

## Supplementary Material

### Cold-water coral habitats in submarine canyons of the Bay of Biscay

Inge MJ van den Beld\*, Jean-François Bourillet, Sophie Arnaud-Haond, Laurent de Chambure, Jaime S. Davies, Brigitte Guillaumont, Karine Olu and Lenaïck Menot

\* **Correspondence:** Corresponding Author: Inge.van.den.Beld@ifremer.fr

#### S1. Description of the coral habitats observed in the Bay of Biscay during this present study.

**Coral reef** was encountered on twelve dives. In the Bay of Biscay, this habitat consisted of live colonies of *Madrepora oculata* and *Lophelia pertusa*, growing on dead framework and/or rubble. The coral framework or rubble was filled by soft substrate and sandy patches were regularly observed in the reefs. Coral reefs in Petite-Sole, Guilvinec and Croisic Canyons were observed on ‘sand waves’, with live and dead framework on the summit, coral rubble and isolated live colonies on (one occurrence of) the flanks and sand with occasional coral rubble in between ‘sand waves’. These ‘sand waves’ were probably generated by a turbidity current. The cold-water corals, at least the colonial scleractinians, can develop in an opportunistic way, either using the harder substrate to grow or grow on existing corals which have been moved by the turbidity current from a higher point in the canyon, settle and then continue to grow.

The linear of this habitat is 10.8 km, what is equivalent to 6.0% of the total linear explored in this study (Table 3).

Coral reefs were observed in three zones of the Bay of Biscay in ten canyons: i) the Celtic Margin (Sorlingues, Petite-Sole and Shamrock Canyons), ii) the north of the Armorican margin (Crozon, Morgat-Douarnenez and Douarnenez Canyons) and iii) on the central part of the Armorican margin (Guilvinec, Odet, Croisic and Pornic Canyons) (Fig. 6). Coral reef represented the majority of coral habitats in Guilvinec (73.2%), Odet (66.4%), Petite-Sole (43.6%), and Croisic (39.5%) Canyons. However, some of these dives were biased towards sampling scleractinians coral habitats, especially reefs (Table 5).

This habitat was observed on 106 segments of which the smallest segments measured 6.7 m and the largest more than 1 km (1180.1 m). The median linear of a segment was 65.3 m.

The coral reefs were found between 655 and 1239 m water depth, with a mean of 852 m ( $\pm 134$  m) (Fig. 8A). Temperature ranged from 9.7 to 11.5°C, with a mean temperature of 11.1°C ( $\pm 0.4$ °C) (Fig. 8B). The density ( $\sigma$ -theta) ranged from 27.19 kg/m<sup>3</sup> to 27.51 kg/m<sup>3</sup>, with a mean of 27.27 kg/m<sup>3</sup> ( $\pm 0.07$  kg/m<sup>3</sup>) (Fig. 8C).

Even though the average coral coverage was more dominant than other substrate types (mean = 74.4%  $\pm$  23.5), the percentage of live framework was small (mean = 2.6%  $\pm$  2.6 of the image). The mean percentage of soft substrate within coral reefs was 24.4% ( $\pm$  22.8). If hard substrate was present (only 0.5% of the image  $\pm$  5.0), it was mostly formed by pebbles and cobbles.

A total of 3208 individual corals were observed in this habitat, corresponding to a density of 5.3 individuals per image. In total, thirty-two morpho-types were observed in this habitat, as well as the scleractinians *Madrepora* and *Lophelia*. *Solenosmilia* was not observed in coral reef habitats (Table 3). A very high abundance of *Leiopathes* spp. (1923 colonies), particularly in reef areas in Petite-Sole Canyon, as well as high abundances of three other species: the antipatharians *Stichopathes gravieri* (293 colonies), the gorgonian *Narella versluysi* (238 colonies) and Antipatharia spp. (212 colonies). Only 1 individual of Plexauridae spp., Plexauridae sp. 1, Gorgonacea sp. 17, Gorgonacea sp. 18, Gorgonacea sp. 19, Bathypathes sp. 1, Bathypathes sp. 2, Nephtheidae spp. and Alcyoniina spp. were observed. The Hurlbert's diversity index is 5.50 based on 16 individuals (the smallest observed number of individuals of one habitat) (Table 3).

**Coral rubble** habitat consisted of broken pieces of scleractinians. It was the most frequently observed habitat, observed during the highest number of dives (25). Even though it was difficult to determine the species forming rubble from images, based on the surroundings, a large part of the rubble could be identified as *Madrepora* and *Lophelia*. Coral rubble was also observed at the base of cliffs, covered by *Solenosmilia* and *Enallopsammia* (see Colonial scleractinians on hard substrate).

The linear of coral rubble was 18.1 km, equivalent to 10.1% of the total linear of observed habitats during all dives (Table 3).

This habitat was observed in four zones of the Bay of Biscay and was the most frequently observed habitat (Fig. 6): the Celtic margin (Sorlingues, Petite-Sole, Shamrock and Hermine Canyons), the north-Armorican margin (Lampaul, Chapelle, Guilcher, Brest, Crozon, Morgat, Morgat-Douarnenez and Douarnenez Canyons), central Armorican margin (Guilvinec, Odet, Odet-Guilvinec, Blavet, Belle-île, Croisic, Saint-Nazaire and Pornic Canyons) and on the south of the Armorican margin (Ars Canyon). Coral rubble habitat comprised the majority of the linear of coral habitats in Blavet (100%), Odet-Guilvinec (100%), Morgat-Douarnenez (90.3%), Ars (81.6%), Crozon (76.8%), Pornic (71.5%) and Lampaul (39.76%) Canyons (Fig. 6). Coral rubble was not dominant, but comprised more than a fifth of the linear of coral habitats in Belle-île (50.0%), Croisic (33.9%), Shamrock (25.3%), Sorlingues (23.8%), St. Nazaire (23.2%), and Petite-Sole (23.0%) Canyons.

Coral rubble was observed on 162 segments, of which the smallest measured 5.2 m and the largest approximately 1 km (1026.0 m). The median linear was 54.5 m long.

The depth range of this habitat was more than 1000 m, from 228 m to 1783 m depth, with a mean depth of 828 m ( $\pm$  234 m) (Fig. 8A). Temperatures ranged from 9.2°C and to 12.2°C, with a mean temperature of 10.8°C ( $\pm$  0.7°C) (Fig. 8B). The density ( $\sigma$ -theta) ranged from 27.13 kg/m<sup>3</sup> to 27.58 kg/m<sup>3</sup>, with a mean of 27.32 kg/m<sup>3</sup> ( $\pm$  0.11 kg/m<sup>3</sup>) (Fig. 8C).

The mean percentage coral rubble cover was 58.1% ( $\pm$  30.0%). The mean coverage of framework was small, with 0.8% ( $\pm$  3.9%: live framework: 0.3  $\pm$  0.9%). The mean percentage of gravel/soft substrate is 38.7% ( $\pm$  29.9%). Only 2.4% (mean  $\pm$  9.5%) of the image was covered by hard substrate (Table 3).

A total of 672 individual corals were observed, corresponding to 0.8 individuals per image (Table 3). Twenty-six morpho-types were observed from this habitat, as well as the scleractinians *Madrepora* and *Lophelia*. *Solenosmilia* was not observed in this particular habitat (Table 3). The Hurlbert's diversity index is 7.16 based on 16 individuals (the smallest number of individuals for a habitat) (Table 3).

**Colonial scleractinians on hard substrate (HS)** were observed during fourteen dives. It is formed by isolated colonies of the colonial scleractinians *M. oculata*, *L. pertusa*, *Solenosmilia variabilis*, *Enallopsammia rostrata* and/or *Dendrophyllia cornigera*, emerging on hard substrate that may have a thin layer of soft sediment. This habitat was usually mono-specific, except in the case of *M. oculata* and *L. pertusa* that occurred together. *S. variabilis* and *E. rostrata* have been observed on vertical walls or other vertical features, such steps. Only a single occurrence of *D. cornigera* was observed.

Colonial scleractinians HS were observed on a linear of 3.4 km (1.9% of the total linear) (Table 3).

It was observed in three zones of the Bay of Biscay (Fig. 6): the Celtic margin (Sorlingues, Petite-Sole and Shamrock Canyons), the northern Armorican margin (Black-Mud, Lampaul, Guilcher, Brest, Morgat and Douarnenez Canyons) and the central part of the Armorican margin (Guilvinec, Croisic and Saint-Nazaire Canyons).

Colonial scleractinians HS comprised the majority of the linear of coral habitats in St. Nazaire (76.8%) and Guilcher (46.4%) Canyons (Fig. 6). It was the second most observed habitat in Petite-Sole (23.2%), Brest (17.5% of the coral linear) and Douarnenez (28.9%) Canyons. In Shamrock, Blackmud, Lampaul, Morgat, Douarnenez and St. Nazaire, cliffs were encountered covered by *Solenosmilia*, *Enallopsammia* or *Lophelia/Madrepora*.

Forty-nine segments were allocated to colonial scleractinians HS, of which the smallest measured 2.5 m long and the largest 414.7 m. The median length of a segment was 37.3 m (Table 3).

It occurred between 556 and 1819 m depth, with a mean depth of 1105 m ( $\pm 234$  m) (Fig. 8A). Temperature ranged between 9.0°C and 11.3°C, with a mean of 10.7°C ( $\pm 0.4$ °C) (Fig. 8B). The density (sigma-theta) ranged from 27.21 kg/m<sup>3</sup> to 27.60 kg/m<sup>3</sup>, with a mean of 27.33 kg/m<sup>3</sup> ( $\pm 0.07$  kg/m<sup>3</sup>) (Fig. 8C).

Approximately 50% of this habitat was covered by hard substrate (mean = 51.7%  $\pm$  37.5%), with only an average percentage of 2.0% ( $\pm$  4.2%) of images covered by live colonies. The mean coverage of colonial scleractinians was 19.0% ( $\pm$  25.1%) and soft substrate and gravel covered 16.0% ( $\pm$  26.3) of the image.

A total of 199 coral individuals were counted, corresponding to 1.1 individuals per image. Twenty-seven morpho-types were observed in this habitat, as well as the scleractinians *Madrepora*, *Lophelia* and *Solenosmilia*. The Hurlbert's diversity index is 9.44 based on 16 individuals (this is the smallest number of coral individuals observed comparing each coral habitat) (Table 3).

**Solitary scleractinians on hard substrate (HS)** was observed only once in Douarnenez Canyon on the northern Armorican margin. It is composed of cup corals from the Caryophylliidae family, probably *Vaughanella* sp. With a linear of only 6.0 m, this habitat contributed less than 0.01% of the total linear of all observed habitats in the Bay of Biscay and 1.7% of the coral habitat linear in Douarnenez Canyon (Fig. 6).

It was observed at 1572 m depth (Fig. 8A), at a temperature of 11.1°C (Fig. 8B) and a sigma-theta of 27.26 kg/m<sup>3</sup> (Fig. 8C).

No substrate coverage and species data are available for this habitat because none of the images showing this habitat was selected for these measurements.

**Antipatharians or gorgonians on hard substrate (HS)** were observed during eleven dives. It covers a linear of 804 m, equivalent to 0.4% of the total linear of observed habitats (Table 3). This habitat is formed by several colonies of antipatharians or gorgonians on hard substrate that may be covered by a thin layer of soft sediment. Most of these habitats are formed by gorgonians (linear = 564 m), compared to habitats formed by antipatharians (linear = 128 m) or formed by unidentified anthozoans, that belong to one of these coral Classes (linear = 112 m). *Acanella* cf. *arbuscula* (referred to as *Acanella*) and other members of the Isididae family were the dominant gorgonians constructing this habitat and the Antipathidae family (*Antipathes dichotoma* and *A. viminalis*) were the dominant antipatharians.

The habitat was observed in three zones in the Bay of Biscay (Fig. 6): the Celtic margin (Sorlingues Canyon), the northern Armorican margin (Blackmud, Lampaul, Guilcher, Brest, Morgat, and Douarnenez Canyons), the southern Armorican margin (Ars) and on the Aquitaine margin (Athos Canyon). This habitat was the dominant habitat in Brest (73.0%) Canyon and the second most observed habitat in Athos (38.6%) and Ars (18.4%) Canyons (Fig. 6). A smaller proportion was observed in Lampaul (10.7%) Canyon. In Douarnenez and Morgat Canyon it represented 8.7% and 5.4%, respectively, of the linear of coral habitats in that canyon, while less than 2% of the coral habitat linear was composed of antipatharians/gorgonians HS in Blackmud, Guilcher and Sorlingues Canyons.

Twenty-four segments were allocated to antipatharians/gorgonians HS, of which the smallest measured 6.7 m and the largest 119.5 m. The median length of a segment was 25.4 m long (Table 3).

Their depth range are large, ranging from 580 to 2348 m water depth, with a mean of 1238 m ( $\pm 487$  m) (Fig. 8A). Temperature ranged from 7.2°C to 11.4°C, with a mean temperature of 10.2°C ( $\pm 1.2$ °C) (Fig. 8B). The density ( $\sigma$ -theta) ranged from 27.20 kg/m<sup>3</sup> to 27.64 kg/m<sup>3</sup>, with a mean of 27.38 ( $\pm 0.13$ ) kg/m<sup>3</sup> (Fig. 8C).

The main substrate cover of this habitat was hard substrate (mean = 65.0%  $\pm$  35.8), followed by soft substrate/gravel (mean = 33.6%  $\pm$  34.8). Coral rubble was also observed on this habitat but in very little quantities (mean = 1.4  $\pm$  5.5%) (Table 3).

A total of 205 coral individuals were counted in this habitat, corresponding to 6.8 individuals per image. Twenty-one morpho-types were identified, as well as one colony of the scleractinians *Madrepora* or *Lophelia* (identification not possible) (Table 3). The Hurlbert's diversity index is 9.04 based on 16 individuals (what is the smallest number of individuals of one of the coral habitats) (Table 3).

**Mixed corals on hard substrate** were observed during fifteen dives. This habitat is formed by a mix of antipatharians, gorgonians and/or scleractinians, usually found in similar abundances. Examples of species forming this habitat are the antipatharians *A. viminalis*, *A. dichotoma*, *Stichopathes gravieri*, *Parantipathes* sp. 1, *Leiopathes* spp., the gorgonian *Narella versluysi*, solitary scleractinians, the scleractinians *Madrepora/Lophelia* and unidentified anthozoans (anthozoa sp. 7; anthozoa sp. 11). It was observed on a linear of 2.2 km (1.2% of the total linear of all observed habitats) (Table 3).

Mixed corals HS was observed in four zones of the Bay of Biscay (Fig. 6): the Celtic margin (Petite-Sole and Shamrock Canyons), the northern Armorican margin (Lampaul, Chapelle, Guilcher, Brest, Morgat and Douarnenez Canyons), the central Armorican margin (Odet, Belle-île and Pornic Canyons) and the Aquitaine margin (Athos Canyon). It was the most dominant habitat observed in Morgat (76.6%), Chapelle (51.7%), Belle-île (50.0%) and Douarnenez (47.3%) Canyons (Fig. 6). It was the second largest habitat in Guilcher (20.9%) Canyon. A proportion of less than 7% of the linear of coral habitats was composed of this habitat in the other canyons.

Forty-three segments were allocated to this habitat, of which the smallest measured 5.0 m and the largest 219.5 m. The median length of this habitat segment was 27.6 m long (Table 3).

It was observed at water depths between 678 and 1816 m depth, with a mean depth of 1094 m ( $\pm 251$  m) (Fig. 8A). Temperature ranged between 8.9°C and 11.9°C, with a mean temperature of 11.0°C ( $\pm 0.5$ ) (Fig. 8B). The density (sigma-theta) ranged from 27.16 kg/m<sup>3</sup> to 27.59 kg/m<sup>3</sup>, with a mean of 27.28 ( $\pm 0.08$ ) kg/m<sup>3</sup> (Fig. 8C).

The main substrate type was hard substrate (mean coverage = 58.4%  $\pm$  34.3), followed by soft substrate/gravel (mean coverage = 36.2%  $\pm$  34.6). Only a small portion of the image was covered by scleractinians (mean coverage = 5.4  $\pm$  12.7) of which most was rubble (Table 3). Only a mean of 0.3% ( $\pm 1.1$ %) of the image was covered by live coral framework.

A total of 718 individual corals were observed, corresponding to 7.8 individuals per image. For this habitat, a total of 30 morpho-types were identified, as well as the scleractinians *Madrepora*, *Lophelia* and *Solenosmilia* (Table 3). The Hurlbert's diversity index is 9.07 based on 16 individuals (the smallest number of individual corals observed on one of the coral habitats) (Table 3).

**Colonial scleractinians on soft substrate (SS)** were observed during thirteen dives. It consisted of isolated colonies of *M. oculata* and *L. pertusa* emerging from a sandy or muddy area. In some cases, the seabed showed sediment-ripples. It was observed on a linear of 4.2 km (2.4% of the total linear) (Table 3).

This habitat was observed from three zones of the Bay of Biscay (Fig. 6): the Celtic margin (Sorlingues, Petite-Sole and Shamrock Canyons), the northern Armorican margin (Lampaul, Guilcher, Crozon and Morgat-Douarnenez Canyons), and the central part of the Armorican margin (Guilvinec, Odet, Croisic and Pornic Canyons). It was the most dominant habitat seen in Shamrock (39.7%) Canyon and the second largest in Guilvinec (22.2%) and Crozon (11.6%) Canyons. The linear of the coral habitats comprised by colonial scleractinians SS was greater than 10% in Sorlingues (21.2%) and Croisic (10.0%) Canyons, but other habitats were more often observed within these two canyons. Colonial scleractinians SS comprised less than 10% of the coral linear in the other canyons where it was observed.

Colonial scleractinians SS formed 68 segments, of which the smallest measures 5.0 m and the largest 266.2 m. The median length of a segment of this habitat is 36.3 m (Table 3).

The depth range of this habitat was approximately 550 m, ranging from 655 to 1229 m depth, with a mean of 932 m ( $\pm 10.9$ ) depth (Fig. 8A). Temperature ranged between 9.7°C to 11.4°C, with a mean temperature of 10.9°C ( $\pm 0.5$ °C) (Fig. 8B). The density (sigma-theta) ranged from 27.19 kg/m<sup>3</sup> to 27.50 kg/m<sup>3</sup>, with a mean of 27.30 ( $\pm 0.09$ ) kg/m<sup>3</sup> (Fig. 8C).

More than half of the image was covered with soft substrate/gravel (mean coverage = 59.4  $\pm$  29.7%). Scleractinians, especially coral rubble, covered an average of 36.8% ( $\pm 28.23$ %) of the image. Only a small proportion of the image was covered by live framework (mean coverage = 1.5%  $\pm$  1.8) (Table 3). Hard substrate was present (3.0  $\pm$  2.4%) and consisted mainly of pebbles and cobbles.

A total of 249 individuals, with a density of 1.1 individual per image, was observed in this habitat. Nineteen morpho-types have been observed, as well as the scleractinians *Madrepora* and *Lophelia* (Table 3). The Hurlbert's diversity index is 7.16 based on 16 individuals (the smallest number of individuals of one of the coral habitats) (Table 3).

**Solitary scleractinians on soft substrate (SS)** were observed during five dives. This habitat is mainly formed by cup corals belonging to the Flabellidae family. It was observed on a linear of 457 m, equivalent to 0.3% of the total linear of all observed habitats (Table 3).

This habitat was observed in two zones of the Bay of Biscay (Fig. 6): on the northern Armorican margin (Lampaul, Chapelle, Guilcher and Morgat Canyons) and in Arcachon Canyon on the Aquitaine margin. It comprised only a small proportion of the coral habitats in these canyons (from 3.1% to 4.1%), except in Guilcher Canyon, where it was the third most observed habitat (of six) in this canyon, occupying 19.8% of the linear of coral habitats.

Only six segments were allocated to this habitat, of which the smallest measured 28.6 m and the largest 138.1 m. The median linear of a segment was 62.4 m.

This habitat occurred over a depth range of approximately 300 m, from 752 m to 1085 m depth, with a mean depth of 825 ( $\pm 91.9$ ) m (Fig. 8A). Temperature ranged from 10.7°C to 11.4°C, with a mean temperature of 10.8°C ( $\pm 0.2^\circ\text{C}$ ) (Fig. 8B). The density ( $\sigma\text{-}\theta$ ) ranged from 27.16 kg/m<sup>3</sup> to 27.37 kg/m<sup>3</sup>, with a mean of 27.32 ( $\pm 0.04$ ) kg/m<sup>3</sup> (Fig. 8C).

Only soft substrate was observed as substrate type within this habitat (mean coverage = 100.0%).

A total of 75 coral individuals were observed in this habitat, with a density of 3.6 individuals per image. These individuals belonged to only four coral species (0.2 species per image). The Hurlbert's diversity index is 2.96 based on 16 individuals (smallest number of individuals of one of the habitats) (Table 3).

**Gorgonians on soft substrate (SS)** were observed during six dives. This habitat is formed by colonies of the gorgonian *Acanella* that belongs to the Isididae family, also known as bamboo corals. This species emerged from soft substrate. It occurred on a linear of 1.1 km (0.6% of the total linear of all observed habitats).

Gorgonians SS were observed in four zones in the Bay of Biscay (Fig. 6): the Celtic margin (Hermine Canyon), the central part of the Armorican margin (Odet Canyon), south Armorican margin (Rochebonne Canyon) and the Aquitaine margin (Cap-Ferret and Arcachon Canyons). Gorgonians SS was the only coral habitat observed in Rochebonne and Cap-Ferret Canyons (100% of the coral linear). It was the second largest habitat in Arcachon (31.8%), Hermine (23.1%) and Odet (10.6%) Canyons.

Fourteen segments were allocated to gorgonians SS, of which the smallest measured 7.8 m and the largest 437.8 m. The median segment length was 43.2 m.

This habitat was observed between 763 and 1847 m water depth, with a mean of 1120 m depth ( $\pm 346$  m) (Fig. 8A). Temperature ranged between 9.9°C and 11.2°C, with a mean of 10.7°C ( $\pm 0.6^\circ\text{C}$ ) (Fig. 8B). The density ( $\sigma\text{-}\theta$ ) ranged from 27.26 kg/m<sup>3</sup> to 27.54 kg/m<sup>3</sup>, with a mean of 27.37 ( $\pm 0.11$ ) kg/m<sup>3</sup> (Fig. 8C).

The only substrate within this habitat was soft substrate (mean coverage = 100.0%).

A total of 68 individuals were observed in this habitat, with a density of 2.8 individuals per image. These individuals belonged to only four morpho-types. The Hurlbert's diversity index is 2.40 based on 16 individuals (the smallest number of individuals for one of the habitats).

**Seapens or pennatulids on soft substrate** (SS) were observed during eleven dives. This habitats was usually monospecific, dominated by *Kophobelemnon* cf. *stelliferum* (referred to as *Kophobelemnon*) either *Pennatula* spp., *Funiculina quadrangularis* or *Distichoptilum gracile*. In some instances, *Kophobelemnon* was found in association with either *Pennatula* spp. or Pennatulacea sp. 3. It occurred on a linear of 6.7 km, equivalent to 3.8% of the total linear of all dives (Table 3).

Seapens SS were observed from four zones in the Bay of Biscay (Fig. 6): the Celtic margin (Sorlingues and Hermine Canyons), the north Armorican margin (Blackmud, Lampaul and Chapelle Canyons), the central Armorican margin (Odet Canyon) and the Aquitaine margin (Athos and Arcachon Canyons). It composed the largest proportion of coral habitat linear in most of these canyons (Blackmud: 98.8%; Hermine: 68.5%; Athos: 59.9%; Arcachon: 46.7%; Sorlingues: 38.8%) and the second largest in Lampaul (30.0%) and Chapelle (27.5%) Canyons. In Odet Canyon, this habitat was the third most observed habitat with 7.8% of the total coral linear in that canyon.

This habitat appeared in 54 segments, of which the smallest measured 6.68 m and the largest 783.26 m. The median segment length was 64.33 m.

This habitat had the largest depth range of approximately 2000 m, from 234 m to 2305 m water depth, with a mean of 901 ( $\pm$  405) m (Fig. 8A). Temperature ranged between 7.7°C and 11.8°C, with a mean of 10.9°C ( $\pm$  1.0°C) (Fig. 8B). The density (sigma-theta) ranged from 27.11 kg/m<sup>3</sup> to 27.62 kg/m<sup>3</sup>, with a mean of 27.27 ( $\pm$  0.14) kg/m<sup>3</sup> (Fig. 8C).

The dominant substrate type was soft substrate (99.9%  $\pm$  0.4). A very small proportion of the image was covered by coral rubble (mean coverage = 0.1%  $\pm$  0.4).

A total of 877 coral individuals was observed, with a density of 3.4 individuals per image. The number of morpho-types encountered in this habitat was 12 morpho-types, as well as the scleractinians *Madrepora* and *Lophelia*. The Hurlbert's diversity index is 2.72 based on 16 individuals (the smallest number of coral individuals on one of the habitats) (Table 3).

**Mixed corals on soft substrate** (SS) were observed during three dives. This habitat was formed by a mix of the gorgonian *Acanella* and the seapen *Kophobelemnon* in areas covered by soft substrate. The linear of this habitat is only 365 m long, what is equivalent to 0.2% of the total linear of all dives.

It was observed from three zones of the Bay of Biscay (Fig. 6): the Celtic margin (Hermine Canyon), central Armorican margin (Odet Canyon) and the Aquitaine margin (Arcachon Canyon). It occupied only a small proportion of the linear of coral habitat in each of these canyons (Arcachon: 18.2%; Hermine: 4.3%; and Odet: 0.3%).

This habitat was present on five segments (Table 3), of which the smallest measured 9.5 m and the largest 236.5 m. The median segment length was 37.8 m.

It occurred at water depths from 788 m to 1799 m, with a mean of 1040 m ( $\pm$  323 m) (Fig. 8A). Temperature ranged from 9.9°C to 11.1°C, with a mean temperature of 10.8°C ( $\pm$  0.4°C) (Fig. 8B). The density (sigma-theta) ranged from 27.28 kg/m<sup>3</sup> to 27.54 kg/m<sup>3</sup>, with a mean of 27.36 ( $\pm$  0.08) kg/m<sup>3</sup> (Fig. 8C).

The only substrate type observed in this habitat was also soft substrate (mean coverage = 100.0%).

Only 16 individual corals formed this habitat, what is the smallest number of corals individuals of all habitats. The density of corals was 1.5 individuals per image. *Kophobelemnon* and *Acanella* were the only coral species in this habitat (Table 3). The Hurlbert's diversity index is 2.00, based on 16 individuals (Table 3).