CRUISE SUMMARY REPORT

CRUISE Name: ICHNUSSA2012 **No:**
enter the unique number, name or acronym assigned to the cruise (or cruise leg, if appropriate).

CRUISE PERIOD start: 11/01/2012 to end : 27/01/2012

PORT OF DEPARTURE (enter name and country) **MESSINA (ITALY)**
PORT OF RETURN (enter name and country) **MESSINA (ITALY)**

SHIP Name: R/V URANIA **Call Sign:**
Type of ship: RESEARCH VESSEL
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.

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

Name: IAMC CNR, U.O.S. ORISTANO
Address: LOC. SA MARDINI snc, TORREGRANDE (OR)
Country: ITALY

CHIEF SCIENTIST(S) Name: **MR MIRENO BORGHINI**
ISMAR CNR, U.O.S. LA SPEZIA
Forte Santa Teresa, 19036 Pozzuolo di Lerici (SP)
ITALY

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

OTHER PARTICIPATING LABORATORIES
enter name and address of the participating laboratories, apart the responsible

Name: Dept. Animal Biology and Marine Ecology, Messina University
Address: Salita Sperone, 98100 Sant'Agata, Messina
Country: ITALY

Name: Tuscia University
Address: Via S.Camillo de Lellis, s.n.c., 01100 Viterbo
Country: ITALY

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.

Objectives

The cruise has been planned to reach the following objectives:

1. Water masses characteristics and biological structures

Several measurements along key sections localised inside and on the board of the western Mediterranean basin in order to define the main paths of the circulation and the physical-chemical-biological properties (temperature, salinity, dissolved oxygen, nutrients, chlorophyll, etc) of the water upper, intermediate and deep western (Tyrrhenian sea, Sardinia Channel, Algero-Provencal basin) Mediterranean water masses and fronts. Check of the diffusion of the new deep waters found during several cruises from 2005 to November 2011 in the Sardinia Channel and south-central Tyrrhenian Sea.

2. Validation of numerical models

Measurements will be used to validate four numerical circulation models implemented at IAMC-CNR in Oristano (SCRM32, WMRM). The two models at IAMC-CNR in Oristano are operational as they give daily forecasts for the following 5 days of the main oceanographic parameters (temperature, salinity, water and surface heat fluxes, currents, waves) visible at the address www.seaforecast.cnr.it.

ADCP and bathymetric measurements in the Messina Strait have been realised to validate and for the bathymetry of a high resolution coastal numerical circulation model implemented in the area.

3. Exploration of microbial diversity in specific sites

Water analyses will be used to establish site-specific collections of highly specialized microbial strains and mixed microbial cultures, novel or improved enzymes, biosurfactants and other microbial products that can be exploited in general as well as in site-tailored intensified bioremediation approaches. The aim is to explore the microbial diversity associated to different polluted environments in the Mediterranean Sea searching new microbial resources to be applied for the bioremediation of matrices polluted with three types of pollutants, petroleum hydrocarbons, chlorinated compounds and heavy metals.

4. Methodological developments

- measurements of velocity profiles by Lowered ADCP and Shipboard ADCP;
- water sampling at different levels to explore microbial diversity;
- check in-situ of new instruments like a modified box-corer and an Apex drifter.

Brief narrative

The cruise has started with current (SADCP) and bathymetry (Multibeam) acquisitions in the Messina Strait and CTD stations in the central-south Tyrrhenian Sea, Sardinia Channel and along the section Sardinia-Baleares (Minorca island) have been acquired. A box corer has been realised in the Sardinia Channel to check a new modified instrument and acquire a mud core in the area for laboratory analyses of heavy metals. Bad weather conditions from January 20 has obliged to delete the CTD stations planned in the northern Sardinian sea and a re-planning of the activities on-board. During the stop close to the island of Favignana (western Sicily) an APEX drifter has been checked with an experiment 6 hours long. After the storm, from January 22, the activities started again with CTDs in the south Tyrrhenian sea and a second experiment with the APEX drifter close to the island of Lipari (Eolian Archipelago) before reaching the harbour of Messina on January 25. The cruise ended earlier than scheduled due to strong northern winds blowing in the area of operations.

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.

The cruise has been organised in the framework of the following projects:

- MyOcean (EU IP);
- MyOcean2 (EU IP);
- PON-TESSA (MIUR);
- PRIAMO (POR – Sicily).

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)

PI	name	Body	address	country	e-mail
A	MIRENO BORGHINI	ISMAR CNR	LA SPEZIA	ITALY	mireno.borghini@sp.ismar.cnr.it
B	ALBERTO RIBOTTI	IAMC CNR	ORISTANO	ITALY	alberto.ribotti@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'.

LEGENDA: R (recovery) D (deployment)

PI	Date, time	Lat [° 'N]	Long [° 'E]	TYPE	DESCRIPTION
D/R	21/01/2012; 10:00	37 56.7252	012 19,2102	APEX drifter	Functionality check. Experiment 6 hours long on 25 m on depth.
D/R	23/01/2012; 10:00	38 30,5125	014 48,764	APEX drifter	Functionality check. Experiment 6 hours long on 35 m on depth.

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'.

Table CTD casts list

Sampling type and institute: N = Nutrients; C = Box Corer/Benna; O = dissolved oxygen; S = salinity; E = marine microbic ecology; H = heavy metals

Start CTD cast Date & Time (UTC)		Station	Bottom [m]	Lat [° 'N]		Long [° 'E]		Activity type
11/01/2012	21:00:54	CTD Stretto	1079,0	38	3,46002	015	33,85998	E, H
13/01/2012	01:39:01	Geostar	3451,8	38	54,99	013	17,95998	N, S, O, H
13/01/2012	06:47:41	acq35	2694,8	38	52,68	012	47,26002	
13/01/2012	10:35:51	acq34	2320,2	38	53,91	012	21,16002	S, N
13/01/2012	15:32:00	acq33	2479,1	39	59,32998	011	50,26002	O, N
13/01/2012	20:31:55	acq36	3474,2	39	19,38	012	21,76002	N
14/01/2012	02:44:51	051	3486,7	39	46,36002	011	53,23998	N, H
14/01/2012	06:45:27	acq31	3352,0	39	35,73	011	44,16	
14/01/2012	11:39:05	acq30	2900,4	39	21,16002	011	17,49	N

14/01/2012	16:55:58	acq32	2786,8	39	26,62998	010	36,81	O, H
14/01/2012	21:02:53	acq29	2752,6	39	7,84002	010	51,43998	N
15/01/2012	02:00:33	acq27	2661,5	39	59,32998	010	22,87998	N, H
15/01/2012	05:40:54	acq28	2493,9	38	48,42	010	37,45998	N,H
15/01/2012	08:55:55	canyon	2392,9	38	38,35002	010	23,53998	N,H
15/01/2012	12:26:59	241	2540,0	38	51,40998	010	11,04	O, H
15/01/2012	16:46:00	acq23	2067,9	38	32,67	009	49,51998	N, E, H
15/01/2012	19:26:02	acq7	2018,8	38	27,36	009	39,76998	
15/01/2012	21:11:15	acq8	2031,5	38	24,70002	009	35,50002	N
15/01/2012	23:24:15	acq5	2009,9	38	22,78002	009	31,27998	N
16/01/2012	01:39:53	acq4	1985,4	38	21,64998	009	26,46	N, E
16/01/2012	04:11:37	acq_3b	1926,4	38	19,44	009	18,18	H
16/01/2012	06:10:39	acq3	2028,6	38	17,95998	009	12,67998	N, H
16/01/2012	09:41	D16	2242,0	38	11,3676	008	42,9927	O, N, H, E
16/01/2012	12:37	D15	1396,0	38	23,5675	008	48,001	E
16/01/2012	15:00	D14	705,0	38	35,584	008	47,9701	H, E
17/01/2012	00:39	S20	101,0	39	49,2194	008	12,2395	
17/01/2012	03:30	S18	1650,0	39	48,1791	008	48,9231	E, H
17/01/2012	07:12	S16	2759,0	39	48,194	007	23,7497	S, O, N, E, H
17/01/2012	11:18	S14	2844,0	39	48,1892	006	59,892	H
17/01/2012	15:07	S12	2857,0	39	48,1829	006	36,5929	S, N, E, H
17/01/2012	19:04	S10	2852,0	39	48,1827	006	12,0307	H
17/01/2012	22:44	S08	2844,0	39	48,1509	005	48,9806	S, N, E, H
18/01/2012	03:20	S06	2827,2	39	48,1840	005	24,2812	H
18/01/2012	07:16	S04	2714,6	39	48,1704	004	59,7251	O, S, N, E, H
19/01/2012	13:30	BOX	2038,4	38	43,9319	010	18,0675	BOX CORER
22/01/2012	16:26	Geo2	3420,0	38	54.8996	013	59.7801	O, S, N, E, H
22/01/2012	20:46	Geo3	3501	38	53.6041	014	23.9669	E, H
24/01/2012	21:03	Geo4	2222,2	38	43.8606	014	55.1304	E

Table SADCP transects in the Messina Strait (11-12/01/2011)

Longitude(° ')	Latitude(° ')	Point
15°49.174	38°19.386	A
15°37.571	38°23.273	B
15°35.446	38°19.993	C
15°44.557	38°16.045	D
15°39.333	38°16.531	E
15°41.52	38°14.708	F
15°37.632	38°15.134	G
15°39.698	38°13.433	H
15°35.567	38°13.979	I

15°38.179	38°12.4	L
15°35.142	38°12.097	M
15°38.422	38°10.639	N
15°34.595	381°0.214	O
15°38.543	38°08.756	P
15°33.319	38°08.573	Q
15°38.726	38°06.629	R
15°31.801	38°06.751	S
15°38.786	38°04.078	T
15°30.768	38°04.625	U
15°38.361	38°01.892	V
15°29.128	3802.438	Z
15°37.997	38°00.07	K
15°27.427	38°00.191	Y
15°39.819	37°57.093	W
15°24.208	37°57.154	X

Table Multibeam lines

Date & Time (UTC)	Point	Lat [° 'N]	Long [° 'E]	File name
12/01/2012 10:10	1	38 15.1630	015 36.4260	0035
12/01/2012 10:24	3	38 15.5667	015 38.0857	0035
12/01/2012 10:25	4	38 15.4681	015 38.0797	0036
12/01/2012 10:40	2	38 15.0678	015 36.4586	0036
12/01/2012 10:41	6	38 14.9696	015 36.4864	0037
12/01/2012 10:55	5	38 15.3695	015 38.0737	0037

On-board operations

CTD casts

At all the 24 hydrological stations (with two repetitions) pressure (P), salinity (S), potential temperature (θ) and dissolved oxygen concentration (DO) were measured with a CTD-rosette system consisting of a CTD SBE 911 plus, and a General Oceanics rosette with 24 12-l Niskin Bottles. Temperature measurements were performed with a SBE-3/F thermometer, with a resolution of 10-3 °C, and conductivity measurements were performed with a SBE-4 sensor, with a resolution of 3 x 10-4 S/m. In addition, dissolved oxygen was measured with a SBE-13 sensor (resolution 4.3 μM), and data were checked against Winkler titration. The vertical profiles of all parameters were obtained by sampling the signals at 24 Hz, with the CTD/rosette going down at a speed of 1 m/s. The data were processed on board, and the coarse errors were corrected.
CTD data have been acquired also by two IDRONAUT probes put on the rosette whose data, starting from station MU07, have been compared with those from SBE.

Laboratory: ISMAR CNR, IAMC CNR

Nutrients

Seawater samples for nutrient measurements were collected at different depths, when the system CTD /rosette was going up, according to the vertical profiles of salinity, potential temperature and dissolved oxygen, recorded in real time. Samples of 100 ml of seawater were collected at different depths and immediately filtered through a polycarbonate filter (0.47 μm Ø and pore size 0.4 μm) under slight vacuum. The filtered samples were transferred in 20 ml polyethylene vials and frozen at -20°C. The analysis of inorganic nutrients will be performed in the laboratory on land by the AutoAnalyser AAIII Bran+Luebbe (Grasshoff,1999).

- Not filtered 60 ml bottles and immediately frozen at -20°C

Laboratory: IAMC CNR, ISMAR CNR

Acquisition of multibeam data

High resolution single channel bathymetric data have been acquired by using, as energy source, the Konsberg EM 710 Multibeam working at a frequency ranging between 70 and 110 kHz and a ping frequency of 40 kHz. The cone beam has a width of 75° per side (maximum cover 150°) depending by the bathymetry. A correction for haeve, pitch and roll and coordinates is applied through the Sea Decks SeaPath 200 system. The bathymetric data have been acquired in the northern part of the Messina Strait, Sicilian side, between the bathymery of 25-90 m of depth where, probably, a current power energy plant will be installed and in the framework of the PRIAMO project.

Laboratory: IAMC CNR

Marine midrobic microbiology

Several stations, at depths along the water column, have been filtered with different sea water volumes to study microbial biodiversity using CARD-FISH technique. Then the sea water samples from Niskin bottles have been processed on board to perform viable counts and isolation

of Heterotrophic Bacteria on Marine Agar medium (MA) and Luminescent Bacteria on SWC (Sea Water Complete) medium (fgure belowey will be characterized in laboratory using morpho-physiological and tassonomic approaches. Some samples are filtered on Millipore filters 0,22 µm and stored in "RNAlater" for a taxonomic study by molecular approach. As a consequence, DNA-RNA extraction was carried out to compare active and inactive microbial communities, coming from different water masses. Filters are stored at -20 °C after incubation in "RNAlater" storage solution.

Laboratory: Messina University

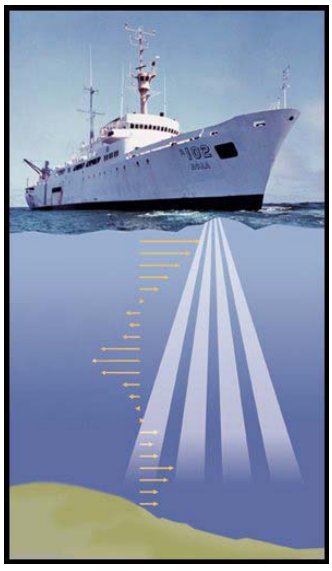
LADCP

Two Lowered Acustic Doppler Current Profilers (LADCP) were used to measure velocity profiles. We used two RDI Workhorse 300 kHz ADCP. For data post-processing we used the LDEO LADCP (versione 8.1) software.

Laboratory: ISMAR CNR

Vessel-mounted ADCPs

The hydrographic data set has been integrated with direct current measurements. During the whole campaign two VM-ADCPs (RDI Ocean Surveyor, 75 kHz, and RDI Workhorse, 300 kHz) which operated during the whole campaign, along the whole ship track. The depth range of the two current profilers is about 700 m (OS75) and 150 m (WH300). Data acquisition is carried out using the RDI VMDAS software vers. 1.44. The ADCP data will be submitted to a post-processing with the CODAS3 Software System, which allows to extract data, assign coordinates, edit and correct velocity data. Data will be corrected for errors in the value of sound velocity in water, and misalignment of the instrument with respect to the axis of the ship.



Laboratory: ISMAR CNR

Heavy metals analyses on water samples

Water samples have been acquired in order to obtain a map of heavy metals concentration and distribution. The aim is to test a new method of conservation for the heavy metal determination. Samples have been collected in 23 stations, 7 in Tyrrhenian Sea, 8 in the Sardinia Channel and in the Sardinia Sea at 5 discrete depths, representative of the surface layers (1 depth), intermediate waters (3 depths) and deep layers (1 depth), and accordingly to the CTD real time profile. Every

sample has been divided in three different subsamples of 50mL. A conservation protocol has been applied on the subsamples:

- ACIDIFIED SAMPLES - Samples of 50 mL acidified to prevent ion precipitation.
- FILTERED ACIDIFIED SAMPLES - Samples of 50 mL filtered onto Whatman GF/F filters (22 μm) and then acidified with ultrapur HCl (30%) in order to obtain pH<2, to prevent ion precipitation.
- FILTERED SAMPLES - Samples of 50 mL filtered to prevent sample contamination.

These samples will be analyzed in laboratory, and the results will be used to validate the method and to map a heavy metal distribution. The filtered-acidified and the filtered samples will be compared to estimate the metal portion absorbed on particulate (i.e. clay), in order to investigate the use of heavy metals as tracers of currents. Moreover at box station was taken deep sediment core sampled by oceanic box corer and was taken two samples of superficial layer of core.

Laboratory: Tuscia University

APEX testing

APEX is a autonomous drifting profiler used to measure subsurface currents and make profile measurements. It surfaces at programmed intervals for data telemetry and geo-location via ARGOS or IRIDIUM satellite. Standard sensors include TP and Salinity (*) through a Seabird CTD installed in the drifter. The new drifter has been tested in two different locations to verify buoyancy and data transmission.

** from http://www.webbresearch.com/apex.aspx*

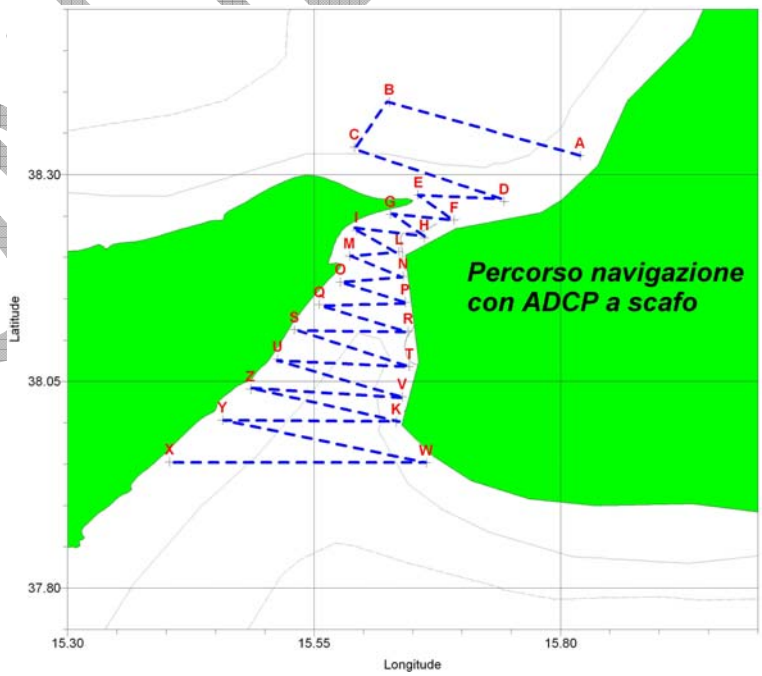
Laboratory: ISMAR CNR

TRACK CHART

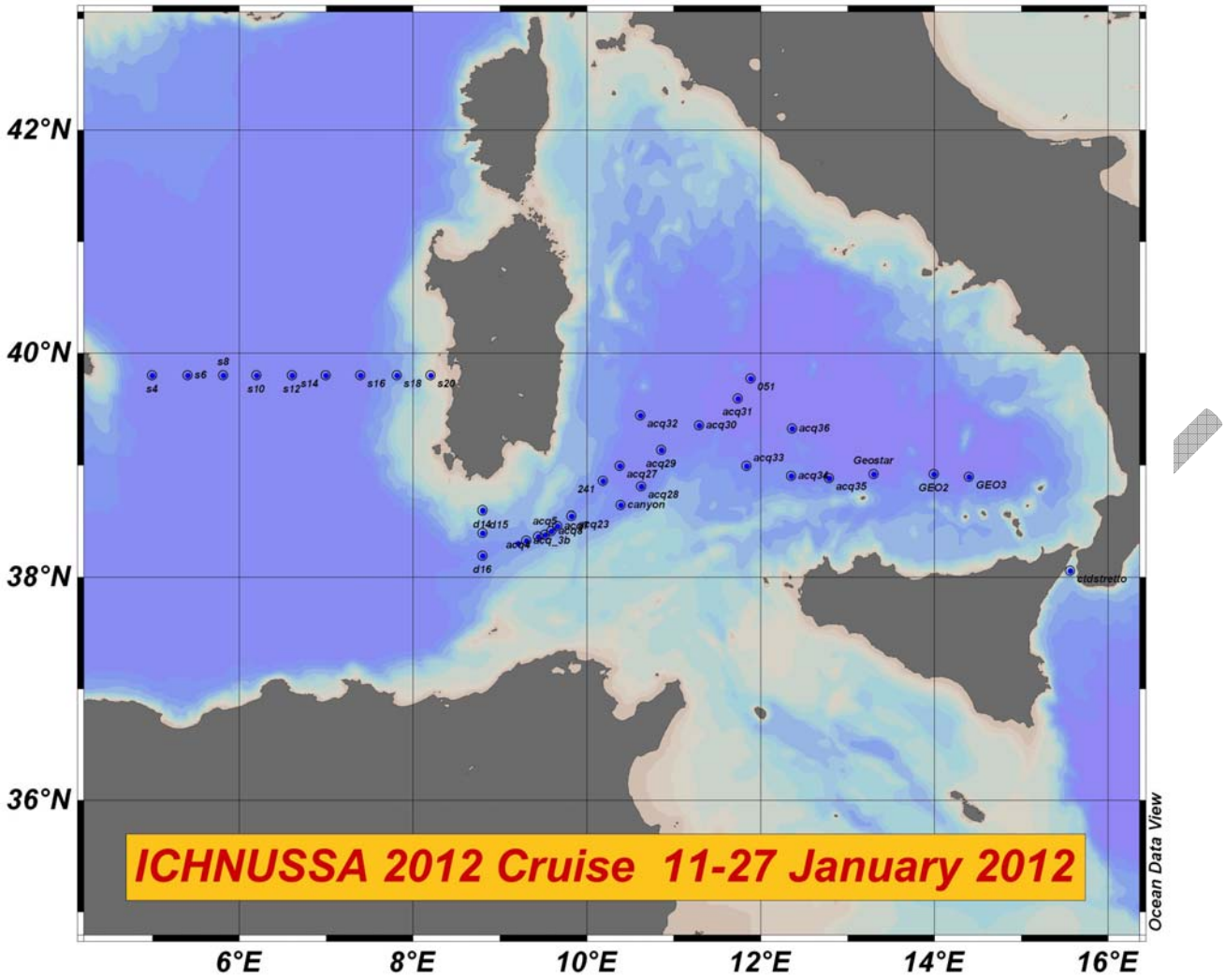
You are strongly encouraged to submit, with the completed report, an annotated chart illustrating the route followed and the points where measurements were taken.

The geographical limits of the study area are 38.00°N - 42.00°N of latitude and 2°E – 16°E of longitude. Due to bad sea conditions, the expected sampling plan has been partially reorganised (see pictures). Multibeam bathymetric and SADCP acquisitions have been realised in the Messina Strait.

The area covered with the Multibeam in yellow in the large picture and in grey, with the 6 extreme points of the transects, in the small one



The SADCP acquisition track in the Messina Strait



The area covered by the CTD stations during the whole cruise

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 Hydrography Bureau Special Publication No. 23, iLimts of Oceans and Seas').

MESSINA STRAIT
TYRRHENIAN SEA
SARDINIA CHANNEL
ALGERO-PROVENCAL BASIN

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 description may include references to local geographic areas, to sea floor features, or to geographic coordinates.

Please insert here the number of each square in which data were collected from the below given chart 143, 144, 180

The Mediterranean sea is a semi-enclosed sea at medium latitudes. Some fundamental processes for the general circulation of the oceans (ex. deep water formation) happen or are given by such sea. The salty waters in the Atlantic, exiting from the Mediterranean, cn influence the water formation processes, the variability and also the equilibrium state of the global thermohaline

circulation, a mechanism by which large amounts of heat are exchanged inside and through the basins. The global thermohaline circulation has a fundamental role in contributing in the stabilization of the climatic system. The Mediterranean circulation, in the western basin, is forced by the wind stress, by the general floating forces generated by the heat and fresh water fluxes at the air-sea interface. The geography of the western Mediterranean is really complex with a really complex deep morphology and a distribution of its coasts, a variety of islands, straits, channels and openings. The exchanges through the different basins depend on the morphology of these straits, channels and openings. Due to a complex topography and geometry and of the high external forcing variability, the response time of the water masses and the spatial and temporal variability scales of the currents are really short than the oceanic ones. The recirculation time of the particles, inside the deep water formations areas, is around a hundreds years at Mediterranean scale, a really short climatic scale if compared with the Atlantic temporal scales of millenniums. The general view that grows up is that of a Mediterranean climatic system always interacting with the atmosphere that stores the information of the changes at the air-sea interface and modifies currents at the abyssal depths. This allows the Mediterranean, and then its western basin, to "react" really quickly to the changes of atmospheric forcing and then to be a "sensor" of the Earth climate. The study of the functioning of marine ecosystems and their response to external forcing is then controversial because really complex. The hydrological characteristics of the different water masses behave differently following depth and geographic position with different modifications in act. In the 30's two different behaviours have been observed, a constant increase in temperature and salinity in the deep and intermediate levels of the western Mediterranean and a more complicated variability of the eastern basin, followed by the climatological transient. What is sure it is then the observation of a phenomenon in the yearly '90s that, due to its dimension and speed, is one of those events characterised by a strong discontinuity: the so called climatological transient. This transient shows as the collapse of a system apparently stable can happen suddenly. In a few years the vertical structure of the basin has been completely modified. The possible reasons of the climatological phenomenon in the eastern basin have been widely described in the specialised literature (Malanotte-Rizzoli et al., 1999; Demirov and Pinardi 2002, Rupolo et al, 2003). This anomaly begun to propagate in the western basin (Schroeder et al., 2006; Schroeder et al., 2007, Schroeder et al., 2008). Actually it is difficult to forecast the effects of such an anomaly in the western Mediterranean even if the long times of run of the intermediate waters in the western basin probably will contribute to absorb it decreasing its effects. Vice versa the occurrence of such a phenomenon has underlined once more as the balances of a complex system can be strongly modified also by small variabilities of one of its components.

The temporal analysis of the analysed data does not permits to understand if these oscillations are characteristics of a natural state of the basin or, viceversa, if they represent an anomalous situation.

The cruise is part of a strategy for the periodic monitoring of this new hydrodynamic regime in order to evaluate the hydrodynamic and biogeochemical characteristic trends of the waters along the column and their interannual variabilities. For this reason the cruises have been repeated every year. Furthermore the biogeochemical anomalies N/P and the difference between the variables in different areas of the basin, with different hydrodynamic regimes, have been analysed.

Then in the area two sub-regional hydrodynamic numerical models are operative giving a 5-days forecast of the sea state of the central and western Mediterranean updated daily. These cruises are

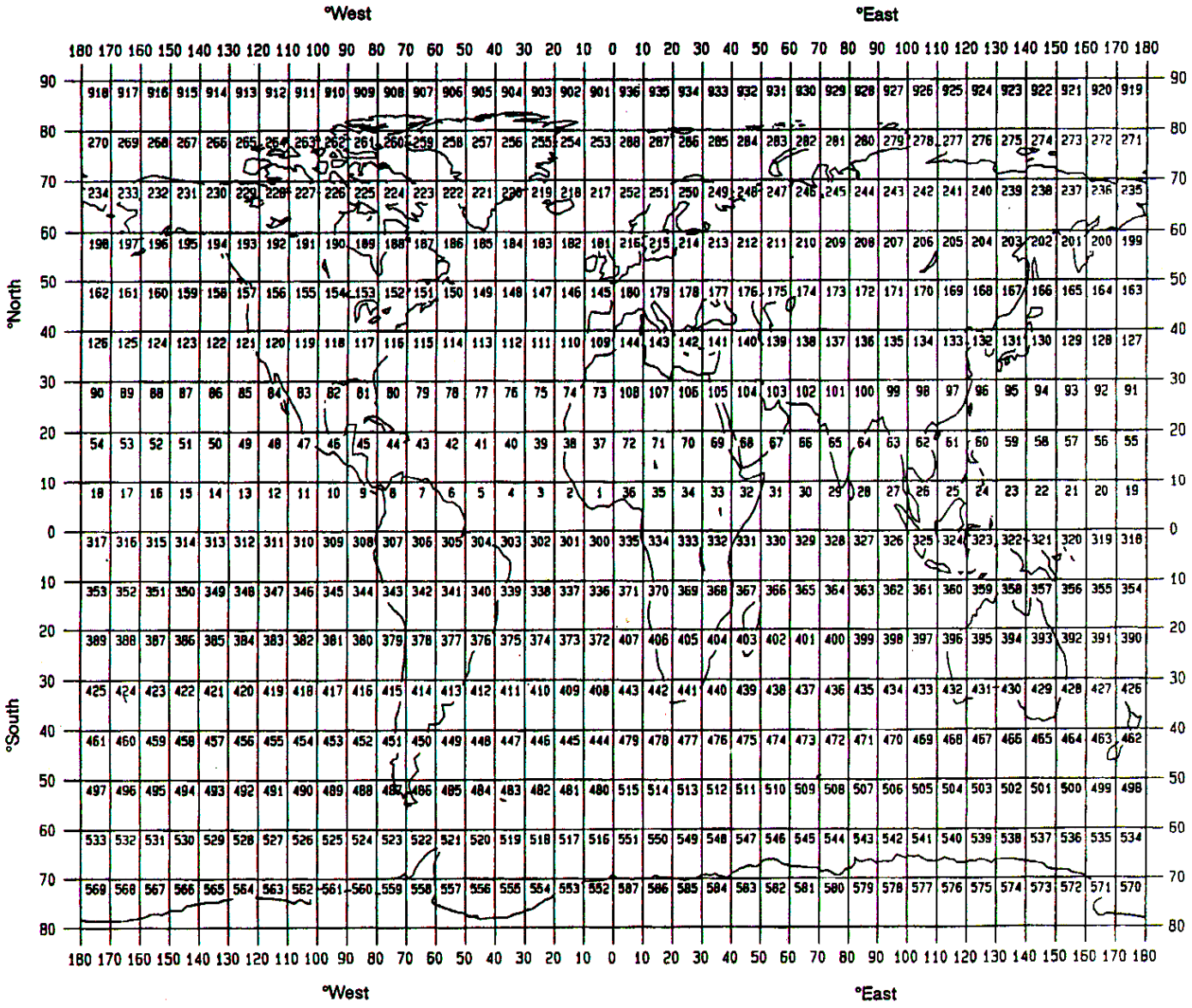
also organised in order to calibrate and validate the circulation models at sub-basin and coastal scales. Comparative studies with in-situ data, from satellite and models outputs will be used to evaluate the interannual variability of the dynamics at basin scale.
This cruise is strictly linked with the previous ones Medgoos1-13 (2000-2006), MedOc05, 06 (2005-2006), MedBio (2006), MedCO07 (2007), SESAME-IT4 and MedCO08 (2008), Tyrrhmounts and Sicily09 (2009), Venus1 and Bonifacio 2010-SIC (2010), Bonifacio 2011 (2011) where zonal trends of the hydrodynamic and biogeochemical characteristics of the water masses in the western basin.

Main hydrodynamic characteristics in the study areas

The **central Mediterranean** (Sardinia channel) is characterised by a really complicated bottom topography directly influencing on the water exchanges between the two Mediterranean basins (eastern and western). In the Sardinia Channel the threshold depth is about 1900 m. This allows the exchange of deep waters in the western Mediterranean.
The **Tyrrhenian sea** is linked both with the western Mediterranean as the eastern and is an intermediate basin whose southern part is linked to the central Mediterranean through a shallow channel permitting the passage of the LIW and of the tEMDW that, sinking at the entrance of the Tyrrhenian sea, origins the TDW that will move over the WMDW. The Opening Sicily-Sardinia is mainly formed by two channels with a wide intermediate plain. The deepest, in its central part, directly links the Tyrrhenian sea to the Sardinia Channel and to the rest of the western Mediterranean. All the water masses composing the water column from the surface to the bottom pass through it.
The **Algerian-Provencal area** represents a crucial region to understand the exchanges between different Mediterranean sub-basins (Ribotti et al., 2004; Santinelli et al, 2006; Puillat et al., 2006; Schroder et al., 2006), the Eastern and the Western. The region is interested by two different hydrodynamic regimes mainly driven by the wind at north (Gulf of Lions and Liguro-Provencal area) and from the mesoscale structures, mainly anticyclonic eddies for the instability of the Algerian Current, at south (Algerian area) playing a key role in the detachment of the LIW (Ribotti et al., 2004). Particularly the **Algerian area,** along the Algerian coast, is characterised by an abyssal plain 2500-2900 m deep and crossed by the AW (*Atlantic Water*) coming from the Gibraltar strait that mixes with the Mediterranean water originating the MAW (*Modified Atlantic Water*). Such a flux moves eastward (*Algerian Current)* along the north African coast with a meandering path due to the coastal morphology and whose closed meanders originate cyclonic and anticyclonic eddies (the latter named AEs – *Algerian Eddies*) with dimensions from 50 to 200 km in diameter and a "life" from a few days to some month. These eddies move eastward to the Sardinia Channel but, due to very shallow bathymetries, the deep eddies (until 1000 m) remain in the western basin circulating anticlockwise in the central-southern part of the Algerian-Provencal basin, while a large part of Atlantic water masses cross the Sicily Strait to the eastern basin.
Resuming, the study area is a very complex system with an almost sub-tropical climate. Furthermore in the central Mediterranean area is present the widest community of marine mammals and fishes of the whole Mediterranean basin.

Other interesting aspects regard the hydrological properties (temperature and salinity) of the deep and intermediate layers, that show a positive trend for some decades. The reasons of this trend are still unknown.

GEOGRAPHIC COVERAGE - INSERT 'X' IN EACH SQUARE IN WHICH DATA WERE COLLECTED



PARAMETER CODES

METEOROLOGY

M01	Upper air observations
M02	Incident radiation
M05	Occasional standard measurements
M06	Routine standard measurements
M71	Atmospheric chemistry
M90	Other meteorological measurements

PHYSICAL OCEANOGRAPHY

H71	Surface measurements underway (T,S)
H13	Bathythermograph
H09	Water bottle stations
H10	CTD stations
H11	Subsurface measurements underway (T,S)
H72	Thermistor chain
H16	Transparency (eg transmissometer)
H17	Optics (eg underwater light levels)
H73	Geochemical tracers (eg freons)
D01	Current meters
D71	Current profiler (eg ADCP)
D03	Currents measured from ship drift
D04	GEK
D05	Surface drifters/drifting buoys
D06	Neutrally buoyant floats
D09	Sea level (incl. Bottom pressure & inverted echosounder)
D72	Instrumented wave measurements
D90	Other physical oceanographic measurements

CHEMICAL OCEANOGRAPHY

H21	Oxygen
H74	Carbon dioxide
H33	Other dissolved gases
H22	Phosphate
H23	Total - P
H24	Nitrate
H25	Nitrite
H75	Total - N
H76	Ammonia
H26	Silicate
H27	Alkalinity
H28	PH
H30	Trace elements
H31	Radioactivity
H32	Isotopes
H90	Other chemical oceanographic measurements

MARINE CONTAMINANTS/POLLUTION

P01	Suspended matter
P02	Trace metals
P03	Petroleum residues
P04	Chlorinated hydrocarbons
P05	Other dissolved substances
P12	Bottom deposits
P13	Contaminants in organisms
P90	Other contaminant measurements

MARINE BIOLOGY/FISHERIES

B01	Primary productivity
B02	Phytoplankton pigments (eg chlorophyll, fluorescence)
B71	Particulate organic matter (inc POC, PON)
B06	Dissolved organic matter (inc DOC)
B72	Biochemical measurements (eg lipids, amino acids)
B73	Sediment traps
B08	Phytoplankton
B09	Zooplankton
B03	Seston
B10	Neuston
B11	Nekton
B13	Eggs & larvae
B07	Pelagic bacteria/micro-organisms
B16	Benthic bacteria/micro-organisms
B17	Phytobenthos
B18	Zoobenthos
B25	Birds
B26	Mammals & reptiles
B14	Pelagic fish
B19	Demersal fish
B20	Molluscs
B21	Crustaceans
B28	Acoustic reflection on marine organisms
B37	Taggings
B64	Gear research
B65	Exploratory fishing
B90	Other biological/fisheries measurements

MARINE GEOLOGY/GEOPHYSICS

G01	Dredge
G02	Grab
G03	Core - rock
G04	Core - soft bottom
G08	Bottom photography
G71	In-situ seafloor measurement/sampling
G72	Geophysical measurements made at depth
G73	Single-beam echosounding
G74	Multi-beam echosounding
G24	Long/short range side scan sonar
G75	Single channel seismic reflection
G76	Multichannel seismic reflection
G26	Seismic refraction
G27	Gravity measurements
G28	Magnetic measurements
G90	Other geological/geophysical measurements