ROV Dive Summary, EX-22-05, Dive 08, July 27, 2022

General Location Map

Dive Information

Site Name	Redonda
General Area Descriptor	30 km west of Mid-Atlantic Ridge axis, on 2.2 My seafloor, normal fault dissected volcano
Science Team Leads	Dr. Scott France (Biology), Dr. Ashton Flinders (Geology)
Expedition Coordinator	Dr. Derek Sowers

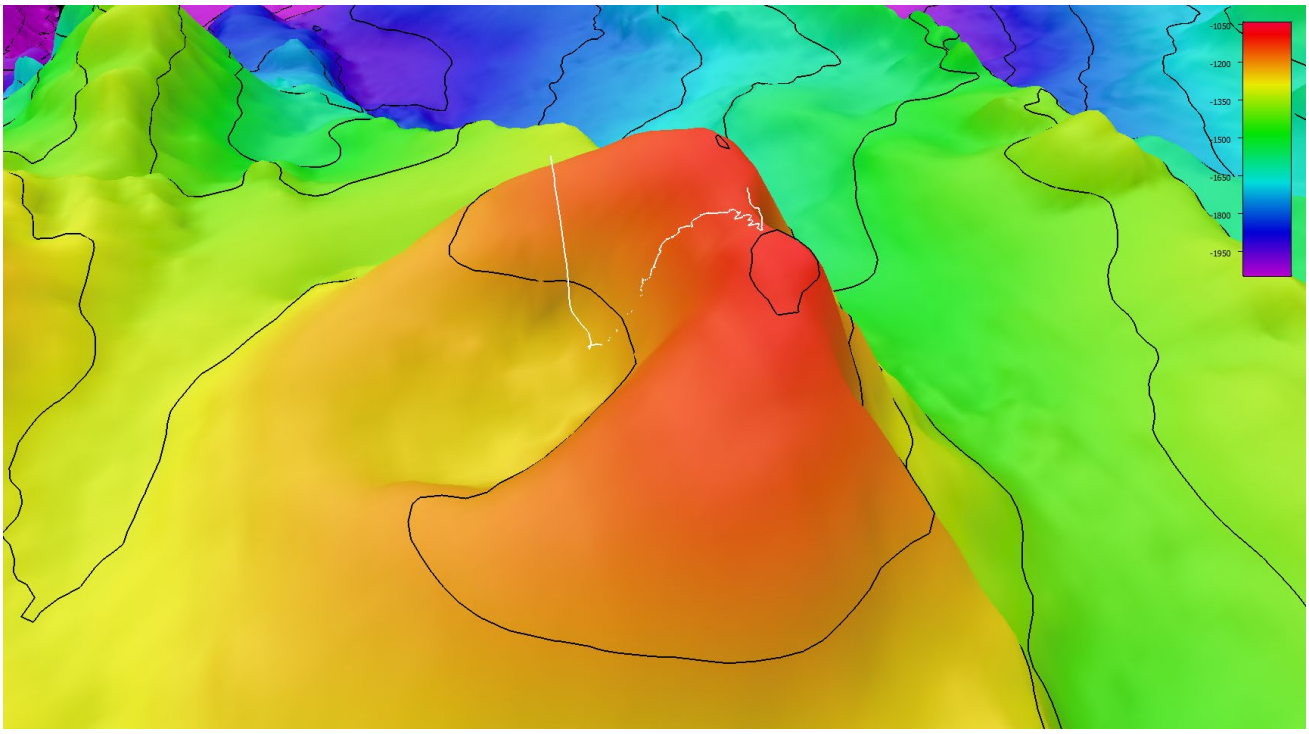
ROV Dive Supervisor	Christopher Ritter
Sample Data Manager	Dr. Arvind Shantharam
Mapping Lead	Shannon Hoy
Dive Purpose	To explore and characterize the community in a caldera on the MAR..
Was the dive restricted for Underwater Cultural Heritage?	No
ROV Dive Summary Data	Dive Summary: EX2205_DIVE08 ^^ Dive Type: Normal In Water: 2022-07-27T10:26:49.020467 40.454345 ; -29.908044 On Bottom: 2022-07-27T11:22:35.685439 40.45275268810654 ; -29.909106885112514 Off Bottom: 2022-07-27T17:58:03.418859 40.45092961459928 ; -29.906097074939023 Out Water: 2022-07-27T18:52:45.035706 40.452400882875935 ; -29.904318713455616 Dive Duration: 8:25:56 Bottom Time: 6:35:27 Max Vehicle Depth: 1235.4 m Min Seafloor Depth: 1094.5 m Distance Traveled: 486.6 m

Dive Description	*Biology* Prior to the dive there were predictions from some participating scientists that today's exploration inside a caldera-like feature would yield very sparse biological communities based on limited exploration of similar features in the area. We were pleased to discover that those expectations were completely upended. From the moment we landed at 1240 m depth we were among corals and sponges right up onto the lip of the crater. Most of these sessile species favored local topographic highs but some were equally at home on the flatter expanses, such as the octocorals *Acanella arbuscula* and *Chrysogorgia* sp.*,* and the glass sponge *Pheronema carpenteri*, all 3 of which were particularly abundant on the flatter seafloor above 1100 m depth. Coral diversity was high. It was estimated we observed as many as 10 different species of black corals (Aphanipathidae (yellow), *Antipathes viminalis*, *Bathypathes*, *Leiopathes*, *Trissopathes*, *Chrysopathes*, *Parantipathes*). The major families of deep-sea octocorals were all well represented, with multiple species observed of golden corals (*Chrysogorgia*, *Metallogorgia*, *Iridogorgia*), bamboo corals (*Jasonisis* spp., *Acanella*, *Eknomisis*), primnoid corals (*Thouarella*, *Convexella*, *Candidella*) and sea pens (*Pennatula, Anthoptilum* rock pens). A number of other octocorals were identified, including species of *Swiftia*, *Acanthogorgia*, Anthothelidae, *Muriceides*-like (white), purple plexaurids (both whip and fan colonies), *Dendrobrachia*, and *Hemicorallium*. Hard corals were also represented by *Madrepora*, cup corals, and hydrocorals (*Crypthelia*). The corals supported many epifauna, including hermit crabs, sea spiders (Pycnogonida), snails (Mollusca, Gastropoda), ring anemones, brittlestars and comatulid crinoids. On one *Eknomisis* bamboo coral there were dozens (hundreds?) of small benthic ctenophores with their retractable tentacles streaming into the water column. Sponges were also numerous and included demosponges such as *Desmacella*, *Polymastia* (a large one was collected), and an unidentified massive-form, and glass sponges (Hexactinellida), most commonly the euplectellid *Hertwigia falcifera* and the bird's nest sponge (*Pheronema carpenteri*). Not surprisingly given the high diversity, there were many calls for collections. Fish diversity was high on this dive relative to others on the expedition and included codlings (*Lepidion*), spiny eel (*Polyacanthonotus merretti*), rattails, oreos, orange roughy (including some very old looking individuals predicted to be >100 years age), slickhead (*Gephyroberyx*), catshark (*Apristurus*) and rabbitfish (*Hydrolagus*). *Geology* Extensive basalt (likely) angular rubble, with several millimeters of ferromanganese crust, intermixed with areas of up to 25 cm of what appears to be partially concreted shells or coral also covered with ferromanganese crust. As we approached the upper slope valley there was significantly less basalt rubble or any exposed pillow basalts. The eastern rim of the volcano was significantly sedimented, with no visible basaltic talus or pillow outcrop, with small patches of concreted calcareous sediment.
Notable Observations	Unexpectedly high diversity of corals within the caldera.
Community and habitat observations	Corals and Sponges - Present Chemosynthetic Community - Absent High biodiversity Community - Present Active Seep or Vent - Absent Extinct Seep or Vent - Absent Hydrates - Absent
CMECS Feature Type(s)	Slope / Pinnacle
SeaTube Link (science annotation system)	https://data.oceannetworks.ca/SeaTubeV3?resourceTypeId=600&resourceId=2633

Equipment Deployed

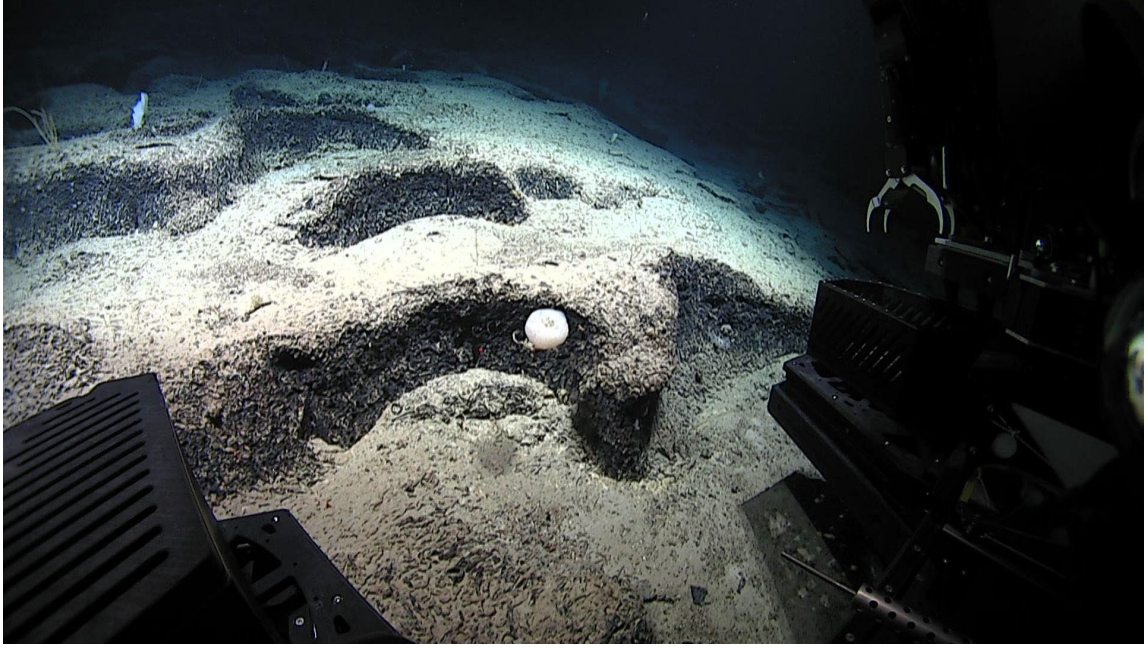
ROV	*Deep Discoverer*
Camera Platform	*Seirios*
ROV Measurements	The following ROV measurements, data streams and equipment are used on each ROV deployment: CTD, depth, scanning sonar, USBL position, altitude, heading, attitude, high-resolution cameras, low resolution cameras, manipulator arms, suction sampler, sample drawers and thrusters. The section below notes if any of these sensors were malfunctioning or not operational.
Equipment Malfunctions	

Close-up Map of Main Dive Site

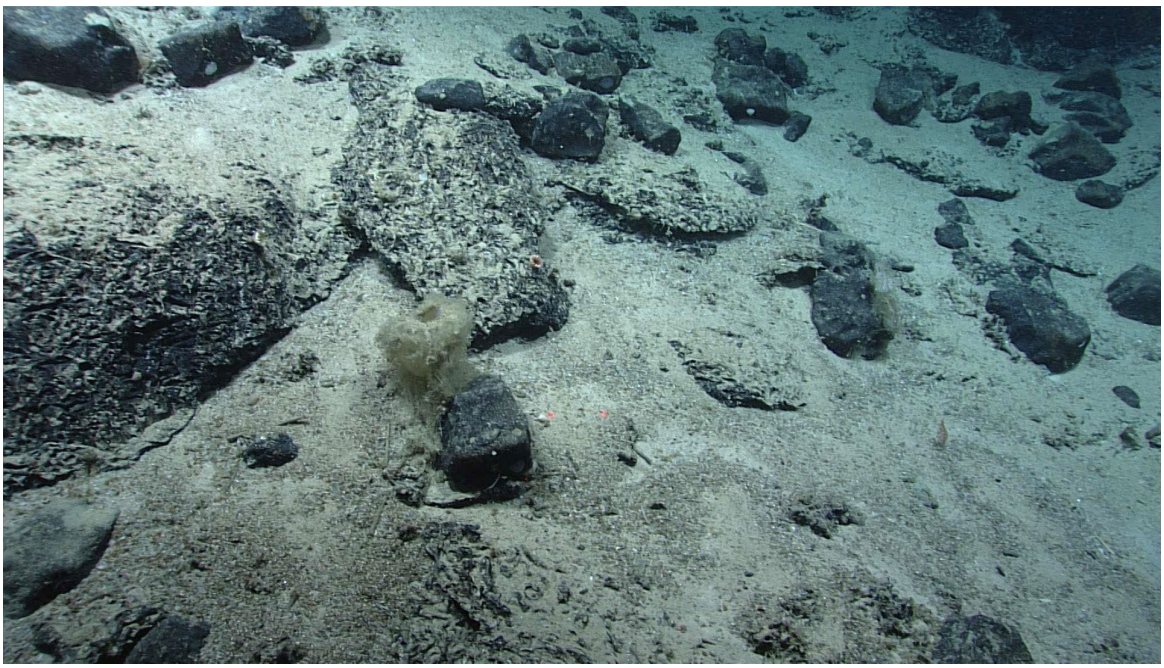


Smoothed ROV dive track in white on 25x25 cell size bathymetry, 3x vertical exaggeration, depth in meters, 10 meter contours.

Representative Photos of the Dive

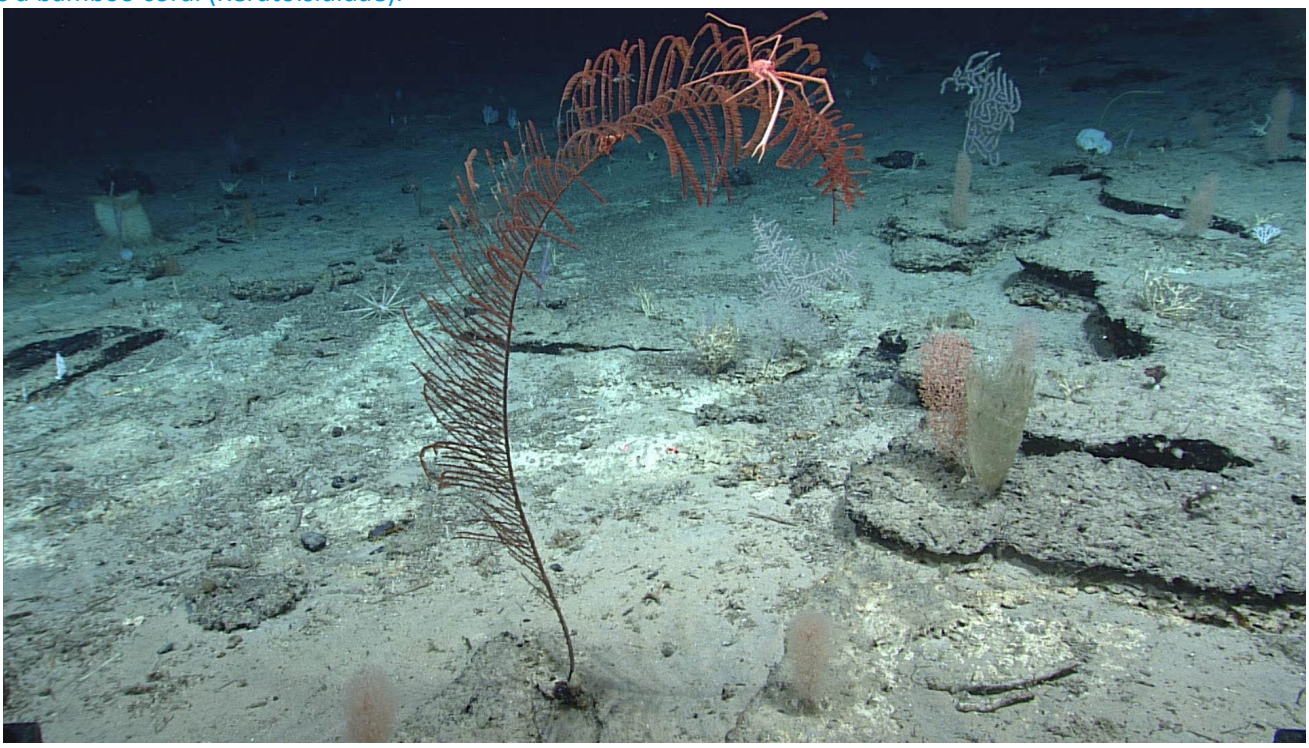


Likely overlapping carbonate concretions, although we were not able to directly sample. Samples from a similar feature on a previous dive were limestone.

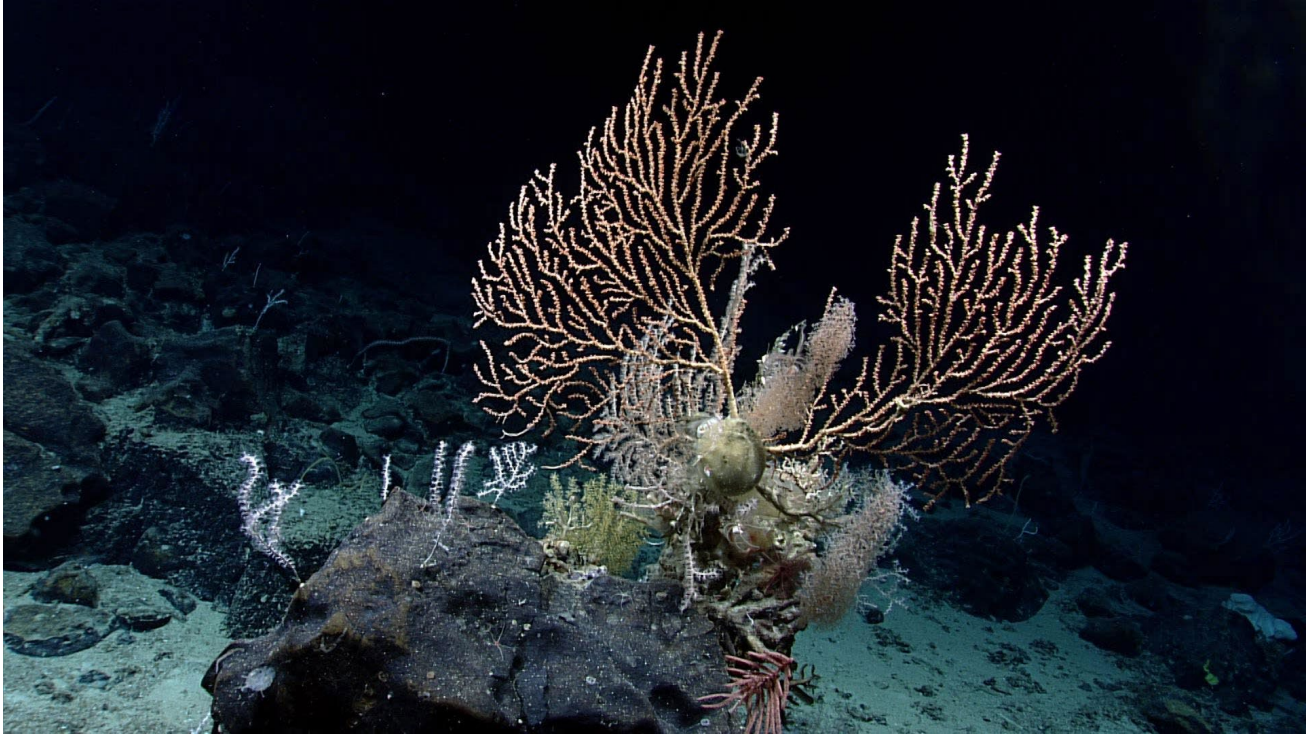


Angular rubble of likely pillow basalts, intermixed with encrusted carbonate skeleton and sediment.

Angular rubble of likely pillow basalts, intermixed with encrusted carbonate skeleton and sediment; colony is a bamboo coral (Keratoisididae).



Intermittent plates of carbonate crust supporting many octocorals, sponges, and the large black coral at front center.



An example of the heightened abundance and diversity of sessile fauna on local topographic highs. This outcrop at 1181 m depth supports numerous octocorals (*Acanthogorgia*, *Chrysogorgia*, *Muriceides*, at least two different species of bamboo coral), black corals, cup corals, sponges and their varied associates.

Epifaunal associates on a *Swiftia* octocoral: hermit crab, sea anemone, and comatulid crinoid.

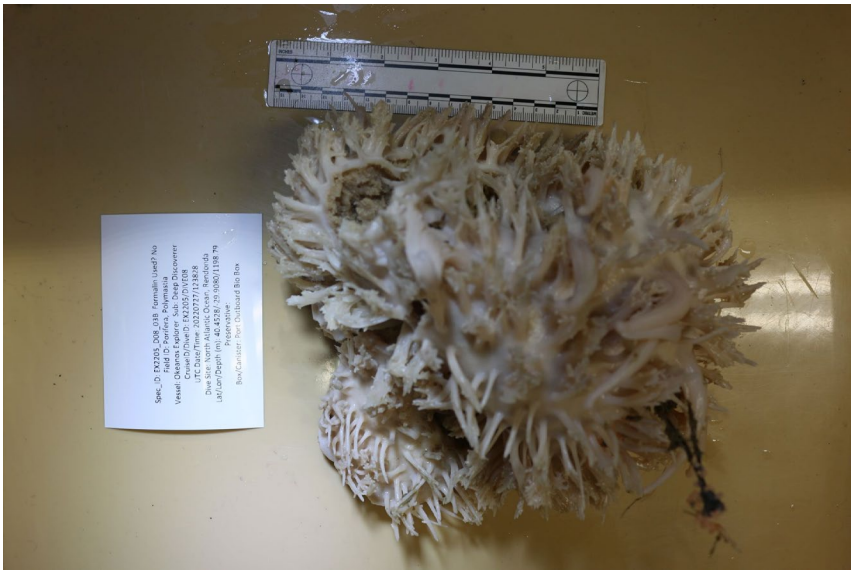
An old orange roughy.

Samples Collected -

Sample ID	EX2205_D08_08G
Date (UTC)	20220727
Time (UTC)	15:20:20
Depth (m)	1133.8
Latitude (decimal degrees)	40.4530
Longitude (decimal degrees)	-29.9070
Temp. (°C)	6.54
Field ID(s)	Coated carbonate concretion
Comments	Limestone/carbonate, signs of bioturbation and dissolution. No signs of macroscale fossils but lots of shell casts. Size: 27 x 10 x 10 cm; rectangular

Associates Sample ID	Field Identification	Count

EX2205_D08_08G_A01	Ophiuroidea	1
EX2205_D08_08G_A02	*Crypthelia*	1
EX2205_D08_08G_A03	Tunicata	2
EX2205_D08_08G_A04	Porifera	1
EX2205_D08_08G_A05	Porifera	1
EX2205_D08_08G_A06	Porifera	1
EX2205_D08_08G_A07	Porifera	1
EX2205_D08_08G_A08	Balanomorpha	1
EX2205_D08_08G_A09	Serpulidae	1



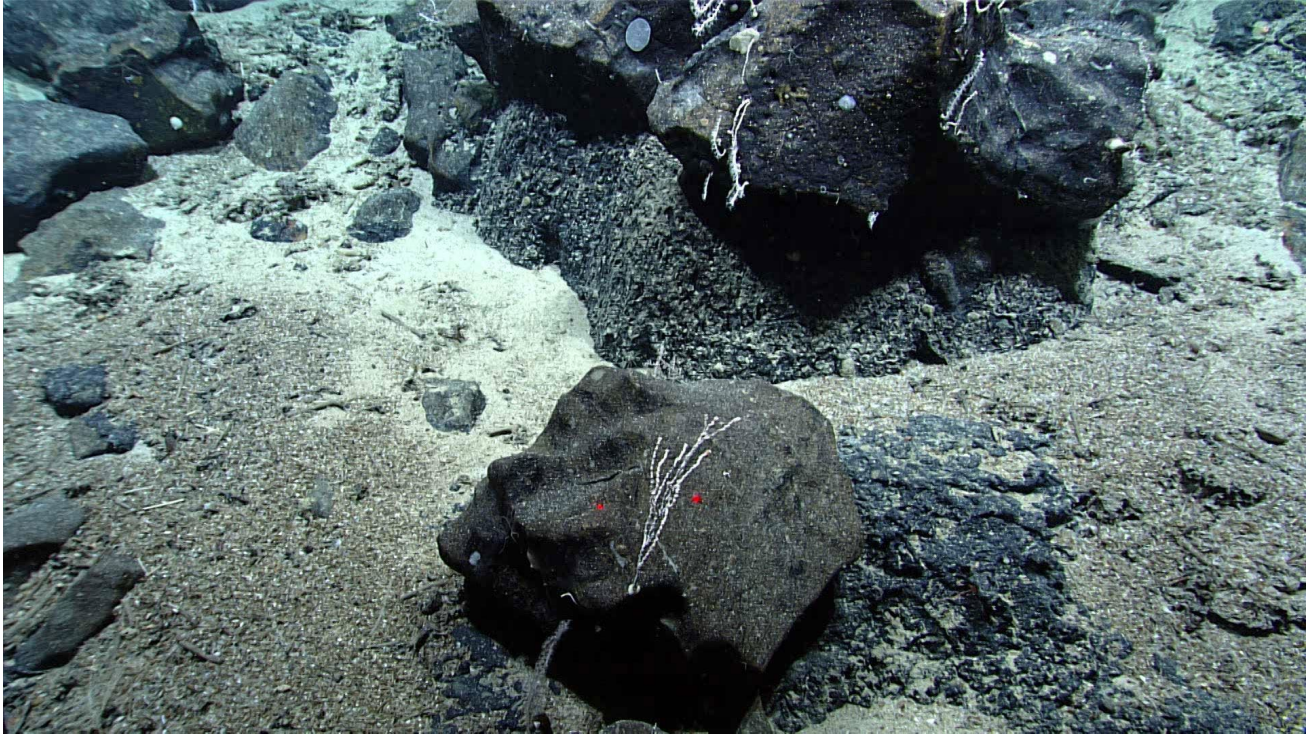
Sample ID	EX2205_D08_03B
Date (UTC)	20220727
Time (UTC)	12:38:28
Depth (m)	1198.8
Latitude (decimal degrees)	40.453
Longitude (decimal degrees)	-29.908
Temp. (˚C)	6.139
Field ID(s)	*Polymastia*
Comments	

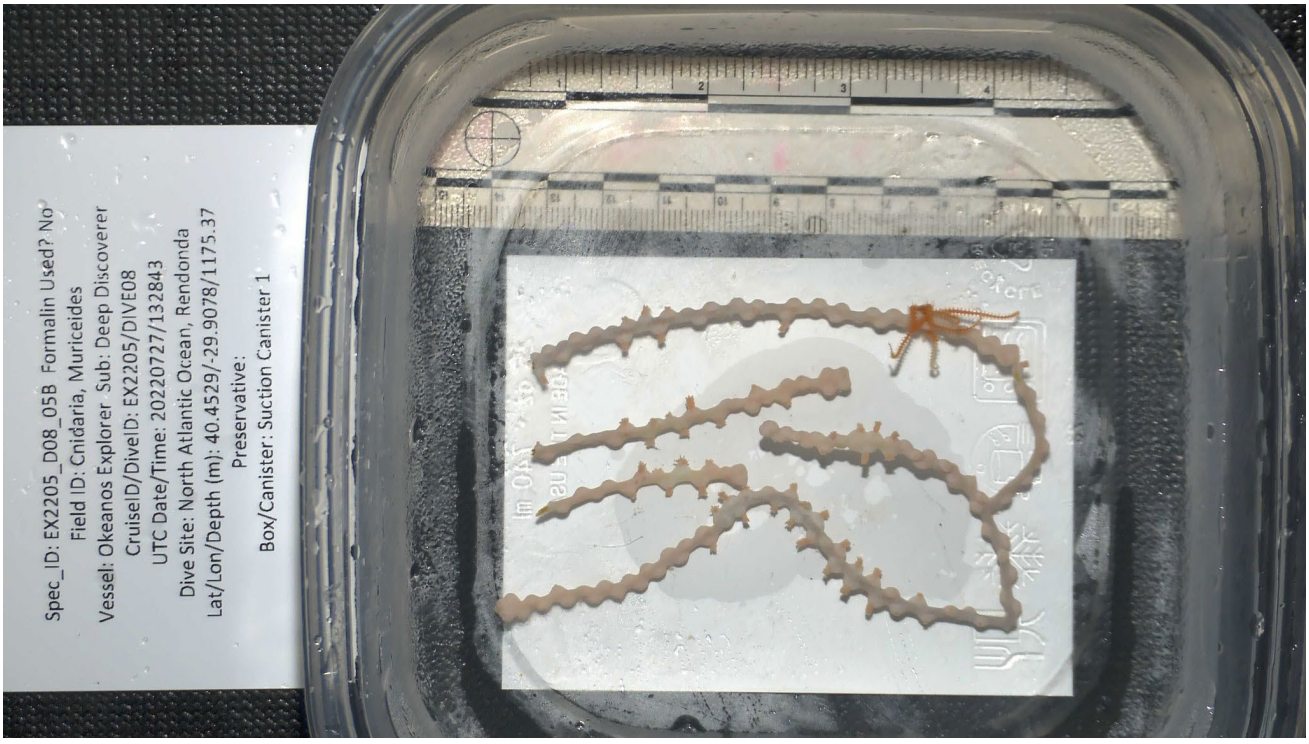
Associates Sample ID	Field Identification	Count
EX2205_D08_03B_A01	Ophiuroidea	1
EX2205_D08_03B_A02	Octocorallia	1


Spec_ID: EX2205_D08_04B Formalin Used? No
Field ID: Cnidaria, Dendrobrachia
Vessel: Okeanos Explorer Sub: Deep Discoverer
CruiseID/DiveID: EX2205/DIVE08
UTC Date/Time: 20220727/132132
Dive Site: North Atlantic Ocean, Rendonda
Lat/Lon/Depth (m): 40.4529/-29.9079/1172.99
Preservative:
Box/Canister: Starboard Inboard Bio Box

Sample ID	EX2205_D08_04B
Date (UTC)	20220727
Time (UTC)	13:21:32
Depth (m)	1173.0
Latitude (decimal degrees)	40.453
Longitude (decimal degrees)	-29.908
Temp. (˚C)	6.316
Field ID(s)	*Dendrobrachia*
Comments	

Associates Sample ID	Field Identification	Count
EX2205_D08_04B_A01	Caridea	1

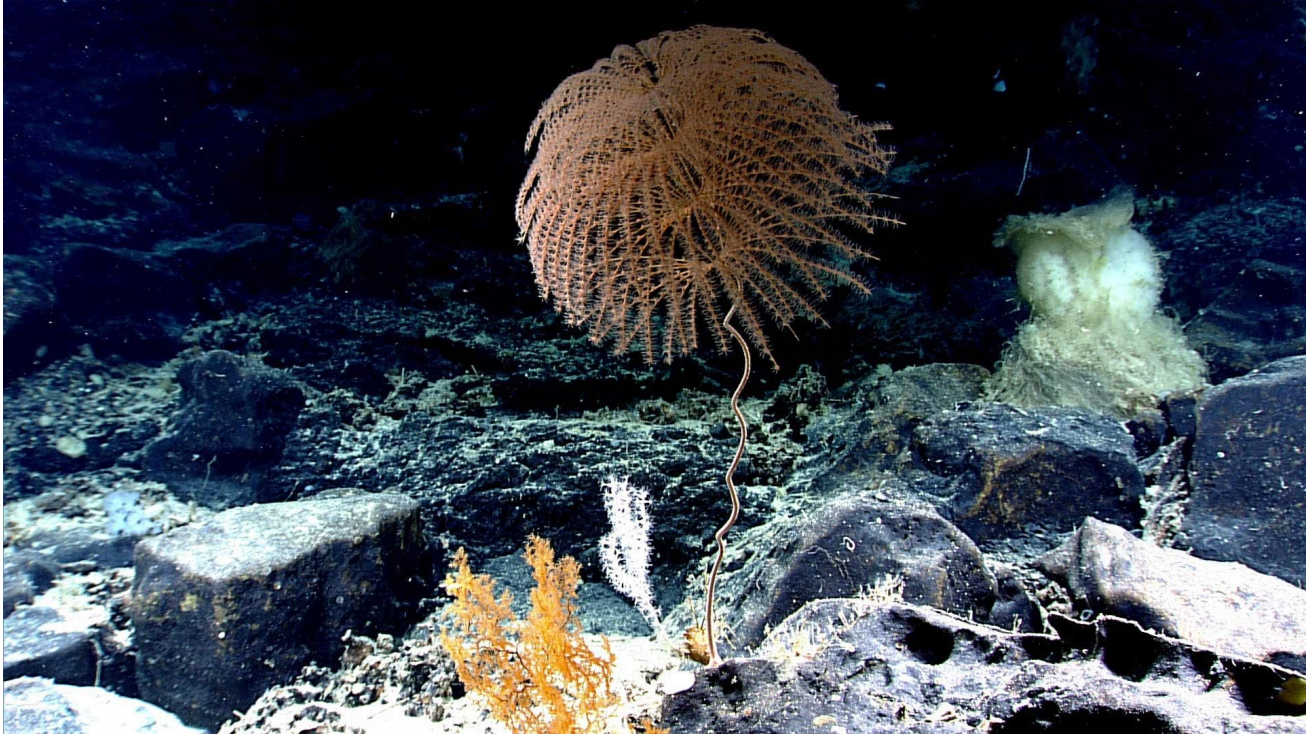




Sample ID	EX2205_D08_05B
Date (UTC)	20220727
Time (UTC)	13:28:43
Depth (m)	1175.4
Latitude (decimal degrees)	40.453
Longitude (decimal degrees)	-29.908
Temp. (°C)	6.362

Field ID(s)	*Muriceides*
Comments	

Associates Sample ID	Field Identification	Count



Sample ID	EX2205_D08_06B
Date (UTC)	20220727
Time (UTC)	14:03:44
Depth (m)	1160.2
Latitude (decimal degrees)	40.453
Longitude (decimal degrees)	-29.908
Temp. (˚C)	6.370

Field ID(s)	*Iridogorgia*
Comments	

Associates Sample ID	Field Identification	Count
EX2205_D08_06B_A01	*Bathypalaemonella*	1

Sample ID	EX2205_D08_07B
Date (UTC)	20220727
Time (UTC)	14:50:07
Depth (m)	1146.4
Latitude (decimal degrees)	40.453
Longitude (decimal degrees)	-29.907
Temp. (˚C)	6.469

Field ID(s)	*Anthoptilum*
Comments	Rock pen

Associates Sample ID	Field Identification	Count

Sample ID	EX2205_D08_09B
Date (UTC)	20220727
Time (UTC)	15:29:29
Depth (m)	1133.3
Latitude (decimal degrees)	40.453
Longitude (decimal degrees)	-29.907
Temp. (˚C)	6.518

Field ID(s)	Goniasteridae
Comments	

Associates Sample ID	Field Identification	Count

Niskin Sampling Summary

Sample ID	EX2205_D08_01W
Date (UTC)	20220727
Time (UTC)	10:53:39
Depth (m)	598.9
Latitude (decimal degrees)	40.4540
Longitude (decimal degrees)	-29.9100
Bottle number	Niskin Bottle 1
Temperature (°C)	11.29
Dissolved Oxygen (ml/L)	6.69
Treatment	eDNA

Sample ID	EX2205_D08_02W
Date (UTC)	20220727
Time (UTC)	11:28:01
Depth (m)	1232.5
Latitude (decimal degrees)	40.4530
Longitude (decimal degrees)	-29.9090
Bottle number	Niskin Bottle 2
Temperature (°C)	6.25
Dissolved Oxygen (ml/L)	7.01
Treatment	eDNA

Sample ID	EX2205_D08_10W
Date (UTC)	20220727
Time (UTC)	17:08:40
Depth (m)	1107.9
Latitude (decimal degrees)	40.4520
Longitude (decimal degrees)	-29.9060
Bottle number	Niskin Bottle 3
Temperature (°C)	6.32
Dissolved Oxygen (ml/L)	6.94
Treatment	eDNA

Sample ID	EX2205_D08_11W
Date (UTC)	20220727
Time (UTC)	17:56:46
Depth (m)	1095.2
Latitude (decimal degrees)	40.4510
Longitude (decimal degrees)	-29.9060
Bottle number	Niskin Bottle 4
Temperature (°C)	6.24
Dissolved Oxygen (ml/L)	6.97
Treatment	eDNA

Sample ID	EX2205_D08_12W
Date (UTC)	20220727
Time (UTC)	18:19:50
Depth (m)	605.7
Latitude (decimal degrees)	40.4510
Longitude (decimal degrees)	-29.9060
Bottle number	Niskin Bottle 5

Temperature (°C)	11.03
Dissolved Oxygen (ml/L)	6.46
Treatment	eDNA

Scientists Involved (provide name, email, affiliation)

Name	Email	Affiliation
Les Watling	watling@hawaii.edu	University of Hawaii at Manoa
Cindy Van Dover	clv3@duke.edu	Duke University
Ken Sulak	Jumpingsturgeon@yahoo.com	USGS
Arvind Shantharam	arvind.shantharam@noaa.gov	NGI/NCEI
Manuela Ramos	manuramo@gmail.com	OKEANOS/IMAR
Elisabetta Menini	elisabetta.menini@duke.edu	Duke University
Asako Matsumoto	amatsu@gorgonian.jp	Chiba Institute of Technology
Ashley Marranzino	ashley.marranzino@noaa.gov	NOAA (UCAR)
Alaina Hebert	c00241285@louisiana.edu	University of Louisiana at Lafayette
Upasana Ganguly	upasana.ganguly1@louisiana.edu	University of Louisiana at Lafayette
Scott France	scott.france@louisiana.edu	University of Louisiana at Lafayette
Ashton Flinders	aflinders@usgs.gov	USGS
Carlos Dominguez-Carrió	carlosdominguezcarrio@gmail.com	University of the Azores
Mary Deere	mary.deere1@louisiana.edu	University Louisiana at Lafayette
Daphne Cuvelier	daphne.cuvelier@gmail.com	Institute of Marine Sciences - Okeanos, University of the Azores
Telmo Morato	t.morato@gmail.com	Okeanos, University of the Azores
Deb Glickson	dglickson@nas.edu	National Academies of Sciences, Engineering, and Medicine
Meri Bilan	meri.bilan@unisalento.it	University of Salento

Please direct inquiries to:

NOAA Office of Ocean Exploration & Research
1315 East-West Highway, SSMC3 RM 10210
Silver Spring, MD 20910
oceanexplorer@noaa.gov