

Table S1. Dataset of cruise details, MBEs system and configurations, oceanographic data and sampling methods used in this work.

Case Study	Cruise	Year	Research Vessel	Chief of Cruise	Multibeam Echosounders (MBEs) Types	Sub-Bottom Profiler (SBP)	Oceanographic Data	Sampling/ Observation Methods	Cruise Reference
1. GALICIA BANK	Spanish EEZ Mapping Programme	ZEE-2001	Hespérides		Simrad EM-12S 13 kHz	TOPAS	Seabird profiling CTD profiles temperature, salinity and dissolved oxygen	Benthic dredges	
		ZEE-2002			Angular coverage = 120°				
		ZEE-2003			81 beams per ping Coverage 2.5 times the water depth				
		ZEE-2006	Hespérides		Simrad EM-12S 13 kHz	TOPAS			
		ZEE-2007			Angular coverage = 120°				
		ZEE-2008			81 beams per ping Coverage 2.5 times the water depth				
BREOGHAM	2005	Hespérides	Luis Somoza	Kongsberg EM-120 12 kHz	TOPAS PS18		[1]		
DIVA-ARTABRIA II	2009	Sarmiento de Gamboa	Vituco Urgorri	Atlas Hydrosweep DS 1×1 14–16 kHz	ATLAS PARASOUND P-35		[2]		
2. GULF OF CÁDIZ	MVSEIS	2008	Hespérides	Luis Somoza	Kongsberg EM-120 12 kHz	TOPAS PS18	ROV-mounted CTD profiles Temperature, salinity, oxygen, fluorescence, turbidity, methane and CO ₂ .	ROV 6000 Luso: Two robotic manipulators—1024 × 1024 pixel digital still camera	[4]
					Angular coverage = 150° 191 beams per ping Coverage 3–4 times the water depth				
	SUBVENT-2 Leg-1	2014	Sarmiento de Gamboa	Luis Somoza	Atlas DS 1×1 14–16 kHz	ATLAS PARASOUND P-35			
					Angular coverage = 140° 360 beams per ping Coverage 5.5 times the water depth				
MOUNDFORCE	2007	L´Atalante	Luis Somoza	KONSBURG EM-12 dual 13 kHz	3.5 kHz CHEOPS		[5]		
				Angular coverage = 150° 162 pings per ping Coverage 7.3 time the water depth					
3. LANZAROTE PASSAGE	SUBVENT-2 Leg 2	2014	Sarmiento de Gamboa	Luis Somoza	Atlas DS 1×1 14–16 kHz	ATLAS PARASOUND P-35	CTDs and ROV-mounted CTD profiles	ROV 6000 Luso	[4]
					Angular coverage = 140°				

Case Study	Cruise	Year	Research Vessel	Chief of Cruise	Multibeam Echosounders (MBEs) Types	Sub-Bottom Profiler (SBP)	Oceanographic Data	Sampling/ Observation Methods	Cruise Reference
					360 beams per ping Coverage 5.5 times the water depth		Temperature, salinity, oxygen, fluorescence, turbidity, methane and CO ₂ .		
4. TAGORO VOLCANO	GAIRE Leg 1 Leg2	29/11/2011 22/12/2011	Sarmiento de Gamboa	Luis Somoza	Atlas DS 1×1 14–16 kHz Angular coverage= 140° 360 beams per ping Coverage 5.5 times the water depth	ATLAS PARASOUND P-35		Water sampling	[6]
	AMULEY	20/07/2012	Hespérides	Luis Somoza	Kongsberg EM-120 12 kHz Angular coverage = 150° 191 beams per ping Coverage 3–4 times the water depth	TOPAS PS18			[7]
	SUBVENT-2 Leg-2	4/04/2014	Sarmiento de Gamboa	Luis Somoza	Atlas DS 1×1 14–16 kHz Angular coverage = 140° 360 beams per ping Coverage 5.5 times the water depth	ATLAS PARASOUND P-35	ROV-mounted CTD sensors: Temperature, salinity, oxygen, fluorescence, turbidity, methane and CO ₂	ROV 6000 Luso: Two robotic manipulators—1024 × 1024 pixel digital still camera	[4]
5. CANARY SEAMOUNTS	DRAGO0511	2011	Miguel Oliver	J. Tomas Vazquez	Kongsberg EM-302 30 kHz Angular coverage = 150° 492 beams per ping Coverage 6.5 times depth	TOPAS PS18		Benthic dredges	[8]
	SUBVENT-1	2013	Hespérides	J. Tomas Vazquez	Kongsberg EM-120 12 kHz Angular coverage = 150° 191 beams per ping Coverage 3–4 times the water depth	TOPAS PS18	CTDs and rosettes	Benthic dredges	[9]
	SUBVENT-2 Leg-1	2014	Sarmiento de Gamboa	Luis Somoza	Atlas DS 1×1 14–16 kHz Angular coverage = 140° 360 beams per ping Coverage 5.5 times the water depth	ATLAS PARASOUND P-35	ROV-mounted sensors: temperature, salinity, oxygen, fluorescence, turbidity, methane and CO ₂ sensors	ROV 6000 Luso: Two robotic manipulators—1024 × 1024 pixel digital still camera	[4]

Table S2. Seabed type, morphology, oceanographic variables, VME Indicator Taxa and seafloor micro-morphologies and habitat types for each of the sites of the case studies.

Case study/ROV Dive or Dredge Site	Seabed Type	Morphology/ Water Depth	Oceanographic Conditions and Water Mass variables	VME Indicator Taxa and Associated Taxa	VME Habitat Type (FAO Codes-) and Seafloor Micromorphology
1. GALICIA BANK	Phosphorite and ferromanganese crusts on limestones basement	Continental bank 620–1175 mbsl	ENACW (Eastern North Atlantic Central Water): 300–600 mbsl Two cores of Mediterranean Outflow Water (MOW): 800 and 1200 mbsl		-
Breogham Mound Province (DRR_20-27-91)		780–1175 mbsl	T = 11–11.5 °C S = 35.9–36.1 psu DO = 5.4–5.5 mL·L ⁻¹ δ_0 = 27.353–27.431 kg·m ⁻³ Speed = 5–10 cm·s ⁻¹	Living <i>Desmophyllum pertusum</i> and <i>Madrepora oculata</i> Scleractinians Bryozoans	SCLERACTINIAN BIOHERMS (CSS) Semiburied stepped 10–12 m in height and widths of 500 m on slopes 2–4°. Living Scleractinian mini-mounds 2–4 m in height and widths of 500 m
Castelao Mound Province (DRR_25-26-28)		830–860 mbsl	T = 11.25 °C S = 35.8–35.9 psu DO = 5.55 mL·L ⁻¹ δ_0 = 27.353–27.431 kg·m ⁻³	Living <i>Desmophyllum pertusum</i> and <i>Madrepora oculata</i> Scleractinians	SCLERACTINIAN BIOHERMS (CSS) Cluster of living Scleractinian mini mounds
2. GULF OF CÁDIZ	Hydrocarbon seeps, mud breccia sediments and MDCs carbonates	Cold seeps, Mud volcanoes	Mediterranean Outflow Water (MOW): T = 13 °C; S = 36.5 psu Mediterranean Upper Water (MU): 500–800 mbsl Speed = 46 cm·s ⁻¹ Mediterranean Lower Water (ML): 750–1200 mbsl Speed = 20–30 cm·s ⁻¹ North Atlantic Deep Water (NADW): 1500–3000 mbsl T = 3–8 °C S = 34.95–35.2 psu		
Mercator MV (SV2_D02)	Soft muddy sediment	350–360mbsl	T = 12.5 °C S = 35.75 psu DO % saturation = 90.5% DO = 9.65 mL·L ⁻¹	Desmosponges <i>Geodia</i> sp. <i>Phakellia</i> sp.	DEEP-SEA SPONGE AGGREGATIONS (DMO) MDAC blocks (up to 1 m) on the summit with abundant desmosponges
	Muddy to silty areas	350 mbsl	Methane concentrations = 41.93–47.63 nM	Chemosynthesis-based communities: Sulfur-oxidizing bacterial (SOB) mats Chemosymbiotic bivalves: <i>Lucinoma asapheus</i>	CHEMOSYNTHESIS-BASED HABITATS (CXV) Pockmarks 1–3 m in diameter
	Soft muddy sediment	365–370 mbsl		Pennatulacea (sea-pens) <i>Funiculina quadrangularis</i>	SEA-PEN COMMUNITIES (NTW) Abundant sea-pens around the summit
	Soft muddy sediment	370–380 mbsl		Cerianthids Annelids <i>Hyalinocia tubicola</i> .	CERIANTHID COMMUNITIES Pockmarks with abundant Cerianthids and annelids on the flanks

Yuma MV (SV2_D09)	Soft muddy sediment with scattered MDACs rocks	Mud volcano summit 1092 mbsl	T = 9.67–9.96 °C S = 35.7–36.1 psu DO = 4.73–5.08 mL·L ⁻¹ δ ₀ = 32.05 kg·m ⁻³ Methane concentrations = 44.07–50.33 nM	Chemosynthesis-based communities: Siboglinid tubeworms Sulfur-oxidizing bacterial (SOB) mats Chemosymbiotic bivalves: <i>Acharax gadirae</i> , <i>Thyasira vulcolutre</i>	CHEMOSYNTHESIS-BASED HABITATS (CXV) Sub-circular micro-mud mounds at the summit
	Soft muddy sediment			Lithistid sponges Pennatulacea (sea pens): <i>Kophobelemnon</i> sp., <i>Pennatula</i> sp. Cerianthids Gorgonians: <i>Radicipes</i> sp. Holothurians Decapods: <i>Paramola cuvieri</i> , <i>Aristaeomorpha foliacea</i>	SEA-PEN COMMUNITIES (NTW) & DEEP-SEA SPONGE AGGREGATIONS (LITHISTID) (LITH) Micro mud mounds
	MDACs slabs and blocks			Gorgonians Scleractinians	AGGREGATIONS OF GORGONIANS (GGW) & SCLERACTINIANS (CSS) Gorgonians (GGW) and Scleractinians (CSS) colonizing MDAC slabs
Las Negras MV (SV2_D05)	Muddy areas	Mud volcano 1360 mbsl	T = 9.5 °C S = 36.00 psu DO = 5.25 mL·L ⁻¹ δ ₀ = 34.90 kg·m ⁻³ Methane concentration = 39.69–47.60 nM	Chemosynthesis-based habitats: Chemosymbiotic bivalves: <i>Thyasira vulcolutre</i> , <i>Isorropodon megadesmus</i> , <i>Bathymodiolus mauritanicus</i>	CHEMOSYNTHESIS-BASED HABITATS (CXV) Pockmarks depressions with graveyards of <i>Bathymodiolus mauritanicus</i> shells
	Soft muddy sediments			Pennatulacea (sea-pens): <i>Kophobelemnon</i> , <i>Pennatula</i> , <i>Anthoptilum</i> Cerianthids Holothurians Decapods: <i>A. foliacea</i> , <i>Plesiopenaeus edwardsianus</i>	SEA-PEN COMMUNITIES (NTW) Flat seafloor and micro-mounds
	MDACs pavements and slabs			Soft corals Desmosponges Anemones	AGGREGATIONS OF SOFT CORALS (AJZ) & DESMOSPONGES (DMO)
Madrid MV (SV2_D08)	Muddy sediments with some gravels	Mud volcano 1390 mbsl	T = 8.8–9.18°C S = 36.06 psu DO = 4.87–5.55 mL·L ⁻¹ δ ₀ = 34.10 kg·m ⁻³ Methane concentration = 48.53 nM	Chemosynthesis-based communities: Chemosymbiotic bivalves: <i>A. gadirae</i> , <i>Solemya elarraichensis</i>	CHEMOSYNTHESIS-BASED HABITATS (CXV) Subcircular micro-mounds
	MDACs pavements and slabs			Isolated gorgonians Scleractinians: <i>Solenosmilia variabilis</i> , <i>Madrepora oculata</i>	AGGREGATIONS OF GORGONIANS (GGW) & SCLERACTINIANS (CSS) Gorgonians and scleractinians on large MDACs slabs, up to 1 m in diameter
	Soft muddy–silty sediments			Cerianthids Holothurians	CERIANTHID COMMUNITIES (CTC) Soft slope sediments (mud-silt)
	Anthropogenic Remains: sunken iron			Solitary scleractinians: <i>Desmophyllum dianthus</i> Hydrozoans Small gorgonians	Anthropogenic remains (e.g., iron bars, glass bottles) colonized by gorgonians and solitary cup corals

Algael MV (SV2_D10, SV2_D11)	Mud volcano summit 775 mbsl	T = 10–10.10 °C S = 35.75 psu DO = 4.55–5.02 mL·L ⁻¹ δ ₀ = 31.058–31.258 kg·m ⁻³		
Soft muddy areas	Summit 775–780 mbsl	Methane concentration = 49.90 nM	Annelida: <i>Siboglinum</i> sp.	CHEMOSYNTHESIS-BASED HABITATS (CXV-SZS) Scattered scleractinian rubbles colonized by Siboglinids
Soft muddy areas	Southern flank 790–785 mbsl		Chemosynthesis-based communities: Molluscs: Shells of <i>Bathymodiolus mauritanicus</i> Hydrozoans	CHEMOSYNTHESIS-BASED HABITATS (CXV-DMK) Extensive pools of <i>Bathymodiolus mauritanicus</i> shells colonized by hydrozoans
Soft muddy areas and shells remains Active degassing seeps	Northern flank 820–810 mbsl	Methane concentration = 97.60 nM	Chemosynthesis-based communities: Molluscs: <i>Bathymodiolus mauritanicus</i> , <i>Solemya elarraichensis</i> , <i>Isorropodon</i> sp. Annelida: <i>Siboglinum</i> sp.	CHEMOSYNTHESIS-BASED HABITATS (CXV-DMK) Extensive beds of living <i>Bathymodiolus mauritanicus</i> colonized by hydrozoans Circular pools (pockmarks) or linear fissures up to 10 m diameter on bioclastic and MDACs blocks
Coral rubbles and MDACs blocks up to 1 m	780–790 mbsl Southern flank		Soft corals (Alcyonacea) Gorgonians: <i>Swiftia</i> sp. Bamboo corals: <i>Chelidonopsis</i> , <i>Acanella</i> Antipatharians (black corals): <i>Bathypathes</i> , <i>Leiopathes</i> , <i>Stichopathes</i> . Desmosponges	AGGREGATIONS OF SOFT CORALS (AJZ) & BAMBOO CORALS (GGW) Scleractinian coral rubbles (<i>D. pertusum</i>) and small blocks of MDACs mainly colonized by living small soft corals and bamboo corals
MDACs gravels	780–820 mbsl Northwestern flank		Antipatharians (black corals): <i>Bathypathes</i> , <i>Leiopathes</i> Soft corals (Alcyonacea) Gorgonians: <i>Swiftia</i> sp. Actinarians Sponges	AGGREGATIONS OF ANTIPATHARIANS (AQZ) ON MDAC ROCKS Small and large MDACs colonized by black corals and sponges
Muddy sediments with scattered patches of coral rubbles and MDACs gravels	820–840 mbsl Northern flank		Hexactinellid sponges: <i>Pheronema</i> , <i>Hyalonema</i> Soft corals (Alcyonacea) Gorgonians: <i>Swiftia</i> sp. Antipatharians (black corals): <i>Paranthipathes</i> , <i>Stichopathes</i>	DEEP-SEA SPONGE AGGREGATIONS (HEXACTINELLID)(HXY) Shells and scleractinian rubbles colonized by Hexactinellid sponges gorgonians and antipatharians
Northern Pompeia Coral (SV2_D03)	Coral ridge 860–870 mbsl	T = 10 °C S = 35.75 psu DO = 5.0 mL·L ⁻¹ δ ₀ = 31.5 kg·m ⁻³	Scleractinian frameworks <i>Desmophyllum pertusum</i> and <i>Madrepora oculata</i> Stony Octocorals: <i>Corallium tricolor</i>	RELICT SCLERACTINIAN REEFS COLONIZED BY STONY OCTOCORALS Semi-buried scleractinian frameworks (<i>D. pertusum</i> and <i>M. oculata</i>) forming reefs colonized by living stony octocorals. Buried mounds up to 30 m identified on seismic sections

		860–870 mbsl	Methane concentration = 41.93 and 43.24 nM	Chemosynthesis-based communities: Chemosymbiotic bivalves: <i>Lucinoma asapheus</i> , <i>Thyasira vulcolutre</i> Scattered bacterial mats (<i>Beggiatoa</i> -like sulfur oxidisers)	CHEMOSYNTHESIS-BASED HABITATS (CXV) Patches of chemosymbiotic bivalves shells and bacterial mats
Bomjardim MV (SV2_D07)	Muddy areas	Mud volcano Summit 3000 mbsl	T = 3.20 °C S = 35.15 psu DO = 0.64 mL·L ⁻¹ δ ₀ = 39.966 kg·m ⁻³ Methane concentration = 20.18–28.12 nM	Chemosynthesis-based communities: <i>Isorropodon megadesmus</i> Decapods: <i>Munidopsis</i> sp.	CHEMOSYNTHESIS-BASED HABITATS (CXV) Abundant shells of chemosymbiotic bivalves
				Annelids: Siboglinidae Hormathiid actinians: <i>Actinauge</i> sp. Holothurians: <i>Mesothuria</i> Fishes: <i>Bathypterois</i>	CHEMOSYNTHESIS-BASED HABITATS (CXV) Soft bottoms on the flanks with siboglinid worms
3. PASSAGE OF LANZAROTE	Recent volcanic rocks (ca. 1 Ma) and salt/shale diapirs	Submarine hills within oceanic passage 838–1530 mbsl	North Atlantic Central Water (NACW) 600 mbsl Antarctic Intermediate Water (AAIW) 600–1100 mbsl Mediterranean Water (MW) 900 mbsl—bottom		
M1 dome (SV2_DV12)	Soft muddy areas on salt diapirs	Sub-rounded submarine seamount 828 mbsl	T = 10–10.10 °C S = 35.75 psu DO = 4.80 mL·L ⁻¹ δ ₀ = 31.058 kg·m ⁻³	Hexactinellid sponges <i>Phoronema carpenieri</i> Venus fly-trap anemones	DEEP-SEA SPONGE AGGREGATIONS (HEXACTINELLID)(HXY) & ACTINIARIAN COMMUNITIES (ATX) Soft muddy bottoms
	Soft muddy areas with scattered volcanic rocks			Starfishes: Brissingid <i>Nymphaster arenatus</i> Stony Octocorals: <i>Corallium</i> spp. Bamboo corals: <i>Acanella arbuscula</i> Decapod crustaceans: <i>A. foliacea</i> , <i>P. edwardsianus</i> Holothurians: <i>Mesothuria</i> Sea urchins: <i>Araeosoma</i>	Mud-silt bottom with scattered blocks. Benthic fauna colonizing small blocks of volcanic rocks. Starfishes on muddy-silty sediments
Volcanic ridge (SV2_DV13)	Old volcanic rocks	Submarine ridge 1019–1092 mbsl	T = 7.3–7.73 °C S = 35.35 psu DO = 4.33 mL·L ⁻¹ δ ₀ = 32.425 kg·m ⁻³	Stony Octocorals: <i>Corallium tricolor</i> <i>Corallium niobe</i> Soft corals (Alcyonacea) Gorgonians: <i>Swiftiasp.</i> Crinoids	AGGREGATIONS OF STONY OCTOCORALS (CSS) AND SOFT CORALS Aggregations of stony octocorals, soft corals and gorgonians aligned to S–N currents on volcanic rocks promontories
				Isolated bamboo corals: <i>Acanella arbuscula</i> Pennatulacea (sea-pens): <i>Pennatula</i>	SEA-PENS COMMUNITIES (NTW) WITH BAMBOO CORALS Soft muddy bottoms with abundant coral rubbles

Eastern Twin Pool (ETP) (SV2_DV14)	Muddy and sandy areas	Circular depression 1279–1270 mbsl	T = 7.33–7.73 °C S = 35.35 psu DO = 4.08–4.62 mL·L ⁻¹ δ ₀ = 32.433 kg·m ⁻³	Soft bottom sponges: <i>Thenaea</i> Cerianthids Echinoderms: <i>Ceramaster</i> , <i>Mesothuria</i> , <i>Araeosoma</i> Crustacean decapods: <i>A. foliacea</i> , <i>P. edwardsianus</i> , <i>Plesionika</i> sp. Large scalpellid barnacles	Sandy and muddy seabed with soft and carbonated flagstones
				Desmosponges Pachastrellid-like sponges Solitary scleractinians <i>Caryophyllia</i> Hydroids	
Volcancito (SV2_DV15)	Volcanic rocks	Volcanic hill 1119–1265 mbsl	T = 7.44–7.70 °C S = 35.35 psu DO = 4.32 mL·L ⁻¹ δ ₀ = 32.725 kg·m ⁻³	Stony Octocorals: <i>Corallium tricolor</i> and <i>C. niobe</i> Hexactinellid and lithistid sponges Soft corals (Alcyonacea) Gorgonians: <i>Swiftia</i> sp. Plexaurid gorgonians.	AGGREGATIONS OF STONY OCTOCORALS (CSS), GORGONIANS and SOFT CORALS (AJZ) Stony octocorals, soft corals, gorgonians aligned along the S–N undercurrents on volcanic promontories
4. TAGORO VOLCANO	Recent volcanic rocks	Summit 89–120 mbsl	T = 18.75 °C S = 36.92 psu DO = 7.88 mL·L ⁻¹ δ ₀ = 26.98 kg·m ⁻³	Orange-brown Fe-oxidising bacteria	CHEMOSYNTHESIS-BASED HABITATS (CXV)/HYDROTHERMAL VENTS (HORNITOS) Active degassing CO ₂ Chimneys 5 m Low T hydrothermal habitats
5. CANARY ISLANDS SEAMOUNTS	Ferromanganese crust on old volcanic rocks (91–119 Ma)	Flanks 150–200 mbsl	T = 13.82 °C S = 36.10 psu DO = 6.44 mL·L ⁻¹ δ ₀ = 27.5 kg·m ⁻³	Molluscs: <i>Neopycnodonte cochlear</i> Annelids: Serpulids Crustacean decapods: <i>Plesionika</i> Fishes: <i>Conger conger</i> , <i>Gymnothorax</i>	VOLCANIC CAVES Fauna living on caves formed by accumulation of recent lava floating bombs and lava bulbous flows
5. CANARY ISLANDS SEAMOUNTS	Ferromanganese crust on old volcanic rocks (91–119 Ma)	Seamounts	North Atlantic Central Water (NACW): 100–700 mbsl. South Arctic Intermediate Water (SAIW) to the south: 400–900 mbsl Antarctic Intermediate Water: 700–1000 mbsl. Antarctic Intermediate Water (AAIW) to the north: 1000–1500 mbsl Mediterranean Water (MW) to the south: 800–1400 mbsl North Atlantic Deep Water (NADW): 1500–3800 mbsl Antarctic Bottom Water (AABW): 3800–5100 mbsl Oxygen minimum zone: DO = 2.5–3.5 mL·L ⁻¹ (ca. 750 m) DO = 5 mL·L ⁻¹ (3000 mbsl)		
Echo Seamount	Volcanic and subvolcanic alkaline rocks: trachytes, phonolites and basalts	350–3700 mbsl			

			Scleractinians: <i>Dendrophyllia cornigera</i> Antipatharian (black corals): <i>Stichopathes</i> Desmosponges: <i>Pachastrella, Poecillastra</i> Molluscs: <i>Asperarca nodulosa, Clelandella</i> , muricids Small hydroids: Echinoderms: Cidarids Crinoids <i>Thalassometra cf. lusitanica</i>	AGGREGATIONS OF SCLERACTINIANS (CSS) AND ANTIPATHARIANS (AQZ) Smooth seabed covered by ferromanganese crusts, and volcanic rocks with high abundance of sponges, scleractinians and black corals as well as a high diversity of small invertebrates
(DR05–DR06)	Summit 310–362 mbsl			
(DR02)	Northern flank 1875–1890 mbsl		Octocorals: Bamboo corals	AGGREGATIONS OF BAMBOO CORALS (GGW) Ferromanganese crust with very few fauna and bamboo corals
(DR04)	Southern flank 1593–1832 mbsl		Gorgonians: <i>Metallogorgia melanotrichos</i> Antipatharians (black corals): <i>Bathypathes</i> Solitary and colonial scleractinians: <i>Desmophyllum</i> -like corals, <i>Solenosmilia variabilis</i> Bamboo corals Large brachiopods	AGGREGATIONS OF GORGONIANS, ANTIPATHARIANS (AQZ) AND BAMBOO CORALS (GGW) Ferromanganese crust and coral rubbles with high abundance of benthic fauna
The Paps Seamount	Volcanic cones formed by alkaline volcanic rocks (cinerites, lapilli and scoria)	1600–4300 mbsl		
DR07 (1860 m) DR08 (1964–1975 m) DR11 (1952–1957 m)	Ferromanganese crust	Summit 1860–1952 mbsl	Gorgonians: <i>Metallogorgia melanotrichos, Chrysogorgia, Paramuricea</i> Hexactinellid sponges: <i>Aphrocallistes</i> Bamboo corals Soft corals: <i>Anthomasthus</i> Crustaceans: <i>Munidopsis</i> Ophiuroids (attached to gorgonians): <i>Ophiocreas, Asteroschema</i> Antedonidae crinoids	AGGREGATIONS OF GORGONIANS (GGW) & DEEP-SEA HEXACTINELLID SPONGES (HXY) Summit covered by ferromanganese crust colonized by large deep-sea gorgonians with abundant epibionts and abundance of hexactinellid sponges
DR10	Northern flank 2839–3010 mbsl		Hexactinellid sponges Gorgonians: <i>M. melanotrichos</i> Ophiuroids: <i>Ophiocreas, Asteroschema</i> Brisingid and goniasterid starfishes	AGGREGATIONS OF GORGONIANS (GGW) & DEEP-SEA HEXACTINELLID SPONGES (HXY) Flanks with ferromanganese crusts incised by gullies

The Tropic Seamount	Alkaline basalts, phonolites and cinerites cones	1000–4200 mbsl		
DR17 (1004–1007 m); DR18 (1137–190 m)		Summit 190–1137 mbsl	Scleractinians: <i>Solenosmilia variabilis</i> , <i>Desmophyllum</i> -like solitary corals Bamboo corals: <i>Acanella</i> , <i>Keratoisis</i> Hexactinellid sponges: <i>Poliopogon amadou</i> Annelids: mainly eunicids Stalked crinoids: <i>Endoxocrinus wyvillethomsoni</i>	AGGREGATIONS OF SCLERACTINIANS(CSS) AND BAMBOO CORALS (GGW), DEEP-SEA HEXACTINELLID SPONGE AGGREGATIONS (HXY) Fe-Mn crusts and carbonate-phosphorite pavements colonized by scleractinians and large colonies of bamboo corals (up 60 cm long)
DR16		Eastern flank 1719 mbsl	Scleractinians: <i>Solenosmilia variabilis</i> , <i>Desmophyllum</i> -like solitary corals Antipatharians (black corals): <i>Bathypathes</i> Hexactinellid sponges Ophiuroids Polychaetes Crustaceans: <i>Munidopsis</i> , balanids, pandalid shrimps	AGGREGATIONS OF SCLERACTINIANS (CSS) AND ANTIPATHARIANS (AQZ), DEEP-SEA HEXACTINELLID SPONGE AGGREGATIONS (HXY) Ferromanganese crusts with abundant coral rubble colonized by <i>S. variabilis</i> and <i>Desmophyllum</i> -like solitary corals
DR15		Lower southern flank 2263–2287 mbsl	Bamboo corals: <i>Acanella</i> , <i>Keratoisis</i> Hexactinellid sponges	AGGREGATIONS OF BAMBOO CORALS (GGW) & DEEP-SEA HEXACTINELLID SPONGE AGGREGATIONS (HXY) Ferromanganese crusts
Drago Seamount DR13 (2290–2426 m)	Tops composed of several small volcanic cones formed by alkaline basalts, tephrites and volcanoclastic rocks	Summit 2200–4300 mbsl	Stony Octocorals: <i>Corallium</i> spp. Gorgonians: <i>M. melanotrichos</i> Small unidentified gorgonians Hexactinellid sponges: <i>Aphrocallistes</i> , <i>Regadrella</i>	AGGREGATIONS OF STONY OCTOCORALS AND GORGONIANS, DEEP-SEA SPONGE AGGREGATIONS (HEXACTINELLID)(HXY) Thick ferromanganese crust colonized by colonies of stony octocorals (<i>Corallium</i> spp.) and gorgonians as well as hexactinellid sponges

Table S3. Summary of the ROV-mounted CTD mass water parameters, VME codes and deep-sea habitat types.

Case	Site	Depth Min. (m)	Depth Max. (m)	T Min. °C	T Max. °C	Salinity Min. psu	Salinity Max. psu	DO Min. mL·L ⁻¹	DO Max. mL·L ⁻¹	Potential Density Min. kg m ⁻³	Potential Density Max. kg m ⁻³	VME Code	Deep-Sea Habitats
GB	Breogham	789	1175	11	11.5	35.9	36.1	5.4	5.5	27.353	27.431	CSS	Scleractinian reefs
GB	Castelao	830	860	11.25	11.25	35.8	35.9	5.5	5.5	27.353	27.431	CSS	Scleractinian reefs
GoC	Mercator MV	350	360	12.5	12.5	35.75	35.75	4.75	4.75			DMO	Deep-sea sponge aggregations
GoC	Mercator MV	350	350	12.5	12.5	35.75	35.75	4.75	4.75			CXV	Chemosynthesis-based habitats
GoC	Mercator MV	365	370	12.5	12.5	35.75	35.75	4.75	4.75			NTW	Sea-pen communities
GoC	Mercator MV	370	380	12.5	12.5	35.75	35.75	4.75	4.75			CTC	Cerianthid communities
GoC	Yuma MV	1092	1092	9.67	9.96	35.7	36.1	4.73	5.08	32.05	32.05	CXV	Chemosynthesis-based habitats
GoC	Yuma MV	1092	1092	9.67	9.96	35.7	36.1	4.73	5.08	32.05	32.05	NTW-LITH	Sea-pen communities & deep-sea sponge agregations (lithistid)
GoC	Yuma MV	1092	1092	9.67	9.96	35.7	36.1	4.73	5.08	32.05	32.05	GGW-CSS	Aggregations of gorgonians scleractinians & antipatharians
GoC	Las Negras MV	1360	1360	9.5	9.5	36	36	5.25	5.25	34.9	34.9	CXV	Chemosynthesis-based habitats
GoC	Las Negras MV	1360	1360	9.5	9.5	36	36	5.25	5.25	34.9	34.9	NTW	Sea-pen communities
GoC	Las Negras MV	1360	1360	9.5	9.5	36	36	5.25	5.25	34.9	34.9	AJZ-DMO	Aggregations of soft corals & desmosponges
GoC	Madrid MV	1390	1390	8.8	9.18	36.06	36.06	4.87	5.5	34.1	34.1	CXV	Chemosynthesis-based habitats
GoC	Madrid MV	1390	1390	8.8	9.18	36.06	36.06	4.87	5.5	34.1	34.1	GGW-CSS	Aggregations of gorgonians scleractinians & antipatharians
GoC	Madrid MV	1390	1390	8.8	9.18	36.06	36.06	4.87	5.5	34.1	34.1	CTC	Cerianthid communities
GoC	Algacel MV	775	810	10	10.1	35.75	35.75	4.55	5.02	31.058	31.258	CXV	Chemosynthesis-based habitats
GoC	Bomjardim	3000	3000	3.2	3.2	35.15	35.15	0.64	0.64	39.966	39.966	CXV	Chemosynthesis-based habitats
PoL	M1dome	828	828	10	10.1	35.75	35.75	4.8	4.8	31.058	31.058	HXY-ATX	Deep-sea Hexactinellid sponge agregations & actiniarian aggregations
PoL	Volcanicridge	1019	1092	7.3	7.73	35.35	35.35	4.33	4.33	32.425	32.25	CSS-AJZ	Aggregations of stony octocorals & soft corals
PoL	ETP Pool	1270	1279	7.33	7.73	35.35	35.35	4.08	4.62	32.433	32.433	CTC	Cerianthis communities
PoL	ETP Pool	1270	1279	7.33	7.73	35.35	35.35	4.08	4.62	32.433	32.433	DMO	Deep-sea desmosponge aggregations
PoL	Volcancito	1119	1265	7.44	7.7	35.35	35.35	4.32	4.32	32.725	32.725	CSS-AJZ	Aggregations of stony octocorals & soft corals
Tagoro	Summit	89	120	18.75	18.75	36.92	36.92	4.32	4.32	26.98	26.98	CXV-VOL	Low T-hydrothermal bacterial communities
Tagoro	Flanks	150	200	13.82	13.82	36.1	36.1	6.44	6.44	27.5	27.5	CXV-VOL	Volcanic caves

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