COLD-WATER CORAL COMMUNITIES IN BLANES CANYON, NW MEDITERRANEAN SEA

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Background

Cold-water corals (CWCs) form complex, three-dimensional habitats acting as deep-sea biodiversity hotspots worldwide, providing shelter, food or substrate for mobile and sessile fauna, such as molluscs, arthropods, lophophorates sponges, other cnidarians, fish, etc [1].

In the Mediterranean Sea, CWCs are mostly found in submarine canyons where particulate organic matter fluxes are high and direct impacts from trawling are avoided due to steep terrain [2].

Blanes Canyon is a shelf-incising canyon, a part of a network of submarine canyons in the NW Mediterranean. Important trawling fishing grounds for blue and red shrimp *Aristeus antennatus* are located on the canyon rims, flanks, and upper canyon axis. During trawling, substantial amounts of sediment are resuspended and transported across the margin and into the canyons as persistent nepheloid layers and turbidity currents [3-6], which have increased sedimentation rates in the axis of Blanes Canyon [7].

CWCs are long-living and slow-growing animals which increases their vulnerability towards disturbances. In Blanes Canyon, they are found on the vertical walls where they experience elevated turbidity due to trawling activities on the continental margin.

Main objective

ABRIC-1 cruise was conducted in February 2020 to **explore the vertical walls of Blanes canyon**. Benthic communities were filmed by the **ROV Liropus 2000** and high resolution bathymetry was obtained by the deployment of the **HROV Ariane**. Repeated transects were performed firstly by HROV Ariane following ROV Liropus at three main sites. Additional sites were explored only with ROV Liropus, leading to a total of 60 transects spanning over 10 different sites. Water samples were collected and CTD casts were carried out adjacent to diving sites in order to describe the main environmental conditions.

Methods

Video analysis

A taxonomic inventory of benthic assemblages was produced based on all the ROV transects, yielding 110 morphospecies. Several substrate categories were distinguished (see box: Substrate types). Due to varying number of transects (1-14) performed per site, we randomly chose one transect per site for analysis. Species richness was recorded as the sum of different taxa filmed in each transect, irrespectively of their relative abundance.

Fishing effort

Fishing effort was calculated as hauls/ha based on Automatic identification system (AIS) data from 2018 where trawling was defined when the vessel speed was 0.7-4.0 knots consecutively during at least 100 minutes.

Shortest distance from hauls was calculated for analysed ROV transects using ArcGIS 10.4 to see how distance and fishing effort may influence species richness in each area.

Blanes Canyon biodiversity

Fig. 2. Main CWC found in Blanes Canyon during ABRIC project: 1) *Desmophyllum pertusum* (known as *Lophelia pertusa*) 2) *Acesta excavata* (bivalve) surrounded by *D. petrusum and Desmophyllum dianthus*; 3) *Madrepora oculata*; 4) *Placogorgia coronata* surrounded by *M. oculata*; 5) *Neopycnodonte zibrowii* (bivalve); 6) *Leiopathes glaberrima* (white); 7) *Muriceides lepida*; 8) *L. glaberrima* (orange); 9) *Parantipathes* sp. 10) *Acanthogorgia hirsuta;* 11) *Antipathes dichotoma;* 12) *Callogorgia verticillata*

Substrate types

The ROV dives began in the canyon axis where soft sediments dominate. Bioturbation was visible in most of the transects, while trawl marks were less common. Coral rubble was present on the sloping areas adjacent to the canyon walls. Moving upslope, the seabed changed to predominantly rocky substrate. Vertical canyon walls were usually draped with soft sediment. Outcropping rock was present, usually densely populated by corals. Biogenic structures on the canyon walls included a thanatocoenosis composed by *Neopycnodonte zibrowii* shells and scleractinian skeletons

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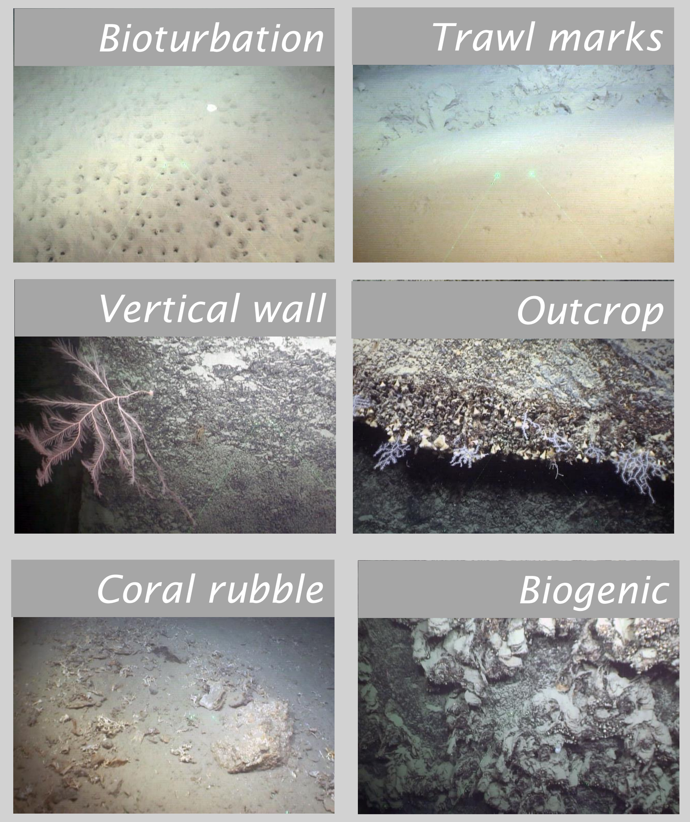
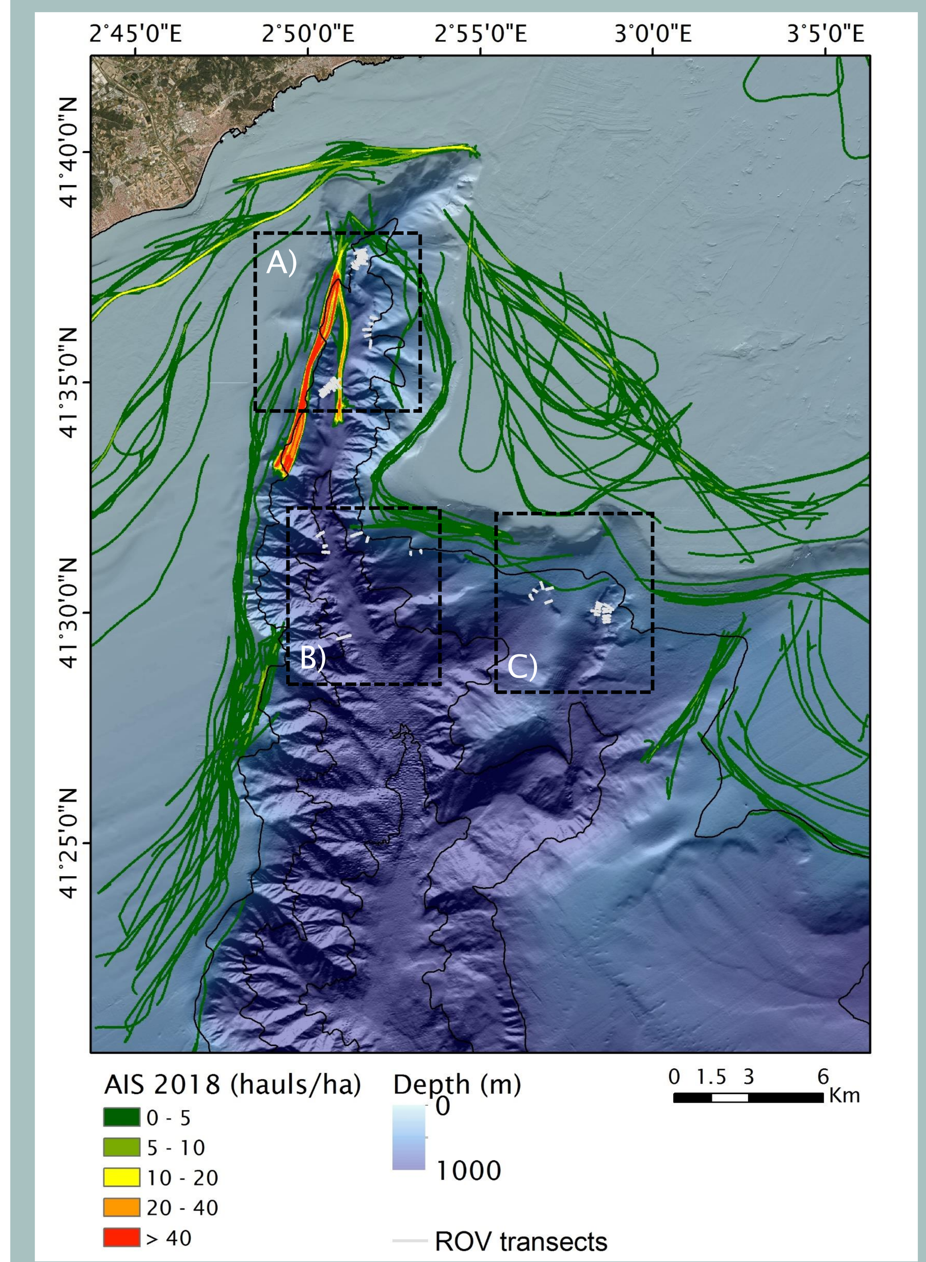
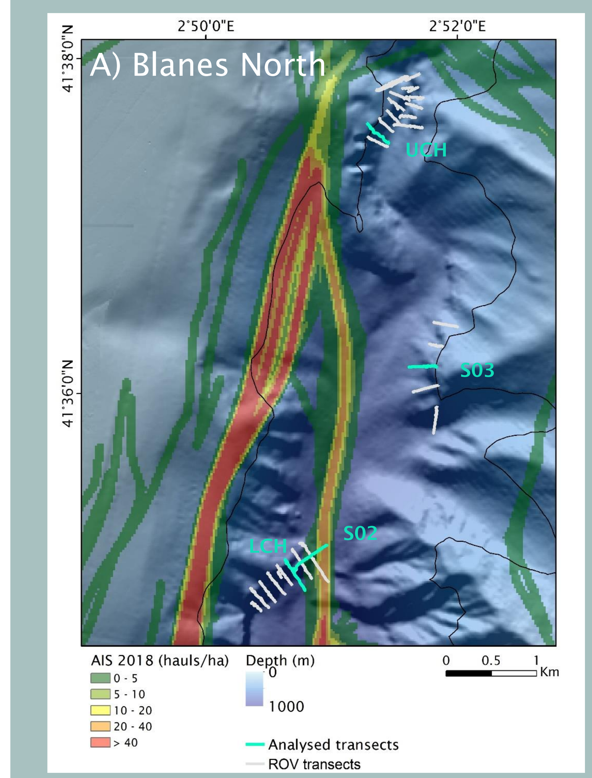


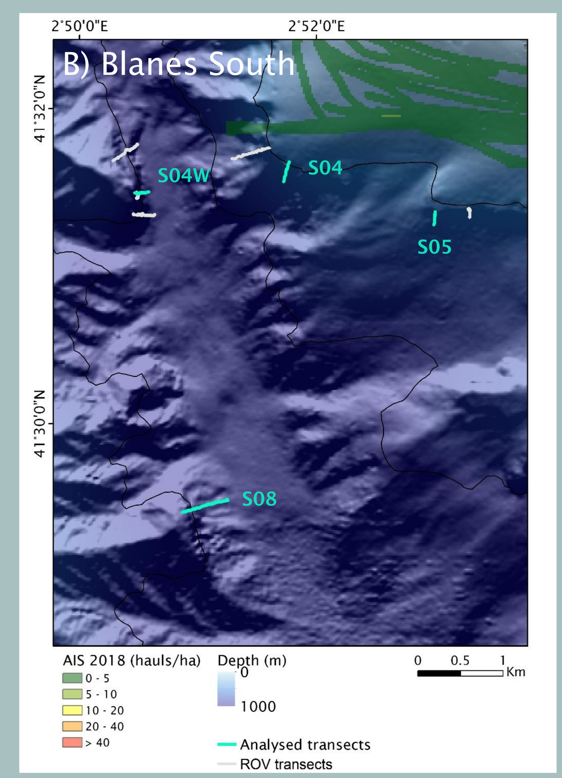
Fishing effort and species richness





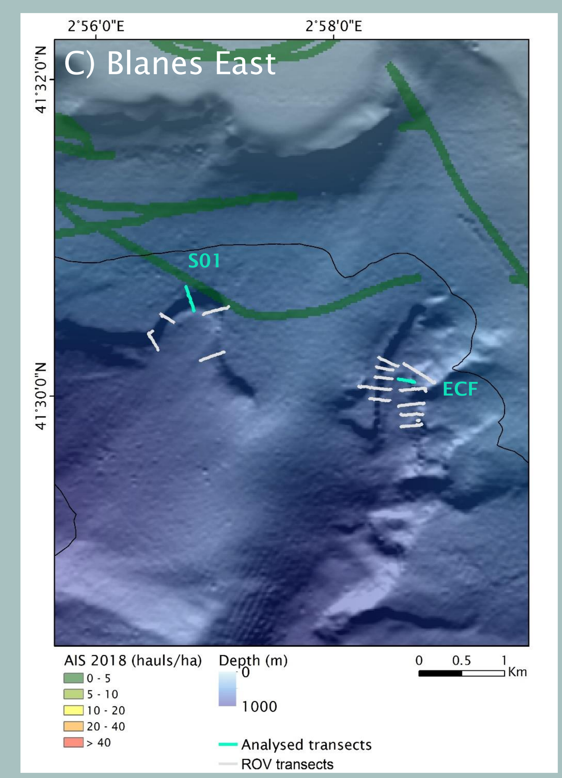
Transect	Depth range (m)	Distance to haul (m)	Species richness
UCH	450 - 650	286.15	34
LCH	680 - 870	41.89	31
S03	460 - 700	547.293	29
S02	730 - 850	0	25

This area is located next to a fishing ground. Calculated transect distance to hauls is between 0 - 547 m. Trawl marks were found on the transect that crossed the fishing ground. CWC species found in this area are: *Desmophyllum petrusum, Desmophyllum dianthus, Madrepora oculata, Callogorgia verticillata, Swiftia dubia, Acanthogorgia hirsuta, Muriceides lepida, Parantipathes* sp., *Antipahtes. dichotoma, Isidella elongata* (Fig. 2). Rare species for the Mediterranean were found: the coral *Placogorgia coronata*, the bivalve *Acesta excavata* and Azorean rockling *Gaidropsarus granti*. The species richness ranged between 34-25



Transect	Depth range (m)	Distance to haul (m)	Species richness
S04W	1050 - 1170	1182.75	34
S04	570 - 715	379.38	34
S08	1240 - 1300	2201.49	24
S05	530 - 610	896.41	18

In this area the deepest dive (1300 m) was carried out, recording large colonies of *M. oculata* and *D. pertusum*. Dense assemblages of *M. lepida* (Fig. 2) were encountered associated with: *D. dianthus, Javania cailleti, Leiopathes glaberrima, Parantipathes* sp., *A. dichotoma, C. verticillata, A. hirsuta, P. coronata*. Rare species of bivalves *A. excavata* and giant deep-sea oyster *Neopycnodonte zibrowii* were found on the vertical walls in this area. Species richness ranged between 34-18, while the calculated distance to hauls is 379-2201 m.



Transect	Depth range (m)	Distance to haul (m)	Species richness
ECF	630 - 715	1070.72	36
S01	580 - 660	82.95	21

This area experiences the least trawling events (Fig.1). The main CWCs in this area were: *M. lepida* and *L. glaberrima* (orange, pink, white morphotypes), followed by *S. dubia, Parantipathes* sp., *A. dichotoma, D. dianthus* (Fig. 2). Rare associated species included the bivalves *A. excavata* and *N. zibrowii*, and a sixgill shark *Hexanchus griseus*. The *L. glaberrima* colonies were usually large and healthy (with limited dead tissue and exposed skeleton) including one colony reaching 2 m² of canopy surface (Fig. 2). Abandoned fishing lines and nets were found entangled in corals and rocky substrate. The highest species richness (36 taxa) was found in this area

Figure 1. Bathymetric map of Blanes Canyon, detailing the 2018 fishing effort (hauls/ha) and ROV transects performed during ABRIC-1. Rectangles indicate detailed maps: A) Blanes North, B) Blanes South, C) Blanes East.

Main findings

- Cold-water corals were found on all dives preformed during ABRIC -1 cruise in Blanes Canyon, including large colonies of *M. oculata*, *L. pertusa* and *L. glaberrima*.
- The main fishing ground is located at the canyon head with > 40 hauls/ha in 2018 with no apparent impact on species richness in ROV dives analyzed.
- The results presented in this poster are preliminary – a detailed analysis is underway.

References:

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