Off shore OBservatory for the long-term ecological research (L-TER) on the biodiversity And ecosystem Functioning of the deep Mediterranean SeA
OBAMA

OBAMA_2011

CRUISE REPORT

R/V URANIA

Ravenna, March 24 – Ancona, April 06, 2011

LEONARDO LANGONE, ***Chief Scientist***
Istituto Scienze Marine – CNR-ISMAR, UOS di Bologna
Via Gobetti, 101- 40129 Bologna, Italy
leonardo.langone@ismar.cnr.it
www.ismar.cnr.it
www.eu-hermione.net/

List of Institutions
CNR-ISMAR in Bologna and Venezia (www.ismar.cnr.it)
UNIPM-DiSMAR, Ancona (http://www.dismar.univpm.it/)
UNIBA-Dip. Biologia, Bari (http://www.prospettivehitech.com/progetti/bio/)
UNI-TS, Trieste (http://dsv.units.it/Benvenuto-home)
UNIGE-DIPTERIS, Genova (http://www.dipteris.unige.it/)

INDEX

1. INTRODUCTION

1.1. Foreword

A multi-disciplinary oceanographic cruise was carried out on the R/V Urania from 24 March and 6 April 2011 in the Southern Adriatic, Otranto Strait and in the cold-water coral province of S. Maria di Leuca to investigate environmental and ecological variations occurred in the deep ocean ecosystems connected to recent climate changes.

The cruise OBAMA_2011 was part of the experimental phase of two research projects: EC_HERMIONE (Hotspot Ecosystem Research and Man's Impact on European Seas) and PRIN_OBAMA (Offshore OBservatory for the long-term ecological research (L-TER) on the biodiversity And ecosystem Functioning of the deep Mediterranean SeA).

The aims of the two projects can be summarized as follows:

a) evaluate the role of episodic events of dense shelf water spreading in the Southern Adriatic in transferring fresh organic matter to the deep benthic community;
b) define if the dense water cascading events can produce the wide range of bedforms found on the continental slope or at its base;
c) quantify the potential effects of global change and human impact on goods and services provided by deep marine ecosystems;
d) investigate the role of viruses and predators on biodiversity of deep sea prokaryotes;
e) define principles to create long-term ecological observatories;
f) suggest offshore marine protected areas in the Italian seas.

1.2. Summary of activity performed

The cruise involved 5 different scientific teams (CNR-ISMAR Bologna and Venice; UNIPM-DISMAR, Ancona; UNIBA-Dip. Biologia, Bari; UNITS, Trieste; UNIGE-DIPTERIS, Genova); technicians by SoProMar and a science communicator and journalist by ProMedia.
Cruise lasted 14 days, included 2 days for mob and demob in the ports of Ravenna and Ancona, respectively. The transits to and from working area took about 3 days. Thus, the working time did not exceed 9 days. On April 2011, 1st at S. Maria di Leuca a partial change of the personnel was carried out. For the most part of the cruise, the weather was good and the sea smooth; bad condition was managed by varying the sequence of operations so as to minimize the stand-by. At the campaign beginning, the lander MEMO did not properly work. Thus, it has been landed, and after further maintenance has been brought on board during the second part of the campaign. This of course led to having to cancel the planned experiments in the Southern Adriatic Sea.

The main operations carried out on the cruise were (Fig. 1.1):

a) Recovery, servicing and re-deployment of 2 instrumented moorings in the South Adriatic;
b) 70 CTD profiles along transects normal to the continental slope following the pathway of the North Adriatic Dense Water (NadDW) spreading in the Southern Adriatic Sea. CTD profiles were further performed at the start of any session of multibeam acquisition to accurately calculate the sound speed. On 5 hydrocasts, water was also collected to define the spatial distribution of microzoo-, microphyto-, nano- and picoplankton populations;
c) Dilution experiments to assess deep sea microbial food web functioning;

d) Sediment box coring on 15 stations. On each station, 4 replicas were generally retrieved for a total of 59 box corer deployments. Once onboard, each box core was subsampled for macrobenthos, meiofauna, foraminifera, bacteria/viruses, organic matter, enzymes, and grain size. On 4 of the sampling stations, short sediment cores were additionally sub-sampled to measure dissolved oxygen microprofiles and to characterise the organic matter.
e) Surface sediment sampling by a large grab (65 l) at 19 sites in the Bari canyon. Sediment was subsampled on board by means of short PVC liners in order to define areas of sediment accumulation, by-passing or erosion;
f) Acquisition of Multibeam (450 nm) and CHIRP sonar (400 nm) lines;
g) Three deployments for a total of ~17 hours of an instrumented baited lander in the white coral province of Santa Maria di Leuca for observing the benthopelagic megafauna in coral and non-coral areas, and monitoring hydrographic characteristics of the bottom water;
h) Outreach activity through a science journalist on board.

Data collected in cruise OBAMA_2011 will be integrated with time-series of data by previous and ongoing research projects (EUROMARGE-AS, EUROSTRATAFORM, OTRANTO, HERMES, VECTOR, MTP II-MATER, CoralFISH).

All the operations were carried out successfully. Biologists, geologists and oceanographers on board worked together on several different activities during the cruise. This co-operation turned out to be really exciting because of an effective exchange of knowledge. Furthermore, apart from the science, the life on board was pleasant and the atmosphere friendly.

We are grateful to the Captain of R/V URANIA, Com.te Emanuele Gentile, the officers, the on-board technical staff and the crew for their assistance in the on board operations.

The chief scientist has assembled this cruise report from individual contributions of the participants.

The journalist Jacopo Pasotti published a dissemination article in the Italian tabloid *L'Espresso* (see Appendix 4). A short video was also produced by Michele Panza (Bari University) and shown at the web page http://espresso.repubblica.it/multimedia/video/30020362.

Leonardo Langone
Chief Scientist - Cruise OBAMA_2011

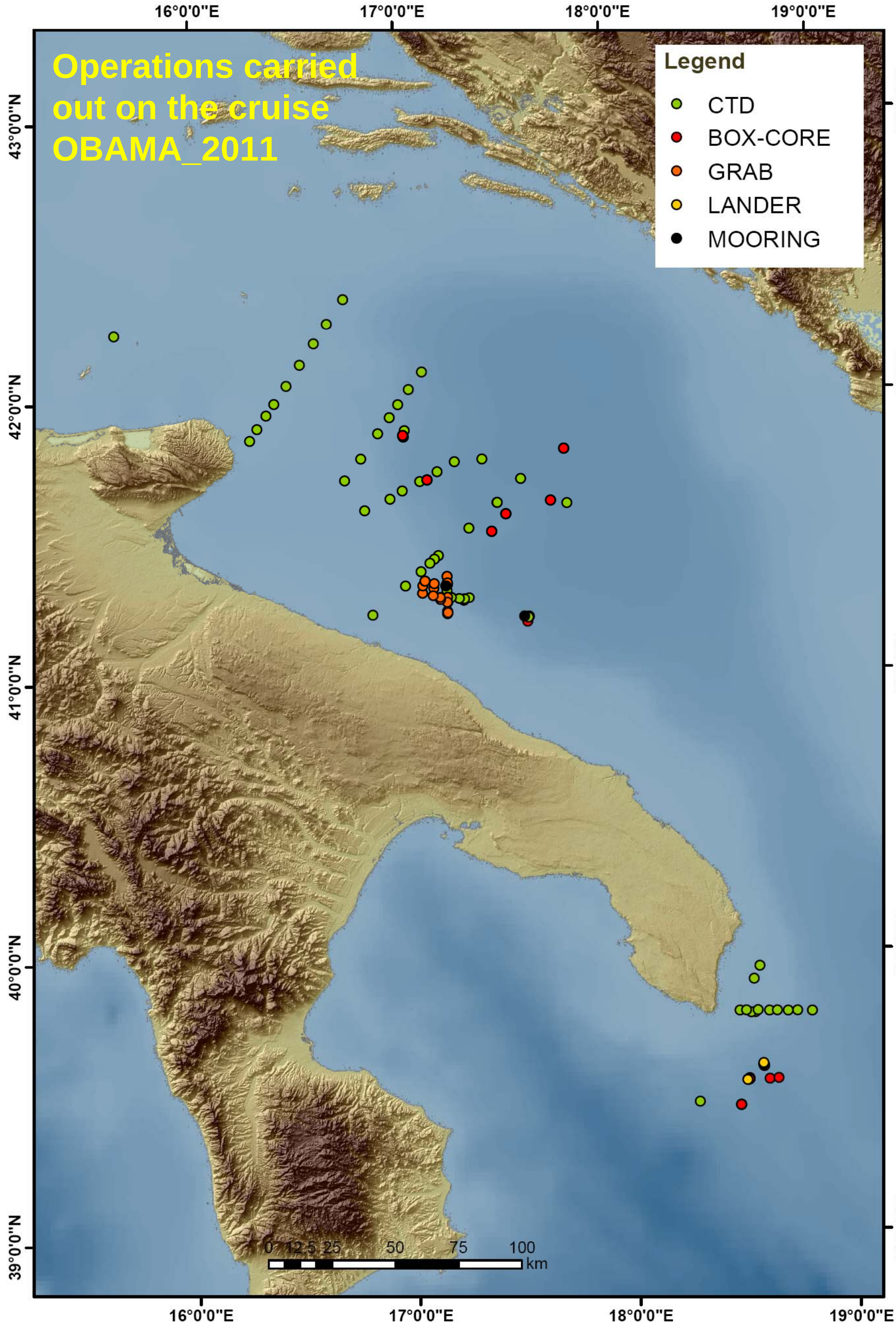


Figure 1.1. *The working areas of the Southern Adriatic, the Otranto Strait and the S. Maria di Leuca are shown, with sites where operations were carried out during the OBAMA_2011 cruise.*

1.3. Personnel

LIST OF PARTECIPANTS

Antonioli Marta	UNITS	Deep sea microbial food web functioning	marta.antonioli@yahoo.it
Bianchelli Silvia	UNIPM-DISMAR, Ancona	Box core subsampling for biodiversity and ecosystem functioning	silvia.bianchelli@univpm.it
Carugati Laura	UNIPM-DISMAR, Ancona	Box core subsampling for biodiversity and ecosystem functioning	sailing7@hotmail.it
Costa Elisa	UNIGE-DIPTERIS, Genova	Bathyal macrofauna	gianfrancocosta@libero.it
Covazzi Harriague Sandra Anabella	UNIGE-DIPTERIS, Genova	Bathyal macrofauna	anabella7@hotmail.com
D'Onghia Gianfranco	UNIBA-Dip. Biologia	Video survey by lander MEMO	g.donghia@biologia.uniba.it
Dalla Valle Giacomo	CNR-ISMAR, Bologna	Positioning and navigation, Multibeam, CHIRP	giacomo.dalla.valle@ismar.cnr.it
Fonda Serena	UNITS	Deep sea microbial food web functioning	s.fonda@units.it
Gallerani Andrea	CNR-ISMAR, Bologna	Sediment sampling, Subsampling grabs	andrea.gallerani@ismar.cnr.it
Gitto Daniele	So.Pro.Mar.	Hydrology, Multibeam, CHIRP, Positioning and navigation	gittodaniele@gmail.com
Langone Leonardo	CNR-ISMAR, Bologna	Chief scientist, sediment sampling, mooring servicing	leonardo.langone@ismar.cnr.it
Liguori Alice	CNR-ISMAR, Bologna	Sediment sampling, Positioning and navigation	alislig@hotmail.it
Maiorano Porzia	UNIBA-Dip. Biologia	Video survey by lander MEMO	p.maiorano@biologia.uniba.it
Marcellini Francesca	UNIPM-DISMAR, Ancona	Box core subsampling for biodiversity and ecosystem functioning	mykly@hotmail.com
Mea Marianna	UNIPM-DISMAR, Ancona	Box core subsampling for biodiversity and ecosystem functioning	m.mea@univpm.it
Miserocchi Stefano	CNR-ISMAR, Bologna	Vice-chief scientist, Mooring servicing, O_2 microprofiles	stefano.miserocchi@ismar.cnr.it
Novaglio Camilla	CNR-ISMAR, Bologna	Sediment sampling	c.novaglio@studenti.unipi.it
Panza Michele	UNIBA-Dip. Biologia	Management of the lander MEMO	m.panza@biologia.uniba.it
Pasotti Jacopo	ProMedia	Science Communicator and Journalist	jacopo.pasotti@gmail.com
Prato Giulia	CNR-ISMAR, Bologna	Sediment sampling, Positioning and navigation	giuliaprato.mi@gmail.com
Rastelli Eugenio	UNIPM-DISMAR, Ancona	Box core subsampling for biodiversity and ecosystem functioning	e.rastelli@univpm.it
Tangherlini Michael	UNIPM-DISMAR, Ancona	Box core subsampling for biodiversity and ecosystem functioning	m.tangherlini@univpm.it
Turchetto Margherita	CNR-ISMAR, Venice	Hydrology, Positioning and navigation	margherita.turchetto@ismar.cnr.it
Urzì Francesco	So.Pro.Mar.	Hydrology, Multibeam, CHIRP, Positioning and navigation	
Zoccarato Luca	UNITS	Deep sea microbial food web functioning	

The scientific staff of the OBAMA_2011 cruise

2. NAVIGATION, MULTIBEAM ECHOSOUNDER AND CHIRP SONAR

Federica FOGLINI, Giacomo DALLA VALLE
CNR-ISMAR, Istituto Scienze Marine, UOS Bologna - Italy
Federica.foglini@ismar.cnr.it

2.1. Instrument setting

The research vessel Urania is equipped with a DGPS Omnistar L1 for positioning linked with the Konsberg Seatex Seapath 200 and Seateax MRU5.
The datum WGS84 and the UTM projection Zone 33N were chosen for navigation and display purposes. Timing was set to UTC, whereas the acquisition rate was set to 10 s.
Multi beam bathymetry data were collected during cruise in a depth range between 100 and 900 m using the multi beam sonar Konsberg EM710 (Table 2.1). The sonar head is positioned on the ship's keel using a V-shaped steel frame. A Sound Velocity probe at the keel 1m above the Sonar Head is interfaced directly to the MBES processor, thus providing the necessary real-time data for the beam-forming. CTD casts were normally used for input of the sound velocity profile to the system.
A Teledyne Benthos CHIRP SBP system (16 hull-mounted transducers) was used to collect Chirp data. The data were acquired by the SWANPRO software by Communication Technology, with direct interfacing to the DGPS. The system setting (multiping mode) was: power full, length 20ms, trigger rate varying from 0.5 to 0.687 s, gain 9dbm preamp gain ranging from 1.5 to 3 db.

Table 2.1. – Characteristics of the Multi Beam Echosounder Konsberg

System	EM710
Frequency	70, 100 kHz
Beam number	256
Soundings	400
Swath angle	1° x 1°
Swath coverage	140°
Pulse lenght	0.2 ms

2.2. GIS and data pre-processing

Navigation data were processed onboard on a daily basis and plotted using GIS system (ArcInfo 9.3). About 635 km of Chirp profiles were collected. An area of about 502 km^2 was covered by multi beam data. Multi beam data were processed on board using CARIS HIPS and SIPS in order to check the data quality and extract DTM of 10m resolution (Fig. 2.1) . Deployments of a CTD probe were performed in each area every 12 hours in order to calculate sound velocity profiles to calibrate the echosounder.

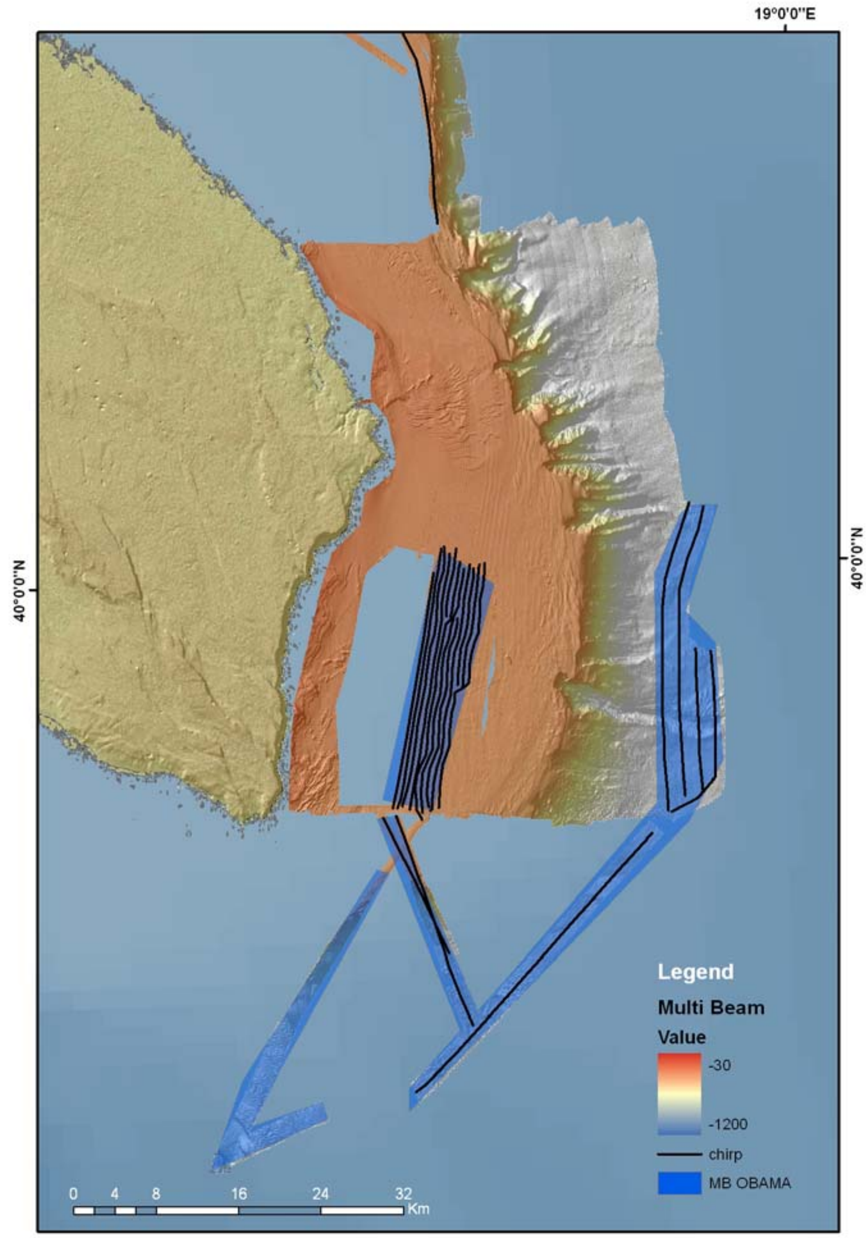


Figure 2-1. Chart of Chirp profiles and Multi beam coverage

3. HYDROLOGY

Margherita TURCHETTO
CNR-ISMAR, Istituto Scienze Marine, Venice – Italy
margherita.turchetto@ismar.cnr.it
(with the contribution of Aniello RUSSO, UNIPM-DiSMAR, Ancona)

During the OBAMA_2011 cruise, continuous vertical profiles of the main hydrological parameters (temperature, conductivity, dissolved oxygen, fluorescence and light transmittance) were carried out with a Sea-Bird 9 CTD probe in 59 stations, 49 during the first leg of the cruise located in the southern Adriatic basin, and 10 during the second leg located in the Otranto Strait and northern Ionian sea (Fig. 3.1). Before the beginning of the multi-beam surveys, additional CTD stations were performed to calculate the sound velocity for multi-beam calibration. The Sea-Bird CTD probe was calibrated at the end of the cruise (Calibration sheets in Appendix 3).

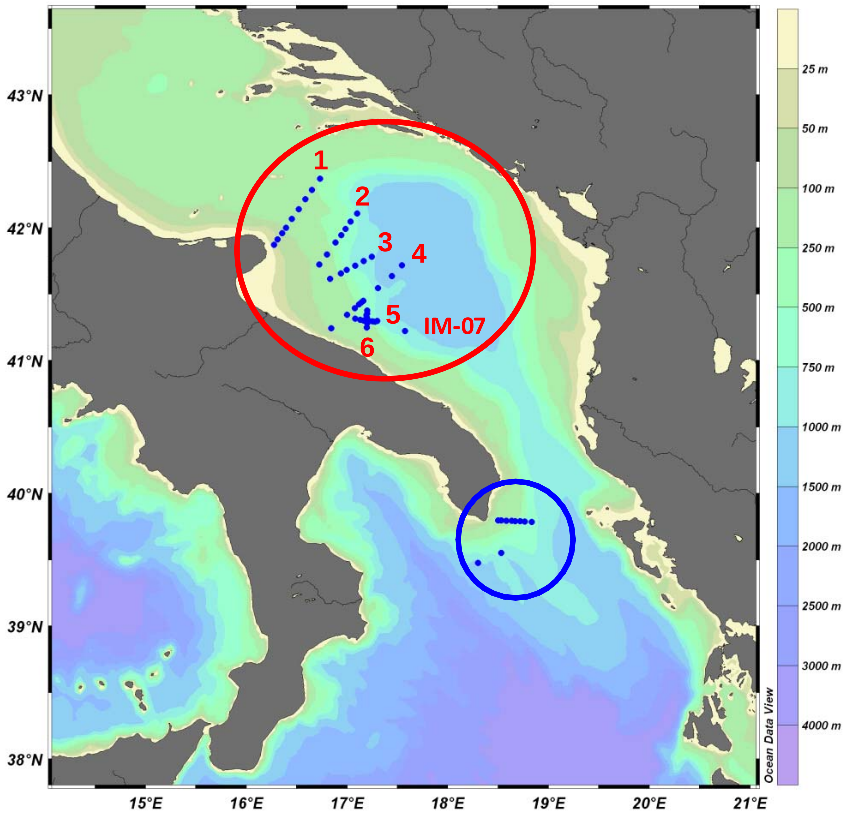


Figure 3.1. *Station maps of the first (red circle) and second leg (blu circle) of the cruise.*

Table 3.1 *– Details of the stations sampled during the first leg*

Station	Latitude *N*	Longitude *E*	Bottom depth *m*	Date *dd/mm/yyyy*
O_01	41 52.1760	16 16.6580	26	25/03/2011
O_02	41 54.6586	16 18.7563	54	25/03/2011
O_03	41 57.5075	16 21.4068	77	25/03/2011
O_04	41 59.9828	16 23.7236	106.4	25/03/2011
O_05	42 03.8857	16 27.2927	128	25/03/2011
O_06	42°08.3126	16°31.2318	141	25/03/2011

Station	Latitude *N*	Longitude *E*	Bottom depth *m*	Date *dd/mm/yyyy*
O_07	42°12.82	16°35.33	170	25/03/2011
O_08	42°16.9858	16°39.1886	206	25/03/2011
O_09	42°22.1870	16°43.9922	209	25/03/2011
O_28b	41°47.3779	17°22.7850	1073	26/03/2011
O_36	41°38.0317	17°26.743	1132.0	26/03/2011
B_2010	41°20.4841	17°34.0870	603	26/03/2011
IM_07	41°13.2850	17°34.7313	857	26/03/2011
O_37B	41°43.0002	17°33.6301	1112	27/03/2011
O_36B	41°38.03	17°26.77	1137	27/03/2011
O_35	41°32.700	17°18.542	730	27/03/2011
O_34	41°26.9822	17°09.7062	508	27/03/2011
O_33	41°26.2554	17°08.5368	406	27/03/2011
O_32	41°25.3861	17°07.2280	237	28/03/2011
O_31	41°23.6508	17°04.6772	172	28/03/2011
O_30	41°20.6597	17°00.1563	131	28/03/2011
O_29	41°14.5360	16°50.7623	102	28/03/2011
O_46	41°22.4975	17°12.0043	474	28/03/2011
O_45	41°21.1150	17°12.0130	570	28/03/2011
O_44	41°19.4974	17°11.8892	512	28/03/2011
O_43	41°18.0361	17°11.9944	596	28/03/2011
O_42	41°16.8965	17°12.0277	390	28/03/2011
O_41	41°14.9718	17°11.9238	161	28/03/2011
O_53	41°17.8169	17°18.0973	836	29/03/2011
O_52	41°17.5887	17°16.7809	720	29/03/2011
O_51	41°17.7040	17°15.3097	730	29/03/2011
O_50	41°17.94	17°13.0834	592	29/03/2011
O_49	41°18.0180	17°09.8886	416	29/03/2011
O_48	41°18.4363	17°08.0079	423	29/03/2011
O_47	41°18.97	17°04.96	260	29/03/2011
O_21B	41°52.7869	17°00.3144	573	29/03/2011
O_17	42°06.3391	17°06.1726	733	29/03/2011
O_16	42°02.66	17°02.25	667	29/03/2011
O_15B	41°59.3944	16°59.1495	503	29/03/2011
O_15A	41°56.69	16°56.66	447	29/03/2011
O_14	41°53.2786	16°53.2199	369	29/03/2011
O_13	41°47.953	16°48.236	158	29/03/2011
O_12	41°43.3768	16°43.4867	112	29/03/2011
O_23	41°36.9013	16°49.0309	129	29/03/2011
O_23B	41°39.2596	16°56.3545	285	29/03/2011
O_24	41°40.993	16°59.858	516	30/03/2011
O_25	41°42.8872	17°04.9085	780	30/03/2011
O_26	41°44.9022	17°09.8931	892	30/03/2011
O_27	41°46.9324	17°14.9209	945	30/03/2011

3.1. Details of the first leg, southern Adriatic basin

In the southern Adriatic area, sea water temperature ranged from 11.3 to 14.7 °C, and salinity from 35.71 to 38.726 showing the lowest values in the shallower shelf area of the northernmost section located off the Gargano promontory (section 1). Sigma-theta values varied from 27.17 and 29.26 kg/m^3, the highest values were recorded at the bottom layer of the deepest stations (> 1000 m depth). At the cross-basin sections (1-4, Figg. 3.2-3.5), colder (T < 12.5°C) and less salted water (S < 38.2) was observed on the shelf shallower area at bottom around 75 - 140 m depth, sometimes showing higher suspended matter content (as lower light transmittance values were recorded). This water probably comes from the northern Adriatic, as NAdDW (Northern Adriatic Dense Water) which forms in the shallow shelf area of the northern Adriatic basin, approximately 2 months before, during winter. This water flowing on the shelf area showed sigma-theta values < 29 kg/m^3, lower than those measured in the same area in previous years (> 29, up to 29.67 kg/m^3 in April 2005); NAdDW has typical sigma-theta values > 29.2 kg/m^3, and its characteristics show relevant interannual variability due to changing meteo-oceanographic conditions in the northern Adriatic area. The bottom layer of cold water is more evident at section 1 (Fig. 3.2), where at 200 m depth it could also be observed a core of denser bottom water (sigma-theta >29 kg/m^3) which, being depleted in dissolved oxygen, should be MAdDW (Middle Adriatic Dense Water) coming from the mid Adriatic depressions. At surface, freshwater transported from the northern Adriatic by the Western Adriatic Current is evident on the westernmost stations. On the eastern side of section 1 there are signals of MLIW (Modified Levantine Intermediate Water), with S > 38.5, entering in the central Adriatic Sea.

At section 2 (Fig. 3.3), a core of warm and salty MLIW (S around 38.7) is centered at 400 m depth on the eastern side of the transect. As the transect is far away from the western coast, there are no evidence of northern Adriatic waters.

At section 3 (Fig. 3.4) the MLIW layer centered at 400 m is again present, as well as a signal of northern Adriatic waters at the bottom of the westernmost station; it is here also evident at depths greater than 800 m a bottom layer of SAdDW (Southern Adriatic Deep Water) with potential temperature below 13.5 °C, S close to 38.7 and sigma-theta > 29.2 kg/m^3.

Section 4 (Fig. 3.5) includes the deepest stations located inside the south Adriatic Pit (> 1200 m depth), and showed high salinity and density values at depths > 800 m, proper of the SAdDW; the low values of dissolved oxygen indicate that deep water formation did not happen in winter 2011. The core of MLIW is again centered at 400 m depth, and on the shelf water of northern Adriatic origin is present.

Cross sections 5 and 6 were planned across the Bari canyon area (Fig. 3.6 and 3.7), the first one from the western slope eastward along the canyon axis, and the second from the shelf northward crossing both canyon branches, aiming to detect dense water cascading in the canyon. As already observed, this winter NAdDW was not formed at its typical density, and only a weak signal of northern Adriatic waters can be found in Fig. 3.7, where there are some evidence that these waters enter in the canyon but, having a low density, detached from the bottom occupying an intermediate layer at about 200-300 m.

Station B_2010, located in the northern branch of the Bari canyon, where a mooring line equipped with a self-recording CTD probe, a sediment trap and a current meter is deployed, showed a warmer, less salted and oxygenated upper layer (0-100 m depth), where also a peak of fluorescence was detected. Below this layer temperature progressively decreased while salinity and density increased (Fig. 3.8).

Station IM_07, located near a field of sediment waves and where another mooring line is deployed, showed a more complex profile. A surface thin layer (20 m) showing lower temperature and salinity, was followed by the thermocline and halocline. Below this, several variations of both parameters were detected, likely due to the intrusion of waters from the shelf observed in the Bari canyon; an increase of temperature and salinity was observed around 400-500 m depth, due to the MLIW, then the bottom layer is occupied by the SAdDW (Fig. 3.9).

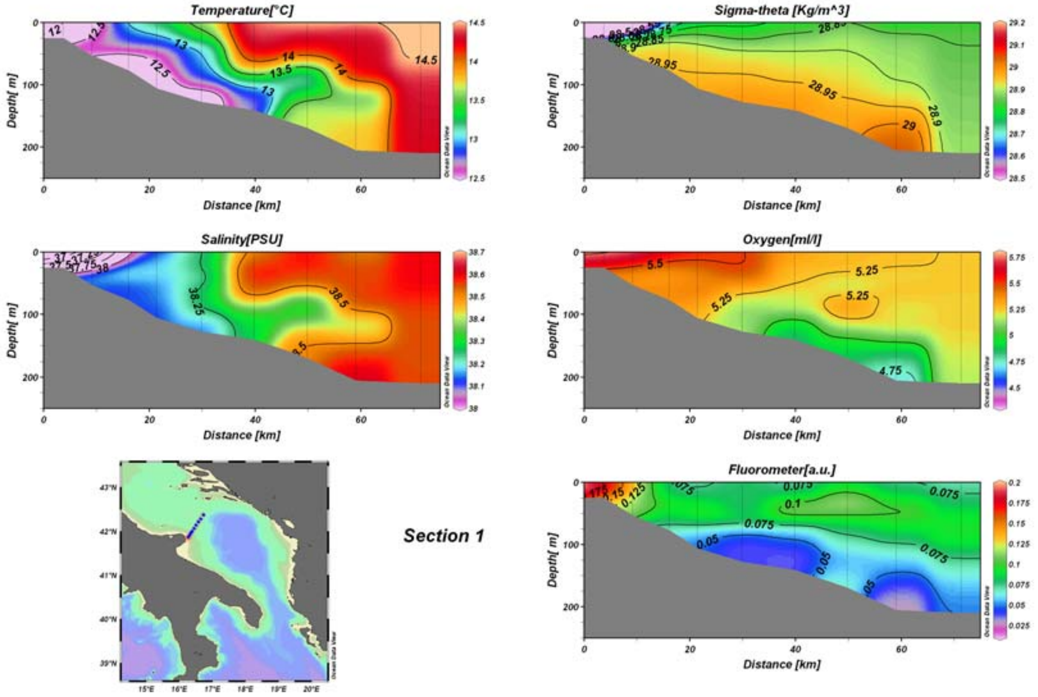


Figure 3.2. *Temperature, salinity, sigma-theta, dissolved oxygen and fluorescence distributions at section 1.*

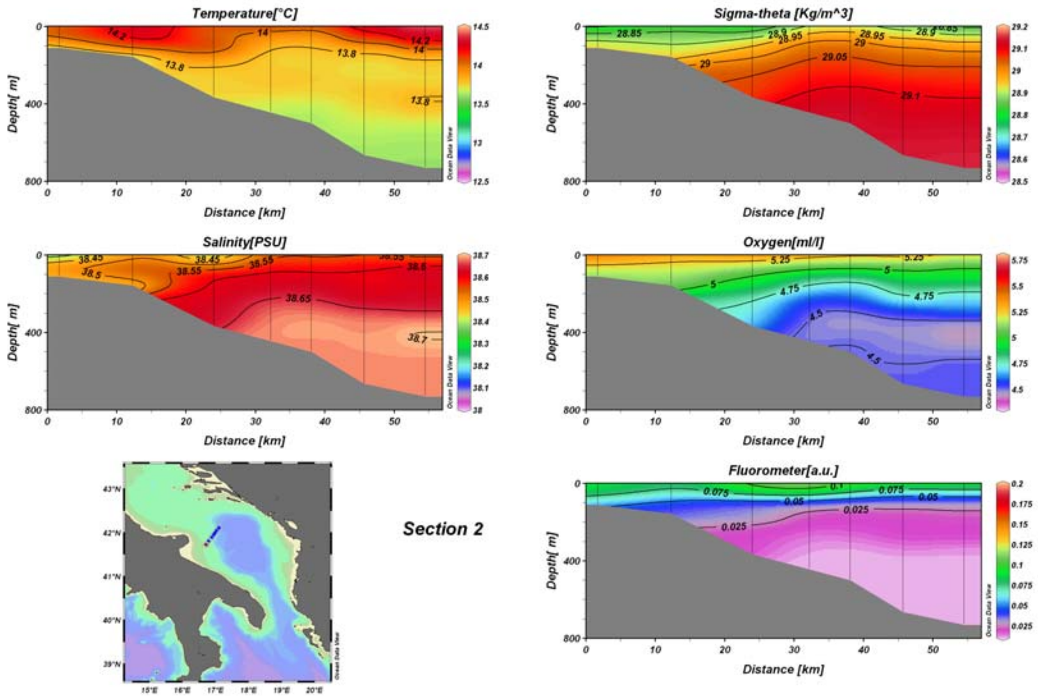


Figure 3.3. *Temperature, salinity, sigma-theta, dissolved oxygen and fluorescence distributions at section 2.*

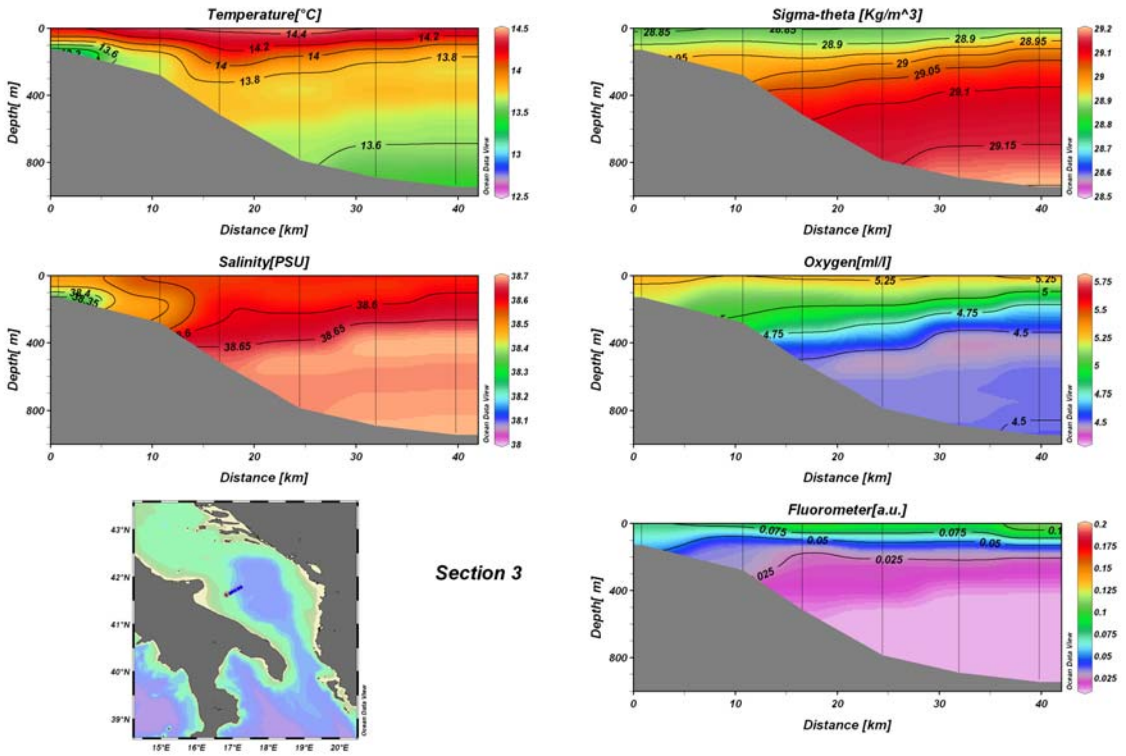


Figure 3.4. *Temperature, salinity, sigma-theta, dissolved oxygen and fluorescence distributions at section 3.*

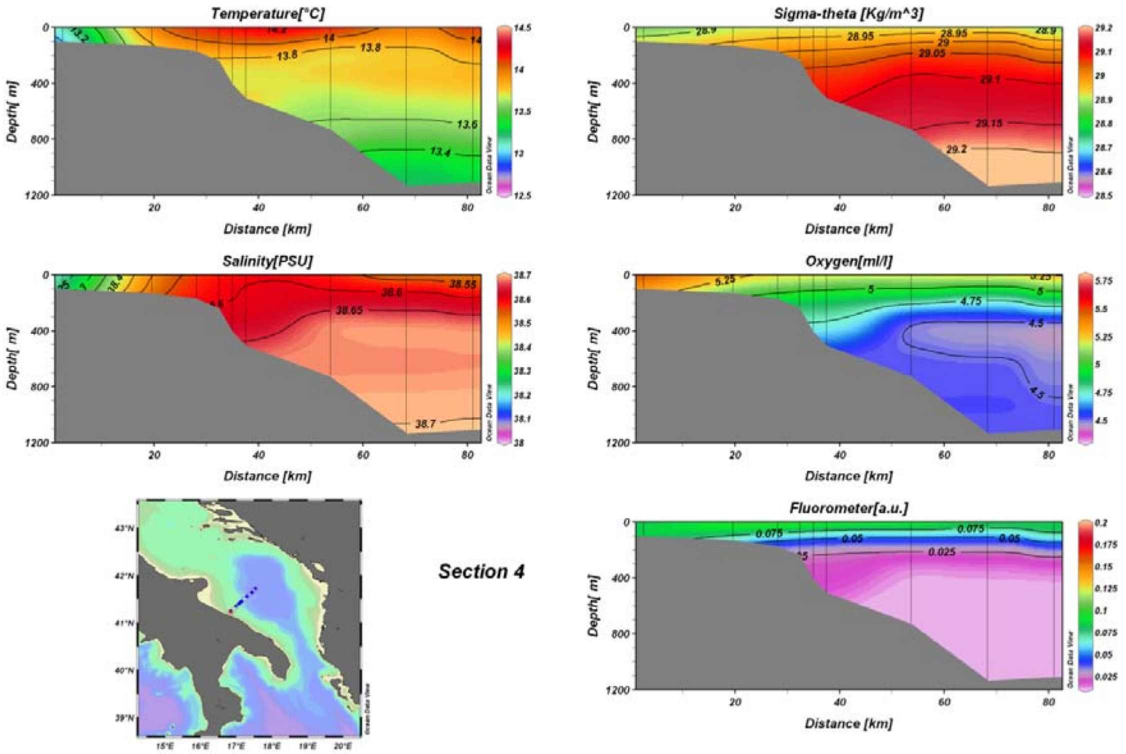


Figure 3.5*. Temperature, salinity, sigma-theta, dissolved oxygen and fluorescence distributions at section 4.*

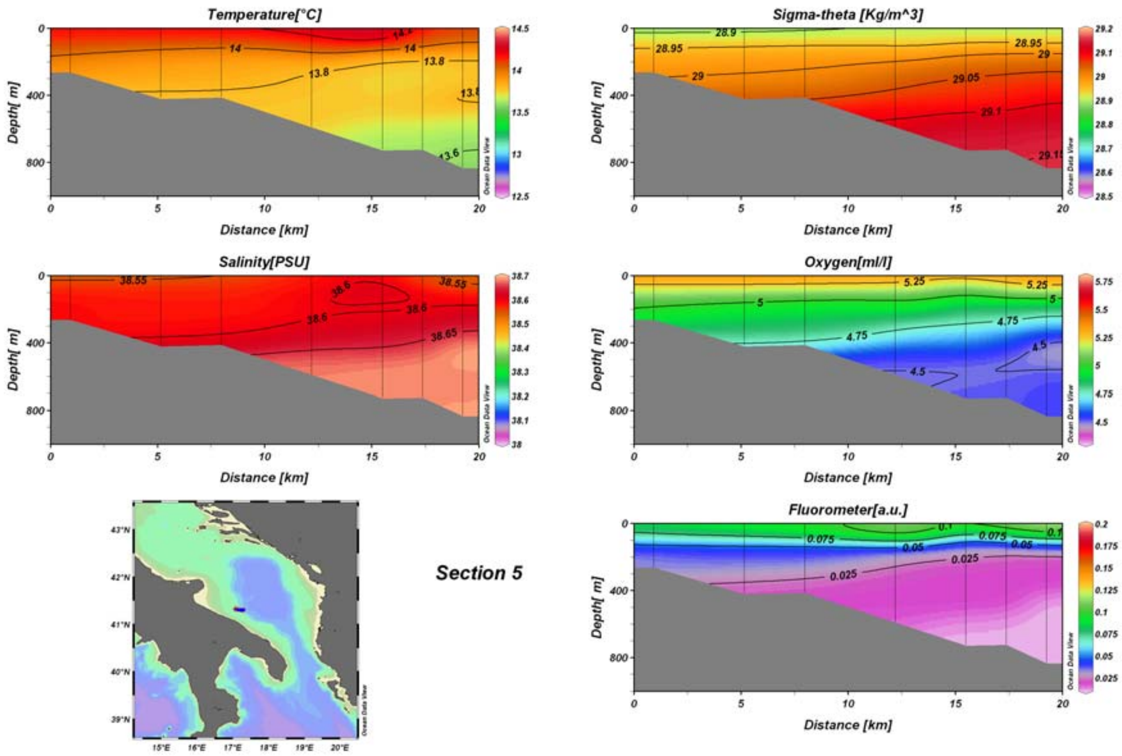


Figure 3.6. *Temperature, salinity, sigma-theta, dissolved oxygen and fluorescence distributions at section 5.*

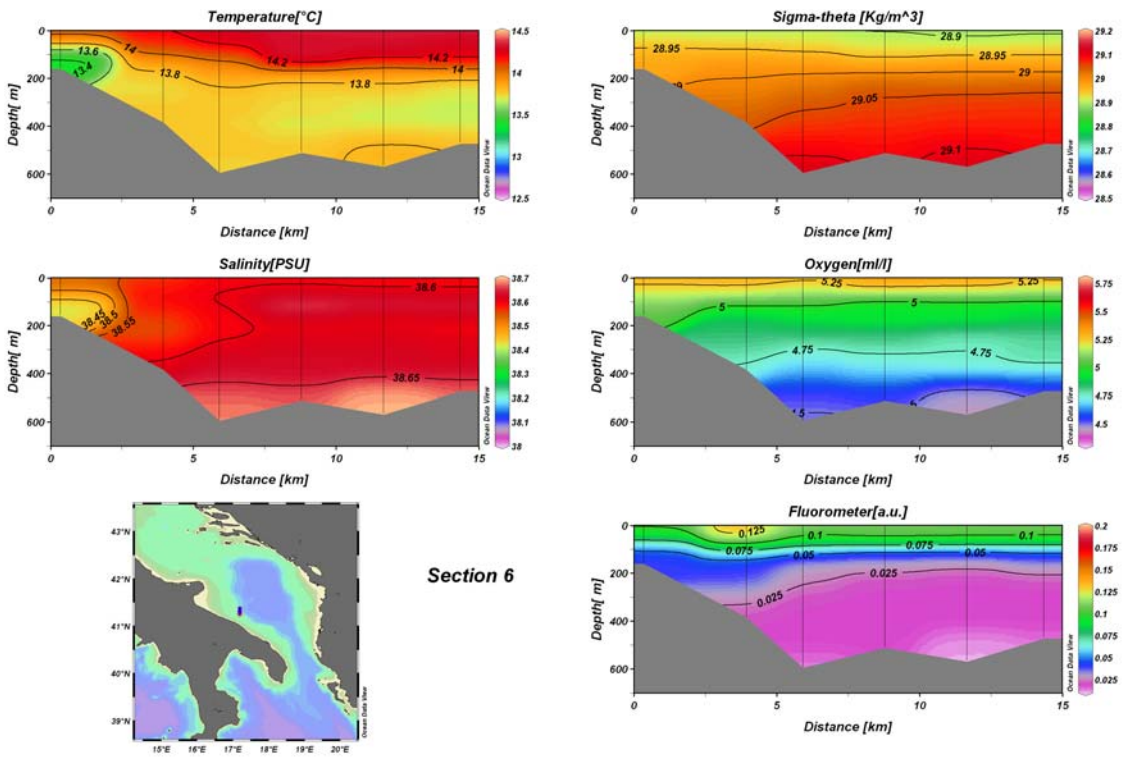


Figure 3.7. *Temperature, salinity, sigma-theta, dissolved oxygen and fluorescence distributions at section 6.*

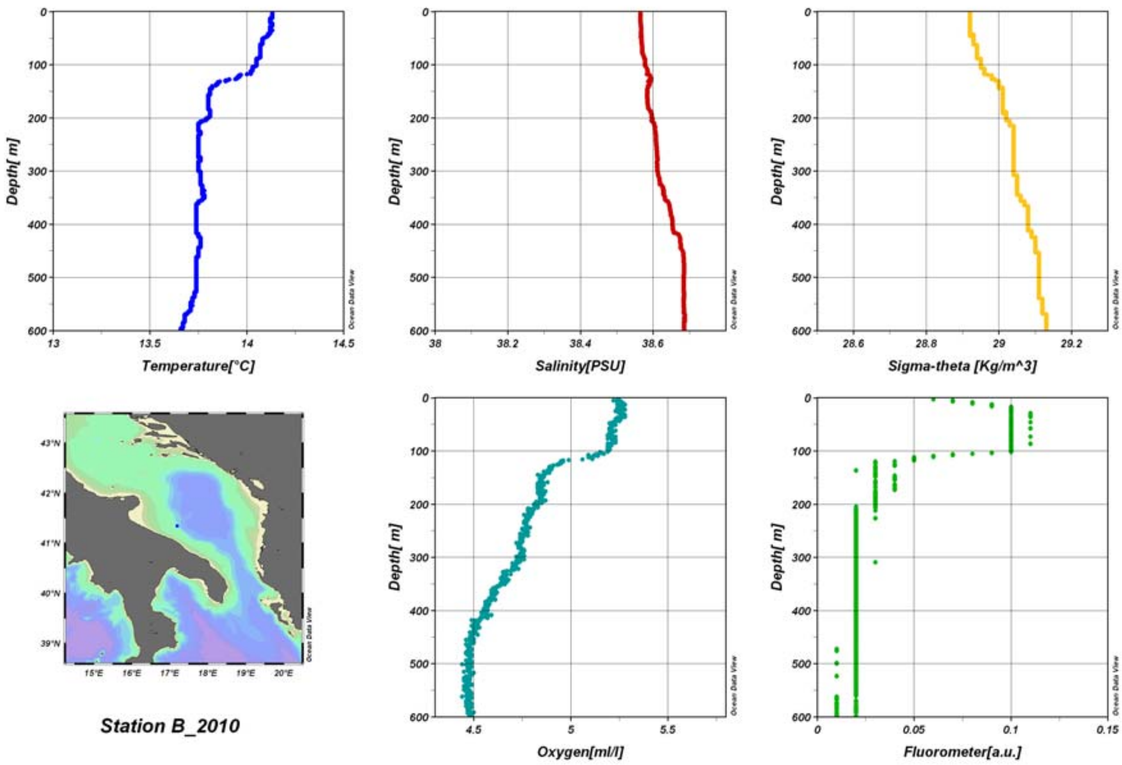


***Figure 3.8**. Temperature, salinity, sigma-theta, dissolved oxygen and fluorescence profiles at station B_2010.*

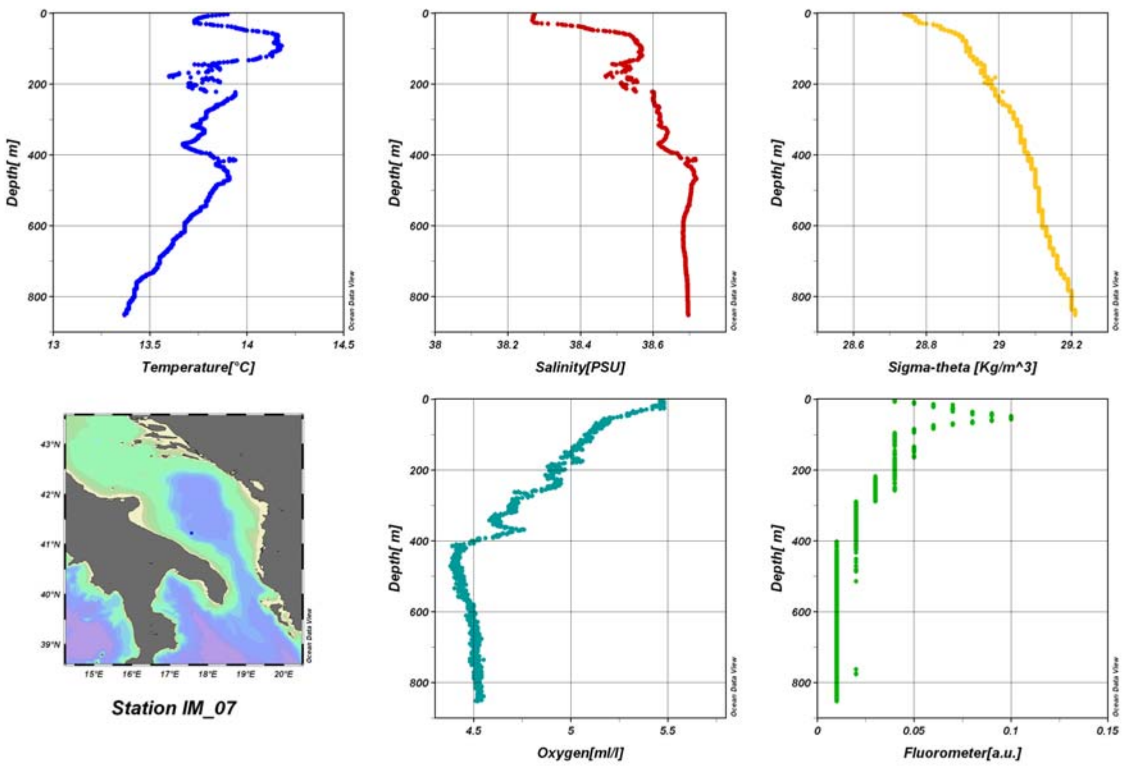


***Figure 3.9.** Temperature, salinity, sigma-theta, dissolved oxygen and fluorescence profiles at station IM_07.*

3.2. Details of the second leg, Otranto Strait and northern Ionian basin

Most of the stations sampled during the second leg of the cruise were located along a transect in the Otranto Strait area, and 2 stations in the northern Ionian.
In this area, temperature and salinity values showed slightly higher values compared with those of the southern Adriatic, the first ranging from 12.72 and 15.79 °C, and the second from 38.046 and 39.065. Water density, as sigma-theta, showed a narrower range of values with a lower maximum (29.16 kg/m^3).
At the Otranto section, at the shelf stations colder and less salted water was detected, while the offshore deeper stations showed a core of saltier and warmer water around 200-300 m depth, belonging to the LIW (Levantine Intermediate Water) with salinity up to 39, and a signal of Adriatic Bottom Water (ABW) at the deepest station (Fig. 3.10).

Table 3.2 *– Details of the stations sampled during the second leg*

Station	**Latitude** *N*	**Longitude** *E*	**Bottom depth** *m*	**Date** *dd/mm/yyyy*
OL_100	39 47.73	18 29.99	132	03/04/2011
OL_101	39 47.71	18 31.81	124	03/04/2011
OL_102	39 47.65	18 35.02	124	03/04/2011
OL_103	39 47.51	18 38.12	139	03/04/2011
OL_104	39 47.46	18 40.31	171	03/04/2011
OL_105	39 47.32	18 43.29	371	03/04/2011
OL_106	39 47.29	18 45.91	501	03/04/2011
OL_107	39 47.13	18 50.00	676	03/04/2011
CF_16	39 28.62	018 18.10	1048	02/04/2011
MS_03	39 33.03	018 31.97	775	01/04/2011

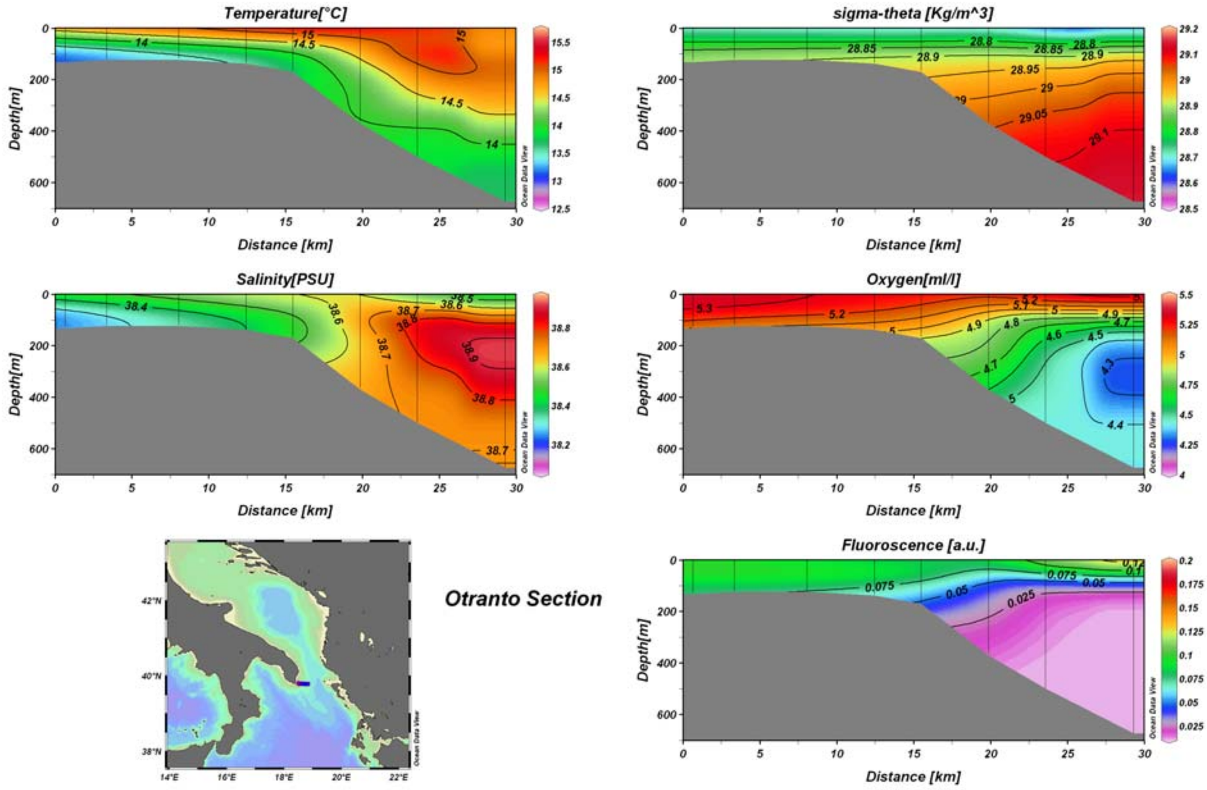


Figure 3.10. *Temperature, salinity, sigma-theta, dissolved oxygen and fluorescence distributions at the Otranto section.*

4. DEEP SEA MICROBIAL FOOD WEB FUNCTIONING

Serena FONDA, Marta ANTONIOLI, Luca ZOCCARATO
Univ. Trieste, Dip. Scienze della Vita, Laboratorio Ecologia, Trieste - Italy
s.fonda@units.it

Aims of Fonda Umani's unit:

1. define the spatial distribution of microzoo-, microphyto-, nano- and picoplankton communities;
2. quantify microzooplankton predation on its preys (microphyto-, nano- and picoplankton) in surface waters;
3. quantify heterotrophic nanoplankton predation on autotrophic and heterotrophic picoplankton in surface and deep waters;
4. verify possible selectivity of nanoplankton predation on picoplankton through genetic analysis;
5. evaluate if water filtration process could lead to DOC enrichment.

4.1. Analysis of microzoo-, microphyto-, nano- and picoplankton distribution along the water column

In each station 5L of seawater were collected from 5 depths (surface, 20m, DCM, intermediate depth, bottom) for the quali-quantitative analysis of microzoo-, microphyto-, nano- and picoplankton communities.
To analyze nano- and picoplankton 50mL were collected. The remaining seawater was then concentrated through gently inverted filtration on 10µm mesh net. All samples were fixed with formalin (final concentration 2%) and stored at +4°C in the dark.

4.2. Analysis of microzooplankton predation on microphyto-, nano- and picoplankton in surface waters

In each station 60L of surface seawater were collected and immediately filtered on 200µm mesh net to remove possible larger predators (mesozooplankton). With such water, dilution experiments were performed to quantify microzooplankton predation, following the protocol proposed by Landry & Hasset (1982). Samples were diluted with 0.22µm filtered seawater, from which all organisms were removed, decreasing the probability of predators-preys interaction and then the prey mortality rate. The considered dilution factors were 100%, 80%, 50% and 10%, each one in triplicate, obtained by adding gradually increasing fractions of the same depth or surface water filtered on 0,22µm. Nutrients were added (5µM $NaN0_3$ and 1µM KH_2P0_4 in each incubation bottle) to avoid phytoplankton growth limitation due to nutrient shortage. Samples were incubated for 24 hours in tanks located on the main deck where a constant flow of surface sea water was kept to ensure environmental conditions that most closely matches the natural ones.
At the beginning of each experiment other three replicates of each dilution were fixed as follows:

- microzoo- and microphytoplankton: 2L fixed with formalin (final concentration 2%);
- nano- and picoplankton: 100mL fixed with 0.22µm filtered formalin (final concentration 2%).

At the end of incubation, samples were fixed in the same way.

4.3. Analysis of heterotrophic nanoplankton predation on picoplankton in surface and deep waters

In each station 12L of surface seawater and 12L of deep seawater were collected and immediately filtered on 10µm mesh net to remove possible nanoplankton predators. With such water, dilution experiments were performed to quantify heterotrophic nanoplankton predation on picoplankton in surface and deep water, considering the protocol proposed by Landry & Hasset (1982). Samples were diluted with 0.22µm filtered seawater, from which all organisms were removed, reducing the encounter probability between predators and preys and then the prey mortality rate. For both surface and deep samples, the dilution factors were 100%, 80%, 50% and 10%, each one in triplicate, obtained by adding gradually increasing fractions of the same depth or surface water filtered on 0,22 µm. Surface samples were incubated for 24 hours in the same tanks located on the main deck of previous experiments. Deep samples were incubated for 24 hours in an incubator in the dark and at the temperature measured at the depth of sampling.
At the beginning of each experiment other three replicates of each dilution were fixed as follows:

- nanoplankton: 100mL of surface water and 250mL of deep water, fixed with formalin (final concentration 2%)
- picoplankton: 50mL of both surface and deep water, fixed with 0.22µm filtered formalin (final concentration 2%)

At the end of incubation, samples were fixed in the same way.

4.4. Genetic analysis aimed to verify possible selectivity in nanoplankton predation on picoplankton

From dilution experiments with both surface and deep water described in paragraph 4.3, 1L of 100% dilution was filtered before and after the incubation on 0.22µm mesh nitrocellulose membranes, to recover prokaryotic organisms.
Other three incubation bottles were set up with 100% seawater filtered on 3.0µm mesh membrane, to isolate only prokaryotic organisms. These bottles were incubated with the others as described above in order to evaluate any changes in prokaryotic community composition not due to predation. At the end of the incubation, 1L was filtered on 0.22µm mesh nitrocellulose membrane to recover the organisms.
All filters obtained were cut into 4 pieces and each was placed in lysis buffer (50 mM Tris-HCl, EDTA 40 mm, 750 mm sucrose) and maintained at -20 ° C.

4.5. Analysis of DOC concentration on aliquots of water subjected to vacuum filtration on different mesh networks

20mL of seawater were collected from whole seawater, seawater filtered on 10µm, on 3.0µm and on 0.22µm mesh. These aliquots were then filtered on 0.45µm membrane and the eluate was stored at -20 ° C.

The following table reports sampling stations and corresponding experiments:

STATION	EXPERIMENTS
36	✓ n° 1 experiment to analyze microzooplankton predation on microphyto- nano- and pico-plankton in surface waters ✓ n° 1 experiment to analyze heteronanoplankton predation on

	picoplankton in surface and deep waters ✓ n° 1 experiment to analyze the predation selectivity on picoplankton in surface and deep waters ✓ n° 1 experiment to determine microzoo-, microphyto-, nano- and picoplankton distribution along the water column
37B	✓ n° 1 experiment to analyze microzooplankton predation on microphyto- nano- and pico-plankton in surface waters ✓ n° 1 experiment to analyze heteronanoplankton predation on picoplankton in surface and deep waters ✓ n° 1 experiment to analyze the predation selectivity on picoplancton in surface and deep waters ✓ n° 1 experiment to determine microzoo-, microphyto-, nano- and picoplankton distribution along the water column ✓ n° 1 experiment to analyze DOC concentration on water subjected to filtration on different mesh networks
MS03_A	✓ n° 1 experiment to analyze microzooplankton predation microphyto- nano- and pico-plankton in surface waters ✓ n° 1 experiment to analyze heteronanoplankton predation on picoplankton in surface and deep waters ✓ n° 1 experiment to analyze the predation selectivity on picoplancton in surface and deep waters ✓ n° 1 experiment to determine microzoo-, microphyto-, nano- and picoplankton distribution along the water column ✓ recovering of about 3L of box corer seawater for the qualitative analysis of organisms
CF_16	✓ n° 1 experiment to analyze microzooplankton predation on microphyto- nano- and pico-plankton in surface waters ✓ n° 1 experiment to analyze heteronanoplankton predation on picoplankton in surface and deep waters ✓ n° 1 experiment to analyze the predation selectivity on picoplancton in surface and deep waters ✓ n° 1 experiment to determine microzoo-, microphyto-, nano- and picoplankton distribution along the water column ✓ n° 1 experiment to analyze DOC concentration on water subjected to filtration on different mesh networks
OL_107	✓ n° 1 experiment to analyze heteronanoplankton predation on picoplankton in surface and deep waters ✓ n° 1 experiment to determine microzoo-, microphyto-, nano- and picoplankton distribution along the water column
OUT_MS03_B	✓ recovering of about 3L of box corer seawater for the qualitative analysis of organisms

The following table reports the samples obtained from each station:

STATION	SAMPLES
36	29 phytoplankton samples 29 microzooplankton samples 77 nanoplankton samples 231 picoplankton samples

	24 quarters of filter for the genetic analysis
37B	29 phytoplankton samples 29 microzooplankton samples 77 nanoplankton samples 231 picoplankton samples 24 quarters of filter for the genetic analysis 12 DOC samples
MS03_A	29 phytoplankton samples 29 microzooplankton samples 77 nanoplankton samples 231 picoplankton samples 24 quarters of filter for the genetic analysis
CF_16	29 phytoplankton samples 29 microzooplankton samples 77 nanoplankton samples 231 picoplankton samples 24 quarters of filter for the genetic analysis 12 DOC samples
OL_107	5 phytoplankton samples 5 microzooplankton samples 29 nanoplankton samples 87 picoplankton samples 12 quarters of filter for the genetic analysis

For a total of 2704 samples to be analyzed by microscopy (inverted or epifluorescence microscope), 48 samples of DOC that will be analyzed using Shimatzu TOC analyzer and 84 samples for genetic analysis.

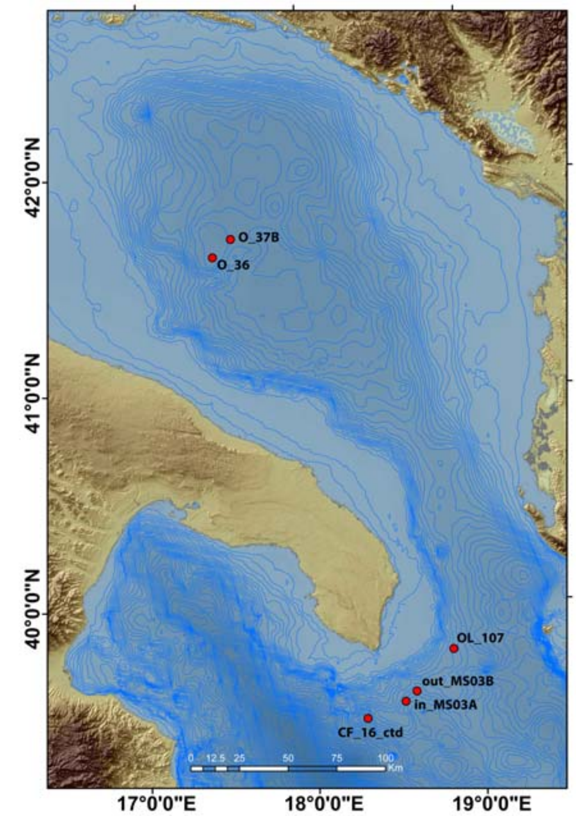


Figure 4.1. *Stations sampled for deep sea microbial food web functioning experiments.*

5. MOORING SERVICING

Stefano MISEROCCHI, Leonardo LANGONE, Andrea GALLERANI, Giulia PRATO, Alice LIGUORI
CNR-ISMAR, UOS Bologna - Italy
stefano.miserocchi@ismar.cnr.it

During the cruise, 2 instrumented moorings deployed in the Bari canyon and in the field of sediment waves at the exit of the canyon were recovered, serviced and re-deployed.

5.1. Aims

Aim of the experiment is to evaluate the role of episodic events of dense shelf water spreading in the Southern Adriatic in transferring fresh organic matter to the deep benthic community. Additionally, we want to understand if dense water cascading events can produce the wide range of bedforms found on the continental slope or at its base.

5.2. Methods

In March 2009 a mooring line with a sediment trap, a current meter (initially an Aanderaa RCM-7 later substituted by a RDI Doppler Volume Sampler - DVS), and a SBE Seacat16 CT recorder with a turbidity sensor, was deployed near the sea bottom at 860 m depth, in a field of sediment waves located down current of the Bari canyon. The mooring line has been serviced every 6 months (in October 2009, March and October 2010).
In March 2010 a second line was deployed in the northern branch of the Bari canyon (in the same position as the B station in 2004-2005).
Details of the configuration of recovered moorings are shown in Fig. 5.1.

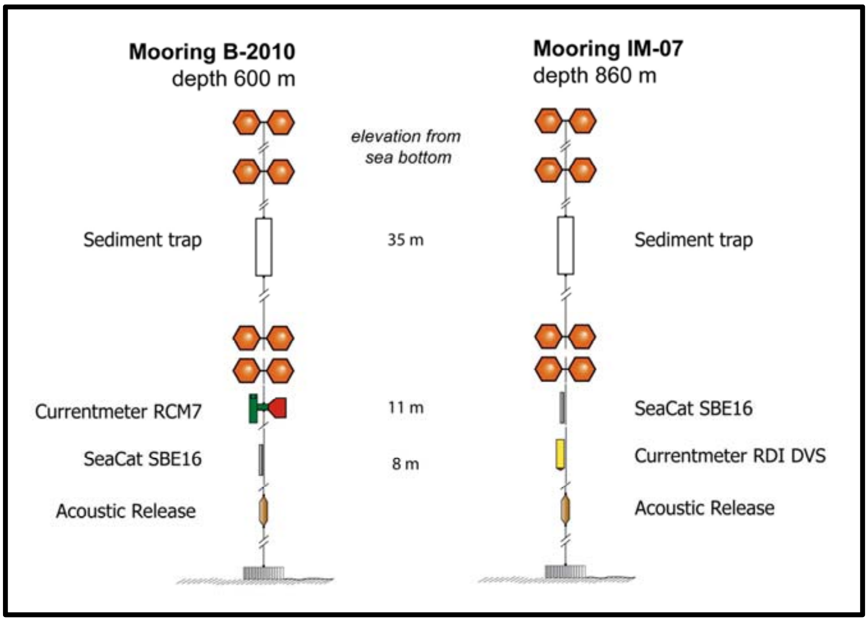


Figure 5.2. *Configuration of the recovered moorings. B-2010 mooring is working in the southern branch of the Bari canyon, while the IM7 mooring was deployed in the sediment waved field down current to the Bari canyon.*

5.3. Field activity

Moorings were successfully recovered on March 26, 2011. All instruments perfectly worked. Data were downloaded by instruments. New batteries were installed. Sediment traps provided 9 samples for each site, as expected. All instruments were accurately cleaned, visually inspected for corrosion and re-programmed for the following deployment. Particular attention was devoted to the compass calibration of the RDI_DVS, performed on the bridge to minimize the magnetic fields from the hull and engine of the ship.

Configuration of the two moorings was slightly changed. Specifically, the RDI_DVS was moved on the canyon mooring B_2010. An extra RCM-7 was added at the same level of the RDI_DVS to check the performance of the Doppler current meter. Furthermore, in the same mooring, an AAnderaa Optode for measuring dissolved oxygen was added to the Seacat SBE16 together with a SBE_5T titanium submersible pump. Moorings were redeployed on March 30, 2011, in the following positions:

MOORING	Date	Time GMT	Latitude N DDMM.XXX	Longitude E DDMM.XXX	Water Depth m
IM_07	30/03/11	12:16	4113.326	1734.716	849
B_2010	30/03/11	14:55	4120.480	1711.617	606

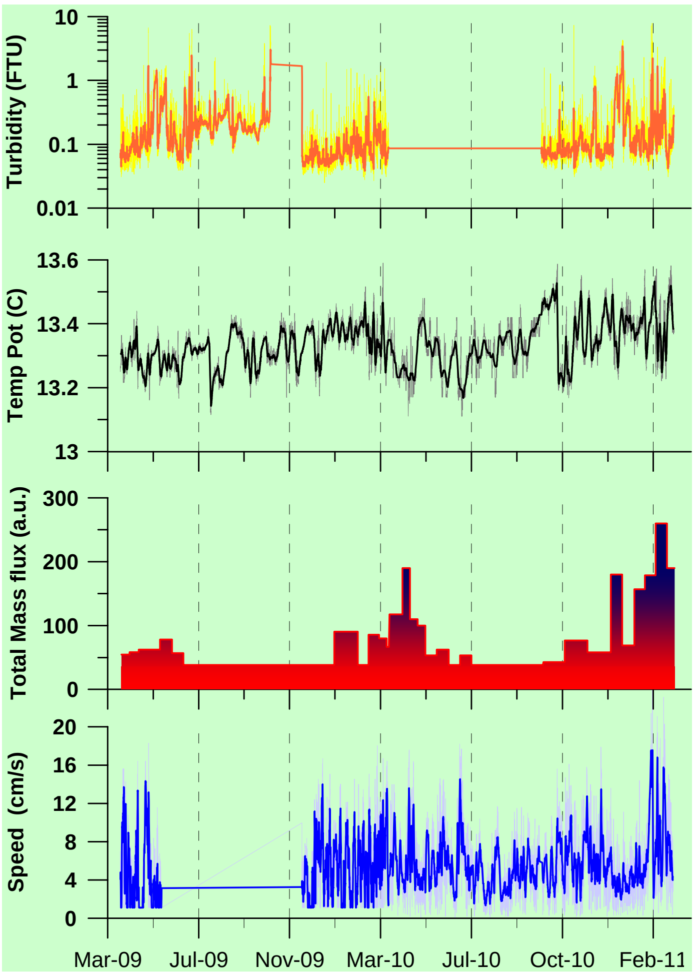


Figure 5.2 *Time series data from site IM-07 on the field of sediment waves*

5.4. Preliminary results

The 2-year record of total mass fluxes at the sediment waves site (IM-07) depicts peak values in each spring and low values along the rest of the year (Fig. 5.2). However, the highest fluxes are shown in March 2011, intermediate in March 2010, whereas the March 2009 peak is the lowest. Generally, the peak values correspond to relative minima in temperature and relative maxima in turbidity and currents speeds (specially in early March 2011). During 2009-2011, current speeds were low, never exceeding 30 cm s^{-1} (< 20 cm/s daily averaged), not sufficient to strongly affect the dynamics of the bedforms.At the canyon station (site B), March of 2004 and 2005 were characterized by colder bottom waters, a notable intensification of bottom currents and increased particle fluxes, which indicated intense episodes of dense shelf water cascading. In contrast, during 2010-2011, the bottom water was less cold and the current speed reduced in intensity, with no component along the canyon axis (Fig. 5.3). Nevertheless, the total mass fluxes were comparable in magnitude (Fig. 5.4). Which process is able to modulate the particle dynamics when the dense water cascading is reduced in intensity?

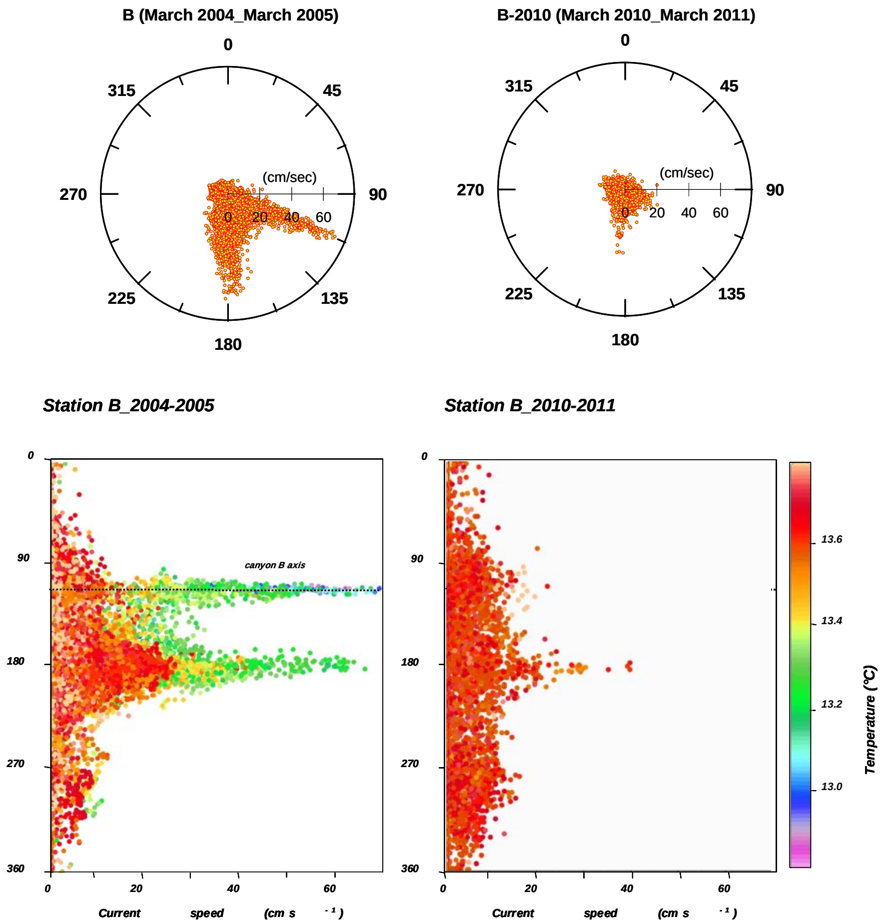


Figure 5.3 *Currents (speed and directions) and water temperatures measured at site B during 2004-2005 and 2010-2011.*

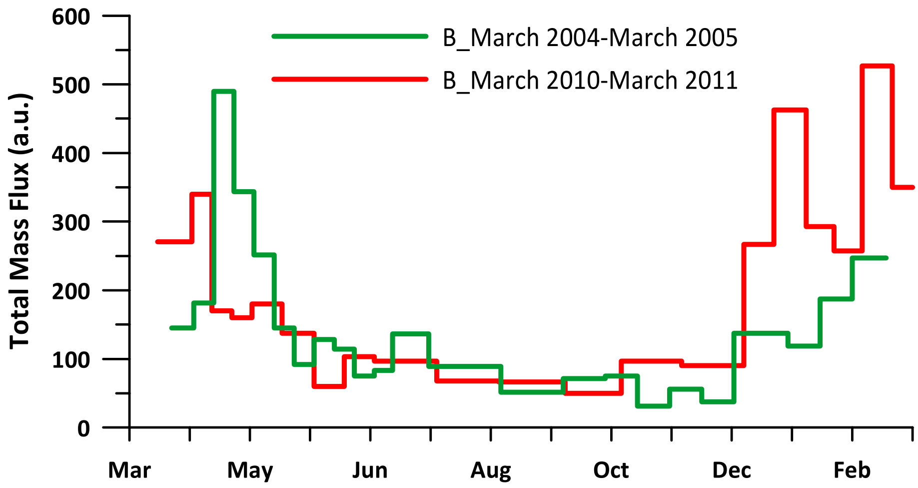


Figure 5.4. *Total mass fluxes, measured in arbitrary unit, at site B in 2004 and 2010.*

In the canyon (B-2010), fluxes were higher than those measured on the sediment wave field (IM-07), closer to the convection area (Fig. 5.5). The temporal pattern was similar, which makes unlikely the influence of the open ocean convection in driving particle fluxes in the Southern Adriatic margin.

Other processes, such as storm-driven shelf-to-canyon particle transport cannot be excluded, although wave data from the Monopoli buoy are not available at present. However, wind storms affected the Apulian coast during late December 2010 and early March 2011. Both periods preceded peaks of mass flux at both mooring sites.

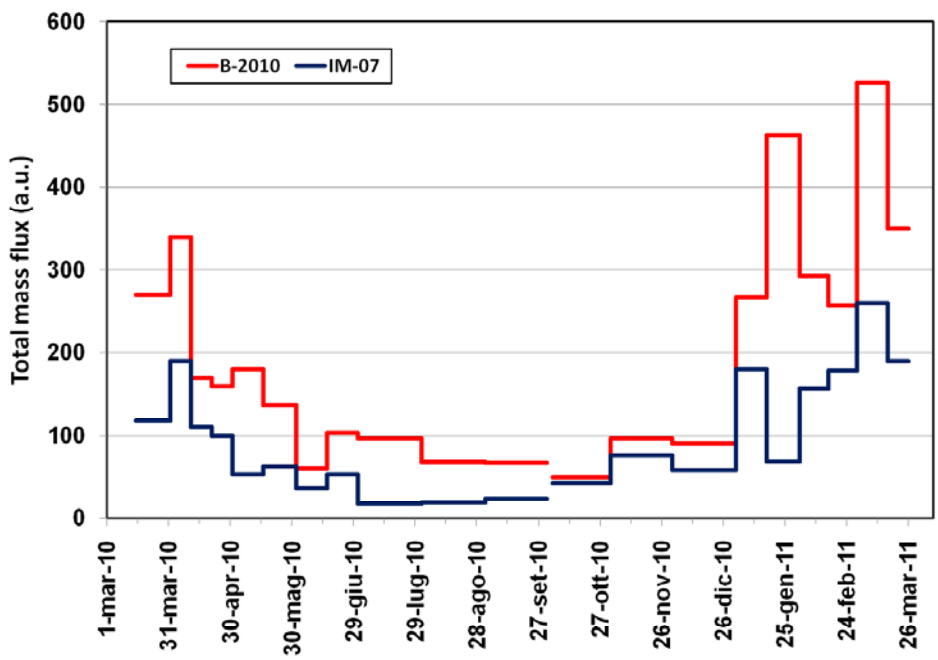


Figure 5.5. *Total mass fluxes, measured in arbitrary unit, at sites B and IM7 in 2010.*

6. SEDIMENT CHARACTERIZATION: MINERALIZATIOIN FLUXES AND ORGANIC CARBON BURIAL, SEDIMENT ACCUMULATION AND MIXING RATES

Stefano MISEROCCHI, Leonardo LANGONE, Andrea GALLERANI, Giulia PRATO, Camilla NOVAGLIO, Alice LIGUORI
CNR-ISMAR, UOS Bologna - Italy
stefano.miserocchi@ismar.cnr.it

6.1. Aims

The aim of this study are to define the main characteristics of sediment environment as:

- Grain size and mineralogical composition of sediment
- Sedimentary organic matter characterization
- Sediment accumulation rates estimates by means of natural radioisotopes
- Benthic respiration rates estimates

6.2. Methods: Sediment sampling

Sediment cores were collected with a cylindrical box-corer (internal diameter 32.4 cm) by multiple deployments. The box-corer was equipped with a closing lid by which the original bottom water is retained above the sediment-water interface and disturbance of the sediment water interface is minimized. Once on board the ship, each box-core has been sub-sampled by means of 3 sub-cores:

- a 100 mm i. d. PVC core has been taken and immediately stored at 4° for the determination on the lab of: X-Ray imaging, magnetic susceptibility, water content, grain size composition, organic matter content (C_{org}, N_{tot}, carbon stable isotopes), natural radionuclides measurements (^{14}C, ^{210}Pb) to calculate sediment accumulation and biomixing rates;
- a 62 mm i.d. core with undisturbed surface structure was also sampled for shipboard pore water oxygen microprofiles;
- a 62 mm i.d. core has been collected to measure sediment porosity by means of resistivity.

Additional samples has been collected by means of a 60L Van Veen grab. On board sediment was subsampled by 25cm PVC liners. On Table 6.1 is reported the list of the sampled stations (see also Fig. 6.1).

Table 6.1 *– List of the stations for sediment sampling with core length and sampling gear.*

Station	Area	Date	Water depth m	Core length cm	Gear
O_50G	SA	28/03/2011	594.0	<25	GRAB
O_51G	SA	28/03/2011	721.8	<25	GRAB
O_52G	SA	28/03/2011	735.0	<25	GRAB
O_53G	SA	28/03/2011	830.0	<25	GRAB
B1_G	SA	28/03/2011	616.0	<25	GRAB
B4_G	SA	30/03/2011	327.0	<25	GRAB
B2_G	SA	30/03/2011	345.0	<25	GRAB
O_46G	SA	30/03/2011	473.0	<25	GRAB
O_45G	SA	30/03/2011	596.0	<25	GRAB

Station	Area	Date	Water depth m	Core length cm	Gear
O_44G	SA	30/03/2011	511.0	<25	GRAB
O_43G	SA	30/03/2011	597.0	<25	GRAB
O_42G	SA	30/03/2011	387.0	<25	GRAB
O_41G	SA	30/03/2011	143.0	<25	GRAB
L1_G	SA	30/03/2011	312.0	<25	GRAB
O_49G	SA	30/03/2011	414.0	<25	GRAB
O_48G	SA	30/03/2011	429.0	<25	GRAB
O_47G	SA	30/03/2011	256.0	<25	GRAB
B_5G	SA	30/03/2011	219.0	<25	GRAB
B_3G_02	SA	31/03/2011	222.0	<25	GRAB
BC10_02	SA	27/03/2011	1045.8	29	BOX CORER
OUT_MS03-A	SML	01/04/2011	786.0	37	BOX CORER
IN_MS03-B	SML	02/04/2011	777.0	25	BOX CORER
OUT_MS03-B	SML	03/04/2011	807.0	26	BOX CORER
IN_MS03-A	SML	04/04/2011	785.0	25	BOX CORER

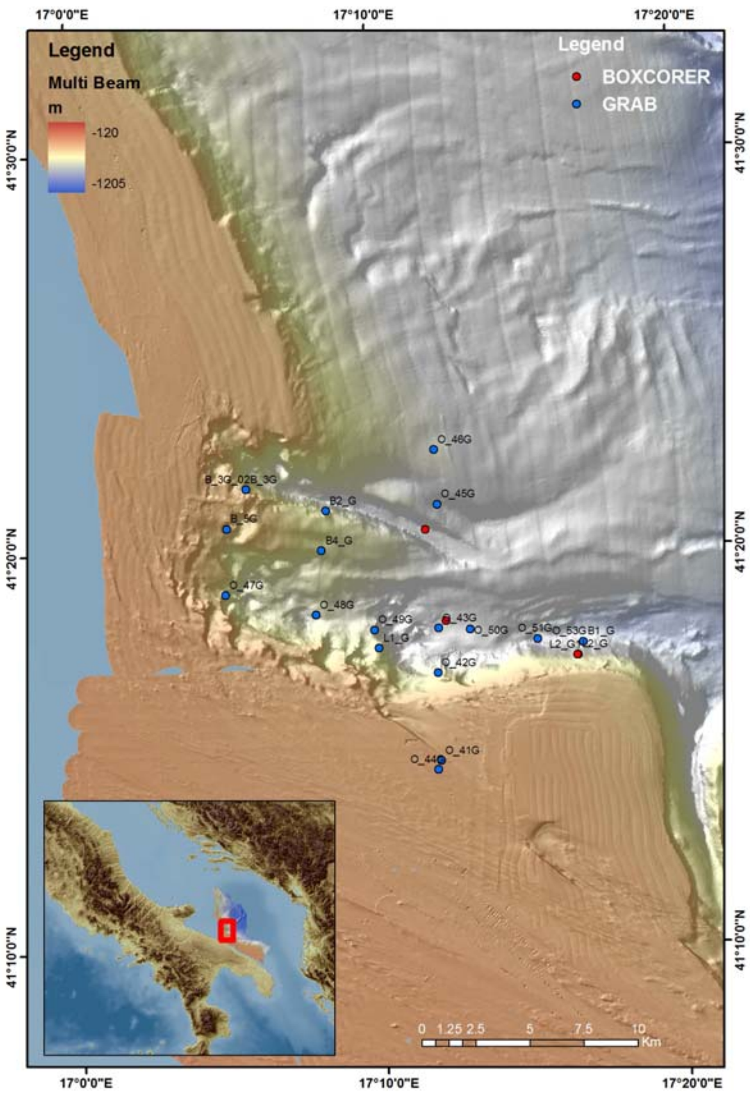


Figure 6.1. *Stations sampled by a large grab. Onboard, sediment was subsampled by 25cm PVC liners.*

6.3. On deck oxygen microprofiles measurements.

Immediately after the sampling the profiling cores are placed within a thermostatic water bath with temperature adjusted at bottom temperature (approx. 13° C). Sub sampling from the box-corer has been carefully performed to preserve original bottom water. Oxygen profiles were measured using Clark-type (with guard electrode) glass microelectrodes controlled from a motorized microprofiler (Unisense©). The electrodes were characterized with a tip diameter of 25 and 50 micron and a steering sensitivity <2.5%. Prior and during the profiling, the supernatant bottom water was gently flushed with air to reach the 100% air saturated oxygen concentration

A two point linear calibration of oxygen microelectrodes was carried out taking account of oxygen solubility of oxygen-saturated water and oxygen-free original bottom-water; since was not possible to reach the depth of oxygen depletion in sediment. Oxygen solubility in sea water was determined as function of temperature and salinity. The original bottom water salinity and temperature was obtained from CTD profiles.

Microprofiles were repeated at least 2 times for each core and recorded at 100-200 micron resolution after 5 seconds of stabilization at each depth. Measurements in the overlying bottom water before and after each profile were used to asses the stability of sensors signals.

The position of sediment water interface was determined from O_2 profiles by assigning the interface position to a break in the oxygen concentration gradient, theoretically due to the decreased diffusion coefficient in the sediment relative to the diffusive boundary layer .

On Fig. 6.2 is showed the instrument set up. Table 6.2 shows the list of the stations samples for oxygen microprofiling. On Fig. 6.3, oxygen profiles measured in the Santa Maria di Leuca area are showed.

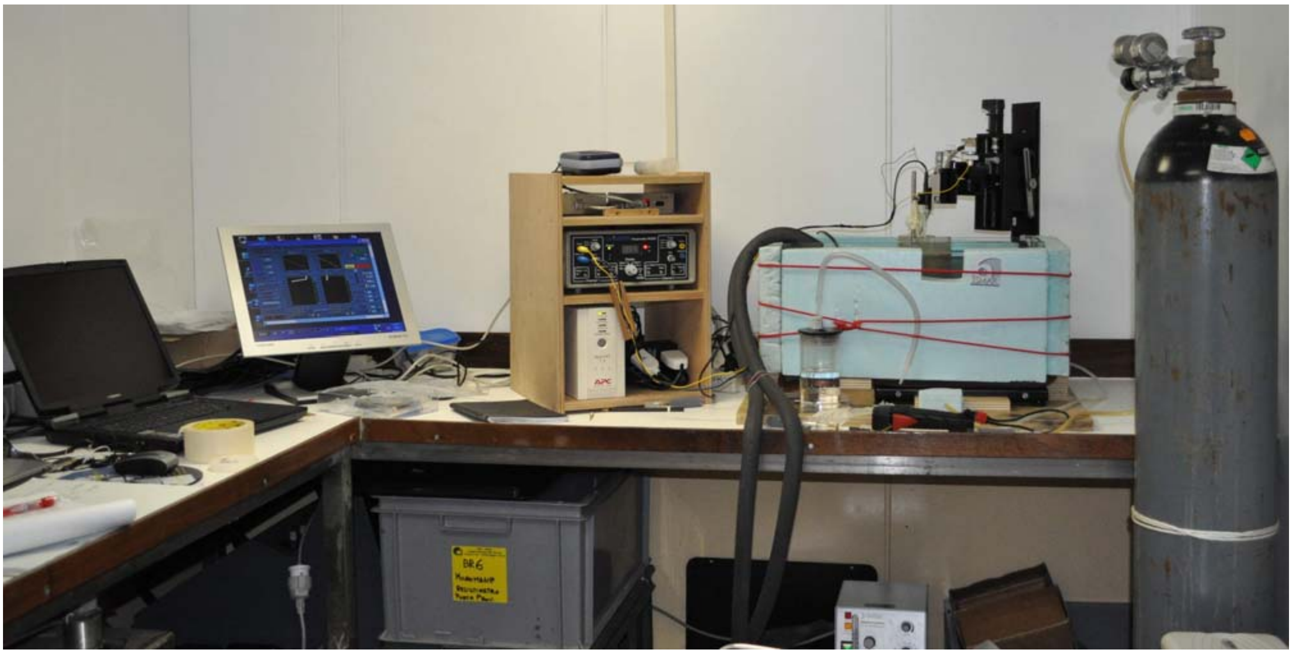


***Figure. 6.2**. Set-up of the experimental system for measuring oxygen microprofiles in a sediment core. The sediment core is positioned within a thermostatic water bath kept at the temperature of the sea bottom.*

Station	Depth. (m)	Sampling (date–time)	Profiling (date–time)	replicates	Electrode (s/n)
OUT MS03A_BC01	786	01/04/2011 15:02	01/04/2011 18:07	3	OX 50-7844
IN-MS03_B_BC01	777	02/04/2011 11:01	02/04/2011 11:46	3	OX 25-5711
OUT MS03-B-BC01	807	03/04/2011 07:05	03/04/2011 07:56	2	OX 25-5711
IN MS03_A-BC02	785	04/04/2011 07:06	04/04/2011 8:00	2	OX 25-5711
IN MS03_A-BC03	785	04/04/2011 07:33	04/04/2011 11:20	2	OX 25-5711

***Table 6.2** - List of stations investigated for measuring oxygen microprofiles and number of replicas for each subsampling.*

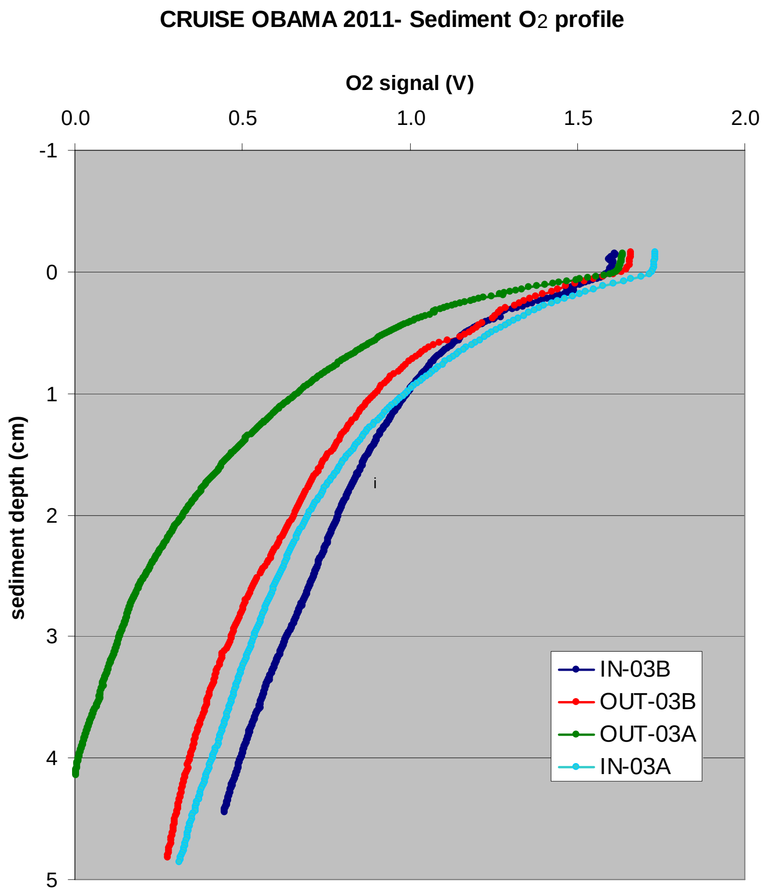


***Figure 6.3.** Oxygen microprofiles measured shipboard on SML area*

6.4. Sediment porosity from electrical resistivity

An additional core was used to calculate sediment porosity. Resistivity profiles were measured with a 4-terminal electrical resistivity probe. Resistivity measurements were converted to formation factor values by the following formulation: F = Rz / Rbw , where F is the formation resistivity factor, Rz is the mean resistivity at a given depth z and Rbw is the average resistivity in the bottom water. Then, formation factor profiles were translated into porosity values using the empirical Archie's relation: $F = \phi^{-n}$, where ϕ is the porosity and n is a factor = 3 for silty sediments. Porosity profiles has been fitted to a an exponential equation to obtain porosity value to be used as input parameters for DOU calculation.

7. BIODIVERSITY AND ECOSYSTEM FUNCTIONING AND EFFICIENCY

Marianna MEA, Silvia BIANCHELLI, Eugenio RASTELLI, Michael TANGHERLINI
UNIPM-DISMAR, Ancona - Italy
m.mea@univpm.it

7.1. Sampling activities

Sediment sampling was conducted by means of a box corer in the stations reported in Table 7.1. Sediment samples will be analyzed to assess: quantity and biochemical composition of organic matter (in terms of lipid, protein, carbohydrate , phytopigment concentration), prokaryotic abundance, biomass and diversity, extracellular enzymatic activities, viral abundance and production, meiofaunal abundance, biomass and diversity). Some analyses such as enzymatic activities and viral production (for the top 1 cm) were immediately performed on board after the samples collection.

7.2. Organic Matter Composition

Each box-corer was sub-sampled using plexiglass cores of 5.5 cm inner diameter. Replicates from independent deployments were collected. Sediment corers were sliced into different layers: 0-1, 1-3, 3-5, 5-10 and 10-15 cm and placed in Petri dishes. Samples were immediately frozen at -20°C and stored until the analysis in laboratory.

7.3. Meiofaunal abundance, biomass and diversity

Each box-corer was sub-sampled using plexiglass cores of 3.6 cm inner diameter. One core from each independent deployment (in total 3 replicates) was immediately frozen at -20°C and stored until the analysis in laboratory.

7.4. Extracellular enzymatic activities, prokaryotic abundance, biomass and diversity

Each box-corer was sub-sampled using plexiglass liners of 3.6 cm inner diameter. Enzymatic activities were fluorometrically determined on board, after sediment incubation with fluorogenic substrates. For prokaryotic abundance, biomass and diversity, one core from each deployment was collected (in total 3 replicates). Sediment cores were immediately sliced into different layers: 0-1, 1-3, 3-5, 5-10 and 10-15 cm and placed in sterile plastic tubes. Samples were immediately frozen at -20°C and stored until the analysis in laboratory.

7.5. Viral abundance and production (water samples)

Each water sample (Table 7.1) was sub-sampled using sterile plastic tubes. Samples were immediately used to perform analyses on board. After incubation at *in situ* temperature conditions during different times (0, 1.5, 3, 6, 12, 24 h), samples were stored at -20°C.

7.6. Viral abundance and production (sediment samples)

Each box-corer was sub-sampled using plexiglass liners of 3.6 cm inner diameter. For viral production, the top 1cm of 3 cores was immediately used to perform analyses on board. After incubation at *in situ* temperature conditions during different times (0, 1.5, 3, 6, 12, 24 h), samples were stored at -20°C. For viral abundance, sediment cores were sliced into different layers: 0-1, 1-3, 3-5, 5-10 and 10-15 cm placed in sterile plastic tubes. Samples were immediately frozen at -20°C and stored until the analysis in laboratory.

Table 7.1 - Sampling stations and performed activities

Station	Lat (°N)	Lon (°E)	Depth (m)	Operations	Sub-Area
O_36	41°31.0317'	17°26.7431'	1132	water sampling	A transect
2 BC	41°13.3445'	17°34.7477'	860	sediment sampling	Up-current sediment waves
3 BC	41°13.4538'	17°34.9453'	848	sediment sampling	Down-current sediment waves
5 BC	41°49.1473'	17°46.1860'	1208	sediment sampling	Deepest part of SA (VECTOR station)
O_37B	41°43.0002'	17°32.6301'	1112	water sampling	A transect
10 BC	41°38.1814'	17°41.9458'	1045	sediment sampling	Giant sediment drift
1 BC	41°20.4797'	17°11.6246'	606	sediment sampling	Canyon B
4 BC	41°18.2028'	17°12.2448'	598	sediment sampling	Canyon C
8 BC	41°52.4997'	17°00.4750'	596	sediment sampling	Up-current Giant comet mark
9 BC	41°52.7882'	17°00.3328'	574	sediment sampling	Down-current Giant comet mark
6BC	41°35.5473'	17°29.1562'	1172	sediment sampling	Dauno moat
7 BC	41°31.8814'	17°25.0027'	827	sediment sampling	Dauno seamount
11 BC	41°43.1886'	17°06.9670'	832	sediment sampling	Gondola slide
OUT_MS03_A	39°27.5925'	18°29.4129'	786	water sampling	SML out of mound A
OUT_MS03_A	39°27.5927'	18°29.4059'	786	sediment sampling	SML out of mound A
IN_MS03_B	39°32.9241'	18°31.5556'	777	sediment sampling	SML inside mound B
CF_16_CTD	39°28.6101'	18°18.1091'	1048	water sampling	SML
OUT_MS03_B	39°35.7337'	18°36.1268'	807	sediment sampling	SML out of mound B
OL 107	39°47.1217'	18°49.968'	678	water sampling	SML
IN_MS03_A	39°33.0237'	18°31.9868'	780	sediment sampling	SML inside mound A

8. BENTHOPELAGIC FAUNA

Gianfranco D'ONGHIA. scientific responsible of the research unit
g.donghia@biologia.uniba.it
Porzia MAIORANO. scientific responsible assistant of the research unit
Michele PANZA. technician of the research unit
Department of Biology. University of Bari (UNIBA) Via E. Orabona. 4. 70125 Bari. Italy

As part of the OBAMA project the Research Unit of the University of Bari (UNIBA) has partecipated to the oceanographic cruise carried out from 24.03.11 to 6.04.11 using the R/V URANIA.

8.1. Aims

The objective of the research is that of evaluating the distribution, diversity, relationship with small-scale habitat conditions and behaviour of the benthopelagic fauna both in cold-water coral habitat located in the Canyon of Bari (and eventually in Gondola Slide) (southern Adriatic) and in the Santa Maria di Leuca cold-water coral province (northern Ionian Sea).

8.2. Methods

In the context of CoralFISH project, which has a tight link with OBAMA, the MEMO (Marine Environment MOnitoring system) lander has been developed (Fig. 8.1). It consists of a metallic frame; 2 digital cameras with 2 LED lights; an electronic compass, inclinometer and altimeter; SBE 19 plus multiparametric probe (Sea-Bird Electronics) with the measurement of pressure, temperature, conductivity, oxygen, pH, turbidity; current meter (doppler) Aquadopp 2000 - Nortek; 4 Deep-Sea batteries; acoustic modem UWM2000 - LinkQuest; ICT infrastructure capable of managing the entire system; bar and plate for the bait. MEMO allows to monitor, in real time and with minimal impact, the environmental conditions and the benthopelagic fauna in the deep waters. On the seabed MEMO is linked by a zinc-coated steel cable to buoys which keep the cable under tension (back up buoys) and then to a surface floating signalling buoy. Continuous connection is maintained via the acoustic modem with an on board PC software platform making images and sensor data available. The lander can work down to 1200 m in depth for 48 consecutive hours. The sampling design foresees the comparison between coral habitat (indicated as IN) and non coral habitat (indicated as OUT).

8.3. Field activity

1st leg (24.03.11 – 01.04.2011)
The lander MEMO did not work during the first leg due to electrical problems. Therefore, the sampling in the southern Adriatic was not carried out. However, during the first leg, the research Unit of Bari solved the abovementioned problems with the aim to employ MEMO in the second leg of the cruise.

2nd leg (01.04.11 – 06.04.2011)
During the second leg the lander MEMO was successfully deployed in the Santa Maria di Leuca (SML) cold-water coral province for the video sampling of benthopelagic fauna in coral *versus* non coral habitat as well as for the recording of environmental parameters. The investigated zones are reported in the Table 8.1. The video records were stored in the NAS system and they will be

successively examined by the researchers of the University of Bari.

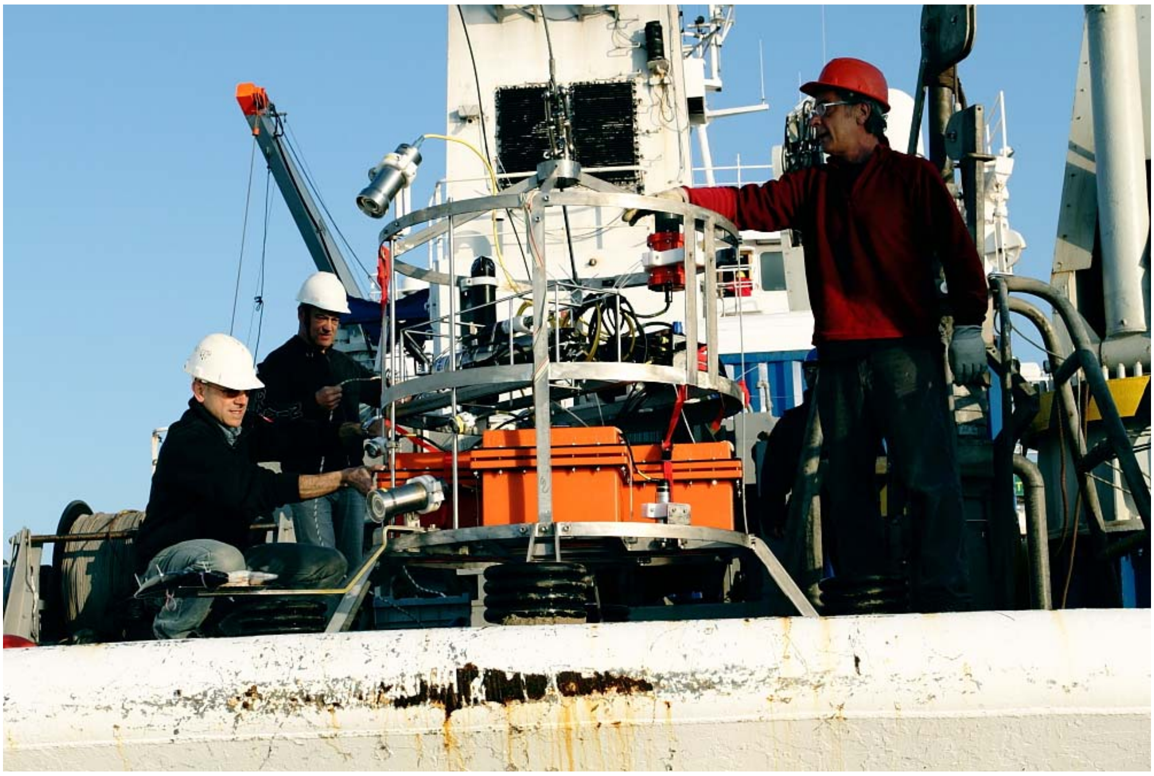


Fig. 8.1 - The lander MEMO used during the OBAMA oceanographic cruise with R/V URANIA

Table 8.1 - Recording stations by MEMO lander during the OBAMA cruise

Date	Stations	SML area	Coordinates			Video time (h)
			Latitude	Longitude	Depth (m)	
02.04.2011	St. MS03A	IN	39°33.0224N	18°31.9878E	775	4.50
03.04.2011	MS03B	OUT	39°36.1544N	18°36.0212E	790	7.20
04.04.2011	MS03B	IN	39°32.9240N	18°31.5561E	771	5.10

8.4. Difficulties

The main difficulties were related to the MEMO electrical problems showed during the first leg of the OBAMA cruise and, thus, to the lack of the video records for the southern Adriatic study areas.

9. BATHYAL MACROFAUNA

Sandra Anabella COVAZZI HARRIAGUE, Elisa COSTA
UNIGE-DIPTERIS. Genova - Italy
anabella7@hotmail.com

9.1 Sampling activity

Sediment samples were collected with a box-corer in three independent deployments. one replicate sample was constituted by the total content of the box-corer. and the other two replicates were constituted by the half content of the box-corer. The list of the sampled stations is reported in Tab. 1. Sediment samples were immediately sieved with 0.5 mm mesh size net and the retained material was frozen (-20°C). In laboratory the samples will be analised for the determination of the macrofaunal composition and biomass.
Additionally. sediment samples for the macrofauna analyses were collected with a Van Veen grab and treated as described above.

Table 9.1 - Sampling stations list, position, depth and used instrument.

Station	Lat (°N)	Long (°E)	Depth (m)	Instrument	Sub-Area
2 BC	41°13.3445’	17°34.7477’	860	Box corer	Up-current sediment waves
3 BC	41°13.4538’	17°34.9453’	848	Box corer	Down-current sediment waves
5 BC	41°49.1473’	17°46.1860’	1208	Box corer	Deepest part of SA (VECTOR station)
10 BC	41°38.1814’	17°41.9458’	1045	Box corer	Giant sediment drift
1 BC	41°20.4797’	17°11.6246’	606	Box corer	Canyon B
4 BC	41°18.2028’	17°12.2448’	598	Box corer	Canyon C
8 BC	41°52.4997’	17°00.4750’	596	Box corer	Up-current Giant comet mark
9 BC	41°52.7882’	17°00.3328’	574	Box corer	Down-current Giant comet mark
6BC	41°35.5473’	17°29.1562’	1172	Box corer	Dauno moat
7 BC	41°31.8814’	17°25.0027’	827	Box corer	Dauno seamount
11 BC	41°43.1886’	17°06.9670’	832	Box corer	Gondola slide
O-53G	41°17.8013’	17°18.1015’	830	Grab	Bari Canyon
O-46G	41°22.4876’	17°11.9796’	473	Grab	Bari Canyon
O-47G	41°18.9700’	17°07.9430’	256	Grab	Bari Canyon
O-41G	41°14.6955’	17°11.9770’	143	Grab	Bari Canyon
OUT_MS03_A	39°27.5927’	18°29.4059’	786	Box corer	SML - out of mound A
IN_MS03_B	39°32.9241’	18°31.5556’	777	Box corer	SML - inside mound B
OUT_MS03_B	39°35.7337’	18°36.1268’	807	Box corer	SML - out of mound B
IN_MS03_A	39°33.0237’	18°31.9868’	780	Box corer	SML - inside mound A

APPENDIX 1 – CRUISE SUMMARY REPORT (ROSCOP)

ICES CRUISE SUMMARY REPORT (ROSCOP)	**Centre: Originators Ref. No.:** Is data exchange restricted ☐ Yes ☐ In part ☐ No

SHIP enter the full name and international radio call sign of the ship from which the data were collected, and indicate the type of ship, for example, research ship; ship of opportunity, naval survey vessel; etc.

Name: URANIA **Call Sign: IQSU**

Type of ship: research vessel

CRUISE NO. / NAME: OBAMA_2011

enter the unique number, name or acronym assigned to the cruise (or cruise leg, if appropriate).

CRUISE PERIOD start (set sail) 24/03/2011 (day/ month/ year) to 06/04/2011 (day/ month/ year) end (return to port)

PORT OF DEPARTURE (enter name and country): Ravenna, Italy

PORT OF RETURN (enter name and country) : Ancona, Italy

RESPONSIBLE LABORATORY enter name and address of the laboratory responsible for coordinating the scientific planning of the cruise

Name: ISTITUTO SCIENZE MARINE, UOS BOLOGNA, CNR (ISMAR-CNR)

Address: Via P. Gobetti, 101 40129 Bologna

Country: Italy

CHIEF SCIENTIST(S) enter name and laboratory of the person(s) in charge of the scientific work (chief of mission) during the cruise.

Leonardo Langone CNR-ISMAR Via P. Gobetti, 101 40129 Bologna

OBJECTIVES AND BRIEF NARRATIVE OF CRUISE enter sufficient information about the purpose and nature of the cruise so as to provide the context in which the report data were collected.

The cruise assembled the field activity of two separate projects: OBAMA_2011 and HERMIONE. The main objective of the two projects can be summarized as follows:

a) Evaluate the role of episodic events of dense shelf water spreading in the southern Adriatic in transferring fresh organic matter to the deep benthic community.
b) Define if the cascading events of dense shelf waters are able to produce the wide range of bed forms found on the continental slope or at its base.
c) Quantify the potential effects of the global change on goods and services provided by deep marine ecosystems.
d) Define principles to create long term ecological observatories.
e) Contribute to identify offshore marine protected areas in the Italian seas.

The following activities were performed:

a. CTD profiles in the mooring sites and along transects normal to the continental slope
b. Recovery. servicing and re-development of two instrumented moorings
c. Sampling of sea bed sediment by using a cylindrical box core
d. Multibeam and Chirp survey
e Short developments (24-48 h) of an instrumented lander

PROJECT (IF APPLICABLE) if the cruise is designated as part of a larger scale cooperative project (or expedition), then enter the name of the project, and of organisation responsible for co-ordinating the project.

Project name: PRIN- OBAMA_2011 and HERMIONE EU-Project
Coordinating body: Università Politecnica delle Marche. Ancona. Italy and NOC, Southampton UK

PRINCIPAL INVESTIGATORS: Enter the name and address of the Principal Investigators responsible for the data collected on the cruise and who may be contacted for further information about the data. (The letter assigned below against each Principal Investigator is used on pages 2 and 3, under the column heading 'PI', to identify the data sets for which he/she is responsible)

A. Leonardo Langone CNR-ISMAR via P. Gobetti. 101 40129 Bologna
Phone +39 051 6398870 **fax** +39 051 6398940
e-mail leonardo.langone@ismar.cnr.it

B. Stefano Miserocchi: CNR-ISMAR via P. Gobetti. 101 40129 Bologna
phone +39 051 6398880 **fax** +39 051 6398940
e-mail stefano.miserocchi@bo.ismar.cnr.it

C. Gianfranco D'Onghia: Università degli Studi di Bari Aldo Moro Via E. Orabona 4 70125 Bari
phone +39 080 5442228 **fax** +39 080 5443350
e-mail g.donghia@biologia.uniba.it

D. Serena Fonda Umani: Università degli Studi di Trieste
Dipartimento di Scienze della Vita Via Valerio. 28-28/1 Trieste
phone +39 04 05582007 **fax** +39 04 05582011
e-mail s.fonda@units.it

E. Margherita Turchetto CNR-ISMAR Arsenale - Tesa 104. Castello 2737/F 30122 Venezia
phone +39 041 2404721 - 732
e-mail margherita.turchetto@ismar.cnr.it

F. Marianna Mea: Università Politecnica delle Marche
Dipartimento di Scienze del Mare Via Brecce Bianche 60131 Ancona
phone +39 071 220 4331 **fax :** +39 071 2204650
e-mail m.mea@univpm.it

G. Anabella Covazzi Harriague: Università degli Studi di Genova Via Balbi 5 16126 Genova
phone +39 010 3538068 **fax +39**
e-mail anabella7@hotmail.com

H. Giacomo Dalla Valle: CNR-ISMAR via P. Gobetti. 101 40129 Bologna
Phone +39 051 6398922 **fax** +39 051 6398940
e-mail giacomo.dalla.valle@ismar.cnr.it

MOORINGS, BOTTOM MOUNTED GEAR AND DRIFTING SYSTEMS

This section should be used for reporting moorings, bottom mounted gear and drifting systems (both surface and deep) deployed and/or recovered during the cruise. Separate entries should be made for each location (only deployment positions need be given for drifting systems). This section may also be used to report data collected at fixed locations which are returned to routinely in order to construct 'long time series'.

PI	APPROXIMATE POSITION						DATA TYPE	DESCRIPTION
	LATITUDE			LONGITUDE			enter code(s) from list on page 4	Identify, as appropriate, the nature of the instrumentation the parameters (to be) measured, the number of instruments and their depths, whether deployed and/or recovered, dates of deployments and/or recovery, and any identifiers given to the site.
See top of page.	deg	min	N/S	deg	min	E/W		
A	41	20	N	17	12	E	B73. D01. H16. H90	Recovery sediment trap and current meter. Date: 26 March 2011, Depth: 838.5 m, Station: B_2010
A	41	13	N	17	34	E	B73, D01 H32, H90	Recovery sediment trap and current meter. Date: 26 March 2011, Depth: 856.8 m, Station: IM_07
A	41	20	N	17	12	E	B73. D01. H16. H21,H90	Deployment sediment trap and current meter Date: 30 March 2011, Depth: 606 m, Station: B_2010
A	41	13	N	17	34	E	B73, D01 H32, H90	Deployment sediment trap and current meter Date: 30 March 2011, Depth: 849 m ,Station: IM_07

SUMMARY OF MEASUREMENTS AND SAMPLES TAKEN

Except for the data already described on page 2 under 'Moorings, Bottom Mounted Gear and Drifting Systems', this section should include a summary of all data collected on the cruise, whether they be measurements (e.g. temperature, salinity values) or samples (e.g. cores, net hauls).

Separate entries should be made for each distinct and coherent set of measurements or samples. Different modes of data collection (e.g. vertical profiles as opposed to underway measurements) should be clearly distinguished, as should measurements/sampling techniques that imply distinctly different accuracy's or spatial/temporal resolutions. Thus, for example, separate entries would be created for i) BT drops, ii) water bottle stations, iii) CTD casts, iv) towed CTD, v) towed undulating CTD profiler, vi) surface water intake measurements, etc.

Each data set entry should start on a new line – it's description may extend over several lines if necessary.

NO, UNITS : for each data set, enter the estimated amount of data collected expressed in terms of the number of 'stations'; miles' of track; 'days' of recording; 'cores' taken; net 'hauls'; balloon 'ascents'; or whatever unit is most appropriate to the data. The amount should be entered under 'NO' and the counting unit should be identified in plain text under 'UNITS'.

PI see page 2	NO see above	UNITS see above	DATA TYPE Enter code(s) from list on page 4	DESCRIPTION Identify, as appropriate, the nature of the data and of the instrumentation/sampling gear and list the parameters measured. Include any supplementary information that may be appropriate, e. g. vertical or horizontal profiles, depth horizons, continuous recording or discrete samples, etc. For samples taken for later analysis on shore, an indication should be given of the type of analysis planned, i.e. the purpose for which the samples were taken.
E	65	station	H10, H11, H16, B02, H21	CTD Vertical profiles
D	5	station	H09, H10, H11, H16, B02,H21, B06, B08, B09, B07	CTD Vertical profiles, Water sampling at different depths for biochemistry, dissolved oxygen, phytoplankton, zooplankton, DOC, pelagic bacteria and virus
B. F. G	58	cores	G04, H31, H32, G28, H75, B16, B18, B72, B02, H21	Box cores for sediment description and subsampling, benthic bacteria and virus, zoobenthos, organic matter composition (proteins. carbohydrates. lipids), grain size, chlorophyll, oxygen profiles
H	450	miles	G74	Multi-beam echosounding.
H	400	miles	G75	Single channel seismic reflection profiles
C	3	station	B19, B90, H10, H11, H16, B02, H21, D01	Lander, demersal fish video, current meter, CTD

TRACK CHART: You are strongly encouraged to submit, with the completed report, an annotated track chart illustrating the route followed and the points where measurements were taken or URL of link to the Track Chart	Insert a tick(✓) in **this box if a track chart is supplied**	☒

GENERAL OCEAN AREA(S): Enter the names of the oceans and/or seas in which data were collected during the cruise – please use commonly recognised names (see, for example, International Hydrographic Bureau Special Publication No. 23, 'Limits of Oceans and Seas').

ADRIATIC SEA and IONIAN SEA

SPECIFIC AREAS: If the cruise activities were concentrated in a specific area(s) of an ocean or sea, then enter a description of the area(s). Such descriptions may include references to local geographic areas, to sea floor features, or to geographic coordinates.
Please insert here the number of each 5 degree square in which data were collected from the marsden square list provided on page 8 onwards

E 17.5 N 37.5 143; 4
E 17.5 N 42.5 179; 2

APPENDIX 2 – EVENT LOG FILE OF CRUISE OBAMA_2011

Event #	LabelEvent	DateEvent dd-mm-yy	TimeEvent hh:mm GMT	LatN WGS84 DDMM.XXX	LongE WGS84 DDMM.XXX	Depth m	Area	Gear	Recovery	Remarks
1	**.**	24/03/11	13:50	4426.71	1214.740	.	.	CRUISE BEGINNING	.	Leaving Porto S. Vitale Ravenna
2	**.**	24/03/11	14:30	4429.77	1218.870	.	.	TRANSIT	.	Exit from main jetties
3	**.**	24/03/11	20:08	4357.200	1315.690	46	MA	TRANSIT	.	Ancona promontory
4	**TEST_0**	25/03/11	10:40	4214.836	1538.078	113	MA	CTD	.	Test for CTD (test_0)
5	**O_01**	25/03/11	14:30	4152.176	1616.658	26	SA	CTD	.	Vieste transect
6	**O_02**	25/03/11	15:07	4154.659	1618.756	54	SA	CTD	.	Vieste transect
7	**O_03**	25/03/11	15:45	4157.508	1621.407	77	SA	CTD	.	Vieste transect
8	**O_04**	25/03/11	16:26	4159.983	1623.724	106	SA	CTD	.	Vieste transect
9	**O_05**	25/03/11	17:08	4203.886	1627.293	128	SA	CTD	.	Vieste transect
10	**O_06**	25/03/11	17:52	4208.313	1631.232	141	SA	CTD	.	Vieste transect
11	**O_07**	25/03/11	18:51	4212.820	1635.330	170	SA	CTD	.	Vieste transect
12	**O_08**	25/03/11	19:39	4216.986	1639.189	206	SA	CTD	.	Vieste transect
13	**O_09**	25/03/11	20:33	4222.187	1643.992	209	SA	CTD	.	Vieste transect
14	**O_28b**	26/03/11	1:35	4147.378	1722.785	1073	SA	CTD-ROSETTE	.	Gondola slide _ South
15	**O_36**	26/03/11	03:49	4138.032	1726.743	1132	SA	CTD-ROSETTE	.	A transect
16	**B_2010**	26/03/11	07:21	4120.756	1712.057	839	SA	MOORING	.	Mooring released
17	**B_2010**	26/03/11	07:30	.	.	.	SA	MOORING	.	Surface buoy sighting
18	**B_2010**	26/03/11	07:39	.	.	.	SA	MOORING	.	Beginnig of mooring recovery
19	**B_2010**	26/03/11	07:51	.	.	.	SA	MOORING	.	Mooring on board
20	**B_2010**	26/03/11	8:19	4120.484	1711.627	603	SA	CTD	.	Bari canyon transects
21	**IM_07**	26/03/11	10:37	4113.170	1734.087	857	SA	MOORING	.	Mooring released
22	**IM_07**	26/03/11	10:45	.	.	.	SA	MOORING	.	Surface buoy sighting
23	**IM_07**	26/03/11	10:58	.	.	.	SA	MOORING	.	Beginnig of mooring recovery
24	**IM_07**	26/03/11	11:05	.	.	.	SA	MOORING	.	Mooring on board
25	**IM_07**	26/03/11	11:18	4113.285	1734.731	857	SA	CTD	.	CTD for mooring instrument calibration
26	**BC2_01**	26/03/11	12:38	4113.344	1734.747	851	SA	BOX CORER	40	Quasi-regular surface

Event #	LabelEvent	DateEvent dd-mm-yy	TimeEvent hh:mm GMT	LatN WGS84 DDMM.XXX	LongE WGS84 DDMM.XXX	Depth m	Area	Gear	Recovery	Remarks
27	**BC2_02**	26/03/11	13:16	4113.344	1734.749	851	SA	BOX CORER	40	Quasi-regular surface
28	**BC2_03**	26/03/11	13:50	4113.347	1734.748	851	SA	BOX CORER	40	Quasi-regular surface
29	**BC2_04**	26/03/11	14:25	4113.343	1734.747	851	SA	BOX CORER	40	Quasi-regular surface
30	**BC3_01**	26/03/11	15:20	4113.452	1734.942	848	SA	BOX CORER	35	Tilted surface
31	**BC3_02**	26/03/11	15:45	4113.454	1734.945	848	SA	BOX CORER	35	Tilted surface
32	**BC3_03**	26/03/11	16:15	4113.451	1734.941	848	SA	BOX CORER	35	Tilted surface
33	**BC3_04**	26/03/11	16:48	4113.452	1734.948	848	SA	BOX CORER	35	Tilted surface
34	**CTD_SVP**	27/03/11	0:00	4137.530	1746.540	1192	SA	CTD	.	Sound velocity profile for MB calibration
35	**.**	27/03/11	01:00	.	.	.	SA	.	.	Change from standard to summer time
36	**0005-10_2011032**	27/03/11	01:00	4140.386	1744.585	.	SA	MB	.	Start multibeam line
37	**0005-10_2011032**	27/03/11	.	4155.726	1736.740	.	SA	MB	.	Stop multibeam line
38	**0011-16_2011032**	27/03/11	.	4155.838	1737.640	.	SA	MB	.	Start multibeam line
39	**0011-16_2011032**	27/03/11	.	4140.533	1745.566	.	SA	MB	.	Stop multibeam line
40	**0017-19_2011032**	27/03/11	.	4139.578	1743.032	.	SA	MB	.	Start multibeam line
41	**0017-19_2011032**	27/03/11	07:15	4140.528	1746.319	.	SA	MB	.	Stop multibeam line
42	**BC5_01**	27/03/11	8:46	4149.147	1746.189	1207	SA	BOX CORER	34	Not completely drained. partially disturbed surface
43	**BC5_02**	27/03/11	9:29	4149.147	1746.186	1207	SA	BOX CORER	26	Tilted surface
44	**BC5_03**	27/03/11	10:07	4149.147	1746.187	1207	SA	BOX CORER	26	Very disturbed and tilted surface
45	**BC5_04**	27/03/11	11:09	4149.145	1746.189	1207	SA	BOX CORER	27	Not completey drained. irregular surface
46	**BC10_01**	27/03/11	13:06	4138.181	1741.943	1045	SA	BOX CORER	none	Empty
47	**BC10_02**	27/03/11	13:35	4138.187	1741.946	1046	SA	BOX CORER	29	Tilted surface
48	**BC10_03**	27/03/11	14:08	4138.182	1741.947	1046	SA	BOX CORER	30	Partially tilded and partially disturbed surface. short core as archive
49	**O_37B**	27/03/11	17:34	4143.000	1733.630	1112	SA	CTD-ROSETTE	.	A transect
50	**O_36B**	27/03/11	19:20	4138.030	1726.770	1137	SA	CTD-ROSETTE	.	A transect
51	**O_35**	27/03/11	21:10	4132.700	1718.542	730	SA	CTD	.	A transect

Event #	LabelEvent	DateEvent dd-mm-yy	TimeEvent hh:mm GMT	LatN WGS84 DDMM.XXX	LongE WGS84 DDMM.XXX	Depth m	Area	Gear	Recovery	Remarks
52	**O_34**	27/03/11	22:51	4126.982	1709.706	508	SA	CTD	.	A transect
53	**O_33**	27/03/11	23:38	4126.255	1708.537	406	SA	CTD	.	A transect
54	**O_32**	28/03/11	0:24	4125.386	1707.228	237	SA	CTD	.	A transect
55	**O_31**	28/03/11	1:08	4123.651	1704.677	172	SA	CTD	.	A transect
56	**O_30**	28/03/11	1:59	4120.660	1700.156	131	SA	CTD	.	A transect
57	**O_29**	28/03/11	3:26	4114.536	1650.762	102	SA	CTD	.	A transect
58	**BC1_01**	28/03/11	6:16	4120.481	1711.623	607	SA	BOX CORER	21	Not completely drained. quasi-regular surface. clasts
59	**BC1_02**	28/03/11	6:38	4120.480	1711.625	607	SA	BOX CORER	21.5	Flat surface. subsampled short core
60	**BC1_03**	28/03/11	7:03	4120.481	1711.621	607	SA	BOX CORER	21.5	Flat surface
61	**BC1_04**	28/03/11	7:28	4120.482	1711.623	607	SA	BOX CORER	21	Flat surface
62	**BC4_01**	28/03/11	8:17	4118.204	1712.246	598	SA	BOX CORER	19	Flat surface. subsampled short core
63	**BC4_02**	28/03/11	8:47	4118.203	1712.245	598	SA	BOX CORER	25	Not completely drained. quasi-regular surface
64	**BC4_03**	28/03/11	9:27	4118.203	1712.246	598	SA	BOX CORER	27	Not completely drained. quasi-regular surface. clasts
65	**BC4_04**	28/03/11	9:53	4118.204	1712.246	598	SA	BOX CORER	23	Inclined surface
66	**O_50G**	28/03/11	11:24	4117.976	1713.035	594	SA	GRAB	.	.
67	**O_51G**	28/03/11	12:32	4117.697	1715.265	722	SA	GRAB	.	.
68	**O_52G**	28/03/11	13:31	4117.597	1716.765	735	SA	GRAB	.	.
69	**L2_BC**	28/03/11	14:24	4117.276	1716.575	437	SA	BOX CORER	.	Almost empty. a few corals. sampled surface sediment
70	**L2_G**	28/03/11	15:02	4117.279	1716.574	419	SA	GRAB	none	Not-closed
71	**L2_G1**	28/03/11	15:30	4117.272	1716.583	408	SA	GRAB	none	Empty
72	**O_53G**	28/03/11	16:28	4117.597	1716.765	830	SA	GRAB	.	Sampled surface sediment + short core (25cm liner)
73	**B1_G**	28/03/11	17:29	4117.597	1716.765	616	SA	GRAB	.	Sampled surface sediment + short core (25cm liner)
74	**O_46**	28/03/11	18:28	4122.498	1712.004	474	SA	CTD	.	Bari canyon transects
75	**O_45**	28/03/11	19:24	4121.115	1712.013	570	SA	CTD	.	Bari canyon transects

Event #	LabelEvent	DateEvent dd-mm-yy	TimeEvent hh:mm GMT	LatN WGS84 DDMM.XXX	LongE WGS84 DDMM.XXX	Depth m	Area	Gear	Recovery	Remarks
76	**O_44**	28/03/11	20:18	4119.497	1711.889	512	SA	CTD	.	Bari canyon transects
77	**O_43**	28/03/11	21:10	4118.036	1711.994	596	SA	CTD	.	Bari canyon transects
78	**O_42**	28/03/11	21:48	4116.897	1712.028	390	SA	CTD	.	Bari canyon transects
79	**O_41**	28/03/11	22:47	4114.972	1711.924	161	SA	CTD	.	Bari canyon transects
80	**O_53**	29/03/11	0:12	4117.817	1718.097	836	SA	CTD	.	Bari canyon transects
81	**O_52**	29/03/11	1:15	4117.589	1716.781	720	SA	CTD	.	Bari canyon transects
82	**O_51**	29/03/11	2:17	4117.704	1715.310	730	SA	CTD	.	Bari canyon transects
83	**O_50**	29/03/11	3:15	4117.940	1713.083	592	SA	CTD	.	Bari canyon transects
84	**O_49**	29/03/11	4:11	4118.018	1709.889	416	SA	CTD	.	Bari canyon transects
85	**O_48**	29/03/11	4:54	4118.436	1708.008	423	SA	CTD	.	Bari canyon transects
86	**O_47**	29/03/11	5:49	4118.970	1704.960	260	SA	CTD	.	Bari canyon transects
87	**BC8_01**	29/03/11	10:12	4152.495	1700.472	596	SA	BOX CORER	25	Partially laterally disturbed surface
88	**BC8_02**	29/03/11	10:42	4152.500	1700.475	594	SA	BOX CORER	30	quasi-regular surface
89	**BC8_03**	29/03/11	11:08	4152.495	1700.472	597	SA	BOX CORER	28	Partially laterally disturbed surface
90	**BC8_04**	29/03/11	11:34	4152.488	1700.483	598	SA	BOX CORER	22	Not-completely drained. quasi-regular surface. clasts
91	**BC9_01**	29/03/11	12:00	4152.784	1700.328	570	SA	BOX CORER	48	Quasi-regular surface only disturbed by the box corer pins
92	**BC9_02**	29/03/11	12:25	4152.788	1700.333	574	SA	BOX CORER	43	Quasi-regular surface. short core as archive
93	**BC9_03**	29/03/11	12:49	4152.788	1700.334	574	SA	BOX CORER	30	Regular surface
94	**BC9_04**	29/03/11	13:10	4152.790	1700.342	574	SA	BOX CORER	41	Quasi-regular surface
95	**O_21B**	29/03/11	13:35	4152.787	1700.314	573	SA	CTD	.	.
96	**O_17**	29/03/11	15:36	4206.339	1706.173	733	SA	CTD	.	Gondola slide _North
97	**O_16**	29/03/11	16:40	4202.660	1702.250	667	SA	CTD	.	Gondola slide _North
98	**O_15B**	29/03/11	17:42	4159.394	1659.150	503	SA	CTD	.	Gondola slide _North
99	**O_15A**	29/03/11	18:29	4156.690	1656.660	447	SA	CTD	.	Gondola slide _North
100	**O_14**	29/03/11	19:25	4153.279	1653.220	369	SA	CTD	.	Gondola slide _North
101	**O_13**	29/03/11	20:31	4147.953	1648.236	158	SA	CTD	.	Gondola slide _North
102	**O_12**	29/03/11	21:24	4143.377	1643.487	112	SA	CTD	.	Gondola slide _North

Event #	LabelEvent	DateEvent dd-mm-yy	TimeEvent hh:mm GMT	LatN WGS84 DDMM.XXX	LongE WGS84 DDMM.XXX	Depth m	Area	Gear	Recovery	Remarks
103	**O_23**	29/03/11	22:30	4136.901	1649.031	129	SA	CTD	.	Gondola slide _South
104	**O_23B**	29/03/11	23:22	4139.260	1656.355	285	SA	CTD	.	Gondola slide _South
105	**O_24**	30/03/11	0:15	4140.993	1659.858	516	SA	CTD	.	Gondola slide _South
106	**O_25**	30/03/11	1:02	4142.887	1704.909	780	SA	CTD	.	Gondola slide _South
107	**O_26**	30/03/11	2:08	4144.902	1709.893	892	SA	CTD	.	Gondola slide _South
108	**O_27**	30/03/11	3:14	4146.932	1714.921	945	SA	CTD	.	Gondola slide _South
109	**BC6_01**	30/03/11	5:44	4135.562	1729.165	1168	SA	BOX CORER	28	Quasi-regular surface
110	**BC6_02**	30/03/11	6:23	4135.547	1729.156	1172	SA	BOX CORER	22	Disturbed surface. rocks colonized bycorals. serpules. sponges
111	**BC6_03**	30/03/11	6:58	4135.547	1729.158	1170	SA	BOX CORER	27	Very disturbed surface
112	**BC6_04**	30/03/11	7:35	4135.547	1729.157	1172	SA	BOX CORER	24	partially disturbed surface. slightly inclined surface
113	**BC7_01**	30/03/11	8:33	4131.882	1725.003	828	SA	BOX CORER	36	Fracture
114	**BC7_02**	30/03/11	9:00	4131.881	1725.003	827	SA	BOX CORER	22	Lateral fracture
115	**BC7_03**	30/03/11	9:27	4131.863	1725.006	827	SA	BOX CORER	20	Quasi-regular surface
116	**BC7_04**	30/03/11	9:53	4131.882	1725.003	828	SA	BOX CORER	34	Only laterally disturbed surface
117	**IM_07**	30/03/11	12:16	4113.326	1734.716	849	SA	MOORING	.	Mooring IM_07 deployment
118	**B_2010**	30/03/11	14:55	4120.480	1711.617	606	SA	MOORING	.	Mooring B_2010 deployment
119	**B4_G**	30/03/11	15:42	4120.013	1708.167	327	SA	GRAB	.	Sampled surface sediment + short core (25cm liner)
120	**B2_G**	30/03/11	16:13	4121.006	1708.346	345	SA	GRAB	.	Sampled surface sediment + short core (25cm liner)
121	**O_46G**	30/03/11	16:49	4122.488	1711.980	473	SA	GRAB	.	Sampled surface sediment + short core (25cm liner)
122	**O_45G**	30/03/11	17:42	4121.117	1712.050	596	SA	GRAB	.	Sampled surface sediment + short core (25cm liner)
123	**O_44G**	30/03/11	18:26	4114.475	1711.871	511	SA	GRAB	.	Sampled surface sediment + short core (25cm liner)
124	**O_43G**	30/03/11	19:04	4118.015	1711.993	597	SA	GRAB	.	Sampled surface sediment + short core (25cm liner)

Event #	LabelEvent	DateEvent dd-mm-yy	TimeEvent hh:mm GMT	LatN WGS84 DDMM.XXX	LongE WGS84 DDMM.XXX	Depth m	Area	Gear	Recovery	Remarks
125	**O_42G**	30/03/11	19:45	4116.904	1711.938	387	SA	GRAB	.	Sampled surface sediment + short core (25cm liner)
126	**O_41G**	30/03/11	20:20	4114.696	1711.977	143	SA	GRAB	.	Sampled surface sediment + short core (25cm liner)
127	**L1_G**	30/03/11	21:05	4117.554	1710.012	312	SA	GRAB	.	Sampled surface sediment + short core (25cm liner)
128	**O_49G**	30/03/11	21:38	4118.012	1709.871	414	SA	GRAB	.	Sampled surface sediment + short core (25cm liner)
129	**O_48G**	30/03/11	22:19	4118.415	1707.943	429	SA	GRAB	.	Sampled surface sediment + short core (25cm liner)
130	**O_47G**	30/03/11	23:00	4118.970	1704.958	256	SA	GRAB	.	Sampled surface sediment + short core (25cm liner)
131	**B_5G**	30/03/11	23:36	4120.615	1705.052	219	SA	GRAB	.	Sampled surface sediment + short core (25cm liner)
132	**B_3G**	31/03/11	0:06	4121.595	1705.725	222	SA	GRAB	.	Disturbed. not sampled
133	**B_3G_02**	31/03/11	0:26	4121.597	1705.726	222	SA	GRAB	.	Sampled surface sediment + short core (25cm liner)
134	**BC11_01**	31/03/11	5:45	4143.194	1706.965	834	SA	BOX CORER	27	.
135	**BC11_02**	31/03/11	6:14	4143.189	1706.967	832	SA	BOX CORER	30	.
136	**BC11_03**	31/03/11	6:43	4143.188	1706.963	832	SA	BOX CORER	24	Irregular surface
137	**BC11_04**	31/03/11	7:12	4143.188	1706.958	832	SA	BOX CORER	31	Inclined surface
138	**SVP_2**	31/03/11	15:19	4042.591	1810.769	129	OC	CTD	.	Sound velocity profile for MB calibration
139	**0020_2011033**	31/03/11	15:35	4042.581	1810.904	.	OC	MB	.	Start multibeam line
140	**0020_2011033**	.	.	4041.666	1812.431	.	OC	MB	.	Stop multibeam line
141	**0021_2011033**	.	.	4041.909	1812.745	.	OC	MB	.	Start multibeam line
142	**0021_2011033**	.	.	4042.534	1811.218	.	OC	MB	.	Stop multibeam line
143	**0022_2011033**	.	.	4042.667	1811.413	.	OC	MB	.	Start multibeam line
144	**0022_2011033**	31/03/11	16:20	4042.018	1812.730	.	OC	MB	.	Stop multibeam line
145	**0023_2011033**	31/03/11	16:55	4041.310	1818.096	.	OC	MB	.	Start multibeam line
146	**0023_2011033**	.	.	4039.910	1823.159	.	OC	MB	.	Stop multibeam line

Event #	LabelEvent	DateEvent dd-mm-yy	TimeEvent hh:mm GMT	LatN WGS84 DDMM.XXX	LongE WGS84 DDMM.XXX	Depth m	Area	Gear	Recovery	Remarks
147	**0024_2011033**	.	.	4039.937	1823.115	.	OC	MB	.	Start multibeam line
148	**0024_2011033**	.	.	4037.539	1827.445	.	OC	MB	.	Stop multibeam line
149	**0025_2011033**	.	.	4037.564	1827.403	.	OC	MB	.	Start multibeam line
150	**0025_2011033**	.	.	4034.280	1830.412	.	OC	MB	.	Stop multibeam line
151	**0026_2011033**	.	.	4034.319	1830.388	.	OC	MB	.	Start multibeam line
152	**0026_2011033**	.	.	4030.644	1832.762	.	OC	MB	.	Stop multibeam line
153	**0027_2011033**	.	.	4030.681	1832.738	.	OC	MB	.	Start multibeam line
154	**0027_2011033**	.	.	4027.178	1834.972	.	OC	MB	.	Stop multibeam line
155	**0028_2011033**	.	.	4027.214	1834.951	.	OC	MB	.	Start multibeam line
156	**0028_2011033**	.	.	4023.362	1835.574	.	OC	MB	.	Stop multibeam line
157	**0029_2011033**	.	.	4023.403	1835.564	.	OC	MB	.	Start multibeam line
158	**0029_2011033**	.	.	4019.357	1835.909	.	OC	MB	.	Stop multibeam line
159	**0030_2011033**	.	.	4019.401	1835.905	.	OC	MB	.	Start multibeam line
160	**0030_2011033**	31/03/11	20:35	4017.413	1836.155	.	OC	MB	.	Stop multibeam line
161	**0031_2011033**	01/04/11	02:54	4003.297	1838.491	.	OC	MB	.	Start multibeam line
162	**0031_2011033**	.	.	3958.441	1838.450	.	OC	MB	.	Stop multibeam line
163	**0032_2011033**	.	.	3958.480	1838.457	.	OC	MB	.	Start multibeam line
164	**0032_2011033**	.	.	3954.540	1837.546	.	OC	MB	.	Stop multibeam line
165	**0033_2011033**	.	.	3954.581	1837.556	.	OC	MB	.	Start multibeam line
166	**0033_2011033**	.	.	3950.418	1836.631	.	OC	MB	.	Stop multibeam line
167	**0034_2011033**	.	.	3950.463	1836.645	.	OC	MB	.	Start multibeam line
168	**0034_2011033**	.	.	3947.322	1835.829	.	OC	MB	.	Stop multibeam line
169	**0035_2011033**	.	.	3947.327	1835.838	.	OC	MB	.	Start multibeam line
170	**0035_2011033**	.	.	3949.209	1835.903	.	OC	MB	.	Stop multibeam line
171	**0036_2011040**	.	.	3949.210	1835.903	.	OC	MB	.	Start multibeam line
172	**0036_2011040**	.	.	3951.142	1836.523	.	OC	MB	.	Stop multibeam line
173	**0037_2011040**	.	.	3951.125	1836.519	.	OC	MB	.	Start multibeam line
174	**0037_2011040**	.	.	3952.696	1836.769	.	OC	MB	.	Stop multibeam line
175	**0038_2011040**	.	.	3952.680	1836.764	.	OC	MB	.	Start multibeam line
176	**0038_2011040**	.	.	3954.242	1837.139	.	OC	MB	.	Stop multibeam line

Event #	LabelEvent	DateEvent dd-mm-yy	TimeEvent hh:mm GMT	LatN WGS84 DDMM.XXX	LongE WGS84 DDMM.XXX	Depth m	Area	Gear	Recovery	Remarks
177	**0039_2011040**	.	.	3954.225	1837.135	.	OC	MB	.	Start multibeam line
178	**0039_2011040**	.	.	3956.646	1837.719	.	OC	MB	.	Stop multibeam line
179	**0040_2011040**	.	.	3956.614	1837.709	.	OC	MB	.	Start multibeam line
180	**0040_2011040**	.	.	3959.750	1838.410	.	OC	MB	.	Stop multibeam line
181	**0041_2011040**	.	.	3959.717	1838.402	.	OC	MB	.	Start multibeam line
182	**0041_2011040**	.	.	4000.482	1838.536	.	OC	MB	.	Stop multibeam line
183	**0042_2011040**	.	.	4000.578	1838.148	.	OC	MB	.	Start multibeam line
184	**0042_2011040**	.	.	3956.619	1837.431	.	OC	MB	.	Stop multibeam line
185	**0043_2011040**	.	.	3956.660	1837.447	.	OC	MB	.	Start multibeam line
186	**0043_2011040**	.	.	3952.748	1836.364	.	OC	MB	.	Stop multibeam line
187	**0044_2011040**	.	.	3952.789	1836.375	.	OC	MB	.	Start multibeam line
188	**0044_2011040**	.	.	3948.933	1835.459	.	OC	MB	.	Stop multibeam line
189	**0045_2011040**	.	.	3948.974	1835.467	.	OC	MB	.	Start multibeam line
190	**0045_2011040**	01/04/11	04:33	3947.289	1835.222	.	OC	MB	.	Stop multibeam line
191	**0046_2011040**	01/04/11	04:44	3947.244	1834.767	.	OC	MB	.	Start multibeam line
192	**0046_2011040**	.	.	3949.582	1835.563	.	OC	MB	.	Stop multibeam line
193	**0047_2011040**	.	.	3949.569	1835.532	.	OC	MB	.	Start multibeam line
194	**0047_2011040**	.	.	3951.713	1835.791	.	OC	MB	.	Stop multibeam line
195	**0048_2011040**	.	.	3951.678	1835.788	.	OC	MB	.	Start multibeam line
196	**0048_2011040**	01/04/11	06:08	3954.003	1836.352	.	OC	MB	.	Stop multibeam line
197	**0049_2011040**	01/04/11	06:12	3954.102	1835.914	.	OC	MB	.	Start multibeam line
198	**0049_2011040**	.	.	3949.851	1834.734	.	OC	MB	.	Stop multibeam line
199	**0050_2011040**	.	.	3949.894	1834.752	.	OC	MB	.	Start multibeam line
200	**0050_2011040**	01/04/11	07:30	3947.800	1831.409	.	OC	MB	.	Stop multibeam line
201	**.**	01/04/11	08:30	.	.	.	.	.	.	People transfer to SML
202	**.**	01/04/11	12:30	.	.	.	.	.	.	Leaving SML
203	**MS03_A**	01/04/11	13:27	3933.030	1831.970	775	SML	CTD	.	.
204	**OUT_MS03A_01**	01/04/11	15:02	3927.593	1829.406	786	SML	BOX CORER	37	Quasi-regular surface
205	**OUT_MS03A_02**	01/04/11	15:28	3927.593	1829.406	786	SML	BOX CORER	39	Regular surface
206	**OUT_MS03A_03**	01/04/11	15:52	3927.593	1829.399	786	SML	BOX CORER	41	Quasi-regular surface

Event #	LabelEvent	DateEvent dd-mm-yy	TimeEvent hh:mm GMT	LatN WGS84 DDMM.XXX	LongE WGS84 DDMM.XXX	Depth m	Area	Gear	Recovery	Remarks
207	**OUT_MS03A_04**	01/04/11	16:19	3927.612	1829.413	783	SML	BOX CORER	41	Quasi-regular surface
208	**SVP_3**	01/04/11	19:45	3947.270	1834.250	115	OC	CTD	.	Sound velocity profile for MB calibration
209	**SML_01.START**	01/04/11	20:09	3947.809	1834.036	124	OC	MB + CHIRP	.	Start multibeam + CHIRP line
210	**SML_01.STOP**	01/04/11	22:10	4000.542	1837.850	.	OC	MB + CHIRP	.	Stop multibeam + CHIRP line
211	**SML_02.START**	01/04/11	22:14	4000.473	1837.474	.	OC	MB + CHIRP	.	Start multibeam + CHIRP line
212	**SML_02.STOP**	01/04/11	23:00	3954.048	1835.973	.	OC	MB + CHIRP	.	Stop multibeam + CHIRP line
213	**SML_03.START**	01/04/11	23:04	3954.214	1835.642	.	OC	MB + CHIRP	.	Start multibeam + CHIRP line
214	**SML_03.STOP**	01/04/11	23:55	4000.300	1837.104	.	OC	MB + CHIRP	.	Stop multibeam + CHIRP line
215	**SML_04.START**	02/04/11	0:03	4000.516	1836.841	.	OC	MB + CHIRP	.	Start multibeam + CHIRP line
216	**SML_04.STOP**	02/04/11	0:25	3957.175	1836.043	.	OC	MB + CHIRP	.	Stop multibeam + CHIRP line
217	**CTD4_02042011**	02/04/11	0:36	3957.120	1836.000	121	OC	CTD	.	Sound velocity profile for MB calibration
218	**SML_05.START**	02/04/11	0:56	3957.138	1836.029	.	OC	MB + CHIRP	.	Start multibeam + CHIRP line
219	**SML_05.STOP**	02/04/11	2:00	3947.665	1833.490	.	OC	MB + CHIRP	.	Stop multibeam + CHIRP line
220	**SML_06.START**	02/04/11	2:04	3947.875	1833.379	.	OC	MB + CHIRP	.	Start multibeam + CHIRP line
221	**SML_06.STOP**	02/04/11	3:22	3957.710	1835.857	.	OC	MB + CHIRP	.	Stop multibeam + CHIRP line
222	**SML_07.START**	02/04/11	3:26	3957.766	1835.575	.	OC	MB + CHIRP	.	Start multibeam + CHIRP line
223	**SML_07.STOP**	02/04/11	4:40	3947.570	1832.921	.	OC	MB + CHIRP	.	Stop multibeam + CHIRP line
224	**IN_MS03A**	02/04/11	07:50	3933.019	1831.987	778	SML	LANDER	.	Start lander deployment
225	**IN_MS03A_Bottom**	02/04/11	08:35	3933.022	1831.988	775	SML	LANDER	.	Lander at the bottom
226	**IN_MS03B_01**	02/04/11	11:01	3932.924	1831.556	777	SML	BOX CORER	25	Slice tilted
227	**IN_MS03B_02**	02/04/11	11:30	3932.926	1831.552	772	SML	BOX CORER	22	Large central fracture
228	**IN_MS03B_03**	02/04/11	11:55	3932.922	1831.557	776	SML	BOX CORER	27	Not completely drained. quasi-regular surface
229	**IN_MS03B_04**	02/04/11	12:25	3932.919	1831.558	777	SML	BOX CORER	26	Not completely drained. quasi-regular surface
230	**IN_MS03A**	02/04/11	13:27	3933.006	1831.927	771	SML	LANDER	.	Large buoy on board
231	**IN_MS03A**	02/04/11	13:38	3933.044	1831.938	774	SML	LANDER	.	Beginning lander recovery (point 2)
232	**IN_MS03A**	02/04/11	13:46	3933.092	1831.950	784	SML	LANDER	.	Small buoys on board

Event #	LabelEvent	DateEvent dd-mm-yy	TimeEvent hh:mm GMT	LatN WGS84 DDMM.XXX	LongE WGS84 DDMM.XXX	Depth m	Area	Gear	Recovery	Remarks
233	**IN_MS03A**	02/04/11	13:57	3933.228	1831.965	784	SML	LANDER	.	Lander on board
234	**CF_16_CTD**	02/04/11	15:58	3928.620	1818.100	1048	SML	CTD	.	.
235	**CTD5_02042011**	02/04/11	19:31	3947.280	1833.120	123	OC	CTD	.	Sound velocity profile for MB calibration
236	**SML_10.START**	02/04/11	19:47	3947.228	1832.884	.	OC	MB + CHIRP	.	Start multibeam + CHIRP line
237	**SML_10.STOP**	02/04/11	20:47	3954.296	1834.203	.	OC	MB + CHIRP	.	Stop multibeam + CHIRP line
238	**CTD6_02042011**	02/04/11	20:51	3954.420	1834.240	123	OC	CTD	.	Sound velocity profile for MB calibration
239	**SML_11.START**	02/04/11	21:09	3954.143	1834.134	.	OC	MB + CHIRP	.	Start multibeam + CHIRP line
240	**SML_11.STOP**	02/04/11	22:02	4000.285	1836.419	.	OC	MB + CHIRP	.	Stop multibeam + CHIRP line
241	**SML_12.START**	02/04/11	22:10	4000.672	1836.177	.	OC	MB + CHIRP	.	Start multibeam + CHIRP line
242	**SML_12.STOP**	02/04/11	22:29	3957.791	1835.371	.	OC	MB + CHIRP	.	Stop multibeam + CHIRP line
243	**SML_13.START**	02/04/11	22:32	3957.844	1835.105	.	OC	MB + CHIRP	.	Start multibeam + CHIRP line
244	**SML_13.STOP**	02/04/11	23:02	4001.366	1835.942	.	OC	MB + CHIRP	.	Stop multibeam + CHIRP line
245	**SML_14.START**	02/04/11	23:06	4001.114	1835.505	.	OC	MB + CHIRP	.	Start multibeam + CHIRP line
246	**SML_14.STOP**	03/04/11	0:31	3947.778	1832.047	.	OC	MB + CHIRP	.	Stop multibeam + CHIRP line
247	**SML_15.START**	03/04/11	0:36	3947.955	1831.585	.	OC	MB + CHIRP	.	Start multibeam + CHIRP line
248	**SML_15.STOP**	03/04/11	2:17	4001.500	1835.135	.	OC	MB + CHIRP	.	Stop multibeam + CHIRP line
249	**SML_16.START**	03/04/11	2:19	4001.424	1834.926	.	OC	MB + CHIRP	.	Start multibeam + CHIRP line
250	**SML_16.STOP**	03/04/11	3:40	3947.880	1831.230	.	OC	MB + CHIRP	.	Stop multibeam + CHIRP line
251	**SML_17.START**	03/04/11	3:42	3947.484	1831.120	.	OC	MB + CHIRP	.	Start multibeam + CHIRP line
252	**SML_17.STOP**	03/04/11	4:52	3936.366	1835.793	.	OC	MB + CHIRP	.	Stop multibeam + CHIRP line
253	**OUT MS03B**	03/04/11	06:25	3936.122	1836.021	793	SML	LANDER	.	Lander deployment
254	**OUT_MS03B_01**	03/04/11	7:05	3935.734	1836.127	807	SML	BOX CORER	26	Lateral cracks
255	**OUT_MS03B_02**	03/04/11	7:31	3935.740	1836.130	808	SML	BOX CORER	28	Quasi-regular surface. cm carbonate crusts
256	**OUT_MS03B_03**	03/04/11	7:55	3935.737	1836.132	808	SML	BOX CORER	27	Lateral cracks
257	**OUT_MS03B_04**	03/04/11	8:21	3935.745	1836.161	807	SML	BOX CORER	28	Large central fracture
258	**OUT_MS03B**	03/04/11	13:52	3936.063	1835.933	794	SML	LANDER	.	Beginning lander recovery
259	**OUT_MS03B**	03/04/11	14:45	3936.336	1835.977	782	SML	LANDER	.	Lander on board
260	**SML_18.START**	03/04/11	14:58	3940.154	1834.346	.	OC	MB + CHIRP	.	Start multibeam + CHIRP line

Event #	LabelEvent	DateEvent dd-mm-yy	TimeEvent hh:mm GMT	LatN WGS84 DDMM.XXX	LongE WGS84 DDMM.XXX	Depth m	Area	Gear	Recovery	Remarks
261	**SML_18.STOP**	03/04/11	15:47	3947.407	1830.229	.	OC	MB + CHIRP	.	Stop multibeam + CHIRP line
262	**OL_100**	03/04/11	15:55	3947.720	1829.980	132	OC	CTD	.	Otranto transect
263	**OL_101**	03/04/11	16:21	3947.710	1831.810	124	OC	CTD	.	Otranto transect
264	**OL_102**	03/04/11	16:52	3947.650	1835.020	124	OC	CTD	.	Otranto transect
265	**OL_103**	03/04/11	17:25	3947.501	1838.116	139	OC	CTD	.	Otranto transect
266	**OL_104**	03/04/11	17:56	3947.447	1840.300	171	OC	CTD	.	Otranto transect
267	**OL_105**	03/04/11	18:28	3947.319	1843.292	372	OC	CTD	.	Otranto transect
268	**OL_106**	03/04/11	19:11	3947.285	1845.910	501	OC	CTD	.	Otranto transect
269	**OL_107**	03/04/11	20:04	3947.114	1850.006	678	OC	CTD	.	Otranto transect
270	**SML_24.START**	03/04/11	20:45	3947.176	1849.652	.	OC	MB + CHIRP	.	Start multibeam + CHIRP line
271	**SML_24.STOP**	03/04/11	22:49	4003.270	1851.956	.	OC	MB + CHIRP	.	Stop multibeam + CHIRP line
272	**SML_25.START**	03/04/11	22:56	4003.035	1852.933	.	OC	MB + CHIRP	.	Start multibeam + CHIRP line
273	**SML_25.STOP**	04/04/11	0:31	3947.938	1850.829	.	OC	MB + CHIRP	.	Stop multibeam + CHIRP line
274	**SML_26.START**	04/04/11	0:41	3948.186	1852.055	.	OC	MB + CHIRP	.	Start multibeam + CHIRP line
275	**SML_26.STOP**	04/04/11	1:35	3955.587	1851.945	.	OC	MB + CHIRP	.	Stop multibeam + CHIRP line
276	**SML_27.START**	04/04/11	1:43	3955.415	1852.985	.	OC	MB + CHIRP	.	Start multibeam + CHIRP line
277	**SML_27.STOP**	04/04/11	2:44	3947.129	1849.846	.	OC	MB + CHIRP	.	Stop multibeam + CHIRP line
278	**SML_28.START**	04/04/11	2:54	3946.046	1848.486	.	OC	MB + CHIRP	.	Start multibeam + CHIRP line
279	**SML_28.STOP**	04/04/11	5:10	3932.969	1831.740	.	OC	MB + CHIRP	.	Stop multibeam + CHIRP line
280	**IN_MS03B**	04/04/11	05:45	3932.889	1831.576	775	SML	LANDER	.	Start lander deployment
281	**IN_MS03B**	04/04/11	06:00	3932.924	1831.556	771	SML	LANDER	.	Lander at the bottom
282	**IN_MS03B**	04/04/11	06:12	3932.979	1831.448	775	SML	LANDER	.	Release large buoy
283	**IN_MS03A_01**	04/04/11	6:30	3933.024	1831.987	785	SML	BOX CORER	28	Half tilted and half disturbed
284	**IN_MS03A_02**	04/04/11	7:06	3933.024	1831.987	785	SML	BOX CORER	25	Half disturbed
285	**IN_MS03A_03**	04/04/11	7:33	3933.024	1831.987	785	SML	BOX CORER	28	Fracture partially hidden
286	**IN_MS03A_04**	04/04/11	8:03	3933.024	1831.987	785	SML	BOX CORER	27	Fractured in the central part
287	**IN_MS03B**	04/04/11	11:20	3932.887	1831.435	775	SML	LANDER	.	Lander on board
288	**SML_29.START**	04/04/11	13:29	3947.879	1830.909	.	OC	MB + CHIRP	.	Start multibeam + CHIRP line
289	**SML_29.STOP**	04/04/11	14:39	4000.131	1834.329	.	OC	MB + CHIRP	.	Stop multibeam + CHIRP line
290	**SML_30.START**	04/04/11	16:22	4018.425	1835.554	.	OC	MB + CHIRP	.	Start multibeam + CHIRP line

Event #	LabelEvent	DateEvent dd-mm-yy	TimeEvent hh:mm GMT	LatN WGS84 DDMM.XXX	LongE WGS84 DDMM.XXX	Depth m	Area	Gear	Recovery	Remarks
291	**SML_30.STOP**	04/04/11	18:52	4041.376	1819.668	.	OC	MB + CHIRP	.	Stop multibeam + CHIRP line
292	**SML_31.START**	05/04/11	9:03	4230.504	1559.300	.	MA	MB + CHIRP	.	Start multibeam + CHIRP line
293	**SML_31.STOP**	05/04/11	18:53	4332.334	1410.216	.	MA	MB + CHIRP	.	Stop multibeam + CHIRP line
294	**.**	05/04/11	22:15	4337.269	1329.775	.	MA	CRUISE END	.	Ancona port

AREAS: MA. Middle Adriatic; SA. Southern Adriatic; OC. Otranto Channel. SML. S. Maria di Leuca.

APPENDIX 3 – CALIBRATION SHEET OF THE CTD PROBE

SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington 98005 USA

Phone: (206) 643 - 9866 Fax: (206) 643 - 9954 Internet: seabird@seabird.com

SENSOR SERIAL NUMBER = 0891
CALIBRATION DATE: 27may2011

CONDUCTIVITY CALIBRATION DATA
PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

GHIJ COEFFICIENTS

g = -3.17518240e+00
h = 4.17639988e-01
i = 6.74997509e-03
j = -2.28898762e-04
CPcor = -9.57e-08 (nominal)
CTcor = 3.25e-06 (nominal)

ABCDM COEFFICIENTS

a = 1.19062934e-01
b = 3.15521422e-01
c = -3.47455232e+00
d = -1.20777096e-03
m = 2.1
CPcor = -9.57e-08 (nominal)

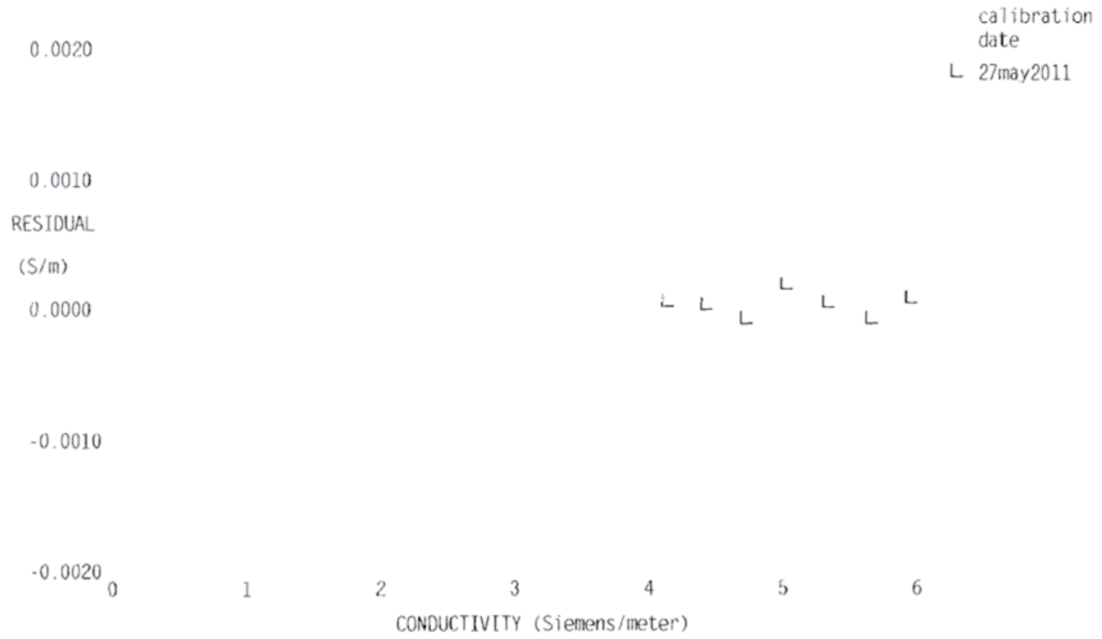
BATH TEMP (ITS-90 °C)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (kHz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
12.0525	35.2683	4.03241	9.70776	4.03243	0.00002
15.0641	35.2638	4.32699	10.02345	4.32698	-0.00001
18.0330	35.2590	4.62345	10.33115	4.62334	-0.00011
21.0012	35.2558	4.92566	10.63591	4.92581	0.00015
24.0130	35.2525	5.23764	10.94115	5.23765	0.00001
27.0708	35.2489	5.55939	11.24728	5.55928	-0.00011
29.8478	35.2447	5.85550	11.52211	5.85555	0.00005

Conductivity = $(g + hf^2 + if^3 + jf^4) / [10(1 + dt + ep)]$ Siemens/meter

Conductivity = $(af^m + bf^2 + c + dt) / [10(1 + ep)]$ Siemens/meter

t = temperaure [deg C]; p = pressure [decibars]; d = CTcor; e = CPcor;

Residual = (instrument conductivity - bath conductivity) using g, h, i, j coefficients



SEA-BIRD ELECTRONICS, INC.
1808 136th Place N.E., Bellevue, Washington 98005 USA
Phone: (206) 643 - 9866 Fax: (206) 643 - 9954 Internet: seabird@seabird.com

SENSOR SERIAL NUMBER = 1368
CALIBRATION DATE: 27may2011

TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

ITS-90 COEFFICIENTS
g = 4.85716669e-03
h = 6.76986177e-04
i = 2.62893558e-05
j = 2.05511490e-06
f_0 = 1000.000

IPTS-68 COEFFICIENTS
a = 3.50624716e-03
b = 5.92727333e-04
c = 1.30965261e-05
d = 2.05641156e-06
f_0 = 8533.746

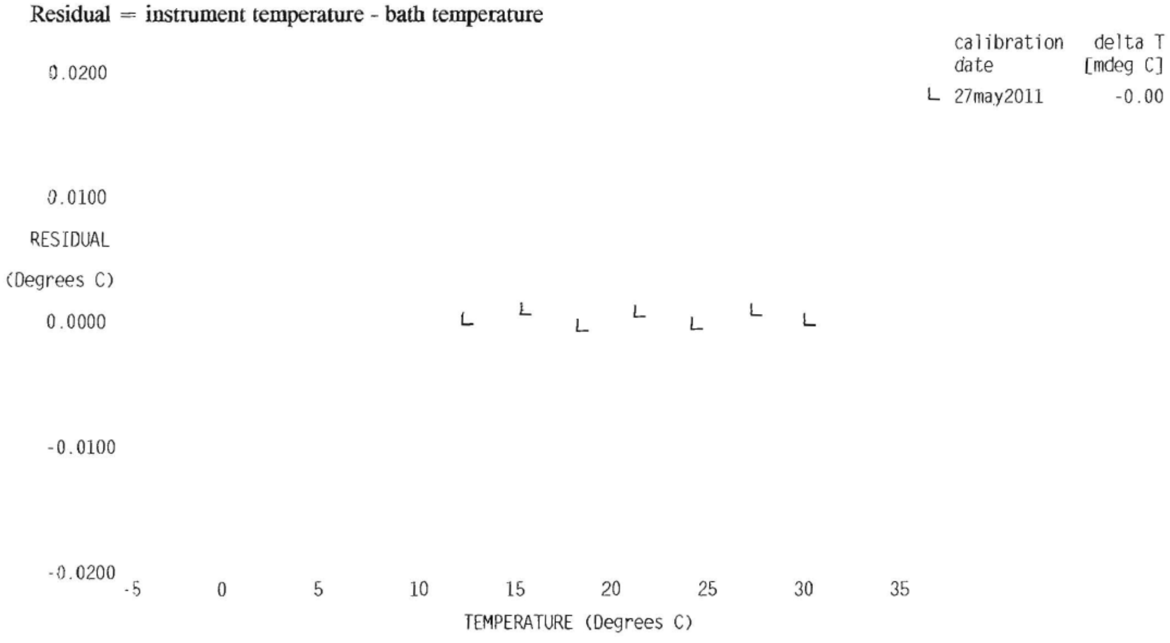
BATH TEMP (ITS-90 °C)	INSTRUMENT FREQ (Hz)	INST TEMP (ITS-90 °C)	RESIDUAL (ITS-90 °C)
12.0525	8533.746	12.0523	-0.00018
15.0641	9078.902	15.0647	0.00060
18.0330	9639.430	18.0323	-0.00068
21.0012	10224.035	21.0016	0.00044
24.0130	10841.523	24.0125	-0.00055
27.0708	11494.762	27.0714	0.00059
29.8478	12110.600	29.8476	-0.00022

Temperature ITS-90 $= 1/\{g + h[Mn(f_0/f)] + i[Mn^2(f_0/f)] + j[Mn^3(f_0/f)]\} - 273.15$ (°C)

Temperature IPTS-68 $= 1/\{a + b[Mn(f_0/f)] + c[Mn^2(f_0/f)] + d[Mn^3(f_0/f)]\} - 273.15$ (°C)

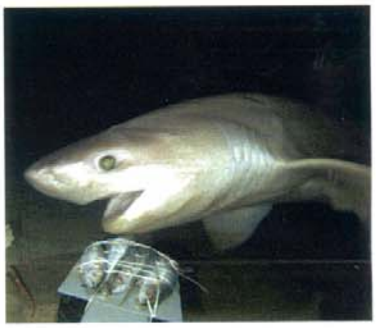
Following the recommendation of JPOTS: T_{68} is assumed to be 1.00024 * T_{90} (-2 to 35 °C).

Residual = instrument temperature - bath temperature



APPENDIX 4 – Article of the journalist Jacopo Pasotti in the Italian tabloid L'ESPRESSO

A SINISTRA: LA SONDA MEMO VIENE CALATA NELLO IONIO. SOTTO: ALCUNE IMMAGINI CHE HA RIPRESO



Mille leghe sotto i mari

Una sonda calata nello Ionio. A grande profondità. Per studiare la vita negli abissi. Tra specie sconosciute e colonie di coralli

DI JACOPO PASOTTI

Lo squalo si avvicina cauto. È attratto dall'esca (quattro sgombri legati a un piatto di plastica). Lo illuminano alcuni led, perché l'ambiente sarebbe altrimenti nella totale oscurità: è un Notidano capopiatto lungo almeno due metri. Due occhi digitali lo spiano e registrano ogni suo movimento anche quando viene respinto seccamente da una paromola inferocita che per prima si era avvicinata agli sgombri. Il crostaceo lo minaccia puntandogli contro una spugna, ricoperta di spicole appuntite e intrisa di tossine. Lo squalo si dimena, solleva una nube di fango tale da accecare gli occhi digitali, due speciali videocamere. Quando la nube si dirada la paromola è ancora lì che banchetta indisturbata. Le videocamere, fissate a una struttura metallica, continuano a riprendere per ore. Sono gli occhi di Memo, la prima (ed unica) sonda per lo studio della macrofauna abissale attiva a bordo dell'Urania, la nave del Cnr, grazie alla quale è ora possibile studiare le creature degli abissi del Mediterraneo nel loro ambiente altrimenti inaccessibile all'uomo, obiettivo della campagna oceanografica Obama, coordinata dall'Università delle Marche, che coinvolge diversi istituti e il Cnr.

Si scopre così sui fondali marini un territorio solcato da canyon profondi anche 200 metri, che corrono per decine di chilometri, percorsi da correnti impetuose che generano vere e proprie cascate sottomarine. Come il canyon di Bari, lungo 40 chilometri: attraverso la forra scorre periodicamente una corrente che trasporta nutrienti dall'alto Adriatico oltre il canale d'Otranto, fino agli abissi dello Ionio. Ed è qui che proliferano paromole dagli arti lunghi più di 20 centimetri, squali, e colonie di coralli bianchi. Ma non solo, perché i biologi scoprono nuove specie ogni volta che esplorano un settore dello Ionio: sui fondali tra i 400 e i mille metri di profondità, al largo di Santa Maria di Leuca hanno osservato che le colonie di candidi coralli «ospitano più di 200 specie», spiega Gianfranco D'Onghia, professore di Ecologia all'Università di Bari: «Di cui almeno cento sconosciute». Le colonie di coralli formano un habitat molto diverso dai fondali fangosi e sterili dell'immagine classica degli abissi. Sono invece aree di rifugio e riproduzione per moltissime specie. Compresi quei naselli, gamberi rossi e pagelli che sono un bene sempre più raro.

CI SONO CANYON PROFONDI, PERCORSI DA IMPETUOSE CORRENTI. DOVE VIVONO SQUALI E GAMBERI, PAROMOLE E SPUGNE VELENOSE

Gli abissi sottomarini corrono infatti un rischio: «Da una parte la temperatura media delle acque profonde nel Mediterraneo sta aumentando di un grado ogni trent'anni, è un valore minimo a cui però alcuni organismi potrebbero non adattarsi», dice D'Onghia. Ci sono poi le attività umane, la pesca, lo sfruttamento dei giacimenti di gas e petrolio, e gli atti criminali come lo scarico abusivo di rifiuti. Tutti fattori che impattano sugli organismi marini. Questo spiega l'urgenza di progetti come CoralFish (progetto comunitario di cui D'Onghia è il responsabile per l'Italia) che studiano i coralli, e di un lander come Memo, che viene calato sul fondale e lì rimane per ore riportando una mole preziosa di dati.

Ma per difendere questo eccezionale habitat sommerso un passo è stato già fatto: grazie ai primi studi svolti sui coralli, dal 2006 la pesca a strascico e le attività di dragaggio sono proibite in 900 chilometri quadrati di mare Ionio.

Sul sito dell'"Espresso" potete scaricare i video ripresi dalla sonda Memo

Foto: Jacopo Pasotti (1)