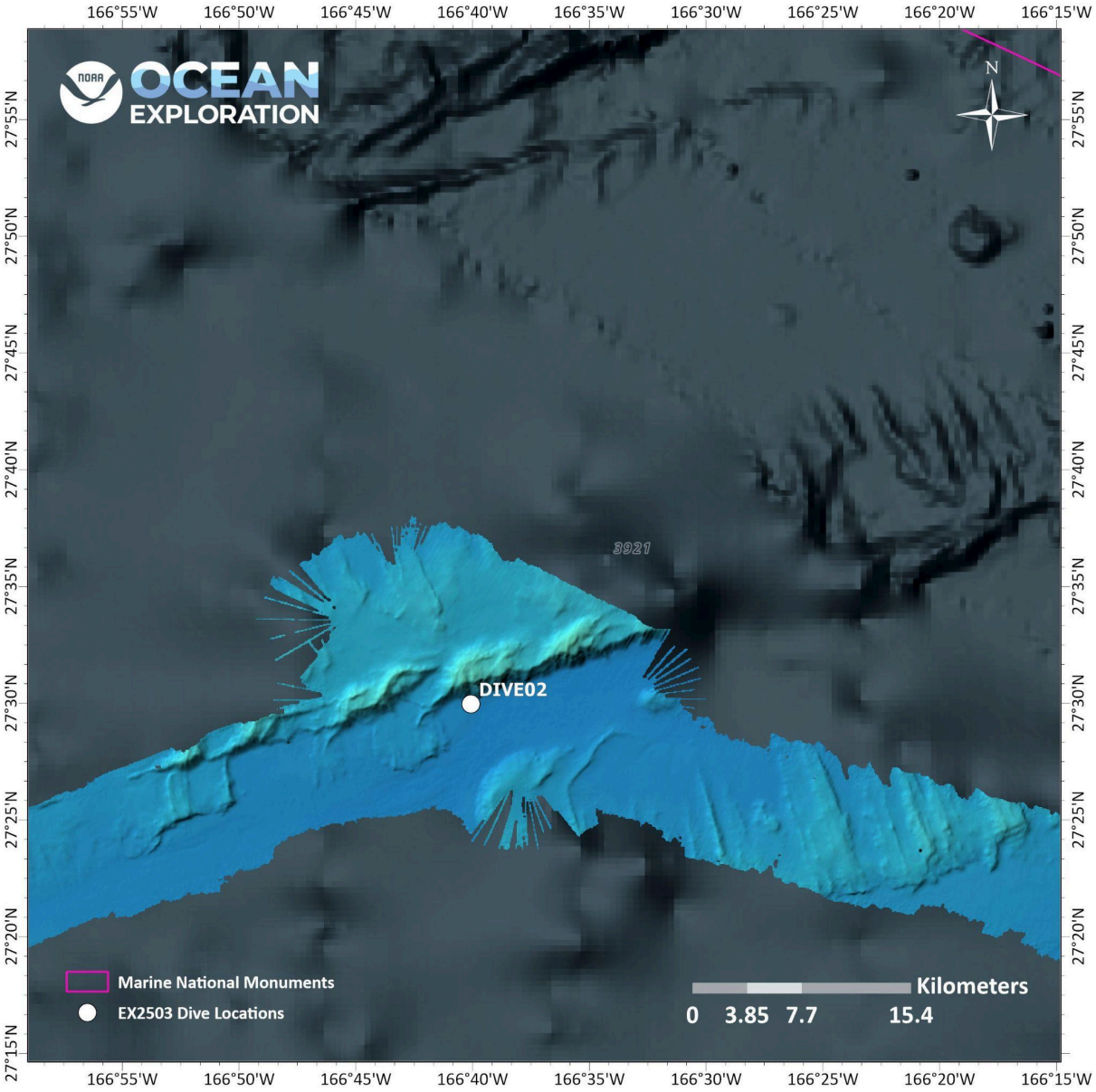
ROV Dive Summary
EX2503, Dive 02, April 12, 2025

General Location Map



Dive Information

Site Name	Murray Fracture Zone
General Area Descriptor	Papahānaumokuākea
Science Team Leads	Sara Kahanamoku-Meyer (UH Mānoa/HI Sea Grant) and Brian Kennedy (ODL/BU)
Expedition Coordinator	Sam Cuellar (NOAA Ocean Exploration)
ROV Dive Supervisor	Chris Ritter (GFOE)
Mapping Lead	Neah Baechler (NOAA Ocean Exploration/UCAR)
Sample Data Manager	Anna Lienesch and Jordan Schweizer (NCEI)
Dive Purpose	1. Explore deepwater features on the Murray Fracture Zone to better understand the fault structure 2. Document benthic communities and looks for new species and range extensions
Maritime Heritage Restrictions	No
ROV Dive Summary Data	Dive Type: Normal In Water: 2025-04-12T18:24:34.450981 27.49910924355625 ; -166.66774531694466 On Bottom: 2025-04-12T21:16:20.161691 27.502277738505796 ; -166.6647590724699 Off Bottom: 2025-04-13T01:50:56.685105 27.506043506383 ; -166.66472529888847 Out Water: 2025-04-13T04:33:37.699113 27.502158455163517 ; -166.65737867290298 Dive Duration: 10:09:03 Bottom Time: 4:34:36 Max Vehicle Depth: 4858.9 m Min Seafloor Depth: 4719.6 m Distance Travelled: 528.0 m

Dive Description	EX2503 Dive 2 took place on the southwestern-most portion of the Murray Fracture Zone. The primary goal of this dive was to visualize the fault face exposed at ~4,750m water depth to further our understanding of the evolution of the Pacific plate in this region. This is, to our knowledge, the first deep dive on this portion of the MFZ. The dive began with visualization of the seafloor at 1125 HST. We were greeted by a swimming holothurian (likely *Paleopatides*). As the dive progressed, we transited over a sediment-filled basin at the base of the MFZ that was home to a surprisingly diverse assemblage of deepwater bamboo corals, carnivorous sponges (likely *Cladorhiza*), hexactinellid sponges, sea pigs (likely family Elpidiidae), and several lizard fish (Bathysauridae) and cusk eels (likely family Ophiididae). We observed several unique sponge morphologies, including a sponge (potentially *Hyalostylus*) with an unusually thick stalk morphology. At 1327 HST, we were able to visualize the fault wall and observed that the wall exposure was likely heavily encrusted in manganese nodules. To support requests from shoreside geologists, we targeted tallus that was more angular and less encrusted in an attempt to ensure that we could recover basalt. We successfully sampled one rock but were unable to collect additional samples due to heavy encrustation and lack of apparent weathering along the fault wall. We noted that there was a ~60m discrepancy between bathymetric maps and our reported depth on the seafloor. While geologic sampling was limited, we sampled several specimens that represent unique morphotypes and/or new species. These included *Cladorhiza* (a carnivorous sponge with a gall along its stalk), a sea pig (Elpidiidae), a sea urchin (Holasteroida), a sea star (Goniasteridae), and two specimens of a white gastropod (likely family Turriddae, perhaps *Theta chariessa*). The gastropods were observed and collected next to a feeding trace – valuable information for understanding the diet habits of these rare deepwater specimens. We also sampled sediments that will be used to characterize benthic infauna and the primary contributions to sedimentation in a region that is likely below the CCD.
Notable Observations	*Cladorhiza* individuals with a variety of morphologies Exposed outcrop near the base of the southwestern portion of the Murray Fracture Zone

Community and Habitat Observations	Corals and Sponges — Present Chemosynthetic Community — Absent High biodiversity Community — Absent Active Seep or Vent — Absent Extinct Seep or Vent — Absent Hydrates — Absent
CMECS Feature Type(s)	Flat > Scarp > Slope
SeaTube Link (science annotations)	https://data.oceannetworks.ca/app/dive-logs/1005

Equipment Deployed

ROV	*Deep Discoverer*
Camera Platform	*Seirios*
ROV Measurements	The following ROV measurements, data streams, and equipment are used on each ROV deployment: CTD, depth, scanning sonar, USBL position, altitude, heading, attitude, high-resolution cameras, low-resolution cameras, manipulator arms, suction sampler, sample drawer,s and thrusters. The following row notes if any of these sensors were malfunctioning or not operational.
Equipment Malfunctions	none

Close-Up Map of Main Dive Site

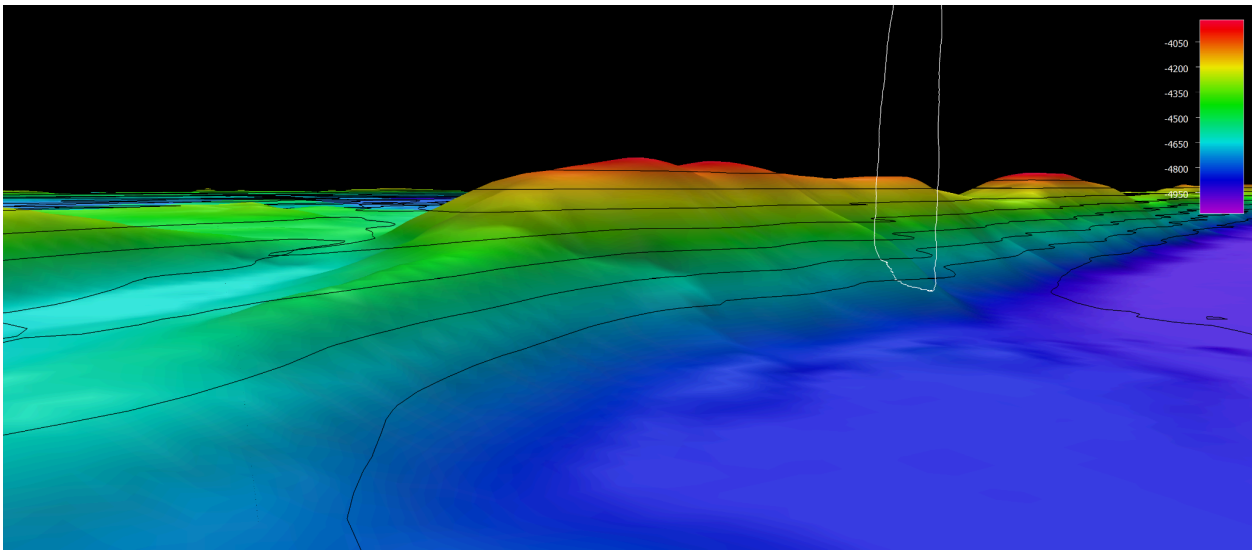


Figure 1: Dive 02 dive site. Shown in 2x vertical exaggeration; planned dive track shown in orange. Coloration based on slope steepness.

Smoothed ROV dive track in white on 25x25 cell size bathymetry, 3x vertical exaggeration, depth in meters, 10 meter contours.

Sound Speed Manager Image of ROV CTD Profile

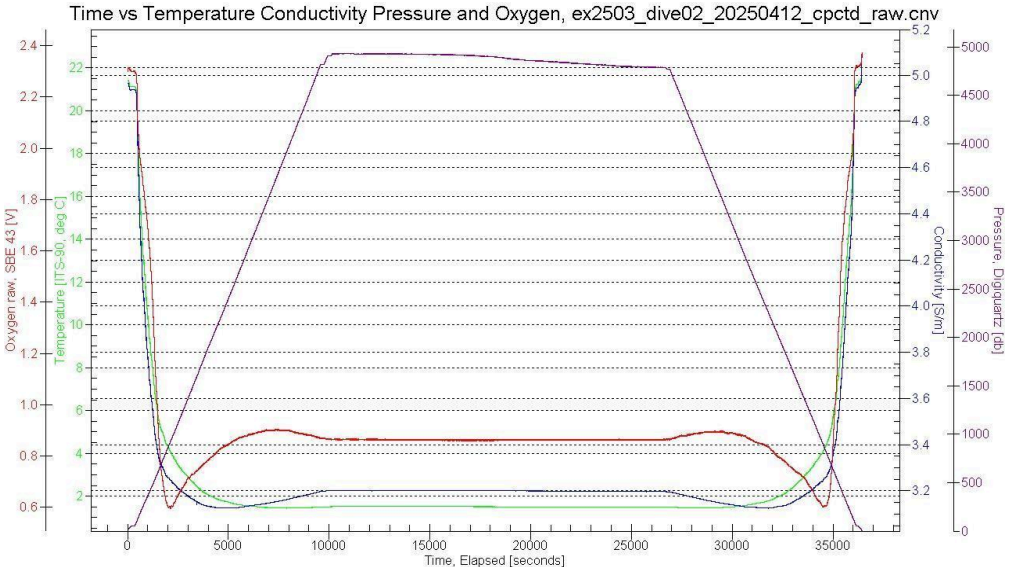


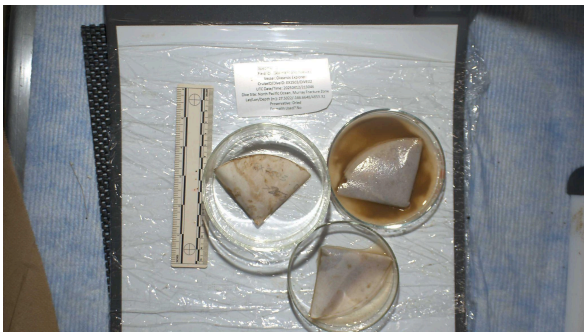
Figure 2. Ambient conditions during Dive 02. Plot shows Temperature (˚C), Conductivity (S/m), Pressure (db), and Oxygen (V; as measured by SBE43).

Representative Photos of the Dive

Glass Sponge on Fe-Mn encrusted seafloor

Gastropod leaves a feeding trace on the seafloor.

Samples Collected

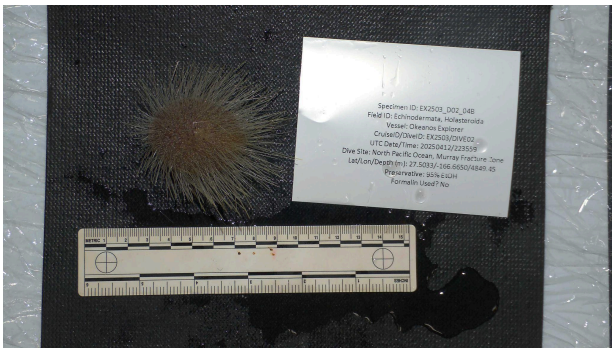


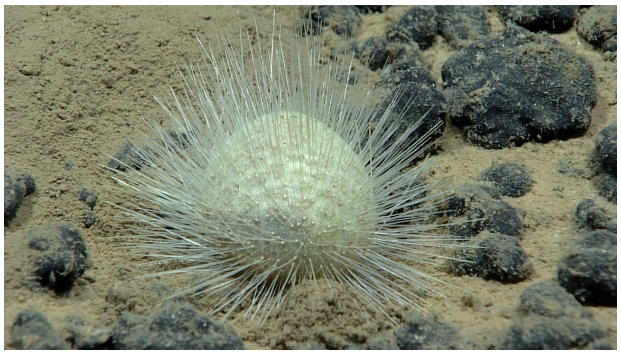
Sample ID	EX2503_D02_02G
Date (UTC)	20250412
Time (UTC)	213046
Depth (m)	4853.32080078125
Latitude (decimal degrees)	27.5022296905518
Longitude (decimal degrees)	-166.664825439453
Temperature (°C)	1.51499998569489
Field ID(s)	Sediment and nodules
Comments	Predominantly clay, no visible carbonate - likely below the CCD

Associates Sample ID:	N/A
Field Identification:	N/A
Count:	N/A

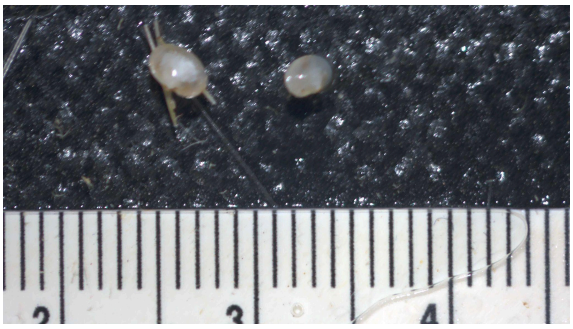
Sample ID	EX2503_D02_03B
Date (UTC)	20250412
Time (UTC)	220226
Depth (m)	4855.2080078125
Latitude (decimal degrees)	27.5027084350586
Longitude (decimal degrees)	-166.664825439453
Temperature (°C)	1.51400005817413
Field ID(s)	Bryozoa
Comments	FeMn nodules it was attached to.

Associates Sample ID:	EX2503_D02_03B_A01G
Field Identification:	Manganese Nodule
Count:	4

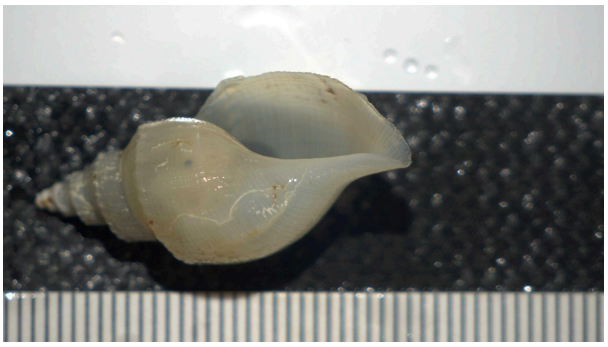




Sample ID	EX2503_D02_04B
Date (UTC)	20250412
Time (UTC)	223559
Depth (m)	4849.4501953125
Latitude (decimal degrees)	27.5033168792725
Longitude (decimal degrees)	-166.664962768555
Temperature (°C)	1.51199996471405
Field ID(s)	Holasteroida
Comments	Not moving. Numerous very small spines. Very brittle spines. Ovoid test shape.



Associates Sample ID:	EX2503_D02_04B_A01B
Field Identification:	unknown bivalve
Count:	2



Sample ID	EX2503_D02_05B
Date (UTC)	20250412
Time (UTC)	225840
Depth (m)	4844.119140625
Latitude (decimal degrees)	27.5039539337158
Longitude (decimal degrees)	-166.665130615234
Temperature (°C)	1.51400005817413
Field ID(s)	Gastropoda
Comments	lefthanded whirl? White, nearly translucent shell. No DNA sample possible.

Associates Sample ID:	N/A
Field Identification:	N/A
Count:	N/A

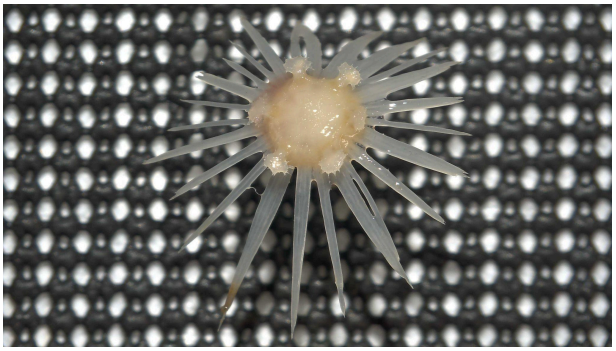
Sample ID	EX2503_D02_06B
Date (UTC)	20250413
Time (UTC)	001505
Depth (m)	4780.47314453125
Latitude (decimal degrees)	27.5051937103271
Longitude (decimal degrees)	-166.664337158203
Temperature (°C)	1.50499999523163
Field ID(s)	Goniasteridae
Comments	looks like a generic goniasterid. Missing part of arm.

Associates Sample ID:	N/A
Field Identification:	N/A
Count:	N/A

Sample ID	EX2503_D02_07G
Date (UTC)	20250413
Time (UTC)	002711
Depth (m)	4767.68603515625
Latitude (decimal degrees)	27.5054187774658

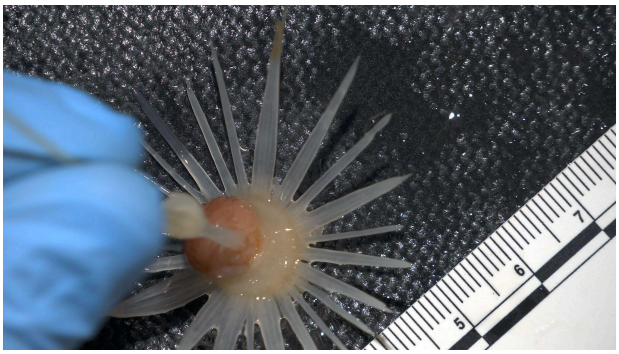
Longitude (decimal degrees)	-166.66455078125
Temperature (°C)	1.50300002098083
Field ID(s)	FeMn encrusted Mudstone?
Comments	clay like sediment present. Most likely mudstone that's encrusted with very thin FeMn. Extremely soft. Mohs scale of maybe 2 or 3. 1 is >10cm, 3 are <10cm.

Associates Sample ID:	N/A
Field Identification:	N/A
Count:	N/A



Sample ID	EX2503_D02_09B
Date (UTC)	20250413
Time (UTC)	004614
Depth (m)	4753.837890625
Latitude (decimal degrees)	27.5056037902832
Longitude (decimal degrees)	-166.664703369141
Temperature (°C)	1.50199997425079
Field ID(s)	Cladorhiza

Comments	anemone at base of head, sponge may be overgrowing. Either second anemone or gall on stalk, approx 3 cm below head of sponge. Magnesium chloride for 10 minutes

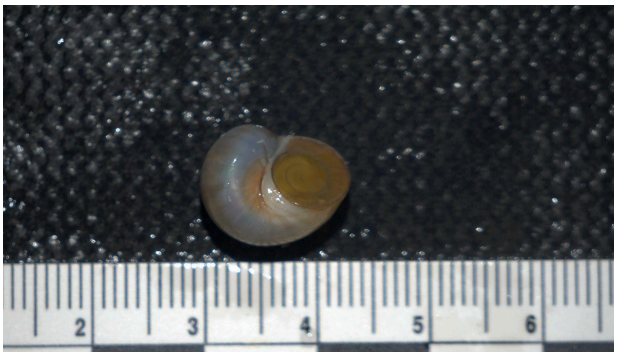


Associates Sample ID:	EX2503_D02_09B_A01B
Field Identification:	Actineria
Count:	1

Sample ID	EX2503_D02_10B
Date (UTC)	20250413
Time (UTC)	011850
Depth (m)	4731.56494140625
Latitude (decimal degrees)	27.5058879852295

Longitude (decimal degrees)	-166.664474487305
Temperature (°C)	1.49899995326996
Field ID(s)	Elpidiidae
Comments	Dead upon recovery. Very visible digestive track. Very prominent extensions around the oral end. Translucent.

Associates Sample ID:	N/A
Field Identification:	N/A
Count:	N/A



Sample ID	EX2503_D02_11B
Date (UTC)	20250413
Time (UTC)	013955
Depth (m)	4723.5390625
Latitude (decimal degrees)	27.5059032440186
Longitude (decimal degrees)	-166.664886474609
Temperature (°C)	1.49800002574921
Field ID(s)	Gastropoda
Comments	looks like a moon snail. Whirl in the

	operculum. Slight iridescent quality to the shell. No DNA samples possible.

Associates Sample ID:	N/A
Field Identification:	N/A
Count:	N/A

Niskin Sampling Summary

Sample ID	EX2503_D02_01W
Date (UTC)	20250412
Time (UTC)	212848
Depth (m)	4855.41796875
Latitude (decimal degrees)	27.5024738311768
Longitude (decimal degrees)	-166.664901733398
Bottle Number	Niskin Bottle 1
Temperature (°C)	1.5110000371933
Dissolved Oxygen (mg/L)	4.78900003433228
Treatment	DNA/RNA Shield

Sample ID	EX2503_D02_08W
Date (UTC)	20250413
Time (UTC)	004001
Depth (m)	4755.81982421875
Latitude (decimal degrees)	27.5056762695313

Longitude (decimal degrees)	-166.664657592773
Bottle Number	Niskin Bottle 2
Temperature (°C)	1.50300002098083
Dissolved Oxygen (mg/L)	4.82200002670288
Treatment	DNA/RNA Shield

Sample ID	EX2503_D02_12W
Date (UTC)	20250413
Time (UTC)	014200
Depth (m)	4721.076171875
Latitude (decimal degrees)	27.5059757232666
Longitude (decimal degrees)	-166.664566040039
Bottle Number	Niskin Bottle 4
Temperature (°C)	1.53299999237061
Dissolved Oxygen (mg/L)	4.70699977874756
Treatment	DNA/RNA Shield

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