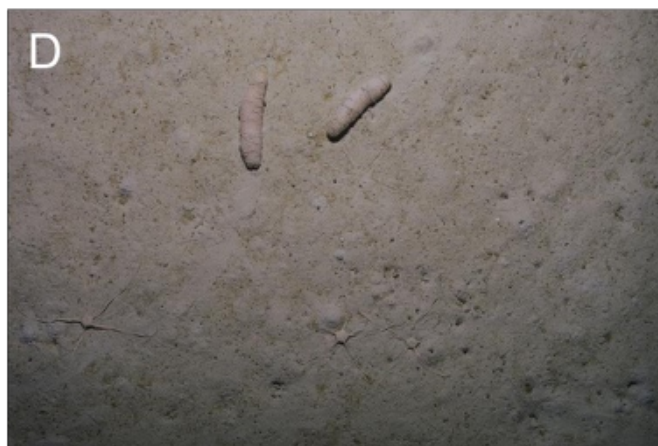
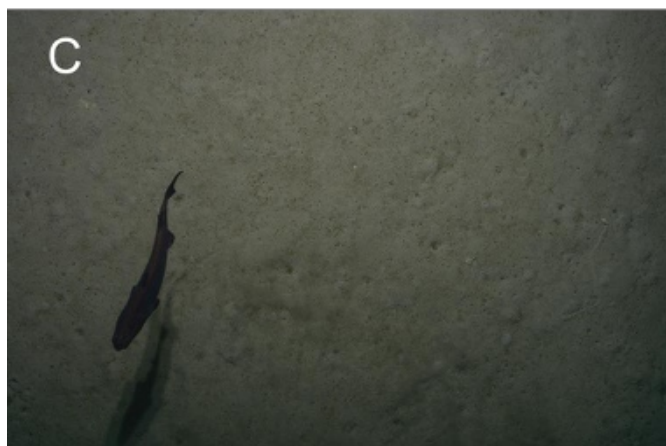


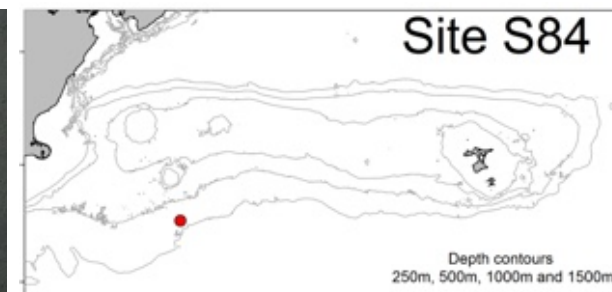
## TAN1701 - Chatham Rise !



### Station 129 Stratum 029

Level muddy sediments with phytoplankton detritus throughout. Few burrows. Sparse fauna, *O. lymani*, echinothuroid urchins, holothuroids, dogfish and rat tails.

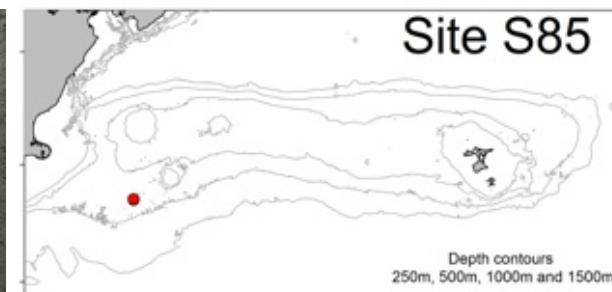




**Station 131**  
**Stratum 029**

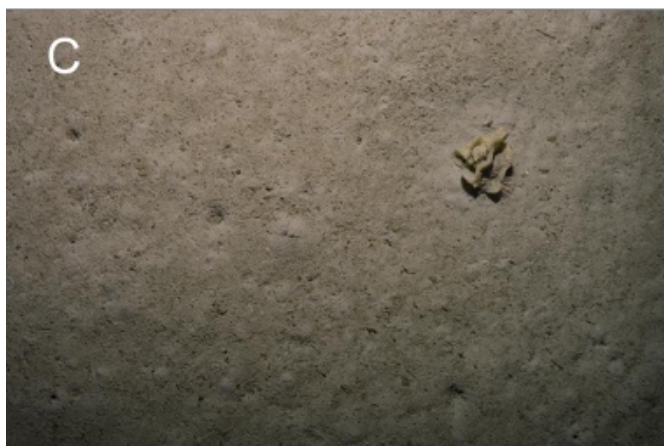
Level pale brown muddy sediments with few burrows and many tracks, some rings-of-burrows. *O. lymani* common throughout, some *Benthodytes* sp. holothuroids and echinothuroid urchins. Eels common.



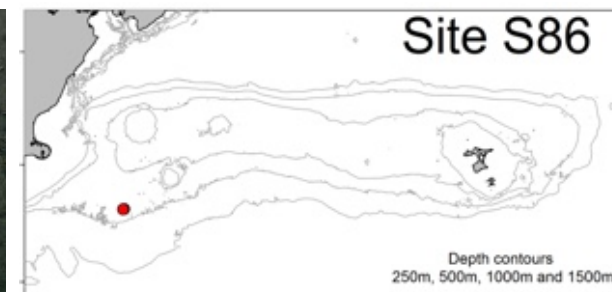


**Station 136**  
**Stratum 006**

Level muddy sediments, few burrows, small-scale biogenic structure. Holothuroids, quill worms, asteroids.

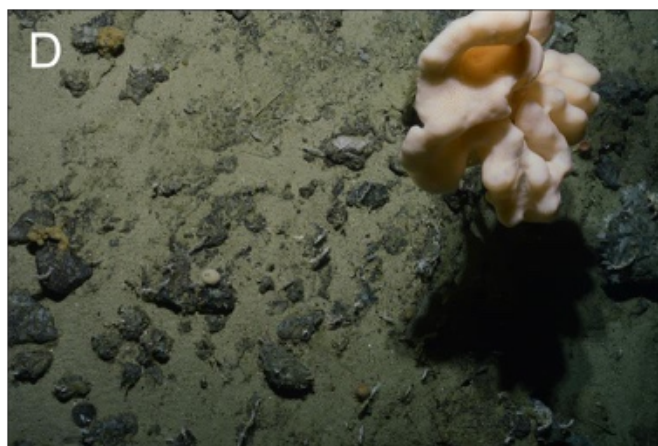


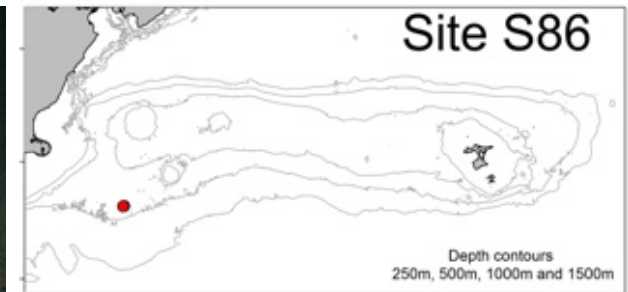




**Station 138**  
**Stratum 027**

Across flat-topped knoll. Dark bedrock, boulders, cobbles, with sand. Stylasterids, large sponges, quill worms on sand. Large dead sponges in places.





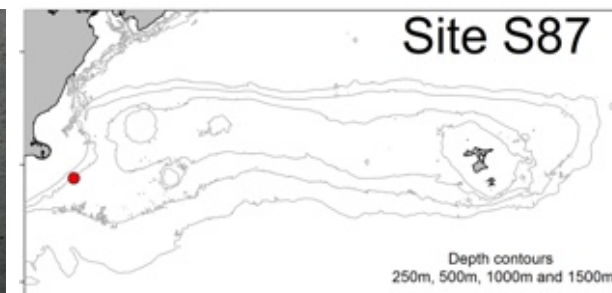
**Station 139**  
**Stratum 027**

Across small knoll WSW of #138. Altitude too high for latter half of transect due to steep drop-off. Volcanic rock, cobbles and sand on summit, becoming boulders, coral rubble, sand and gravel down flank. Stylasterids and bryozoans abundant on summit, soft corals abundant on flank. Coral rubble and some intact stony coral thickets but none confirmed live.





## TAN1701 - Chatham Rise !

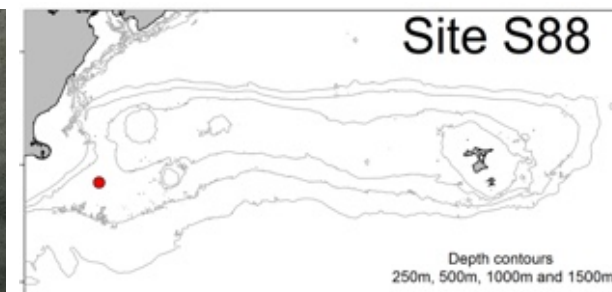


### Station 148 Stratum 016

Level muddy sediment, small burrows, little biogenic structure. High density of quill worms, some holothuroids and pagurids. Trawl marks throughout, and pockmarks in MBES.





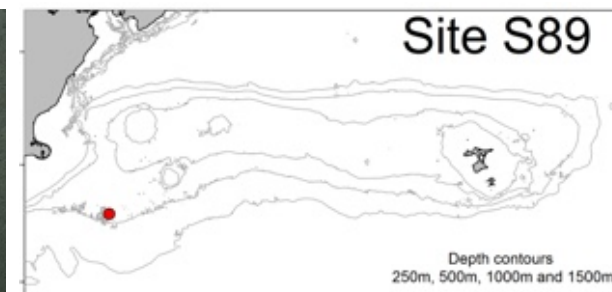


**Station 150  
Stratum 006**

Level muddy sediment with burrows, tracks, mounds. High density of quill worms, few cidaroid urchins, *Flabellum* sp. and *Anthomastus* sp.



TAN1701 - Chatham Rise !

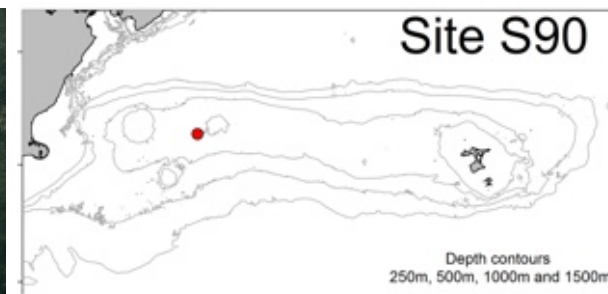


**Station 141**  
**Stratum 027**

Level muddy sediments, no burrows, fine-scale biogenic structure throughout. Holothuroids, echinoids, xenophyophores, asteroids; all at low densities.







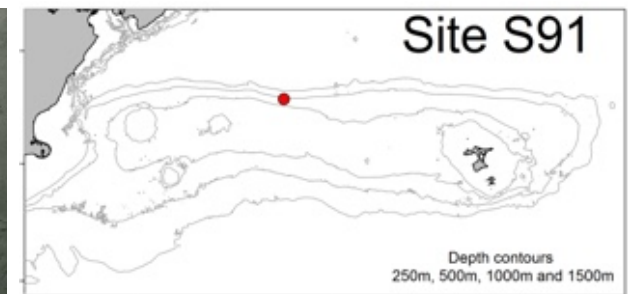
**Station 007**  
**Stratum 019**

Dark, firm, sandy sediments with reticulated appearance, some patches of black sand with chalk in places. Fauna of sponges, asteroid, tube worms, cup corals.



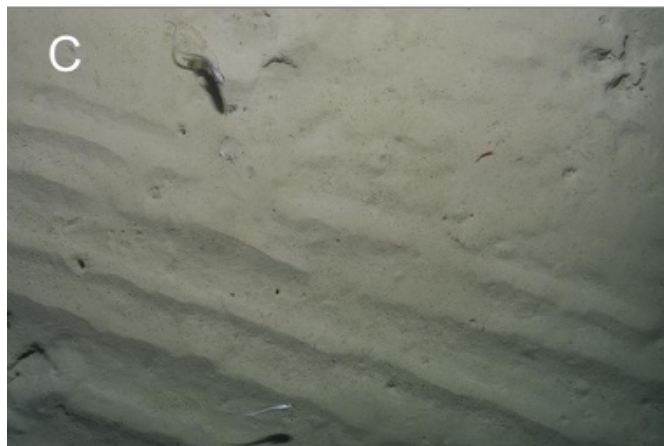


## TAN1701 - Chatham Rise !

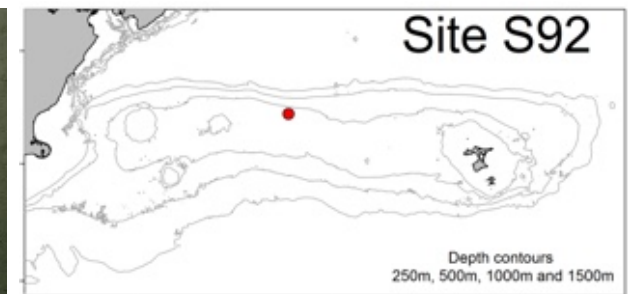


### Station 022 Stratum 022

Level muddy sediments with burrows, current ripples, and trawl marks. *E. eximia* holothuroids, asteroids, rat tails, oreos.



## TAN1701 - Chatham Rise !

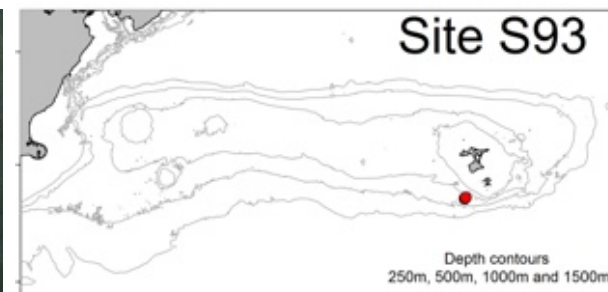


**Station 023**  
**Stratum 020**

Muddy sediments with dark sand under.  
Burrows, mounds, pits, tracks.

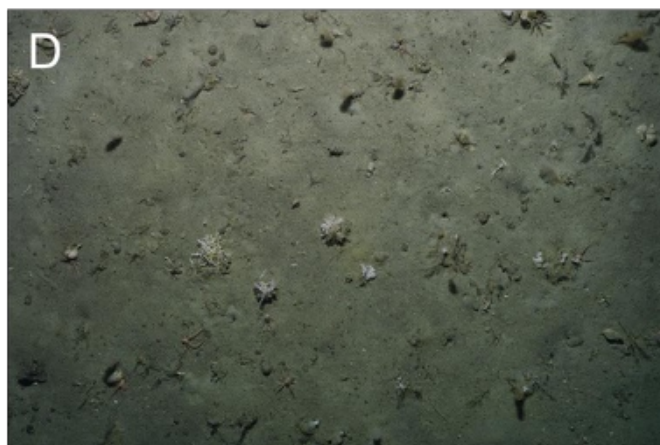
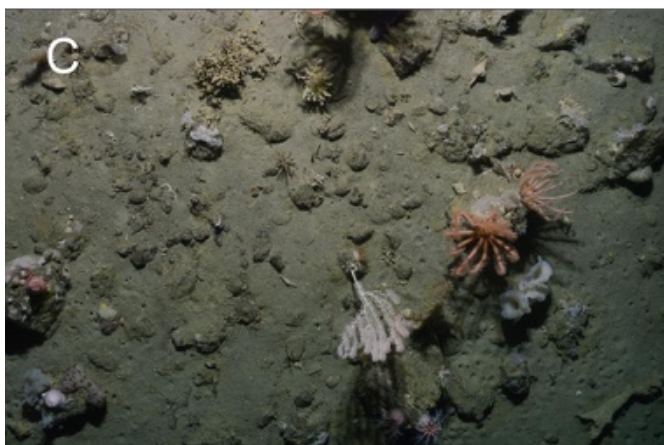


## TAN1701 - Chatham Rise !



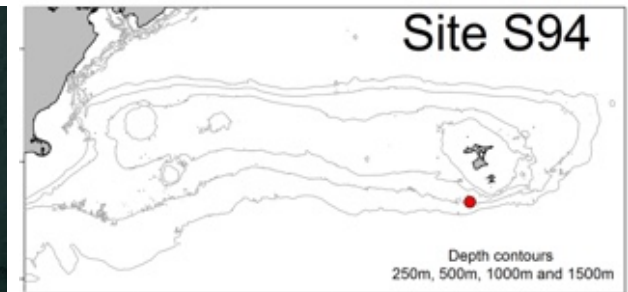
### Station 092 Stratum 004

Transect across flat-topped plateau west of target S93. Level firm muddy sand with scattered cobble and boulder. Diverse fauna with sponges, bryozoans, stony corals but all at low densities.





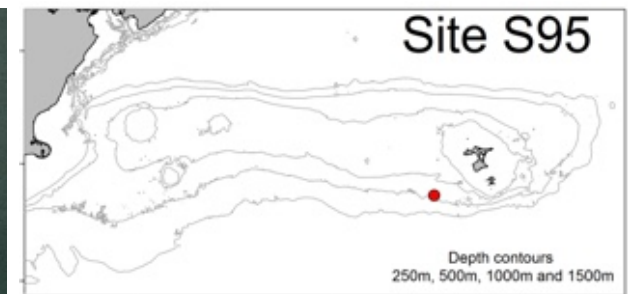
## TAN1701 - Chatham Rise !



### Station 091 Stratum 025

!Sensitive habitat! Mostly muddy sediment with old coral rubble but with outcropping bedrock in places. Many shrimps and *G. multidentatus*, with some scleractinian coral thickets (*Madrepora* sp.?).



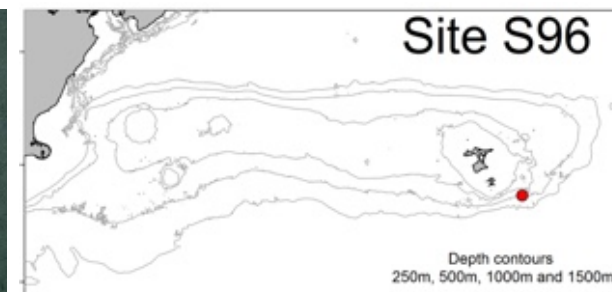


**Station 102  
Stratum 025**

Level muddy sand sediments. *G. multidenatatus* common, rat-tails. [Manually-driven transect].

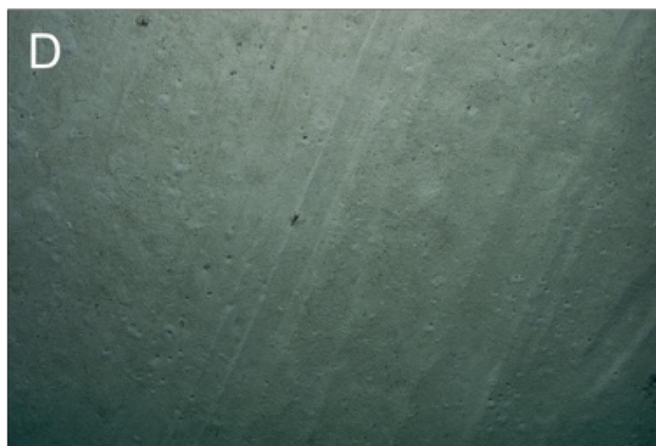




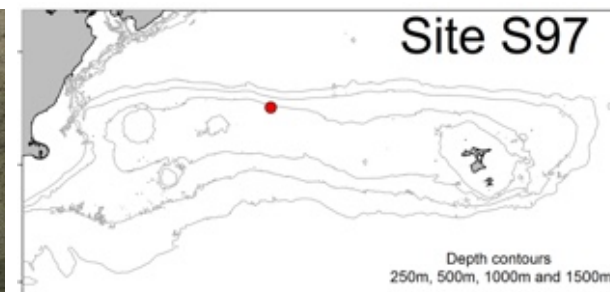


**Station 089**  
**Stratum 025**

Level firm muddy sediments with few burrows at start, low rocky outcrop near end. Trawl marks throughout. *Gracilechinus multidentatus* urchins common on sediment, some black corals and bryozoans on outcrop.



## TAN1701 - Chatham Rise !

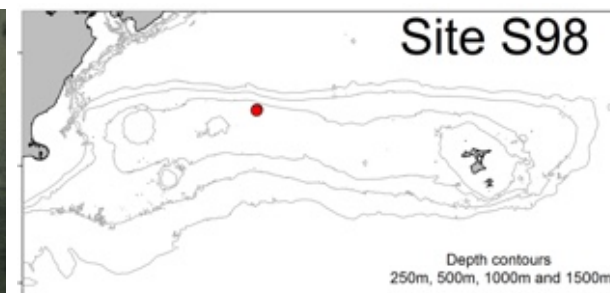


### Station 021 Stratum 08B

Fine greenish muddy sediments overlying black sand. Burrows, pits, mounds and tracks. Scampi, asteroids, holothuroids, one large crab.





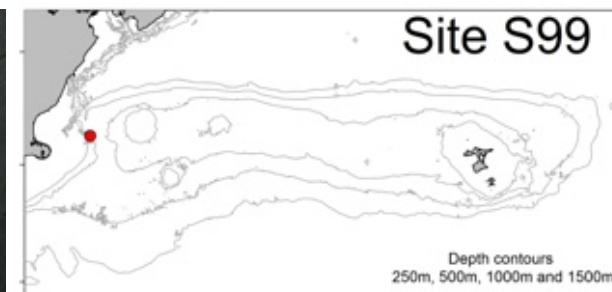


**Station 019  
Stratum 02A**

Fine greenish muddy sediments overlying black sand. Burrows, pits, mounds and burrowing urchin tracks. Scampi, burrowing urchins, asteroids.



## TAN1701 - Chatham Rise !

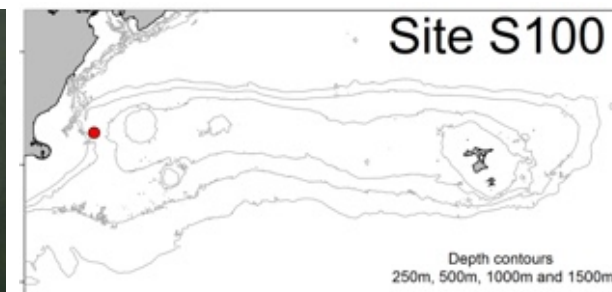
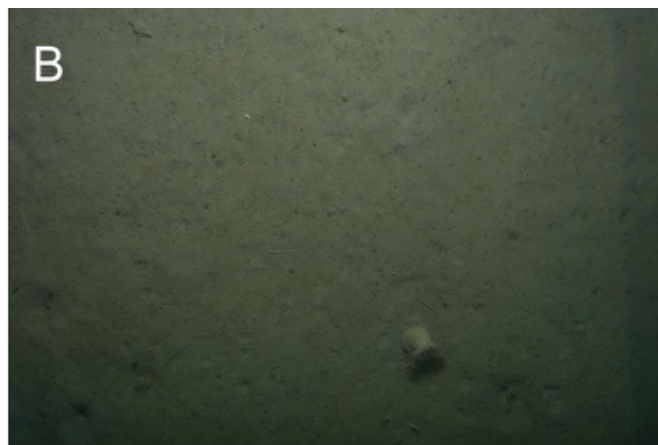


### Station 172 Stratum 001

Current-rippled muddy black sand with shell/coral hash and patches of cobble and gravel in places. Quill worms, *G. multidentatus*.





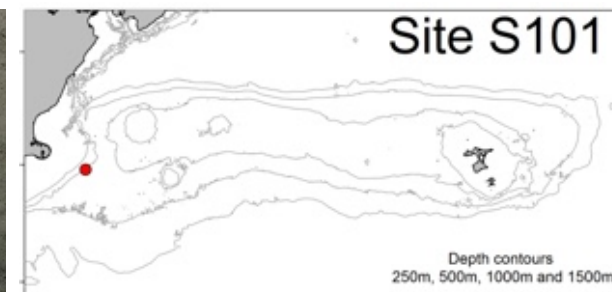


**Station 171**  
**Stratum 07A**

Level muddy sediments, few burrows. Some quill worms and *Munida* sp. but generally sparse fauna. Curved track and altitude high.



## TAN1701 - Chatham Rise !

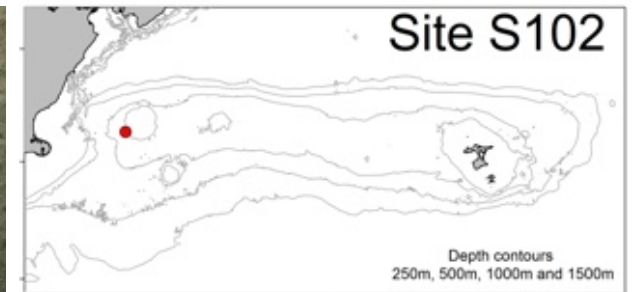


### Station 149 Stratum 016

Level muddy sediment, few burrows, little biogenic structure. High density of quill worms, some scampi, pagurids, and cidaroid urchins. Trawl marks throughout, and pockmarks in MBES.



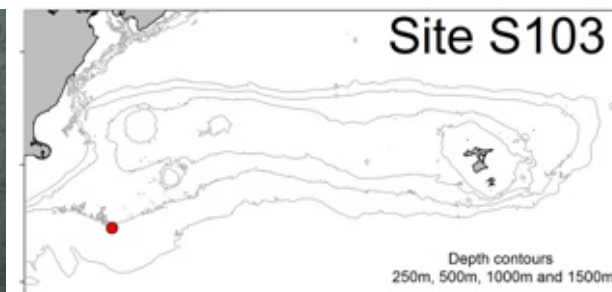




**Station 169**  
**Stratum 018**

Level muddy sand sediment with fine shell hash, no burrows, sparse fauna.



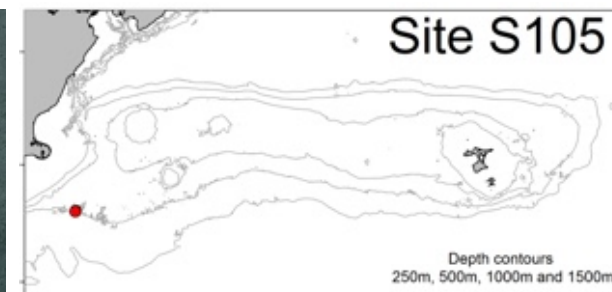


**Station 140**  
**Stratum 030**

Level muddy sediment, few burrows.  
Xenophyophores, *O. lymani*, holothuroids, and  
some echinothuroid urchins.



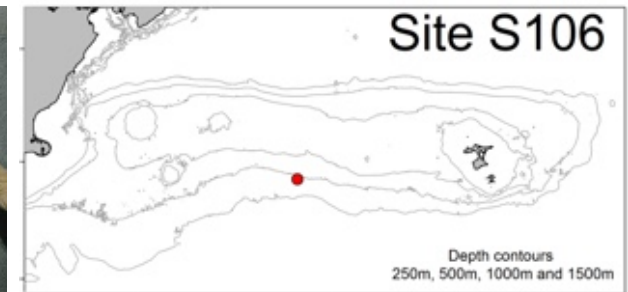
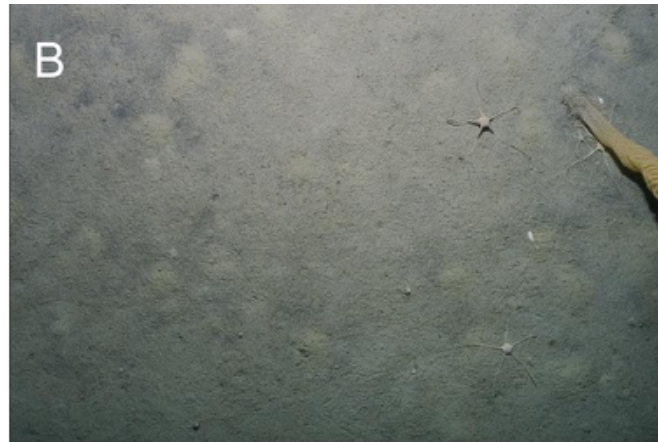




**Station 143**  
**Stratum 030**

Area with extensive sink-hole topographic features. Level muddy sediments, few burrows, fine-scale biogenic structure. Rocky scarp and boulder and cobble substrata in places. Xenophyophores in high density in all level sediment areas.





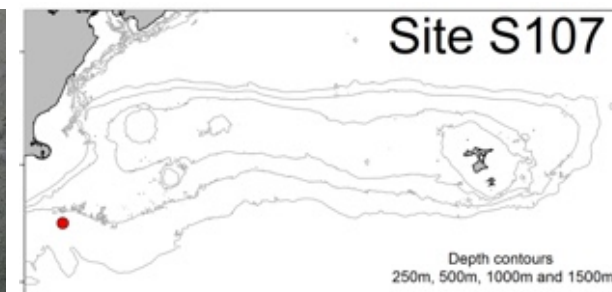
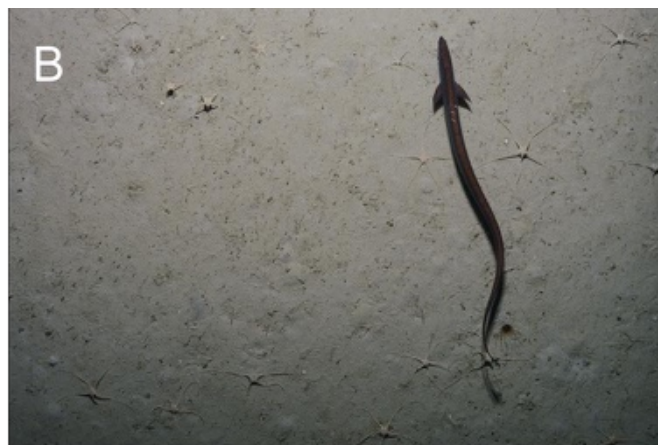
**Station 121**  
**Stratum 029**

Level muddy sand sediment, black sand. Few burrows or other bioturbation, *Ophionotus lymani* throughout transect, some *G. multidentatus*, occasional sea-pens and sponges. [manually-driven transect]





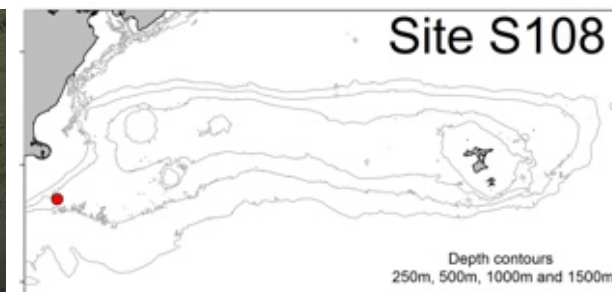
TAN1701 - Chatham Rise !



**Station 145  
Stratum 030**

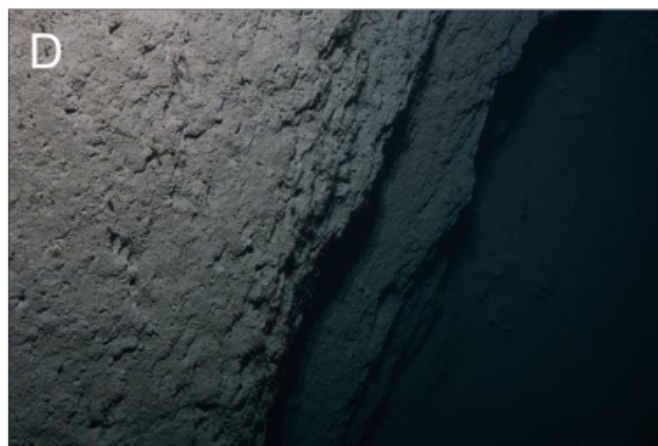
Level muddy sediment with fine-scale biogenic structure. High density of *O. lymani*, some echinoids and holothurians.



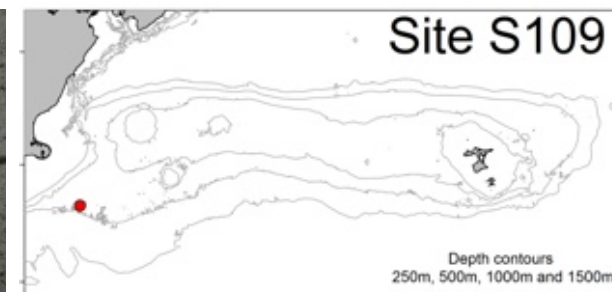


**Station 147  
Stratum 006**

MBES shows many pockmarks. Level muddy sediments, no burrows, little fine-scale biogenic structure. Some patches of coarser sediment with a few sponges on larger cobbles. Steep scarp towards end of transect. Very high density of quill worms, some xenophyophores and *Flabellum* sp.



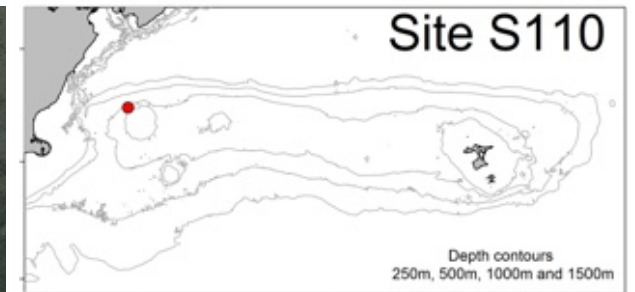




**Station 142**  
**Stratum 027**

Area with extensive large 'sink-hole' topographic features. Level muddy sediments, few burrows, fine-scale biogenic structure. Rocky scarps and boulder and cobble substrata in places. Quill worms, xenophyophores, cidaroid and echinothuroid urchins, some asteroids. Xenophyophores at high density near end of transect.





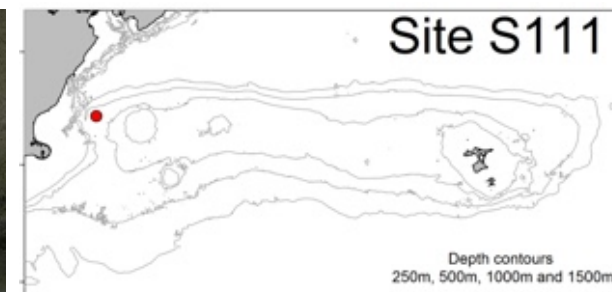
**Station 168  
Stratum 07A**

Level muddy sediments with burrows, mounds, pits, and tracks. Sea-pens (white whip) common.





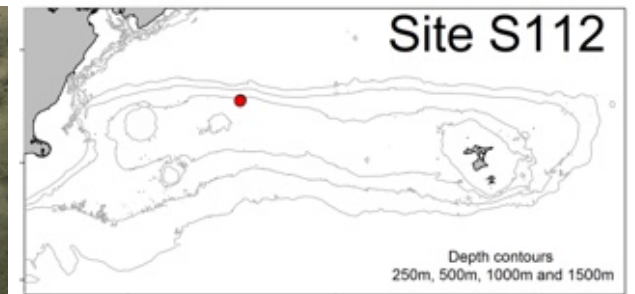
## TAN1701 - Chatham Rise !



### Station 173 Stratum 001

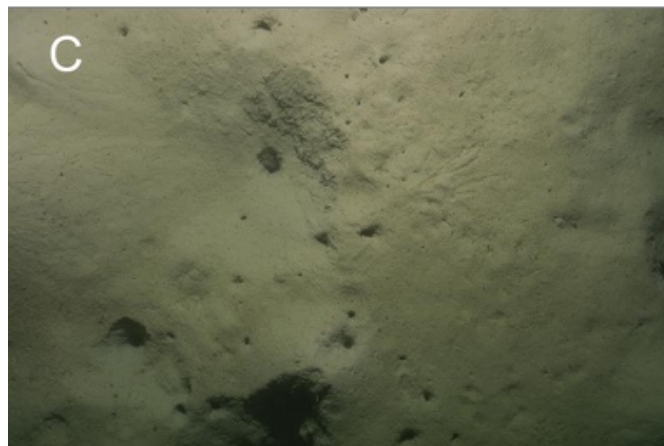
Level muddy sediment with many burrows and fresh phytoplanton detritus. Some sea-pens (brown bushy) and *Flabellum* sp.



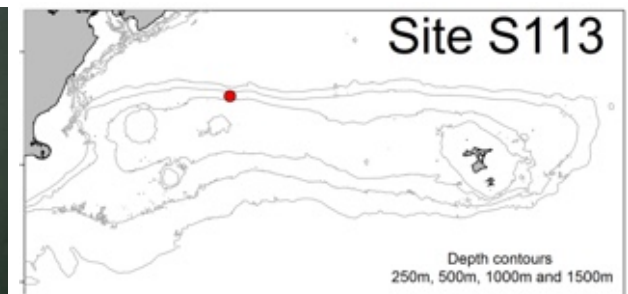
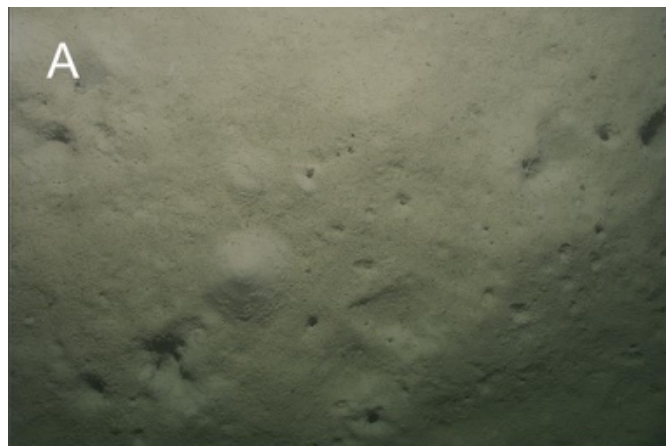


**Station 013  
Stratum 08A**

Fine muddy sediment, many burrows, pits, and mounds. Scampi, asteroids, *Munida gracilis*.

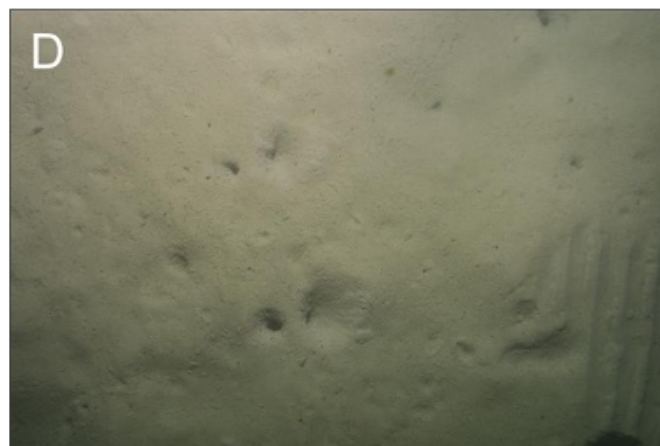




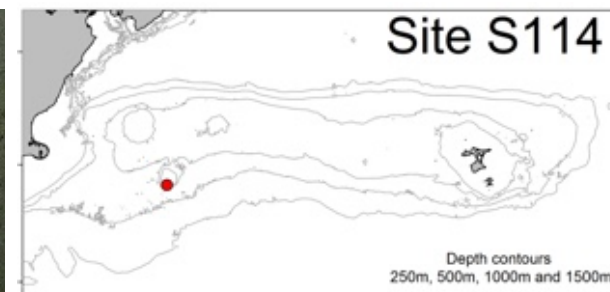


**Station 012  
Stratum 02A**

Muddy sediments. At start, high density of burrows, mounds, pits. Later, extensive trawl tracks. Water turbid.



## TAN1701 - Chatham Rise !



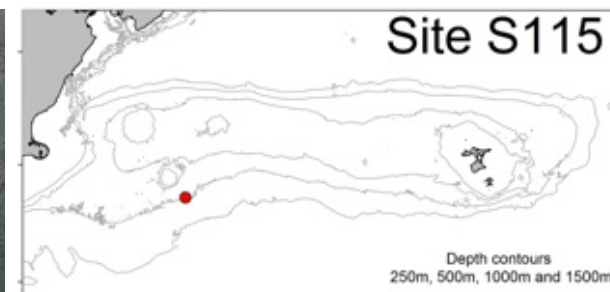
### Station 134 Stratum ---

Veryan Bank summit plateau and rim. Sand with areas of rock and cobble. Brachiopod shells and live brachiopods conspicuous throughout transect. Also anemones.





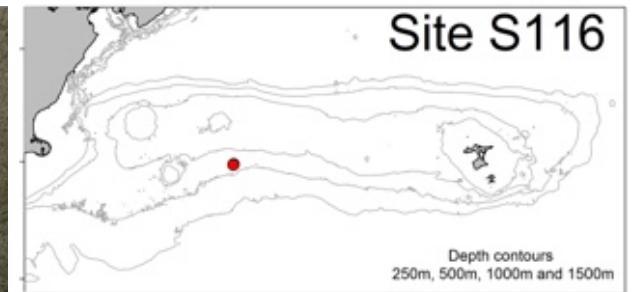
## TAN1701 - Chatham Rise !



### Station 130 Stratum 026

Level muddy sediments with phytoplankton detritus throughout. Few burrows. Sparse fauna, *G. multidentatus*, holothuroids.



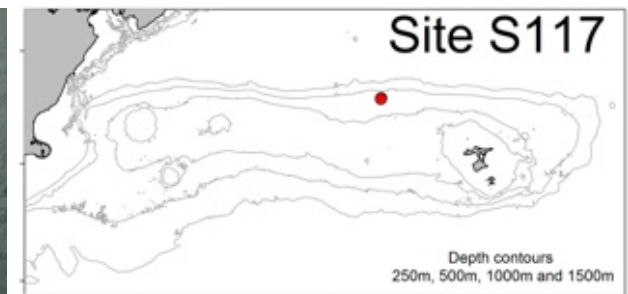
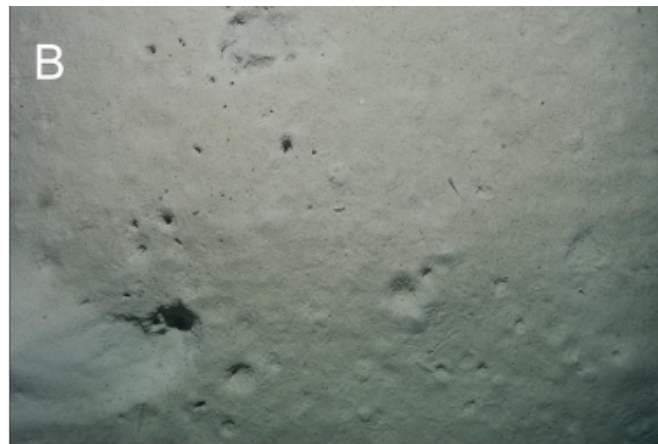
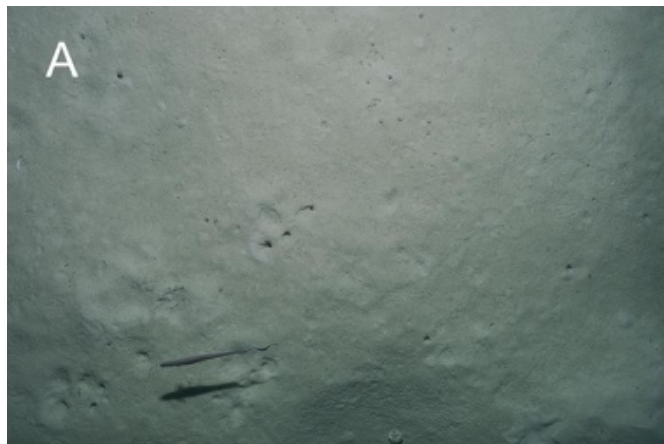


**Station 125  
Stratum 026**

30 min transect to investigate steep western rim of depression. Steep terraced rock drop-off with sparse sessile fauna at start, becoming level sediment substrata with *G. multidentatus*. One boulder with *D. horridus* and a large primnoid.

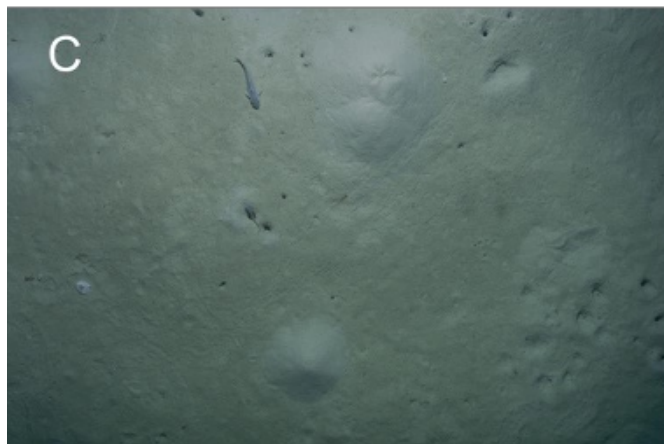


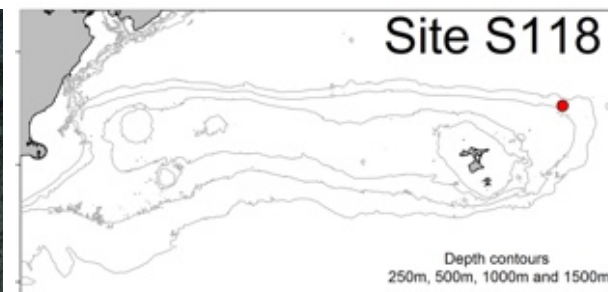




**Station 034**  
**Stratum 02B**

Soft muddy sediments with burrows, pits, mounds. Sparse epifauna.



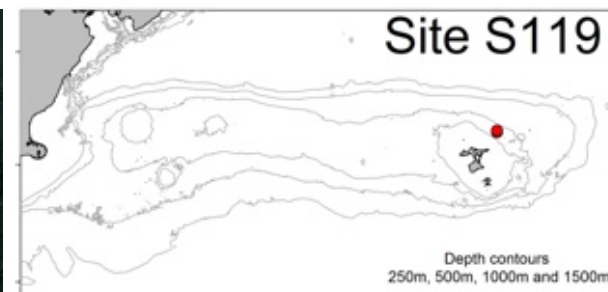


**Station 068  
Stratum 024**

Seamount site "Smith's City". Heavily trawl-impacted, some orange roughy over bedrock and coral rubble on summit, becoming lava, boulders, and sand on lower flanks.





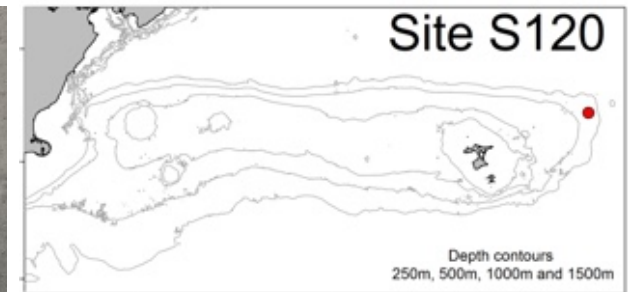


**Station 058**  
**Stratum 009**

!Sensitive Habitat! Transect across the summit of a low rocky knoll. Shell hash, sand, and gravel on the flanks, patches of bare outcropping rock on the summit. Sponges and antipatharian and stylasterid corals on rock substrata, brachiopods recorded on gravel substrata.



## TAN1701 - Chatham Rise !

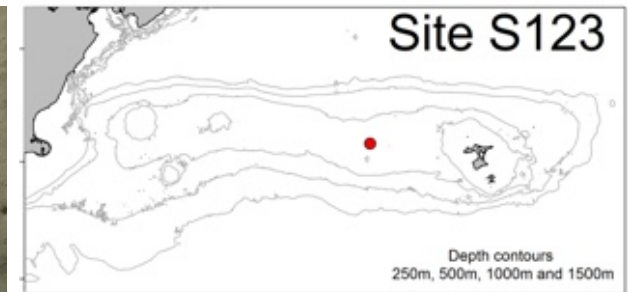
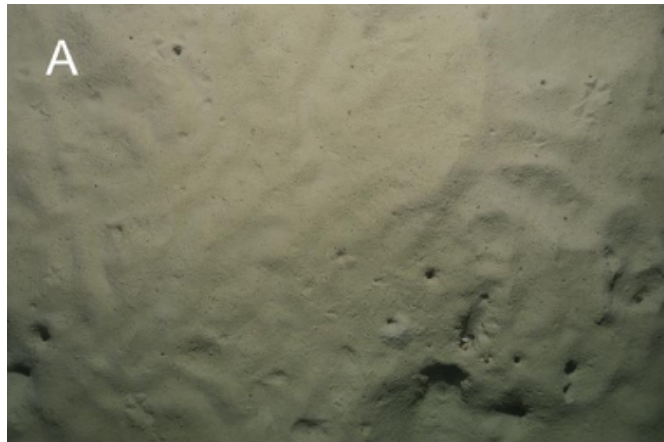


### Station 069 Stratum 024

Level muddy sediments with few burrows or other bioturbation marks. Trawl marks, sparse fauna.





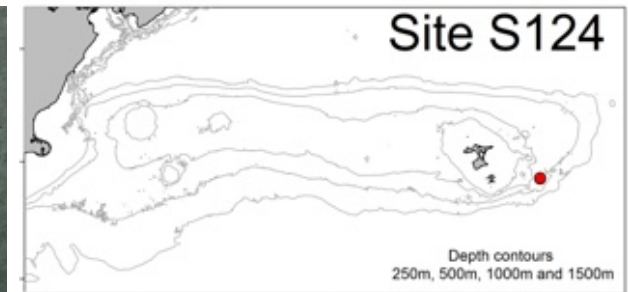


**Station 041**  
**Stratum 010**

Level muddy sediments with burrows, pits, mounds. Sparse epifauna; white holothuroids, scampi.



TAN1701 - Chatham Rise !

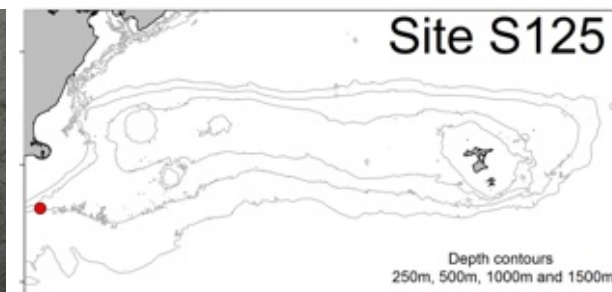


**Station 082**  
**Stratum 025**

Level firm muddy sediments with little bioturbation. Some holothuroids.

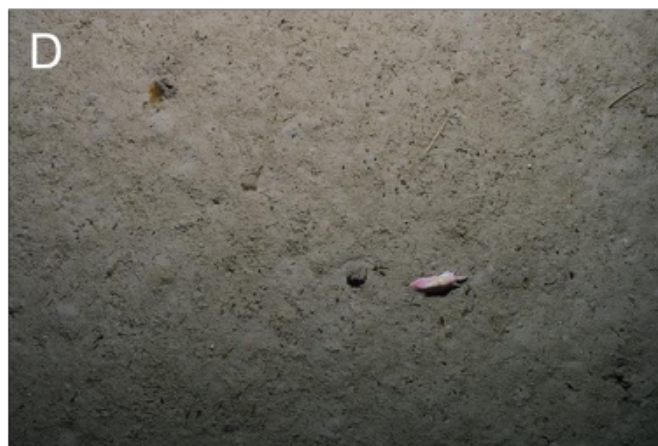


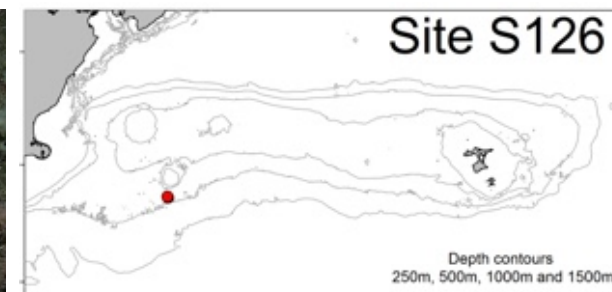




**Station 146**  
**Stratum 027**

Level muddy sediments, no burrows, fine-scale biogenic structure throughout. Some quill worms, holothuroids, echinoids, xenophyophores, asteroids; all at low densities. Several small rays.



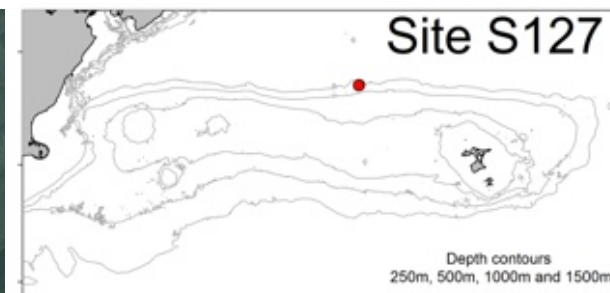


**Station 132**  
**Stratum 027**

Steep knoll south of Verran Bank. Bedrock and scleractinian coral rubble near summit and along ridge. High density of a type of pale pink-orange soft coral on coral rubble, massive convoluted sponge on lower flank, and numerous plexaurid corals on lower flank and base.





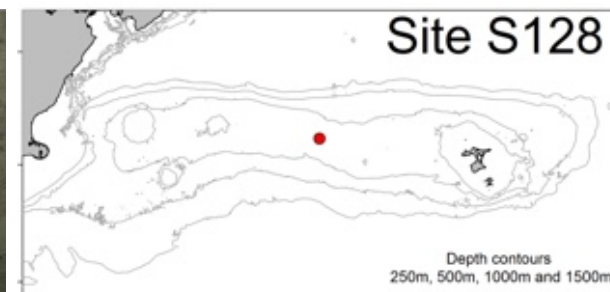


**Station 031**  
**Stratum 023**

Current-rippled muddy sand sediment. Sparse fauna; Echinothuroid urchins, shrimps, *Enypniastes eximia* holothuroids.



## TAN1701 - Chatham Rise !



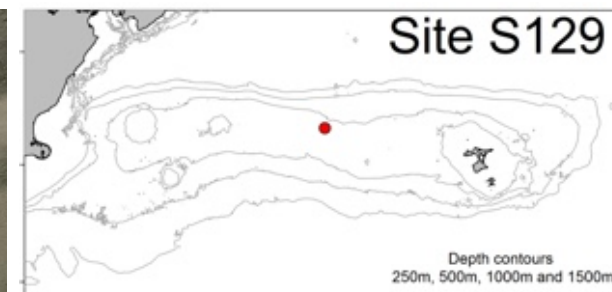
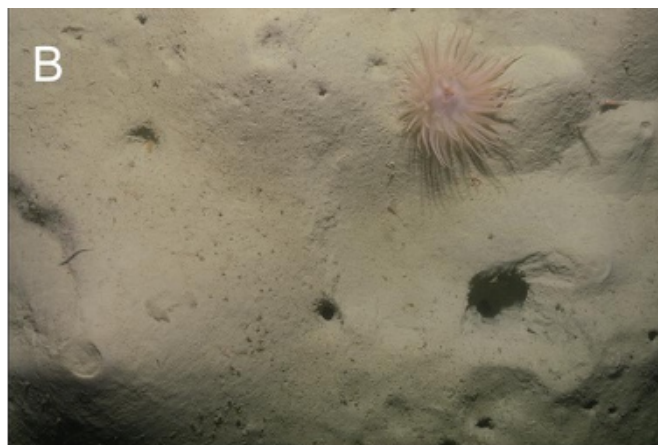
### Station 026 Stratum 020

!Sensitive habitat! Muddy sediments with areas of phosphorite nodules with diverse sessile communities: *Goniocorella dumosa*, crinoids, sponges, bryozoans and others.





## TAN1701 - Chatham Rise !

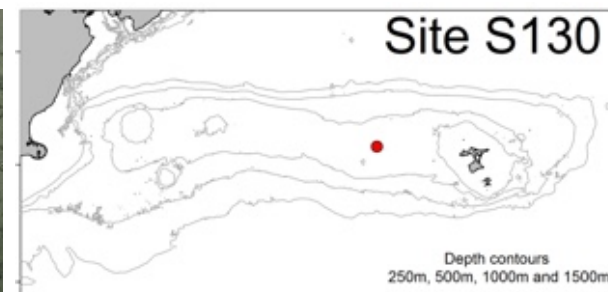


### Station 027 Stratum 08B

!Sensitive habitat! Muddy sediments burrows, mounds, and pits. One area of phosphorite nodules with diverse sessile communities: *Goniocorella dumosa*, crinoids, sponges, bryozoans and others.

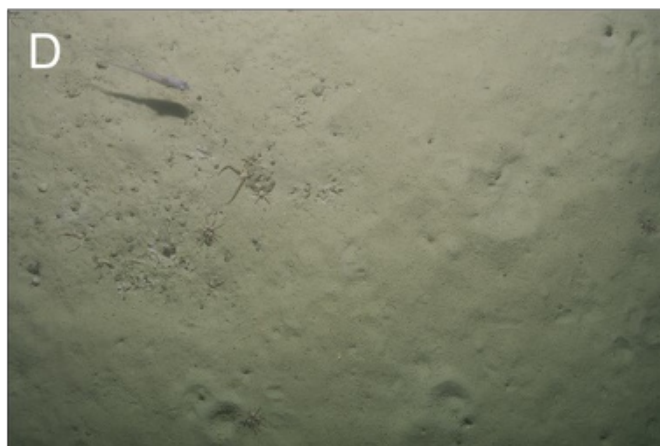


## TAN1701 - Chatham Rise !



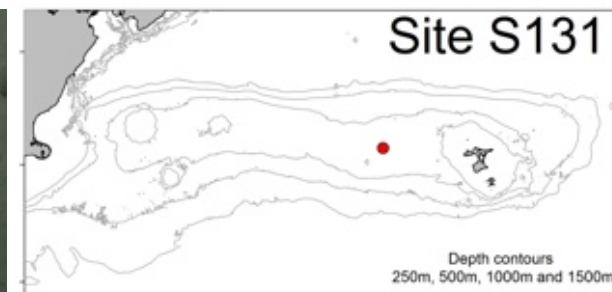
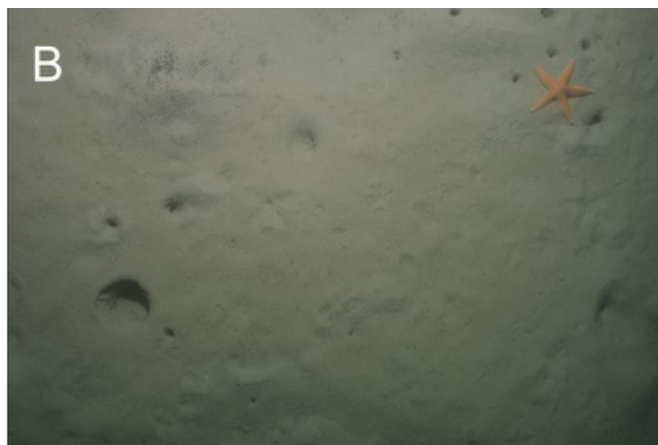
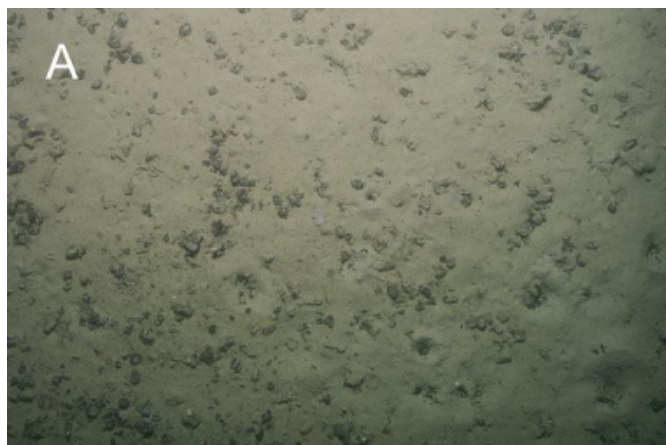
### Station 043 Stratum 011

Mostly muddy sediments with burrows, pits, mounds, and tracks but with some patches of cobble/phosphorite. Sparse epifauna, holothuroids, echinoids, scampi. Juvenile hoki.



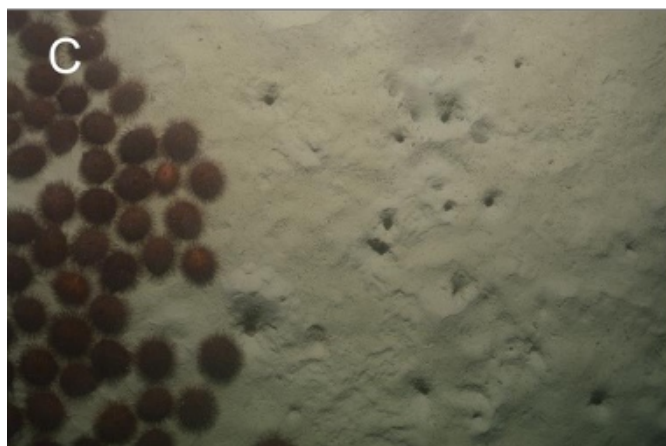


## TAN1701 - Chatham Rise !

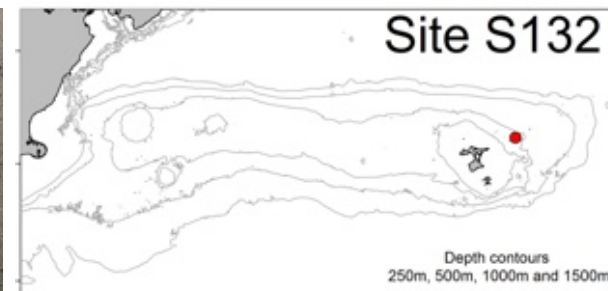


### Station 045 Stratum 011

Muddy sediments with areas of cobble/phosphorite, sometimes extensive. Epifauna sparse throughout; asteroids, echinoids, some sponges on hard substrata.

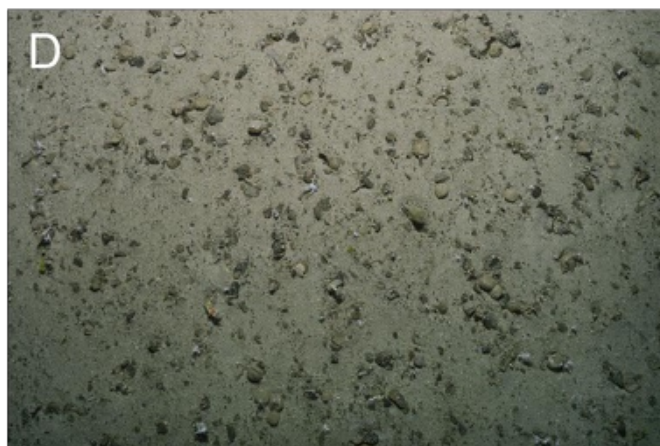


## TAN1701 - Chatham Rise !



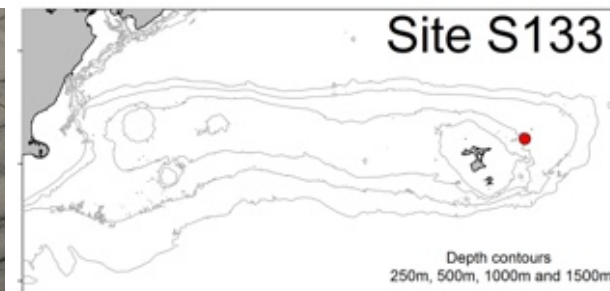
### Station 063 Stratum 012

!Sensitive Habitat! Rippled muddy sand at start, then sand and shell hash with areas of cobble, boulder, and rock. Sponges, stylasterid corals, gorgonians, hydroids, and bryozoans on hard substrata.





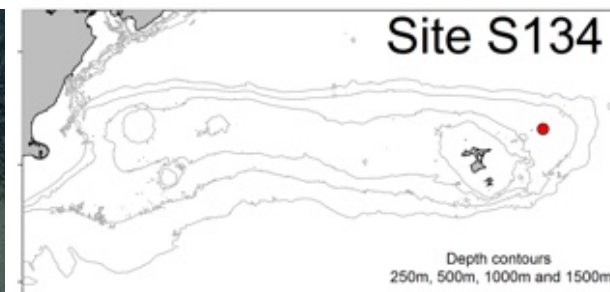
TAN1701 - Chatham Rise !



**Station 066**  
**Stratum 012**

!Sensitive Habitat! Transect on bank north of S54. Rippled sand, boulders and bedrock in places, with sponges, stylasterid corals, bryozoans, and some small stony coral colonies.



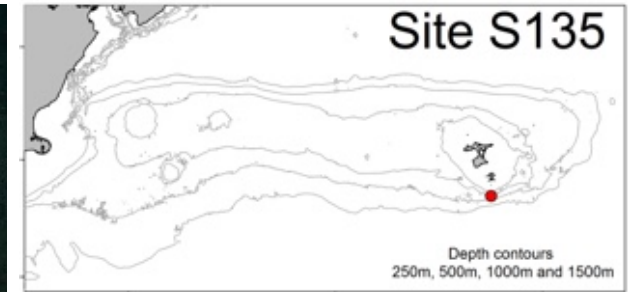


**Station 077**  
**Stratum 02B**

Targeting scarp feature seen in MBES SW of S52. Bare bedrock, boulders, and sand at top of scarp, becoming sand and muddy sand at base. Sparse fauna. [short transect because of vertical component].

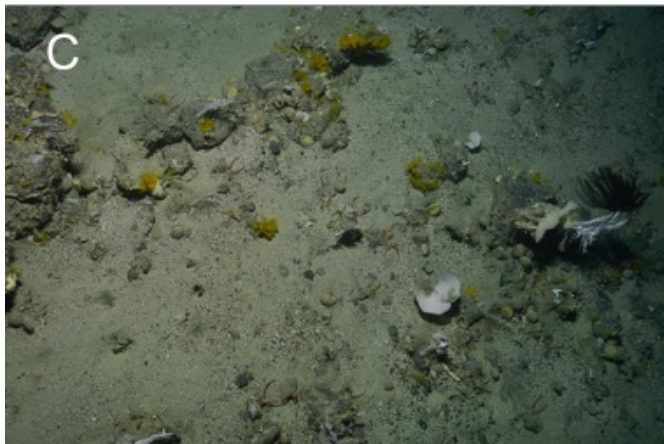


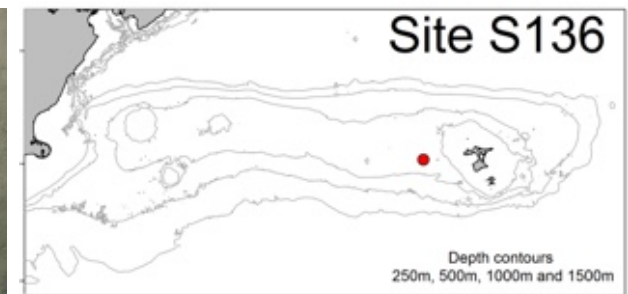




**Station 090**  
**Stratum 012**

!Sensitive habitat! Coarse sand, brachiopod shell hash and rock at start, with large tube worms. Bedrock, boulders, cobbles in places, with sponges, bryozoans, stylasterid corals, crinoids, and brachiopods. Becoming muddy sediment at end.



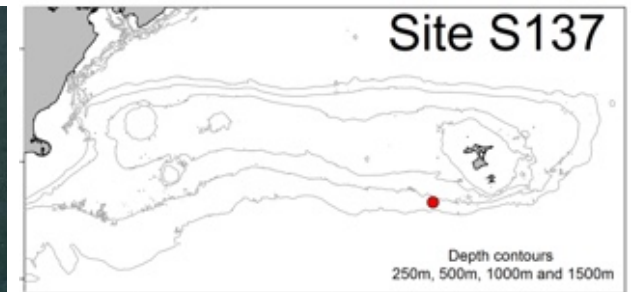


**Station 099**  
**Stratum 012**

Level muddy sand sediments with burrows and tracks. Some burrowing urchins and scampi.

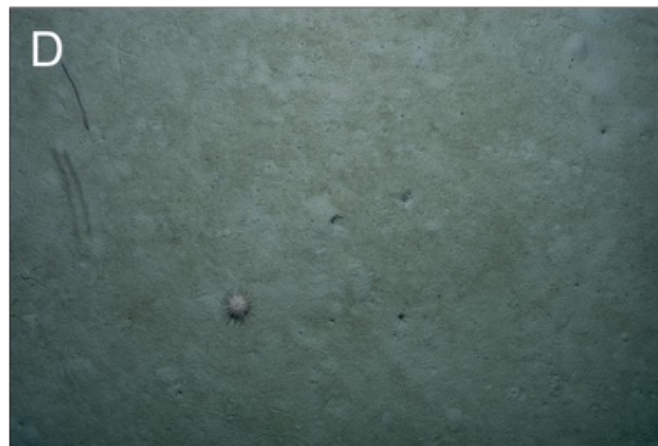


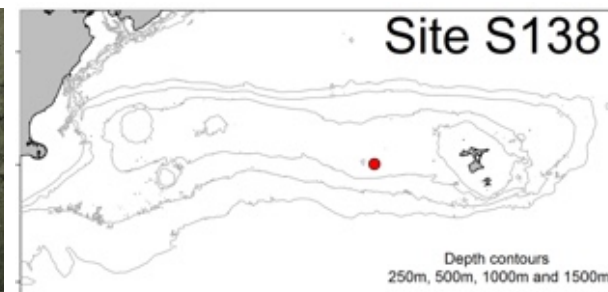




**Station 103**  
**Stratum 028**

Transect across large sediment wave features. Firm muddy sand and gravel with little bioturbation. Sparse fauna, some *G. multidentatus*, *Benthodytes* sp. holothuroids, gastropods. [Manually-driven transect].



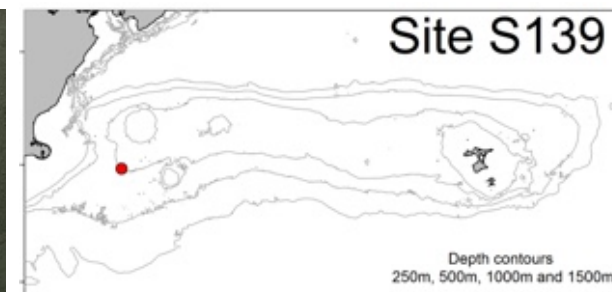


**Station 111  
Stratum 003**

Muddy sand (dark) with cobbles, pebbles and rock in places. *Munida* sp., and burrowing urchins in sediment, crinoids, sponges, and bryozoans on rocks.



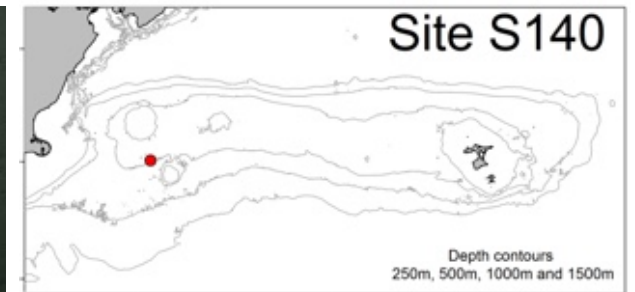
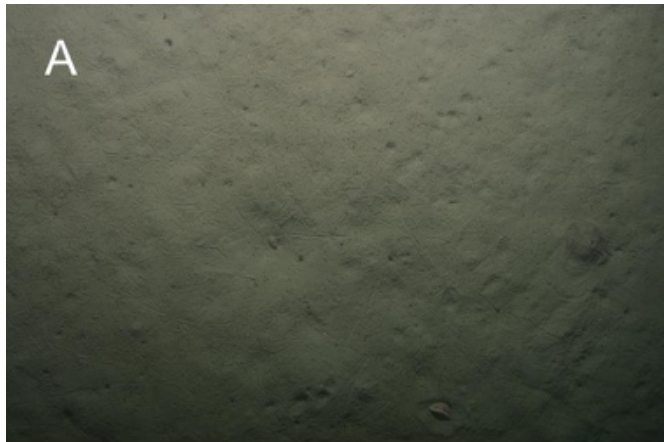




**Station 151**  
**Stratum 016**

Level muddy sediment with burrows and tracks. Many *Anthomastus* sp., sea-pens (brown, bushy), echinoids, quill worms, *Flabellum* sp., asteroids.



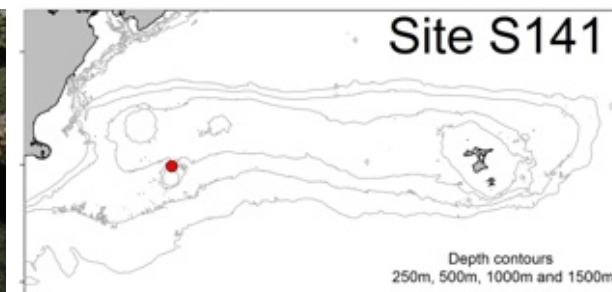
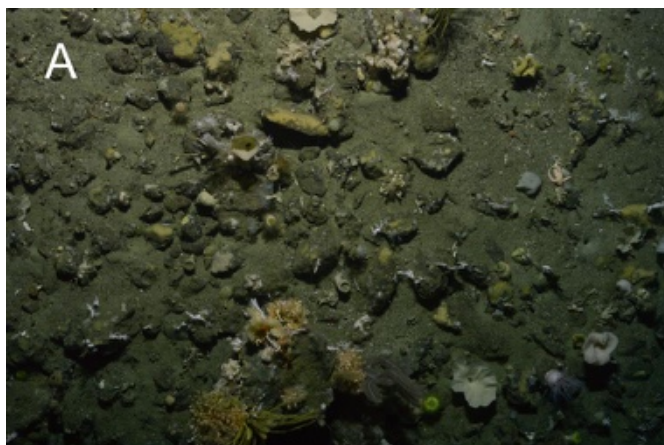


**Station 152**  
**Stratum 016**

Level muddy sediment. Some *Anthomastus* sp., and sea-pens (brown bushy). Visibility poor; trawler operating 2NM up-current.



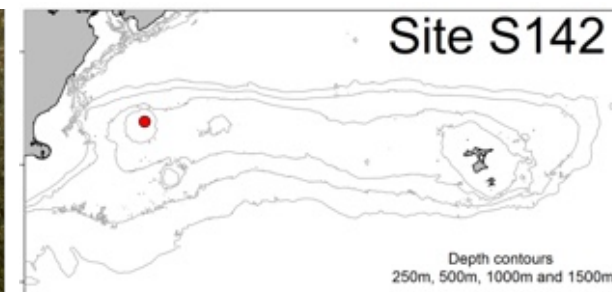
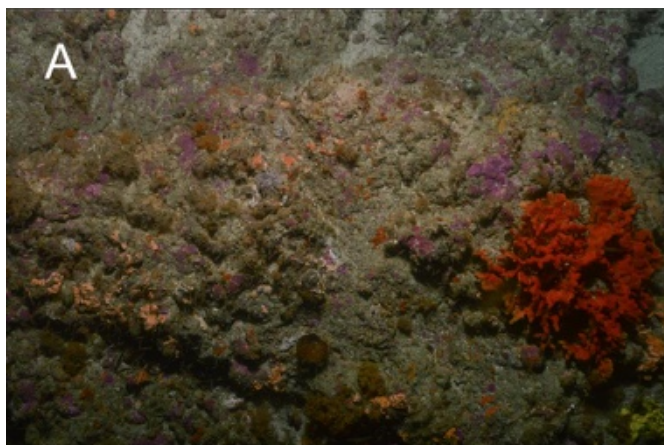




**Station 154**  
**Stratum 015**

!Sensitive habitat! Steep knoll on northern flank of Veryan Bank. Compacted coarse gravel, sand, cobble and boulder substrata, with many burrows in finer sediments. Becoming level sand at end of transect. Diverse sessile community on hard substrata throughout; sponges, stylasterids, bryozoans, hydroids, large bivalves, crinoids, *Gorgonocephalus* sp., and some small stony coral colonies overgrown by soft corals. Juvenile hoki.



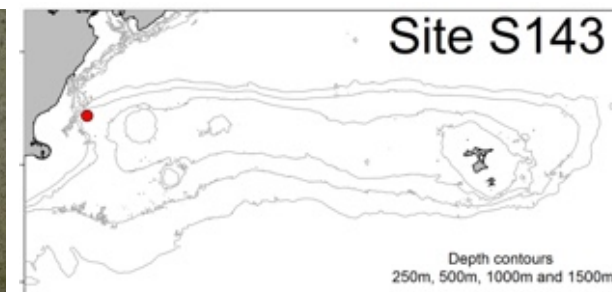


**Station 159**  
**Stratum ---**

Shallow outcrop on plateau of Mernoo Bank.  
Rock with diverse sponge and other sessile  
fauna community, sand in places. Mysid  
swarms throughout, squid over sand substrata.





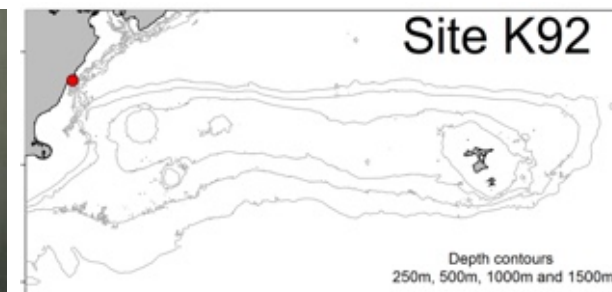
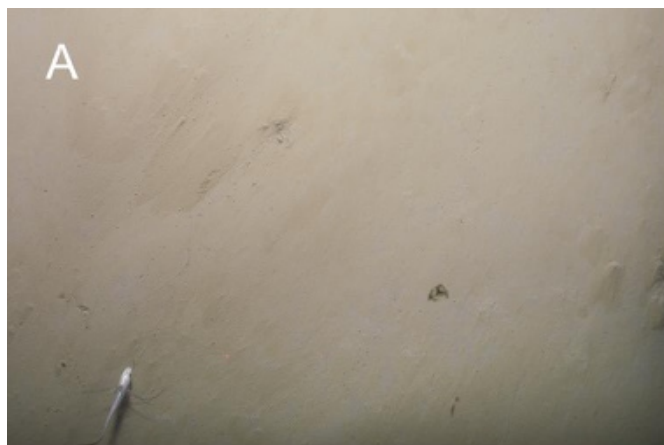


**Station 174  
Stratum 022**

Transect near canyon edge. Level muddy sediment with many trawl marks. At end, rocky scarp and boulders.



## TAN1701 - Chatham Rise !

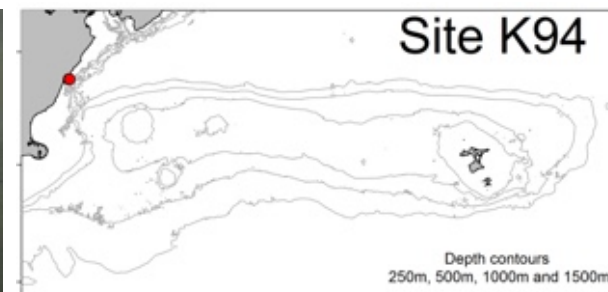
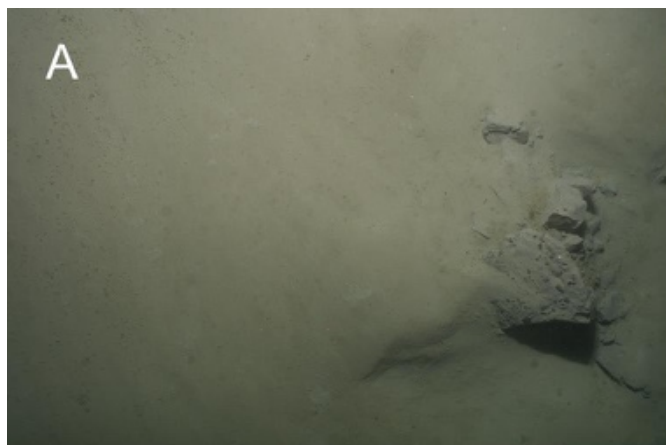


### Station 177 Stratum ---

Smooth, pale, fine sediments with some pale cobbles and boulders. No benthic fauna, no burrows or other bioturbation. Rat tails abundant.





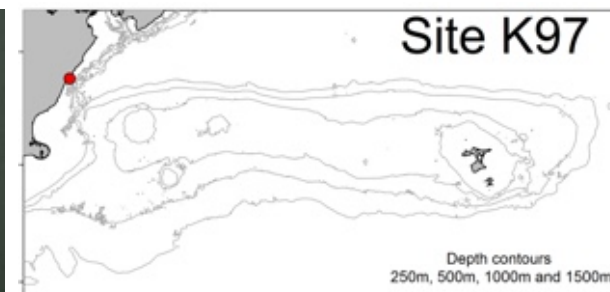


**Station 180**  
**Stratum ---**

Smooth, pale, fine sediments with some pale cobbles and boulders. No benthic fauna, no burrows or other bioturbation. Rat tails abundant.

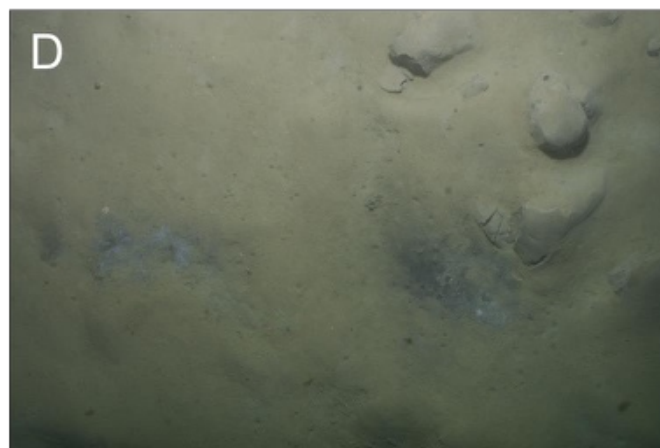


## TAN1701 - Chatham Rise !



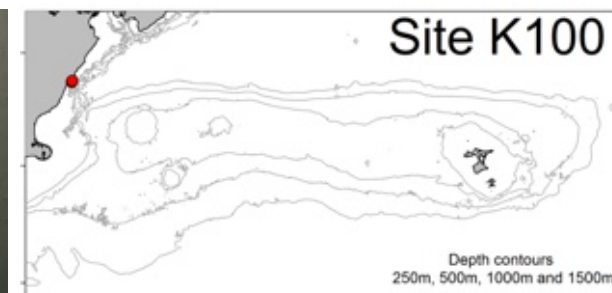
### Station 179 Stratum ---

Smooth, pale, fine sediments with some pale cobbles and boulders. No benthic fauna, burrows or other bioturbation. Rat tails abundant.



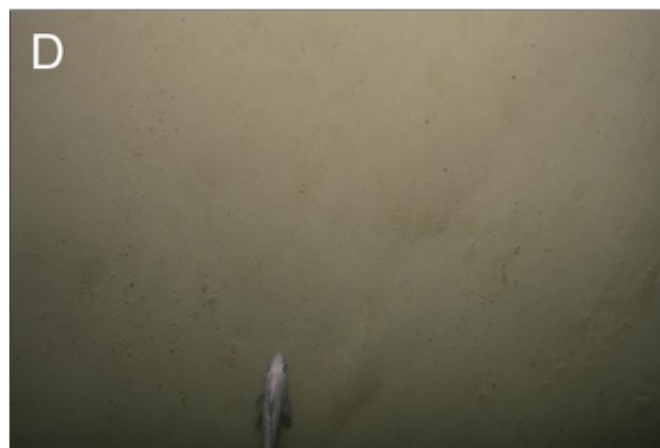


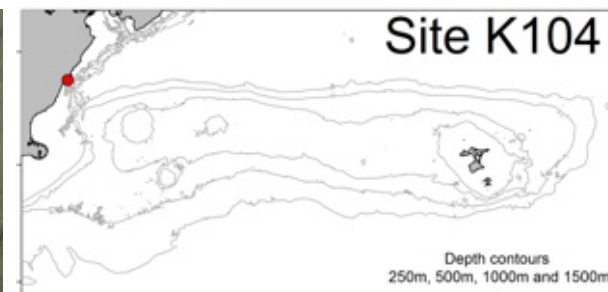
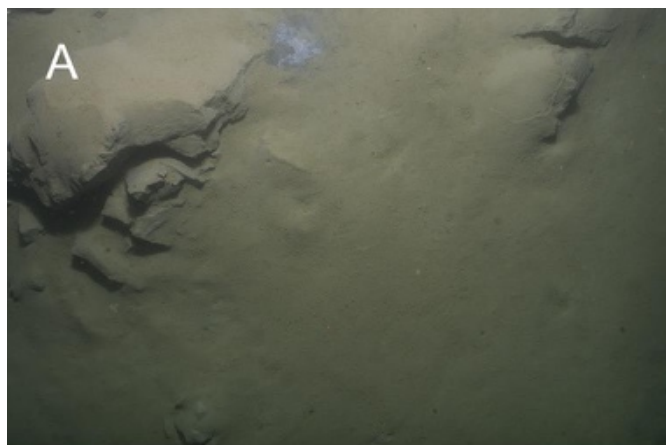
## TAN1701 - Chatham Rise !



### Station 176 Stratum ---

Smooth, pale, fine sediments with some pale cobbles and boulders. No benthic fauna, no burrows or other bioturbation. Rat tails abundant.





**Station 178**  
**Stratum ---**

Pale fine muddy sediment but with areas of fractured, chaotic rock and boulders. No benthos, no bioturbation. Some grey patches that resemble bacterial mats.

