MAGIC - CoralFISH

CRUISE REPORT

R/V UNIVERSITATIS

Northern Ionian Sea

(Santa Maria di Leuca cold water coral province)

1th Leg - April 7th – April 17th, 2010

2nd Leg – April 18th – April 24th, 2010

MAGIC – CoralFISH Cruise

Period: April 7th – 24th, 2010
Area: Ionian Sea (eastern Mediterranean sea)

CoralFISH project Principal Investigator: G. D’Onghia (CoNISMa LRU of Bari University)

MAGIC project Principal Investigator: C. Corselli (CoNISMa LRU of Milano-Bicocca University)

Chief Scientists: A. Savini (CoNISMa LRU of Milano-Bicocca University)
G. D’Onghia (CoNISMa LRU of Bari University)

Research Vessel: R/V UNIVERSITATIS (CoNISMa)
Captain: E. Gentile (So.Pro.Mar.)

1. BACKGROUND AND PURPOSES

The MAGIC-CoralFISH cruise was carried out within the framework of two different projects:

- MAGIC (*MApping Geohazard along the Italian Coast*)
- CoralFISH (*Assessment of the interaction between corals, fish and fisheries, in order to develop monitoring and predictive modelling tools for ecosystem based management in the deep waters of Europe and beyond* - EU-FP7 collaborative project).

The cruise was divided in two Leg:

1st Leg started from Gallipoli on April 06th 2010 and ended at the same port on 17th April.

2nd Leg started on April 18th 2010 from Gallipoli and ended on 24th April in Termoli.

Thirteen researchers coming from three Mediterranean countries and different research institutes, have been involved within the two Legs, along with twelve Italian students (Table 1).

The **MAGIC** project scientific objectives were:

- to provide a extensive acquisition of multibeam data offshore Santa Maria di Leuca (MAGIC project Map sheet 47), according to data acquisition and quality standards defined by the MAGIC project Technical Committee.

- to provide a dense grid of chirp sonar profiles well resolving the main Holocene-upper Pleistocene sedimentary processes within the investigated area. These data, along with multibeam mapping will provide the basis for producing a standard marine geohazard map of the investigated area.

Indeed the main objective of the whole MaGIC project is to furnish the National Civil Protection Department accurate depiction of surficial geology and related geohazards on the most sensitive and hazard-prone areas. This issue will be accomplished by the extensive acquisition of multibeam data and by producing interpretative maps of the continental margins between –50 and –600 m water depth. These maps will form the "Map of the elements of geohazards of the Italian Seas", consisting of 72 Map Sheets at scale 1:50.000. A long-term goal of MaGIC is to produce data that can be used for a wide range of research and management issues.

During the MAGIC-CoralFISH cruise we acquired multibeam data for the final compilation of the Map Sheet 47 (Santa Maria di Leuca), in which previous projects collected multibeam data only in the central portion of the sheet.

The **CoralFISH** project scientific objectives were:

The CoralFISH project is organized in 10 different Work Packages (WPs), and a number of oceanographic expeditions have been therefore planned by the project to improve our knowledge of CWC habitat settings, distribution and variability in all the major European ecoregions where they occur. The MAGIC CoralFISH cruise aimed in particular to provide a set of data according to the scientific objectives that are planned to be reached by WP1, WP2, WP3, WP4 and WP5. The main objectives of the cruise thus were:

- The collection of benthic detailed temporal observations of both fish and coral using 'state of the art' instrumented lander systems provided by NIOZ and UNIABDN, the former equipped with baited time-lapse video camera and the latter with baited digital still camera. This represented an important task for this cruise to provide a set of data that will feed into WP2, WP3 and WP5. Benthic landers were deployed at two representative sites "in" and "out" the "Santa Maria di Leuca cold water coral province". Data acquired from lander deployments will be used to assess the abundance of the fauna in the SML coral region and to compare the results between Mediterranean and Atlantic regions as part of WP3 and also related to WP2.

- the collection of Macrofauna samples through at least 3 boxcorer deployments "in" and "out" the cold water coral province. Samples will be used by NIOZ as part of WP5 in order to estimate the density and biomass of the benthic organisms in a coral area and in a nearby non-coral area as well as for biodiversity comparison between Mediterranean and Atlantic regions.

- the collection of Macrofauna samples by a Van Veen grab and an epibenthic sledge, a metallic frame with a mouth opening into a net, on muddy bottoms near the coral area (intermound area) and off the coral area in order to increase the knowledge on the suprabenthos biodiversity, mainly represented by cnidarians, sponges, annelids, molluscs, small crustaceans, echinoderms and small fish.

- the collection of focused geophysical investigation (side scan sonar data) and ground-truthing data collection at some representative sites to better describe different expression of CWC habitats at the Santa Maria di Leuca Cold Water Coral province (WP1 – regional cold water coral setting).

- the collection of living samples of cold water corals for WP4 (genetic), according to the protocol received by IFREMER.

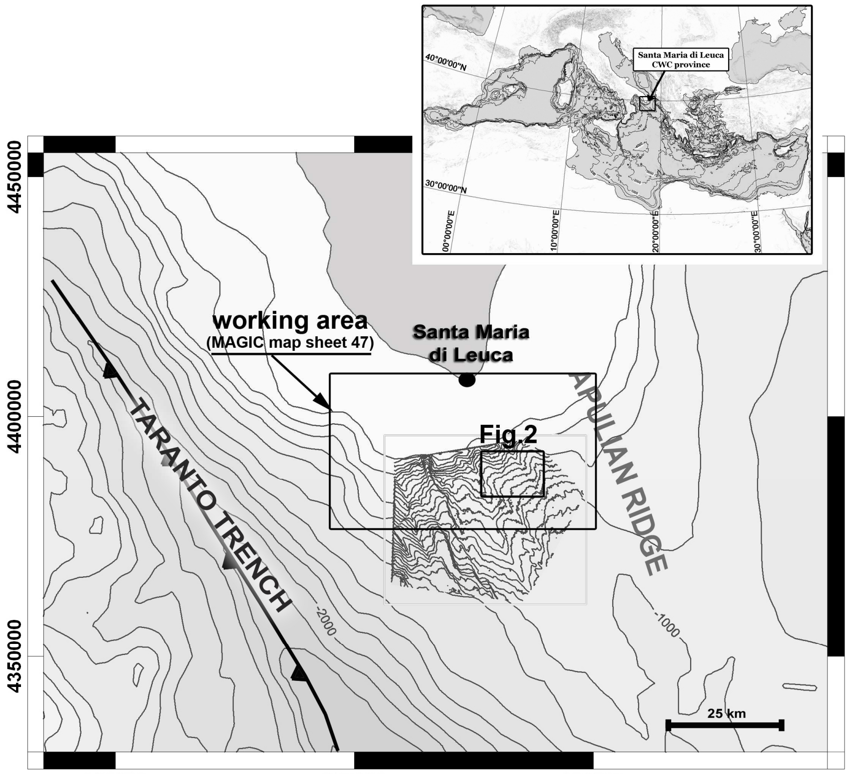


Fig.1: Map of the working area. The of the MAGIC project map sheet 47 (Santa Maria di Leuca) is indicated. Contour interval is 200m for the whole image and 50m for the area already covered by previous multibeam data in which is located Fig.2.

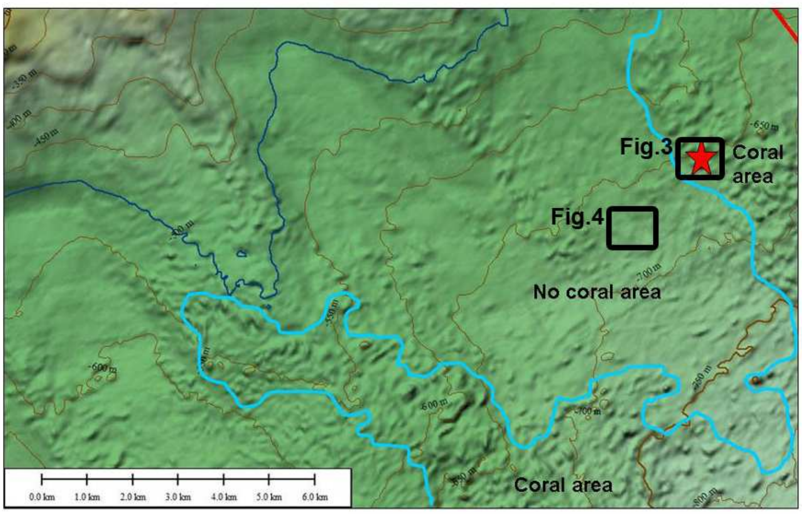


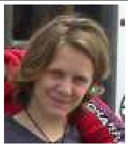
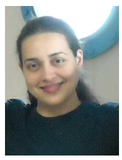
Fig. 2: Location of the “in” and “out” coral areas for the deployment of NIOZ and OCEANLAB benthic landers.

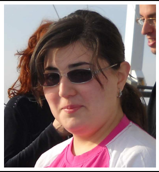
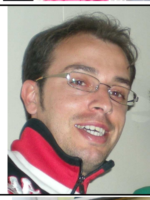
2. SCIENTIFIC-TECHNICAL STAFF

The names and identities of the scientific and technical team and main activity field are shown in Table 1:

Table 1: List of cruise personnel

NAME	AFFILIATION	COUNTRY	ACTIVITY	Leg	PHOTO
Alessandra Savini	CoNISMa LRU Milano Bicocca University	Italy	Chief Scientist	I – II	
Gianfranco D'Onghia	CoNISMa LRU Bari University	Italy	CoralFISH Project Principal investigator Chief Scientist	I	
Agostina Vertino	CoNISMa LRU Milano Bicocca University	Italy	Sedimentology/Palaeontology	I – II	
Piero Panetta	CoNISMa LRU Bari University	Italy	Malacology	I	
Marc Lavaleye	NIOZ -	Netherlands	NIOZ lander deployments and biodiversity boxcores (responsible)	I	
Sandrine Baillon	NIOZ -	Netherlands	NIOZ lander deployments and biodiversity boxcores	I	
Thomas Linley	OceanLab	United Kingdom	OceanLab Lander deployments (responsible)	I	
Sakchai McDonough	OceanLab	United Kingdom	OceanLab Lander deployments	I	

Karen Gariboldi	CoNISMa LRU Milano Bicocca University	Italy	Marine Geomorphology – Student	I – II	
Elena Grimoldi	CoNISMa LRU Milano Bicocca University	Italy	Marine Geomorphology– Student	I – II	
Laura Milan	CoNISMa LRU Milano Bicocca University	Italy	Marine Geomorphology – Student	I – II	
Margherita Panettieri	CoNISMa LRU Milano Bicocca University	Italy	Marine Geomorphology – Student	I	
Filippo Perego	CoNISMa LRU Milano Bicocca University	Italy	Marine Geomorphology – Student	I	
Enrico Olivari	CoNISMa	Italy	Technician - Oceanography	I - II	
Francesco Mastrototaro	CoNISMa LRU Bari University	Italy	Marine Biology	II	
Antonella Indennidate	CoNISMa LRU Bari University	Italy	Marine Biology	II	
Domenico Micucci	CNR Ancona	Italy	Marine Biology	II	

Daniela Battista	CoNISMa LRU Bari University	Italy	Marine Biology	II	
Giulia Cipriano	CoNISMa LRU Bari University	Italy	Marine Biology – Student	II	
Mirko Mele	CoNISMa LRU Bari University	Italy	Marine Biology – Student	II	
Annalisa Natuzzi	CoNISMa LRU Bari University	Italy	Marine Biology – Student	II	
Simona Papa	CoNISMa LRU Bari University	Italy	Marine Biology – Student	II	
Enrico Ricchitelli	CoNISMa LRU Bari University	Italy	Marine Biology – Student	II	
Giuseppina Spagnolo	CoNISMa LRU Bari University	Italy	Marine Biology – Student	II	
Daniela Vestita	CoNISMa LRU Bari University	Italy	Marine Biology – Student	II	

3. PARTICIPANT INSTITUTES

1. CoNISMa – LRU of Milano Bicocca University - Department of Geological Sciences and Geotechnologies
2. CoNISMa – LRU of Bari University - Department of Animal and Environmental Biology
3. NIOZ - Royal Netherlands Institute for Sea Research
4. OCEANLAB – University of Aberdeen, UK

4. SAMPLING AND GEOPHYSICAL DATA COLLECTION

To provide the different goals planned for both MAGIC and CoralFISH of project cruise objectives, different geophysical devices and sampling gears were used, such as:

- geophysical devices:

- 50 khz MBES (MultiBeam EchoSounder) – Reson Seabat 8160 (bathymetry and morphology)
- 9-11 kHz Geo-Chirp profiling system - Geo Acoustic (high resolution seismo-stratigraphy)
- 27-200 kHz SingleBeam EchoSounder (SBES) - Simrad EA400 (Bathymetry)
- 100-500 kHz Side Scan Sonar (SSS) – Klein3000 (backscatter and morphology)

- Water sampling and measurements:

- CTD (SeaBird Electronics 9/11+), equipped with 12 position carousel with standard Niskin bottles of 12 litres;

- Sediment and mega-, macro- and meio-fauna sampling:

- Box corer (sediment, macro- and meio-fauna)
- Van veen grab (sediment, macrofauna)
- Epibenthic sledge (sediment, macro- and mega-fauna)

- Benthic landers:

According to the aim of the CoralFISH project on-board activities, cruise core elements have been the NIOZ and OCEANLAB landers. These landers are designed for in-situ measurements directly above the seabed covering deep environments. They are free-fall landers attached with various measurement instruments. They are deployed by free fall, the recovery is done with the help of an acoustic release. This works on the principle that weights attached to the bottom of the landers hold it down and their release makes the lander descents upwards.

According to CoralFISH project aims, 3 deployments of the landers were planned “in” a coral area and 3 within a “no coral” area (“out”) (Fig. 2).

5. DIARY (UTC time)

All the operations and the activity diary of this report are referred in UTC time.

I Leg

April 6th
Arrive in Gallipoli harbour - Embarking of people

April 7th
Gallipoli harbour. Embarking of all people and equipments. The departure of the oceanographic cruise (planned for April 7th) has been postponed to April 11th due to the change of the society that manage the Universitatis vessel.

April 8th
Gallipoli harbour. Safety meeting. Scientific meeting: overview of the cruise plan, activities, role of researchers, and operational procedures

April 9th
Gallipoli harbour.

April 10th
Gallipoli harbour.

April 11th
06:00 Departure from Gallipoli harbour.
10:00 Geophysical data acquisition on "coral site". NIOZ lander deployment on coral area. Aberdeen lander deployment at "no-coral" site.
13:00 Multibeam calibration. SVP and CTD cast. Box corer sampling (3).
18:00 Multibeam mapping for MAGIC project

April 12th
07:30 NIOZ and Aberdeen lander recovery. SVP and box corer sampling (3) at "no coral" area.
13:00 NIOZ and Aberdeen lander deployment. CTD cast.
15:00 Multibeam mapping for MAGIC project
18:00 Stop of multibeam mapping due to the bad weather condition on the working area.

April 13th
06:00 Start of multibeam mapping for MAGIC project
14:00 Stop of multibeam mapping for MAGIC project and transfer to the benthic lander deployment sites. The recovery of the landers was interrupted due to the bad weather condition.
15:00 Multibeam mapping for MAGIC project
20:00 Stop of multibeam mapping due to the bad weather condition on the working area.

April 14th
06:00 NIOZ and Aberdeen landers recovery. Box corer sampling (6).
13:30 NIOZ and Aberdeen landers deployment. CTD
16:00 Multibeam mapping for MAGIC project

April 15th

04:40 NIOZ and Aberdeen landers recovery. Box corer sampling (3).
09:00 NIOZ and Aberdeen landers deployment.
10:00 Multibeam mapping for MAGIC project
16:00 Aberdeen lander recovery.
17:00 Multibeam mapping for MAGIC project

April 16th

06:00 Aberdeen lander deployment.
07:00 NIOZ lander recovery. CTD
08:00 Multibeam mapping for MAGIC project. Test on SVP.
13:30 Aberdeen lander recovery. Box corer sampling (4).
17:00 Multibeam mapping for MAGIC project.

April 17th

01:00 Transfer to Gallipoli harbour.
05:00 Arrive in Gallipoli harbour – end of first Leg

II Leg

April 18th

06:00 Departure from Gallipoli harbour
10:30 Arrive on working area. SVP and CTD cast. Epibenthic sledge (3)
18:30 Multibeam mapping for MAGIC project.

April 19th

06:00 Epibenthic sledge (1). SVP and CTD cast. Box corer sampling (4).
16:00 Multibeam mapping for MAGIC project.

April 20th

06:00 Epibenthic sledge (2). SVP and CTD cast. Side Scan Sonar data acquisition on coral area.
22:30 Multibeam mapping for MAGIC project.

April 21th

05:00 Transfer to Gallipoli harbour and training activity for ARPA (regional agency for the environment) personnel. Rock dredge, grab sampling, CTD cast and plankton net on continental shelf.
13:30 Transfer to CoralFISH and MAGIC project working area
17:30 Grab sampling and CTD cast
20:00 Multibeam mapping for MAGIC project.

April 22th

06:00 Epibenthic sledge (2). Box corer sampling (7) and CTD cast. Side Scan Sonar data acquisition on coral area.
22:30 Multibeam mapping for MAGIC project

April 23th
11:30 Transfer to Gallipoli harbour to disembark people from LRU of Bari University
19:00 Return on working area. Multibeam mapping for MAGIC project.

April 24th
02:45 End of multibeam mapping for MAGIC project – end of cruise

6. STATION LIST

Table 2: List of all stations of the MAGIC-CoralFISH cruise.

STATION LIST - MAGIC – CoralFISH Cruise - 1° LEG							
Date	Hour (UTC)	Operation	Event	Lat	Long	Depth (m)	Notes
11-apr	11.35	LN 01	Release	39°36.7728'N	18°30.5803'E	648	Coral area (Ms04)
	12.21	LO 02	Release	39°36.0028'N	18°29.5333'E	663	No coral area
	13.40	SVP/CTD 03	Bottom	39°36.8927'N	18°30.1364'E	627	
	14.58	BC 04	Bottom	39°33.1078'N	18°31.9327'E	784	2,6 ton
	15.59	BC 05	Bottom	39°33.0707'N	18°31.9259'E	774	2,6 ton
	17.06	BC 06	Bottom	39°32.9343'N	18°31.4929'E	774	2,9 ton
12-apr	7.44	LN 07	Recovery	39°36.9112'N	18°30.5436'E	631	Coral area (Ms04)
	8.32	LO 08	Recovery	39°36.1119'N	18°29.5240'E	658	No coral area
	9.18	SVP 09	Bottom	39°36.7152'N	18°30.5118'E	647	
	10.03	BC 10	Bottom	39°36.7101'N	18°30.5176'E	638	
	11.19	BC 11	Bottom	39°36.7240'N	18°30.5110'E	640	
	12.08	BC 12	Bottom	39°36.7155'N	18°30.5193'E	635	
	13.14	LO 13	Release	39°36.7430'N	18°30.5539'E	652	Coral area (Ms04)
	14.03	LN 14	Release	39°36.0150'N	18°29.5731'E	670	No coral area
	14.42	CTD 15	Bottom	39°36.4355'N	18°30.5911'E	667	
14-apr	5.50	LN 16	Recovery	39°36.0137'N	18°29.5382'E	672	No coral area

	6.42	LO 17	Recovery	39°36.7941'N	18°30.5703'E	655	Coral area (Ms04)
	7.59	BC 18	Bottom	39°36.7315'N	18°30.5466'E	642	3,1 ton
	8.57	BC 19	Bottom	39°36.7125'N	18°30.5187'E	623	2,3 ton
	9.43	BC 20	Bottom	39°36.7173'N	18°30.5174'E	623	2,6 ton
	11.08	BC 21	Bottom	39°36.7237'N	18°30.5376'E	640	3,2 ton
	11.53	BC 22	Bottom	39°36.7182'N	18°30.5242'E	638	
	12.36	BC 23	Bottom	39°36.7231'N	18°30.5323'E	630	2,6 ton
	13.36	LO24	Release	39°36.0164'N	18°29.5572'E	652	No coral area
	14.18	LN 25	Release	39°36.7068'N	18°30.5806'E	660	Coral area
	15.03	CTD 26	Bottom	39°36.7449'N	18°30.5510'E	652	
15-apr	4.39	LN 27	Recovery	39°36.7390'N	18°30.5575'E	650	Coral area
	5.26	LO 28	Recovery	39°36.0489'N	18°29.5185'E	660	No coral area
	6.49	BC 29	Bottom	39°36.0218'N	18°29.5507'E	660	3,2 ton
	7.30	BC 30	Bottom	39°36.0227'N	18°29.5515'E	660	3,2 ton
	8.16	BC31	Bottom	39°36.0269'N	18°29.5577'E	670	3,7 ton
	9.13	LO 32	Release	39°36.7322'N	18°30.5481'E	650	Coral area
	9.46	LN 33	Release	39°36.0104'N	18°29.5489'E	667	No coral area
	16.49	LO 34	Recovery	39°36.7664'N	18°30.5079'E	653	Coral area
16-apr	6.15	LO 35	Release	39°36.7288'N	18°30.5399'E	697	Coral area
	6.55	LN 36	Recovery	39°36.1050'N	18°29.5390'E	656	No coral area
	7.31	CTD 37	Bottom	39°36.7432'N	18°30.5743'E	655	
	9.19	SVP 38	Bottom	39°33.4784'N	18°40.3731'E	774	no record
	10.09	SVP 39	Bottom	39°33.8127'N	18°40.3330'E	750	
	13.24	LO 40	Recovery	39°36.7307'N	18°30.5476'E	668	Coral area
	14.30	BC 41	Bottom	39°36.7236'N	18°30.5363'E	635	2,6 ton
	15.10	BC 42	Bottom	39°36.7212'N	18°30.5496'E	630	2,6 ton
	15.44	BC 43	Bottom	39°36.7352'N	18°30.5636'E	640	2,6 ton

STATION LIST - MAGIC – CoralFISH Cruise – 1I° LEG

Data	Ora (utc)	Operazione	Evento	Lat	Long	Prof (m)	Note
18-apr	10.47	SVP/CTD44	Bottom	39°36.9925'N	18°23.0250'E	419	
	12.21	BT 45	Start	39°36.4424'N	18°24.0353	450	

	12.51		Finish	39°36.7198'N	18°21.0583'E	452	BT empty
	14.30	BT 46	Start	39°36.5160'N	18°23.2193'E	445	
	14.38		Finish	39°36.5670'N	18°22.7311'E	452	Operation failed
	16.21	BT47	Start	39°36.5987'N	18°22.4199'E	451	
	16.50		Finish	39°36.7824'N	18°20.4092'E	429	
19-apr	6.39	BT 48	Start	39°36.0693'N	18°14.0547'E	467	
	7.03		Finish	39°35.5785'N	18°12.2369'E	423	
	8.16	CTD/SVP 49	Bottom	39°33.4753'N	18°13.2901'E	533	
	10.22	BC 50	Bottom	39°36.7459'N	18°30.5652'E	650	
	11.36	BC 51	Bottom	39°36.7450'N	18°30.5670'E	645	
	12.30	BC 52	Bottom	39°36.0181'N	18°29.5425'E	663	
	13.23	BC 53	Bottom	39°36.0102'N	18°29.5557'E	660	
20-apr	6.30	BT 54	Start	39°35.8532'N	18°13.2532'E	457	
	6.54		Finish	39°35.3895'N	18°11.5736'E	454	
	9.07	BT 55	Start	39°35.9395'N	18°14.4362'E	475	
	9.41		Finish	39°35.8076',	18°11.7655'E	384	
	11.31	CTD/SVP 56	Bottom	39°33.4553'N	18°13.2873'E	531	
	12.27	GR 57	Bottom	39°36.2367'N	18°15.1559'E	472	
	12.49	GR 58	Bottom	39°36.2263'N	18°14. 7950'E	454	
	13.20	SVP 59	Bottom	39°36.1847'N	18°14.7646'E	430	
21-apr	17.35	GR 60	Bottom	39°36.4189'N	18°24.3011'E	533	
	17.57	GR 61	Bottom	39°36.4269'N	18°24.3096'E	533	
	18.20	GR 62	Bottom	39°36.4101'N	18°24.2770'E	532	
	18.47	CTD 63	Bottom	39°36.4000'N	18°24.3300'E	531	
22-apr	6.33	BT 64	Start	39°36.5863'N	18°21.8643'E	446	
	7.03		Finish	39°36.7314'N	18°19.8964'E	412	
	8.43	BT 65	Start	39°36.5821'N	18°21.9438	446	
	9.16		Finish	39°36.7321'N	18°19.8170'E	404	
	11.06	BC 66	Bottom	39°33.9053'N	18°26.2185'E	550	
	11.43	BC 67	Bottom	39°33.9121'N	18°26.2052'E	558	
	12.24	BC 68	Bottom	39°33.9054'N	18°26.2156'E	550	
	12.54	CTD 69	Bottom	39°33.8943'N	18°26.2698'E	586	
	14.33	BC 70	Bottom	39°33.3225'N	18°13.2057'E	530	
	15.11	BC 71	Bottom	39°33.3206'N	18°13.3263'E	520	
	16.01	BC 72	Bottom	39°33.5006'N	18°13.2360'E	525	

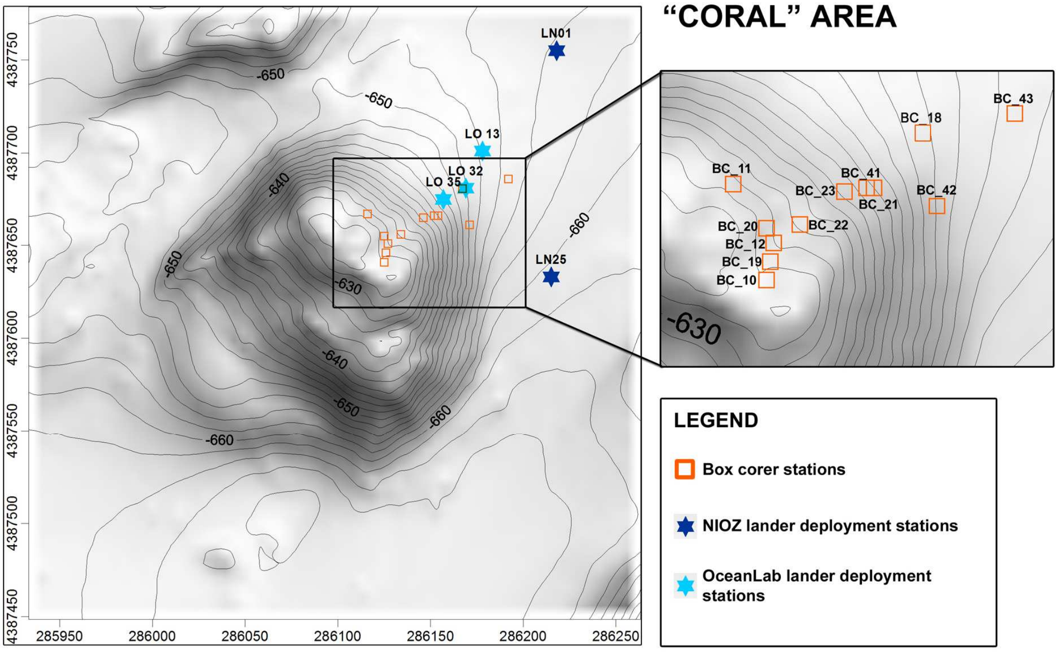


Fig. 3: Bathymetry chart showing location of box-corer and lander deployment stations at the "coral" study area (Contour interval 2m). This is the coral-bearing mound (MS04-Atlantis mound) to the east of the "no coral" area (reference area). It is of comparable depth and comprised of the same surface sediment with areas of coral rubble and live colonies.

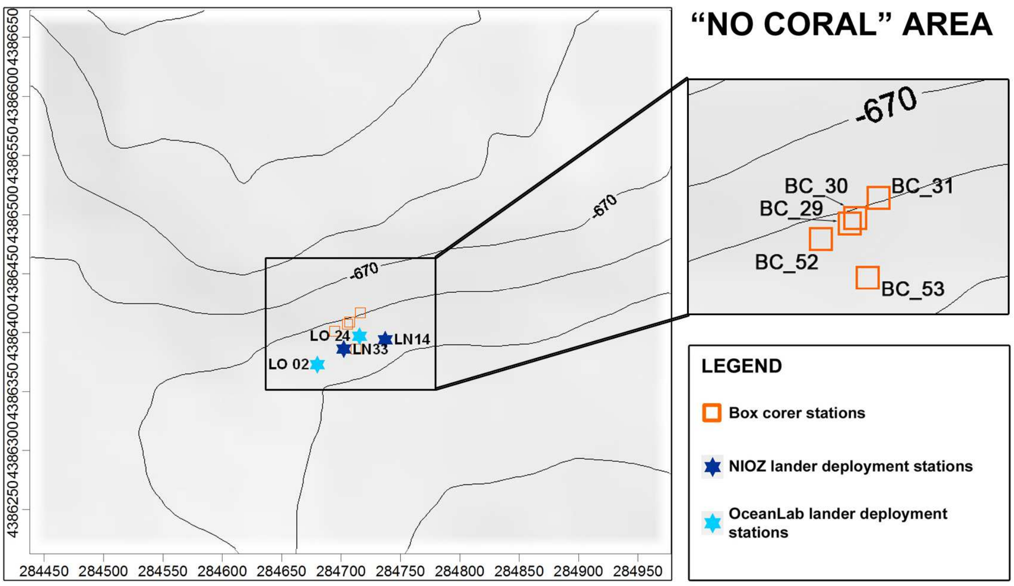


Fig. 4: Bathymetry chart (Contour interval 2m) showing locations of box-corer and lander deployment stations at the "no-coral" area (reference area).

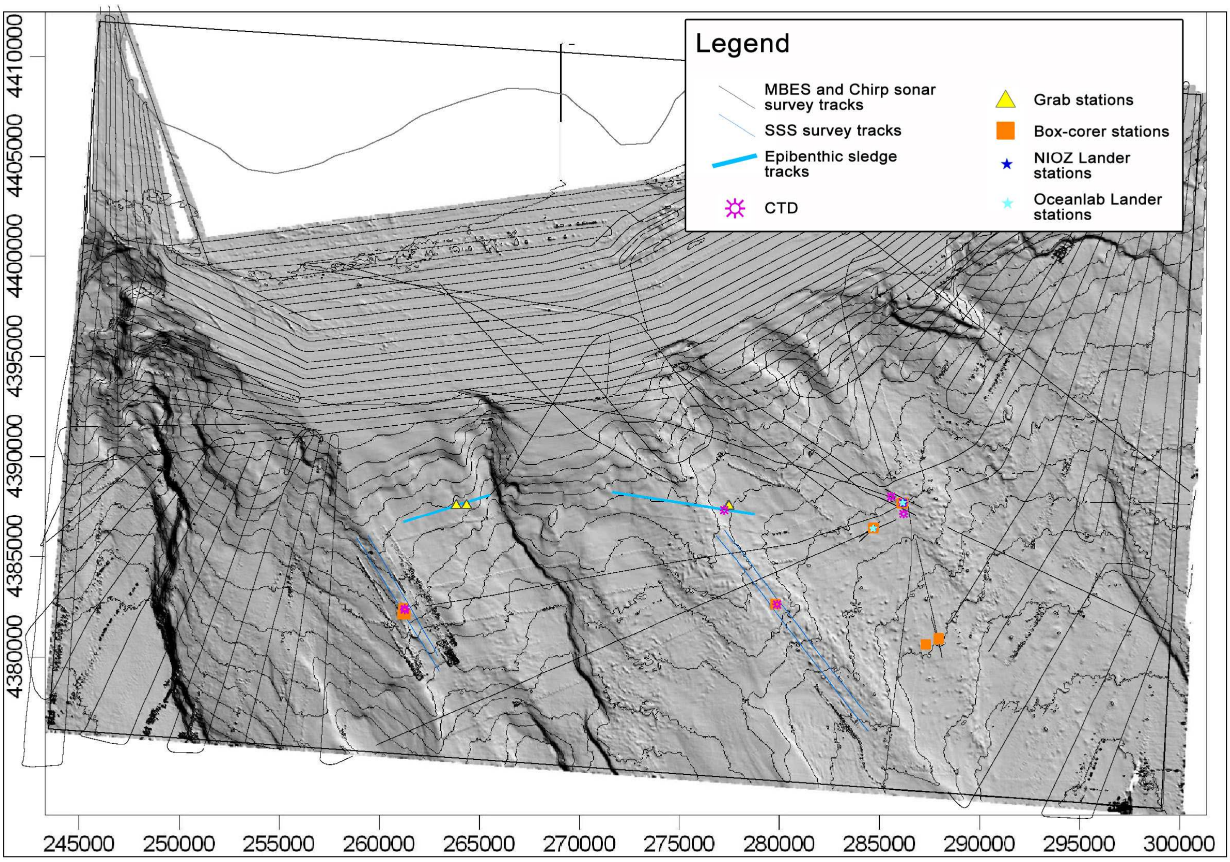


Fig. 5: Shade relief of the working area (MAGIC map sheet 47) with all the sampling stations and track lines provided by the MAGIC-CoralFISH cruise (see legend on the upper-right corner).

7. RESEARCH "BLOCKS"

According to both MAGIC and CoralFISH project objectives, cruise activities may be segmented into research blocks. Here after a brief description of the activity concerning each research unit is reported.

7. 1 SEAFLOOR MAPPING

Alessandra Savini(1), Agostina Vertino(1), Karen Gariboldi(1), Elena Grimoldi(2), Laura Milan(1), Margherita Panettieri(1), Filippo Perego (1),
(1)Università di Milano "Bicocca", Dipartimento di Scienze Geologiche e Geotecnologie, Milano - Italy

A total of roughly 900 Km^2 of multibeam echosounder coverage and a dense network of about 1100 nautical miles of chirp-sonar profiles have been acquired within the explored area (Fig. 6).

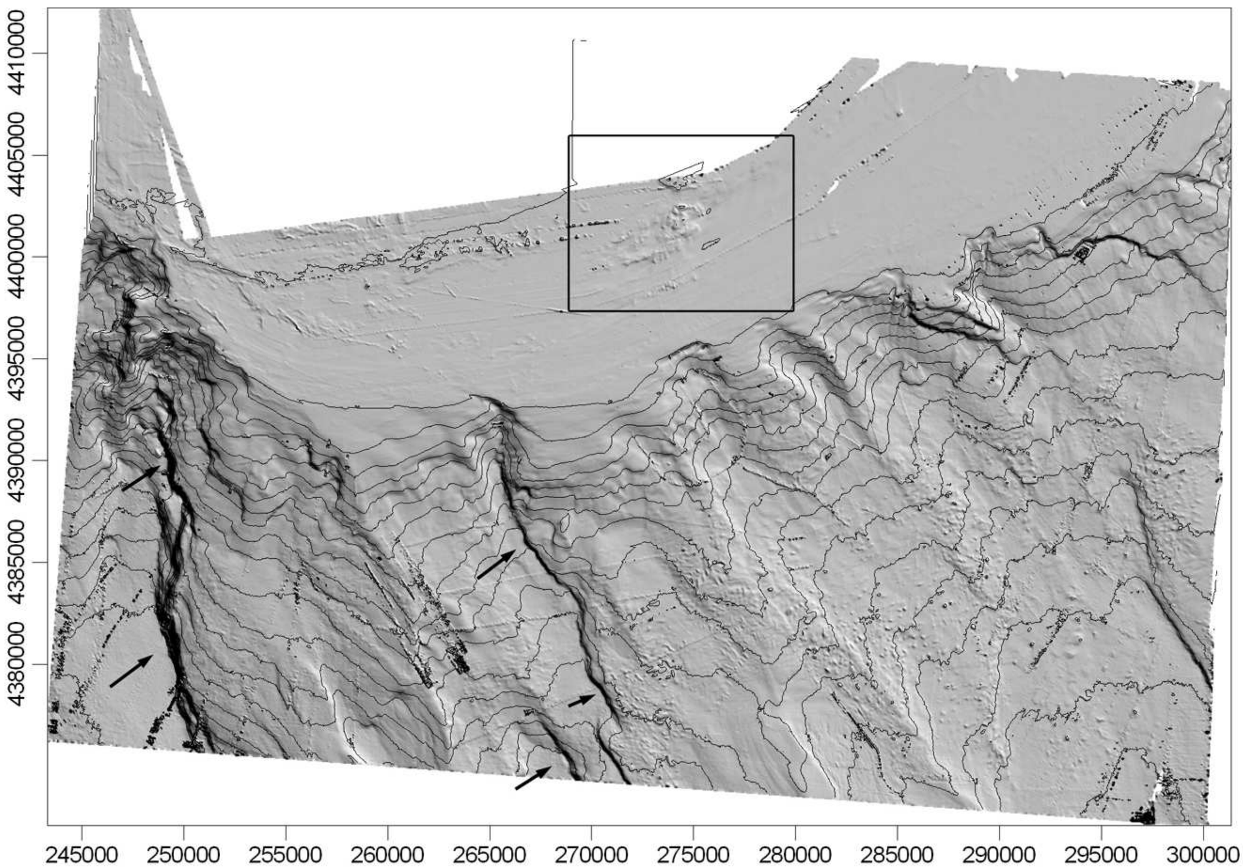


Fig. 6 – Shade relief of the working area (MAGIC map sheet 47) formed by all the multibeam coverage provided by MBES survey carried out during the MAGIC-CoralFISH cruise and MBES survey carried out within foregoing cruises. The square represent the location of fig. 7 and the black arrows indicate the main mapped fault-related scarps.

The survey was carried out follow straight line at 7/8 Kn. The acoustical geophysical data were acquired using the PDS2000 navigation software and the Triton Elics International (TEI) software packages. The integrated system used an IXSEA OCTANS motion Sensor and Gyro and a DGPS Satellite link by Skyfix. The DGPS data were acquired and processed by the navigation software PDS2000, interfaced with all the equipment working during the cruise to geo-reference all the measured data. The datum was WGS84 and the Universal Transverse Mercatore projection was chosen for navigation and display, 34 North. During the cruise all the geophysical devices have been managed by a single operator, working on shift.
Within the whole MBES covered area a huge sector of continental shelf (570 km2) has been mapped. The continental shelf is a quite flat area where small scale sub-elongated and or sub-circular reliefs, few metres high, apparently randomly occur. Such elevated areas morphologically resemble areas colonised by coralline red algae assemblages (fig. 7).

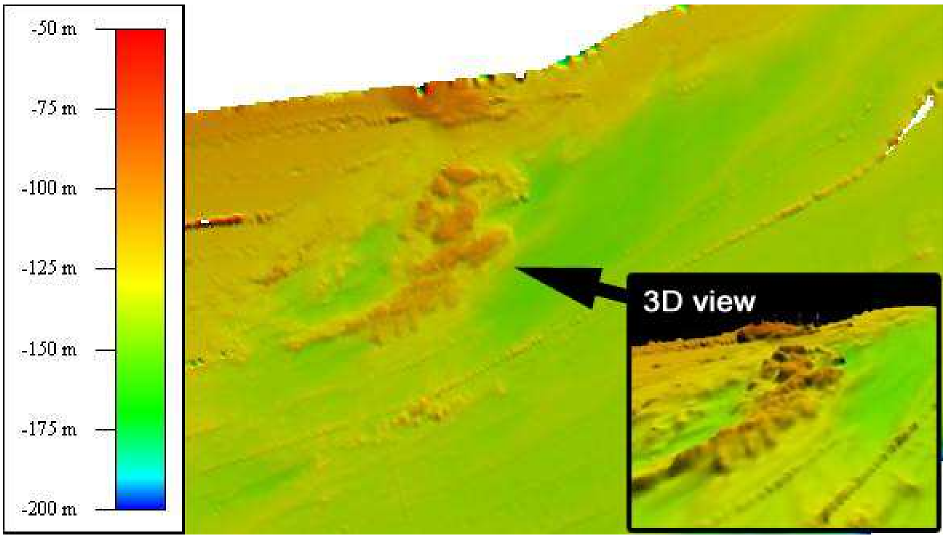


Fig 7: Detail of the subelengoted relies that widespread occur along the continental shelf on the MBES mapped area (see location in fig. 6)

The transition zone between the continental shelf and the upper continental slope is affected by a number of failure scars and incisions that document the consistent erosion that took place on this part of the southern Apulian margin. Indeed on the new mapped slope areas, as previously documented for the existing MBES data (Savini and Corselli, 2010), huge failure deposits were mapped, in particular to the east.
To the west the most striking morphological features are the prominent fault-scarps, with high vertical throw (up to 100m), that form a step-like profile going from the Apulian plateau toward the Taranto trench.
The main morphological features related to instability processes and that can be relevant for the MAGIC project are the extensive and wide distributed failures that affect the eastern sector and the

prominent fault-scarps to the west. Indeed seismic activity seems to be relevant on the Apulian plateau.

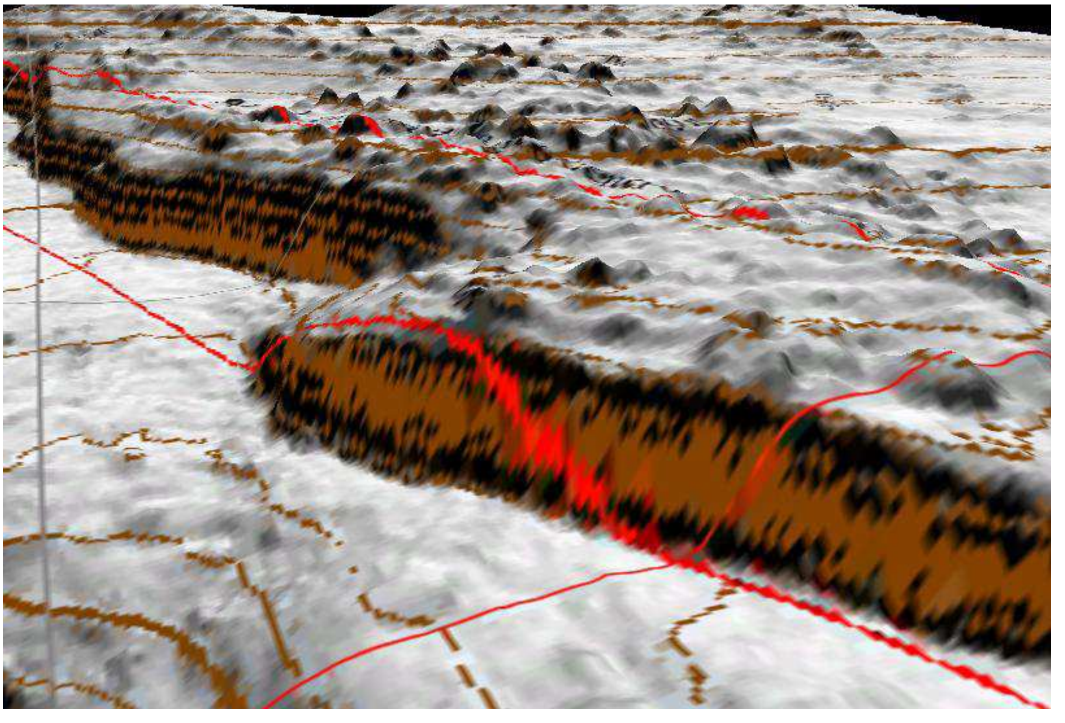


Fig. 8: Example of fault-related scarps occuring along the Apulian slope.

The DTM provided by the MBES survey will be useful also to identify new mapped area potentially colonised by cold-water coral, increasing the knowledge at medium scale of the geomorphology of this Santa Maria di Leuca cold-water coral province, according to the aims of the WP1 of the CoralFISH project. For WP1 purpose the cruise in particular allow to acquire some side scan sonar profiles to map some key sites, where ROV video inspections were already collected by foregoing oceanographic expeditions. The side scan sonar survey was carried out follow straight line at 3 Kn, less than 500m spaced. 300m side scan sonar range setting has been employed according to seafloor acoustic targets, which were represented by some coral-bearing mound of the Santa Maria di Leuca cold-water coral province.
All the data provided by the geophysical devices were recorded as digital raw format. They were recorded on HD on the same computer connected with the deck unit system. The data will be processed in the department of Geological Sciences and Geotechnologies of Milano-Bicocca University using proper software packages.

7.2. NIOZ Lander deployments with fish bait experiments

Marc Lavaleye (2) & Sandrine Baillon(2)
(2) Royal NIOZ - Royal Netherlands Institute for Sea Research

7.2.1 Introduction:

One of the objectives of CoralFISH is to compare methods to assess fish abundances. A common method to estimate fish abundance is by using the approach time of fish to a bait which is usually attached to a camera set-up (photo/video) deployed onto the seafloor (see Priede & Merret 1998).

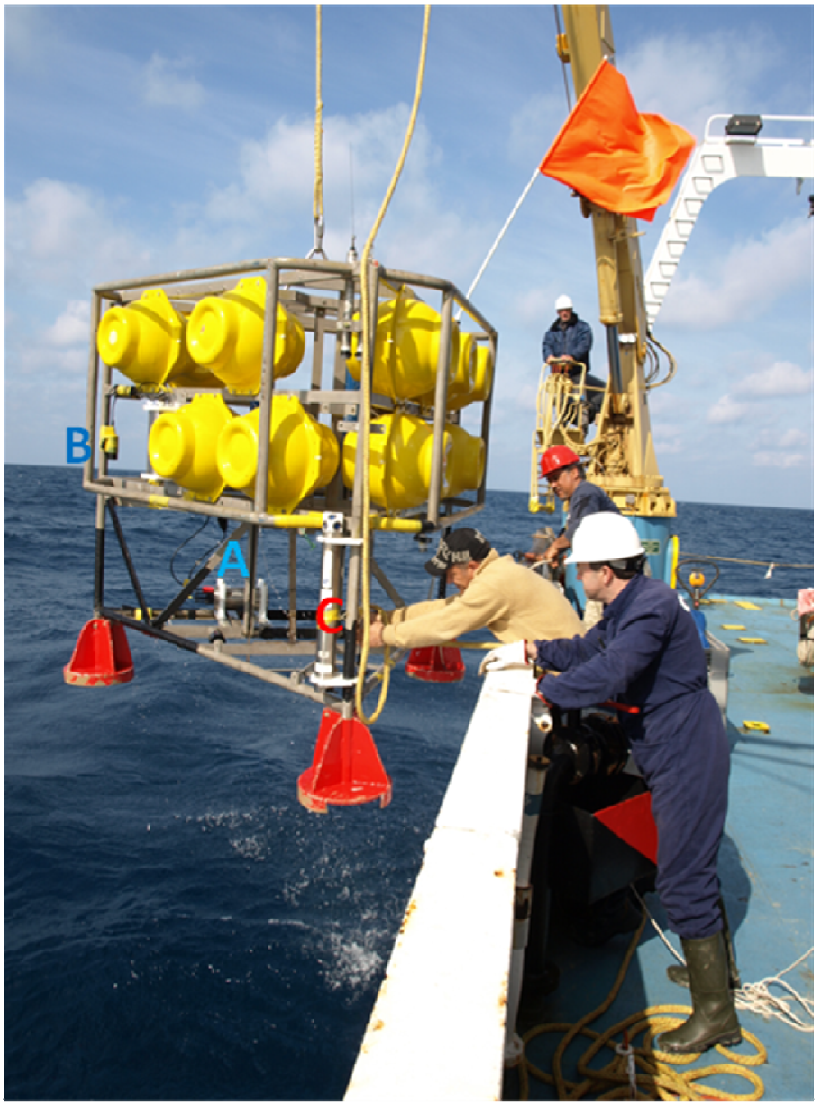


Fig. 9: The NIOZ lander taken on board of the RV Universitatis after a short deployment. The HD video camera (A), the OBS and Flourometer (B) and Aquadop current meter (C) are visible.

7.2.2 Method

The lander system, operated by NIOZ (Fig. 9), consist of a triangular aluminum frame with 12 floats, 2 acoustic releasers (Benthos 530 + 785) and a ballast weight of 260kg. For easy recovery a large orange flag, a flashlight and a radiobeacon (both Novapex) are also attached. For the baited fish experiment it holds a programmable HD videorecorder (Sony HDR-CX6EK) in a titanium housing, a battery pack stored inside an extra glassfloat, and one NIOZ-made infrared light (LED). Because of the quick absorption of infrared light in water the distance between bait and camera was kept short (1.20 m), and the infrared lamp was put very close to the bait. The bait (2 whole ungutted mackerels) was attached to one corner of (but inside) the lander frame. During the experiments the NIOZ lander sits on the seafloor with the bait approximately 40cm above the bottom.
The videocamera is fully programmable (NIOZ product) and can take time-lapse video and/or photos. During this expedition we only programmed it to take videos, because the Aberdeen lander already took time-lapse photographs of similar fish experiments. The program for the video camera was as follows:

Table 3: Program of the NIOZ video camera

Hours	Video Action	Cumulative Recordings
0-1	continuous	1
1-3	60 seconds every 2 minutes	61
3-6	60 seconds every 3 minutes	121
6-16	30 seconds every 5 minutes	241
16-36	30 seconds every 10 minutes	361
36-76	30 seconds every 20 minutes	481
76-136	30 seconds every 30 minutes	601

The lander deployments in reality were always much shorter than the total video program, which means that after recovery the program was interrupted and stopped. The reason for putting in such a long program is that the recovery of the lander is among others dependent of the weather condition. Just before deployment the camera was programmed with a delay time to start video recording just before landing on the seafloor.
In addition to the video camera 3 other instruments were attached to the lander:
An acoustic current meter with tilt and pressure sensors (Nortek Aquadopp). The head with 3 beams was placed 1.20m above bottom. It was programmed as follows: interval 60 sec., average 30 sec., blanking 1.01m, salinity 38.7 (except for first deployment when it was set at 38.5).
A fluorometer (Seapoint 2385) and turbidity sensor (OBS 1769) both attached to a NIOZ datalogger (BD). Both instrument were attached 1.4m above bottom and programmed as follows: interval 1 minute, gain 4.

7.2.3 Results.

Deployments: In total 4 deployments were carried out, 2 upstream and near the coral area and 2 far off the coral area (see Figs. 2, 3 and 4). Because of malfunction the camera did not record during the first deployment in the coral area. All other times and all other instruments worked fine.

Because of weather condition the second deployment was prolonged, while a fifth and last deployment never happened as it was stopped at the last minute because bad weather forecast and lack of time.

7.2.4 Baited fish experiments.

In all cases the bait was completely gone upon recovery of the lander. The video images proved that at the end the largest part of the bait was eaten by giant *Conger conger.* Small sharks sometimes took small bites, but never finished the bait completely.

Second deployment (in non coral area) showed that the Blackspot seabream (*Pagellus bogaraveo)* visited the bait 16 minutes after the landing. Than nothing happened for a long time. After more than 8 hours one of the mackerels was gone, most probably eaten by a Conger. A grouper (*Polyprion americanus*) also showed up in this time. Finally the bait was taken by a giant Conger eel (*Conger conger*) almost 13 hours after the landing. Much later after one full day a large Carrier crab (*Paromola cuvieri*) arrived.

In the third deployment (in coral area) the bait was eaten within 2.5 hours again by Conger eels. A couple of very small sharks take some small bites out of the bait but do not return. A Forked beard (*Phycis blennoides*) shows up too.

During the fourth deployment (non-coral area) a small shark an a conger eel were seen almost immediately after landing. The shark (*Dalatias licha*) took some small bites out of the bait. But stanegely enough these fish do not return. More than 6 hours later the whole bait is eaten by a giant Conger eel. A large shrimp (*Aristeus antennatus*) also visited the bait.

7.2.5 Current data.

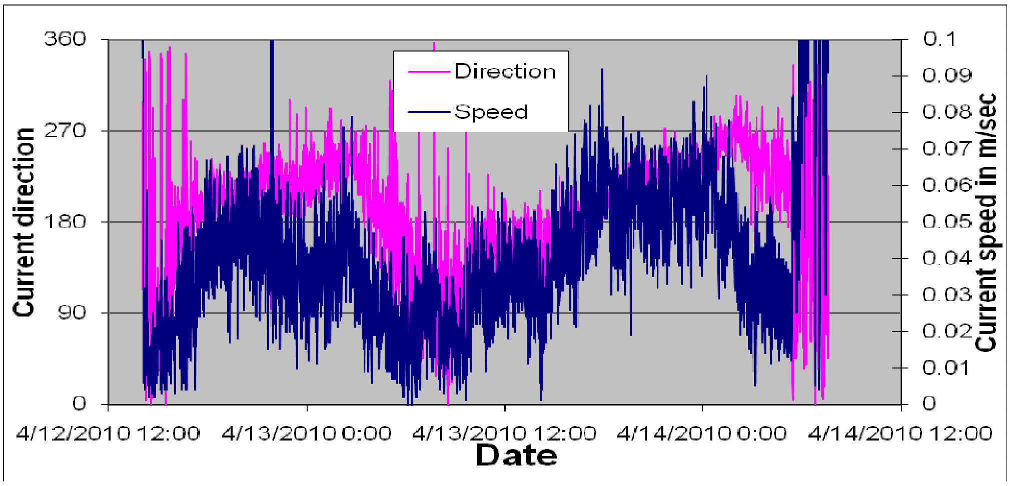


Fig. 10: Current data from the second deployment (no coral area).

The figure 10 shows an example of the current data of the second deployment (non coral area). The other deployment basically showed the same picture, with low current speeds (1 to 8 cm/sec) with a diurnal tidal cycle, with current directions regular varying between roughly 90 and 270 degrees. The stronger currents have a SW direction.

7.2.6 Turbidity, Fluorescence and Temperature.

The figure 11 shows an example of the turbidity (OBS), fluorescence and temperature data of the first deployment in the coral area. Temperature and fluorescence are quite constant during the 18 hours deployment, while the turbidity show some minor fluctuations. But all data of turbidity and fluorescence are very low. There is no indication of the springbloom at the bottom signal yet.

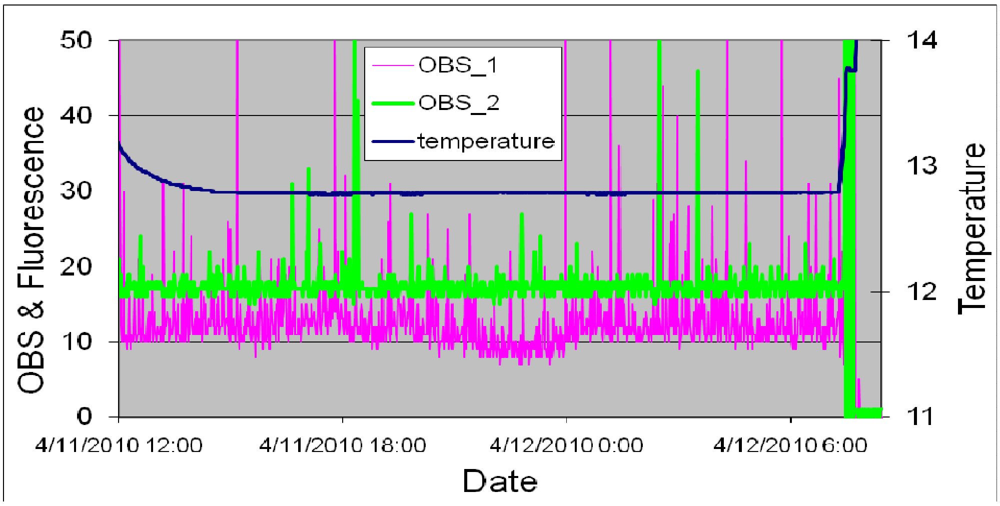


Fig. 11: Turbidity (OBS), fluorescence and temperature data from the first deployment (no coral area).

7.3 OCEANLAB - University of Aberdeen: Biogenic Reef Ichthyofauna Lander (BRIL) deployments

Thomas Linley (3) & Sakchai McDonough (3)
(3) Oceanlab – University of Aberdeen, UK

7.3.1 Technology

Oceanlab's BRIL (Biogenic Reef Ichthyofauna Lander) autonomous lander was constructed based on a design previously implemented and proven successful.
The lander is provided buoyancy via eight 17 inch glass vacuum spheres attached to a mooring line. The floats are mounted as pairs in aluminium frames. At the upper end of the mooring is a dhan buoy with a flag, strobe and radio beacon to aid in spotting the lander once at the surface. A pellet buoy is attached to the dhan buoy via floating rope that allows the mooring to be grappled and the lander recovered (see Fig. 12).

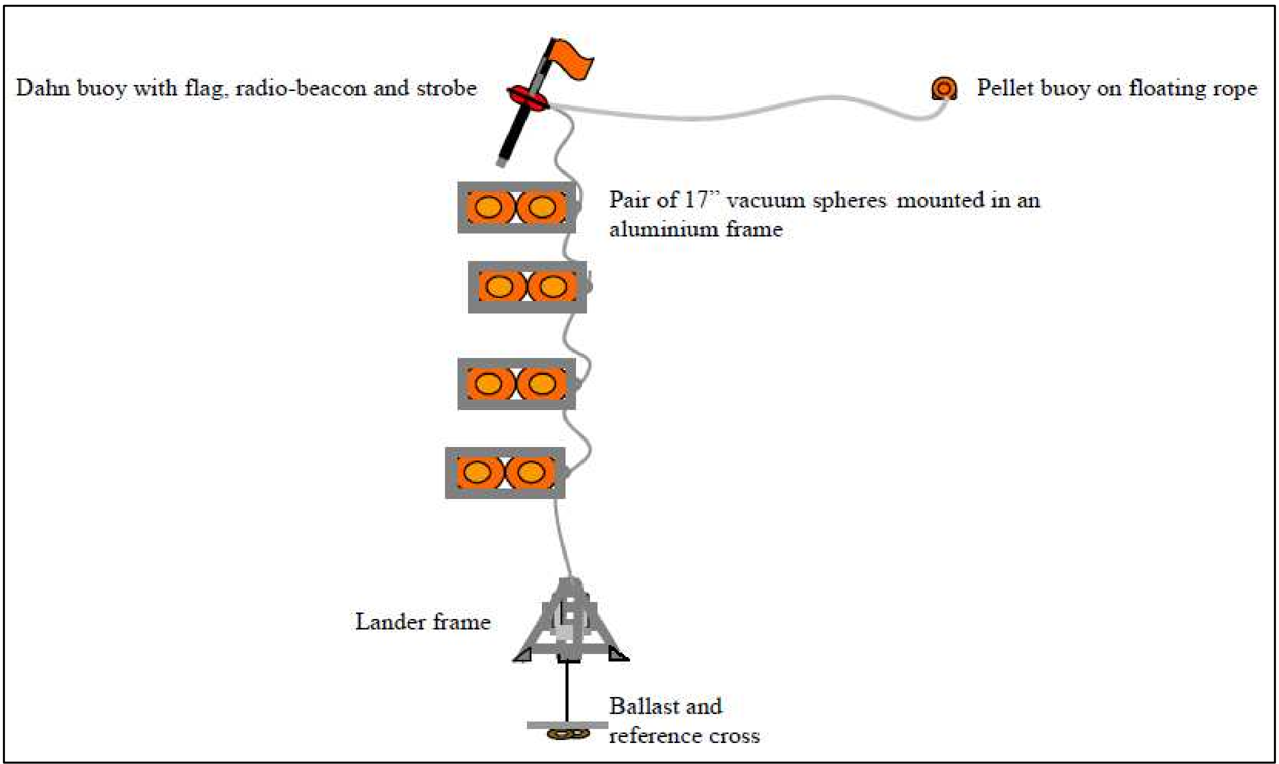


Fig. 12: Basic diagram of Oceanlab's BRIL lander indicating components of the complete lander during deployment.

The lander itself is an aluminium frame on which is mounted a Kongsberg digital stills camera, Kongsberg flash unit, Bennex Deep Sea Power and Light Battery (DSPL Battery), SeaGuard ADCP and CTD and two IXSEA acoustic releases (see Fig 13).

The Kongsberg digital stills camera is programmed to take an image every minute during deployment and store it on an internal compact flash card. Unless stopped the camera will continue to fire until its memory is full or the DSPL Battery fails. The battery tends to be the limiting factor and fails after about 29hrs at 4^0C.

The cameras settings are manually set prior to deployment to have the correct focal length and shutter speed for the reference cross to be optimally captured.

The AADI SeaGuard platform houses a Recording Current Meter (RCM) and also sensors for temperature, pressure and conductivity (salinity and depth are then calculated as virtual sensors). The unit is programmed directly using a Windows biased interface and can take a full set of readings every 30seconds. This sample rate is usually reduced to once every five minutes to conserve battery life. The data is stored internally on a removable Secure Digital (SD) memory card.

The IXSEA Acoustic Releases allow the ballast to be dropped following an acoustic command from a surface unit. The yoke system on the lander frame means only one release must fire to release the ballast, the other acting as a failsafe. These releases also allow the lander to be ranged either for exact location triangulation or to monitor assent.

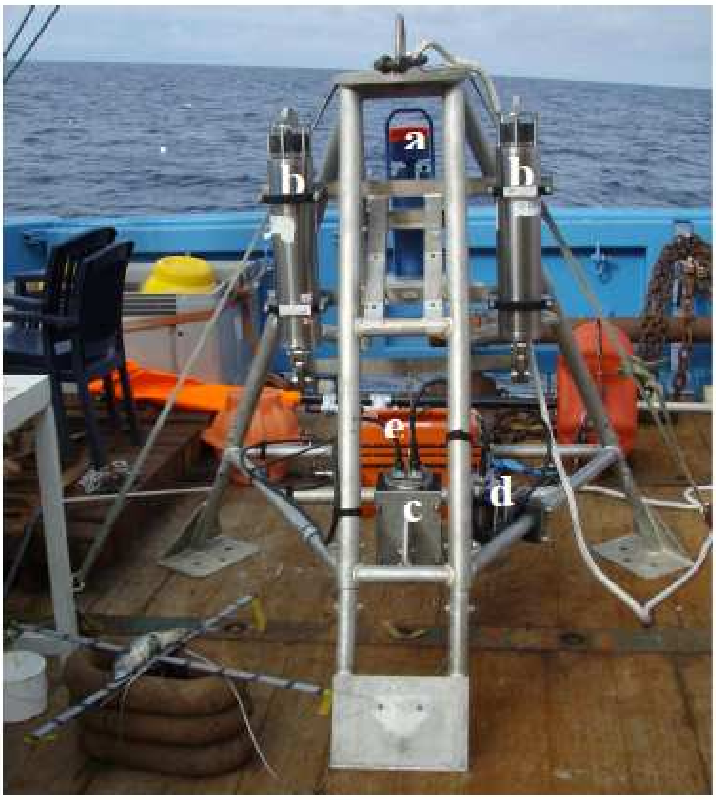


Fig. 13: Lander frame. a) AADI SeaGuard, b) IXSEA Acoustic Releases, c) Kongsberg Digital Stills Camera and d) Flash and e) Bennex Deep Sea Power and Light Battery can all be seen clamped to the frame. The reference cross, bait and ballast can also be seen in the foreground.

Two pieces of 1m low grade steel form the references cross. Each is coated with a non-reflective primer to reduce flash glare and marked at 10cm intervals. The ballast is attached to the cross and the cross to the lander's release hook via a 2m wire strop. This known distance allows the camera to be optimised for taking images in this plane. Pieces of light fabric on the edges of the cross indicate current direction and allow images to be related to the data collected by the SeaGuard.
Standardised bait (two whole, un-gutted Mackerel – 500g) is attached to the centre of the cross and information such as the station number and date can be written along the arms of the cross.

7.3.2 Deployments

Over the course of the cruise the BRIL was successfully deployed 5 times. It captured 3,849 images at the seabed, at depths of 642-673m (depth calculated via SeaGuard pressure and temperature sensors) (Table 4).

Table 4: Oceanlab BRIL lander deployment positions

Deployment	Station	Lat	Long	Depth (m)	Seabed images	SeaGuard sample interval (mm:ss)	Site description
1	LO02	39°36.0028'N	18°29.5333'E	673	515	05:00	Reference area
2	LO13	39°36.7430'N	18°30.5539'E	653	2019	05:00	88m from seamount apex
3	LO24	39°36.0164'N	18°29.5572'E	667	504	05:00	Reference area
4	LO32	39°36.7322'N	18°30.5481'E	651	420	05:00	70m from seamount apex
5	LO35	39°36.7288'N	18°30.5399'E	642	391	05:00	55m from seamount apex

7.3.3 Preliminary result

Two coral outcroppings extended into open sandy sediment. The area between these outcroppings was used as a reference station as an example of a non-coral habitat within the same environmental conditions. The reference station was at least 2km from the nearest coral location however was down current of the reef. Animals on this closer reef should not be aware of the scent plume. The nearest down current reef was more than 3 miles. The coral areas had more complex topography and so as confidence built in the positioning of the lander its distance from the high density reef apex was reduced. Even on cautious, early deployments, the lander was never more than 200m from the reef.
Opportunistic scavengers attracted to the bait were dominated by Conger eels (*Conger conger*) (Fig 14b) at both stations. These large scavengers were able to consume almost all bait in less than an hour. Both on and off coral stations also saw Greater forkbeards (*Phycis blennoides*), Common mora (*Mora moro*) and the Kitefin shark (*Dalatias licha*) (Fig 14b). Redfish have long been

associated with reefs and what is likely *Helicolenus dactylopterus dactylopterus* is only seen on coral stations. The Gulper shark (*Centrophorus granulosus*) (Fig 14a) was also only seen in the coral areas. Although seen in coral areas on previous cruises, large Bluntnosed Sixgill sharks (*Hexanchus griseus*) (Fig 14c) were only seen at the off coral sites. (Table 5, Fig 14).
Further analysis is required to quantify differences between the study areas but this initial assessment of arrival time indicates that there is a difference in the fish abundances between coral and non coral areas. The large difference in the arrival times of *C.conger* suggests that this species is associated with the reef habitat. Differences within the other species observed may become apparent upon full analysis.

Table 5; Preliminary fish population indicators: species arrival time (minutes after landing).

Deployment	Area	Time of 1st species arrival	1st Species	Time of 2nd species arrival	2nd Species
1	Reference area	56	Conger eel (*Conger conger*)	236	Bluntnose sixgill shark (*Hexanchus griseus*)
3	Reference area	95	Conger eel (*Conger conger*)	118	Greater forkbeards (*Phycis blennoides*)
2	Coral area	9	Conger eel (*Conger conger*)	249	Greater forkbeards (*Phycis blennoides*)
4	Coral area	2	Conger eel (*Conger conger*)	87	Blackbelly rosefish (*Helicolenus dactylopterus dactylopterus*)
5	Coral area	6	Conger eel (*Conger conger*)	42	Kitefin shark (*Dalatias licha*)

Fig. 14: Examples of the fish species seen during BRIL deployment: a) Gulper shark (*Centrophorus granulosus*) with a colony of *Lophelia pertusa* visible in the lower right of the frame. b) a Conger eel (*Conger conger*) and Kitefin shark (*Dalatias licha*) arrive at the bait at the same moment. c) Bluntnosed sixgill shark (*Hexanchus griseus*).

Invertebrates that were attracted to the bait were dominated at all stations by the blue and red shrimp (*Aristeus antennatus*). If amphipods were present then they were not of adequate size or number to be visible on the camera. Deployments closest to the reef saw swimmer crabs

(*Bathynectes maravigna*), carrier crabs (*Paromola cuvieri*) and squat lobsters (*Galathea spp.*) later in the deployment. This may suggest that these animals are associated with the reef but take longer to reach the bait due to their slower speed in relation to fish species.

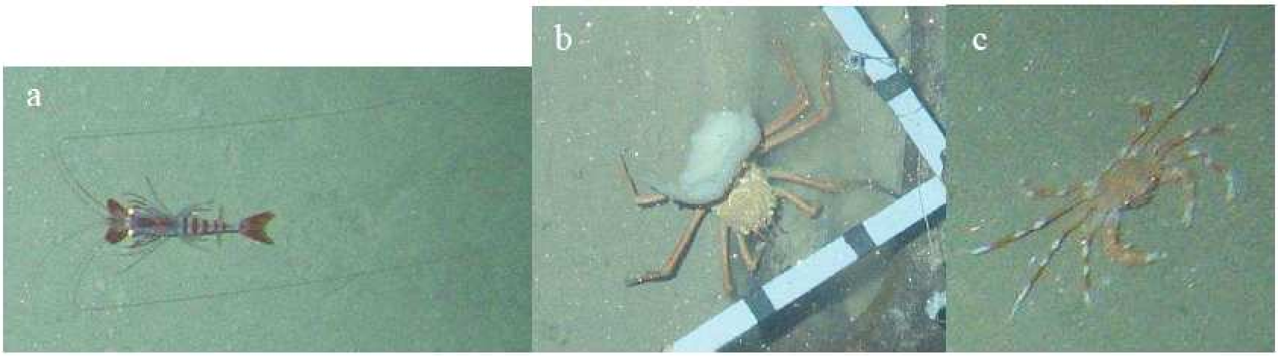


Fig.15: Examples of invertebrates attracted to the bait: a) Blue and red shrimp (*Aristeus antennatus*), b) Carrier crab (*Paromola cuvieri*), c) Swimmer crab (*Bathynectes maravignae*).

7.3.4 Analysis

Analysis of the data will consist of:

a) image analysis; simple time series counts, length frequency determination, bait visitation by individuals, local abundance estimation calculation for the numerically dominant species, confirmation of species identification, behavioural observations.

b) Collation and interpretation of ADCP data in relation to the scavenging fauna observed.

7.3.5 Limitations

All species identification is currently speculative and may be changed following complete analysis of the data.

The cruise was very successful and five of the six anticipated deployments were achieved. The final deployment was aborted as weather reports indicated that there was a chance that recovery would not be possible, resulting in BRIL being left at the seabed to be recovered at another date. It was decided that we should be cautious and so the final deployment on the reference station was not conducted.

The congers eel’s ability to rapidly consume the bait in less than an hour resulted in shortened deployments. Securing the bait with more seizing wire slowed them down a little but I was reluctant to invalidate the experiment with more aggressive measures. The lander is designed to mimic a natural food fall and if this natural fall is consumed rapidly then this is still a true representation of the area.

7.4 Box-corer sampling

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(1) LRU CoNISMa of Milano-Bicocca University, Dept. of Geological Sciences and Geotechnologies, Milano, Italy
(4) LRU CoNISMa of Bari University, Dept. of Animal and Environmental Biology, Bari, Italy.

For geo-biological studies 28 samples were collected in coral-dominated and neighbouring mud-dominated areas (Tab. 3) by means of a cylindrical box corer which was 31 cm in diameter and 60 cm in height. 24 cores were successful, 4 box corers failed due to the existence of hardgrounds on the seafloor which hampered the corer penetration.
On recovery of successful corers, the supernatant water was drained and the core surface was photographed. Immediately after, living epibenthic organims (in particular corals, symbiotic polychaetes and sponges) were collected from the core surface for genetic (IFREMER) and isotope (NIOZ) analyse. In particular live specimens of *Lophelia pertusa*, *Madrepora oculata* and *Desmophyllum dianthus*, along with samples of *Eunice norvegica* and tiny gorgonians, have been preserved according to the protocol received by IFREMER and related the WP4.
Some specimens of live corals were kept alive to attempt aquarium cultivation (UNIMIB).
Subcores of around 10 cm in diameter and 20 to 40 cm in lenght were taken in 6 box-cores (Tab 6).
The rest of the sediment was sieved on board through 2 cm, 1 cm, 0.5 cm, 0.2 cm mesh sieves (NIOZ-UNIMIB). In some cases, around 10% of the core was sieved through a mesh of 63 µ.
After draining of supernatant water, 4 box-cores (2 collected in the coral area and 2 in the no-coral (reference-area) were sampled for meiofauna analysis (UNIBARI – see chapter 7.5).

Table 6: Box-corer sampling list and specification about sampling pourposes (notes).

Operation	Lat	Long	Depth (m)	Sampling area	Notes
I LEG					
BC 04	39°33.1078'N	18°31.9327'E	784	Coral area (MS03)	Sieved sample (upper 5 cm) and subcore UNIMIB
BC 05	39°33.0707'N	18°31.9259'E	774	Coral area (MS03)	Sieved sample (upper 5 cm) and subcore UNIMIB
BC 06	39°32.9343'N	18°31.4929'E	774	Coral area (MS03)	Sieved sample (upper 5 cm) and subcore UNIMIB
BC 10	39°36.7101'N	18°30.5176'E	638	Coral area (MS04)	Empty – few oxidized corals on t he outer box-core frame
BC 11	39°36.7240'N	18°30.5110'E	640	Coral area (MS04)	Sieved sample (> 0.5 cm) UNIMIB - Live corals UNIMIB - Live corals (tiny

					Desmophyllum) IFREMER
BC 12	39°36.7155'N	18°30.5193'E	635	Coral area (MS04)	Empty – just a small fossil coral fragment on the outer box-core frame
BC 18	39°36.7315'N	18°30.5466'E	642	Coral area (MS04)	Entire sample NIOZ
BC 19	39°36.7125'N	18°30.5187'E	623	Coral area (MS04)	Entire sample NIOZ
BC 20	39°36.7173'N	18°30.5174'E	623	Coral area (MS04)	Entire sample NIOZ
BC 21	39°36.7237'N	18°30.5376'E	640	Coral area (MS04)	- Subcore UNIMIB - Sieved sample NIOZ
BC 22	39°36.7182'N	18°30.5242'E	638	Coral area (MS04)	- Live corals UNIMIB - Live corals IFREMER - Sieved sample UNIMIB
BC 23	39°36.7231'N	18°30.5323'E	630	Coral area (MS04)	- Live corals (*Madrepora*) UNIMIB - Live corals (*Madrepora*) IFREMER - Other live organisms and sieved sample NIOZ
BC 29	39°36.0218'N	18°29.5507'E	660	No coral area	Entire sample NIOZ
BC 30	39°36.0227'N	18°29.5515'E	660	No coral area	Entire sample NIOZ
BC31	39°36.0269'N	18°29.5577'E	670	No coral area	Entire sample NIOZ
BC 41	39°36.7236'N	18°30.5363'E	635	Coral area (MS04)	- Sieved sample (> 2mm) UNIMIB - Sieved sample (< 2mm) UNIMIB - Mollusks UNIBARI
BC 42	39°36.7212'N	18°30.5496'E	630	Coral area (MS04)	Entire sample NIOZ
BC 43	39°36.7352'N	18°30.5636'E	640	Coral area (MS04)	- Meiofauna UNIBARI - Sieved sample NIOZ
II LEG					
BC 50	39°36.7459'N	18°30.5652'E	650	Coral area (MS04)	disturbato
BC 51	39°36.7450'N	18°30.5670'E	645	Coral area	Meiofauna UNIBARI
BC 52	39°36.0181'N	18°29.5425'E	663	No coral area	Meiofauna UNIBARI
BC 53	39°36.0102'N	18°29.5557'E	660	No coral area	Meiofauna UNIBARI
BC 66	39°33.9053'N	18°26.2185'E	550	Coral area (Reef A)	Few cm of sediment. Sieved sample UNIMIB
BC 67	39°33.9121'N	18°26.2052'E	558	Coral area (Reef A)	Sieved sample UNIMIB
BC 68	39°33.9054'N	18°26.2156'E	550	Coral Area (Reef A)	empty
BC 70	39°33.3225'N	18°13.2057'E	530	Coral area (MS08)	Sieved sample and subcore

					UNIMIB
BC 71	39°33.3206'N	18°13.3263'E	520	Coral area (MS08)	- Live corals UNIMIB - Live corals IFREMER - Other live organisms (mostly sponges) UNIBARI - Sieved sample UNIMIB
BC 72	39°33.5006'N	18°13.2360'E	525	Coral area (MS08)	- Live corals UNIMIB - Live corals IFREMER - Other live organisms (mostly sponges) UNIBARI - Sieved sample and subcore UNIMIB

7.5 Biological sampling

Gianfranco D'Onghia (4), Francesco Mastrototaro (4), Piero Panetta (4), Daniela Battista (4), Antonella Indennidate (4), Domenico Micucci (5)
(4) LRU CoNISMa of Bari University, Dept. of Animal and Environmental Biology, Bari, Italy
(5) CNR, Ancona ,Italy

Megafauna and **Macrofauna** samples have been collected by means of an epibenthic sledge, a metallic frame with a mouth opening into a net, on muddy bottoms near the coral area (intermound area) (3 replicates) and on muddy bottoms off the coral area (3 replicates) in order to increase the knowledge on the suprabenthos biodiversity, mainly represented by cnidarians, sponges, annelids, molluscs, small crustaceans, echinoderms and small fish. Macrofauna samples have been also collected using Van Veen grab sampling both IN (2 replicates) and OFF (2 replicates) coral area (Fig. 5).
Meiofauna samples have been collected quali-quantitatively with boxcorer to increase the knowledge on the biodiversity of SML coral region as well as to estimate the density of the meiofauna species in a coral area (2 replicates – BC43 and BC51 – see table 6) and in a nearby non-coral area (2 replicates – BC52 and BC53 – see table 6). In particular, this sampling will be useful also to develop collaborative research between CoralFISH and OBAMA projects (National programme founded by MIUR and started in 2010).

7.6 Biodiversity, density and biomass of macrofauna

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(2) Royal NIOZ - Royal Netherlands Institute for Sea Research

For the quantitative study of biodiversity, density and biomass relatively undisturbed samples were collected with a boxcorer (diameter of box = 31.4cm). After siphoning off the overstanding water a photograph was taken of the sediment surface. As a standard the top 10 cm of the sediment was sieved over a sieve with 0.5 mm screensize and the residue was preserved in formaline (4%). In total 7 boxcores were treated this way, 4 collected inside the coral area and 3 outside the coral area. Additionally left-over material or material from disturbed boxcores were also sieved over 0.5mm for the study of the thanatocoenose (dead fauna) and the residue was stored dry. A few samples of sponges and Madrepora were also collected and stored in the freezer for stabile isotope analyses (foodweb study). The table shows which boxcores were sieved for which purpose.

Table 7: List of box-corer collected for biodiversity, density and biomass of macrofauna studies (see figs. 3 and 4 for locations

Boxcore	Depth in m	Area	Purpose	Remarks
BC-04	784	Non-Coral area	Thanatocoenose	
BC-05	774	Non-Coral area	Thanatocoenose	
BC-18	642	Coral area	Biodiversity	No coral fragments
BC-19	623	Coral area	Biodiversity	
BC-20	623	Coral area	Thanatocoenose	
BC-21	640	Coral area	Thanatocoenose	
BC-22	638	Coral area	Thanatocoenose	Only <10mm
BC-23	630	Coral area	Biodiversity	
BC-29	660	Non-Coral area	Biodiversity	
BC-30	660	Non-Coral area	Biodiversity	
BC-31	670	Non-Coral area	Biodiversity	
BC-42	640	Coral area	Biodiversity	
BC-43	640	Coral area	Thanatocoenose	

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It has been really a nice cruise. Despite the bad weather condition encountered during the first leg we managed to get a nice set of data and samples and we almost achieved all the objectives of CoralFISH project and the MAGIC project purpose as well.

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Gianfranco D'Onghia