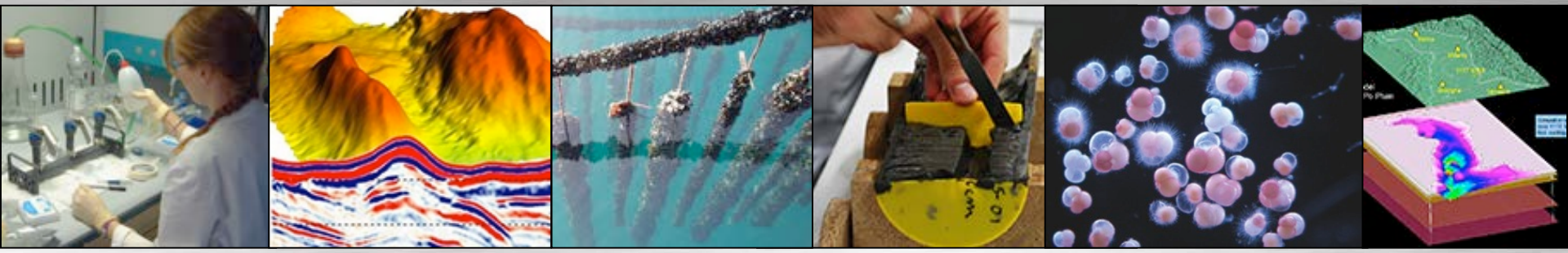
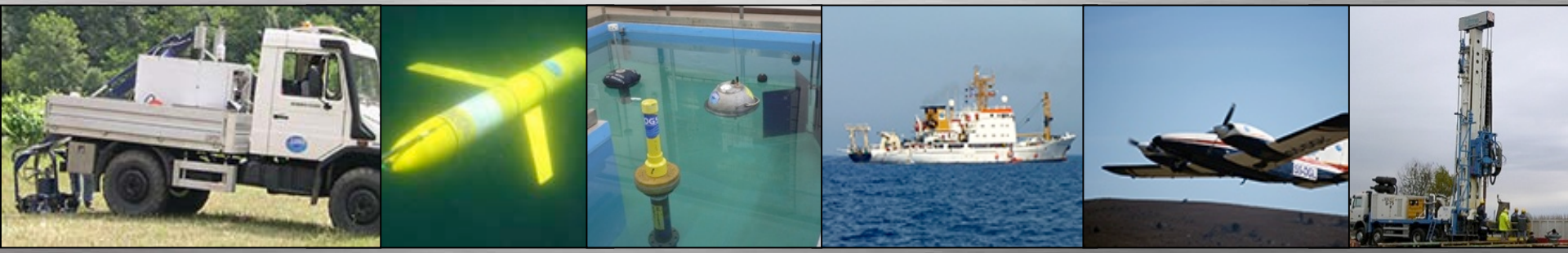
OGS research vessels

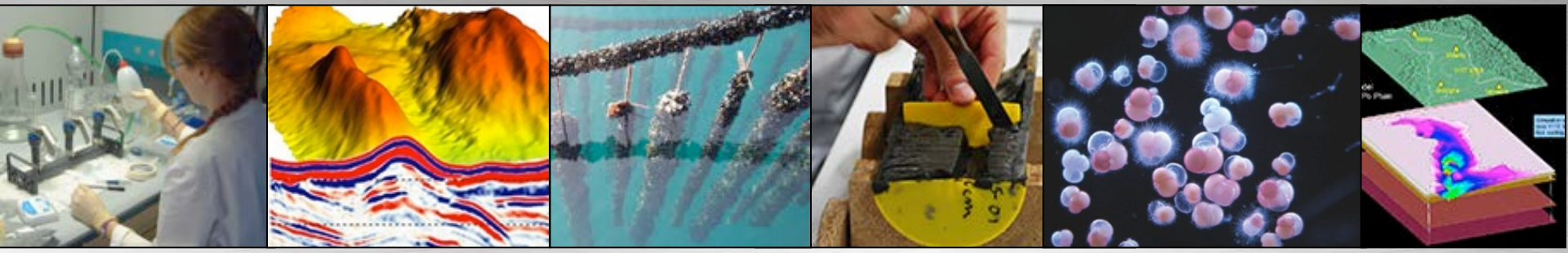
Overview, operation and plans for a new vessel



OGS is an internationally-oriented public research institute funded and monitored by the Italian Ministry of Education and Research.

OGS' roots date back to the School of Astronomy and Navigation founded in Trieste by empress Maria Theresa of Austria in 1753.

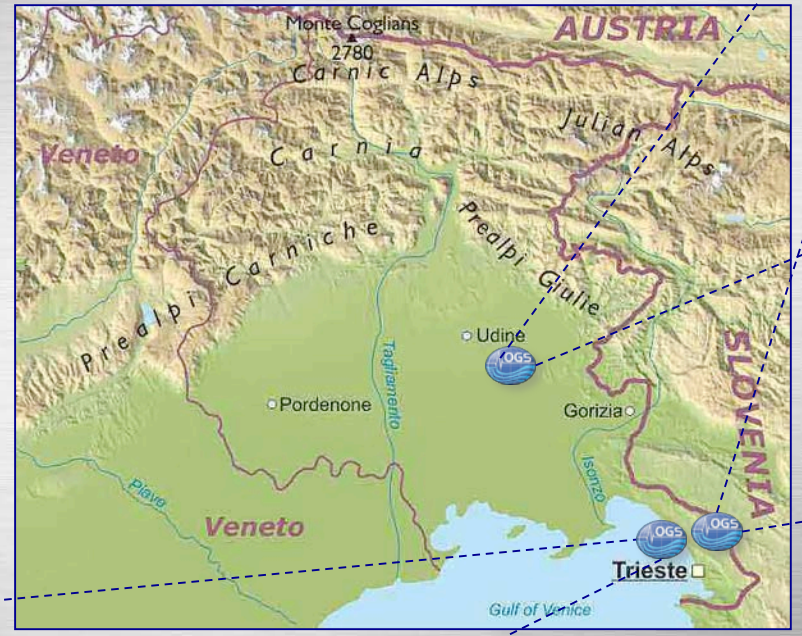


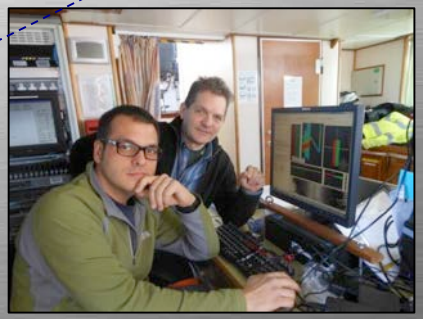


The Institute operates and develops its mission within the Worldwide Research Area at international level with particular focus on the basic and applied research fields such:

- **Oceanography (physics, chemistry and biology);**
- **Geophysics and marine geology;**
- **Applied and exploration geophysics.**

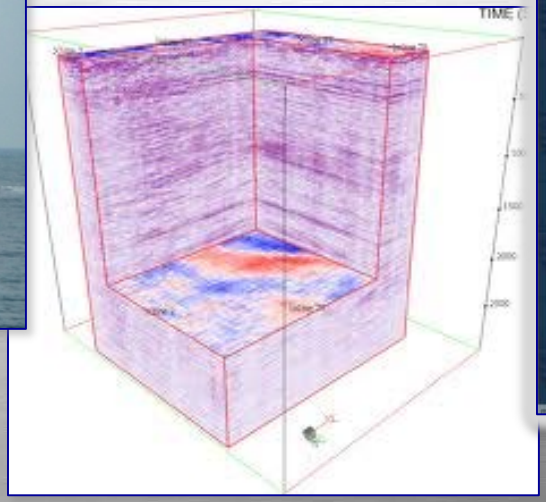
Located in Trieste (*Borgo Grotta Gigante - Marina di Aurisina*) and Udine

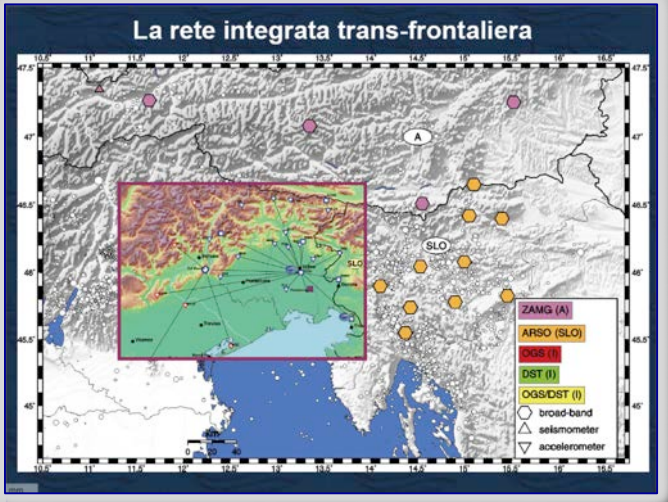




RESEARCH SECTIONS

- Infrastructures
- Geophysics
- Seismology
- Oceanography





OVERVIEW

AERIAL OPERATIONS

- REMOTE SENSING
- CARTOGRAPHY

OFFSHORE OPERATIONS

- OCEANOGRAPHY
- MARINE BIOLOGY
- MARINE GEOLOGY
- GEOPHYSICS

LAND & INSHORE OPERATIONS

- GEOPHYSICS
- COASTAL GEOLOGY

DATA MANAGEMENT

- PROCESSING
- ARCHIVING
- VALORIZATION
- DISSEMINATION

INSHORE

THE MINOR VESSELS

Sicurezza & Soccorso - http://www.sicurezzaesoccorso.com - Image © Davide & Andrea Pialorsi - 2006

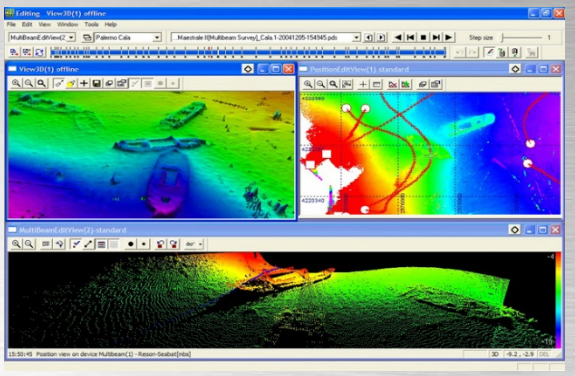
Class N 500	
Type	Pilothouse
Length	9.10 m
Width	2.95 m
Draft	1.50 m
Engine	2 x AIFO 8061 SM

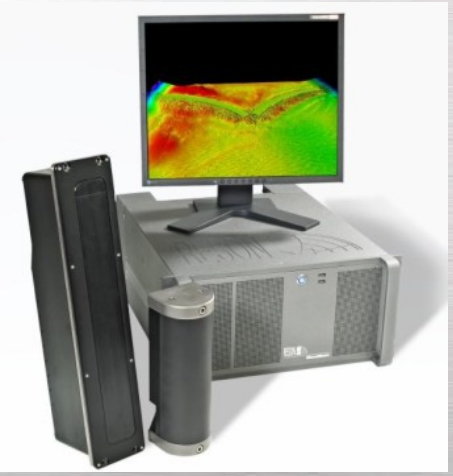
RUBBER DINGHY BSC 50	
Length	5.00 m
Width	2.40 m
Draft	0.30 m
Engine	SUZUKI 40 HP

INSHORE GEOPHYSICS

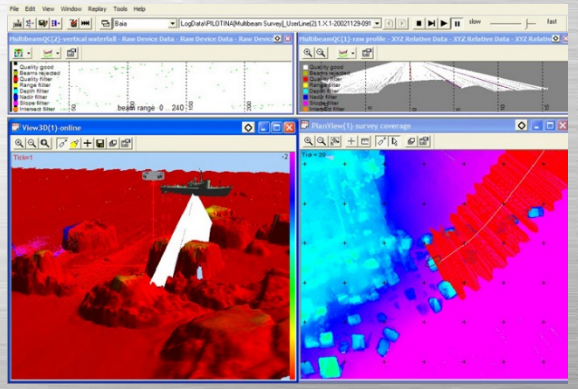
SINGLE AND MULTIBEAM ECHOSOUNDING

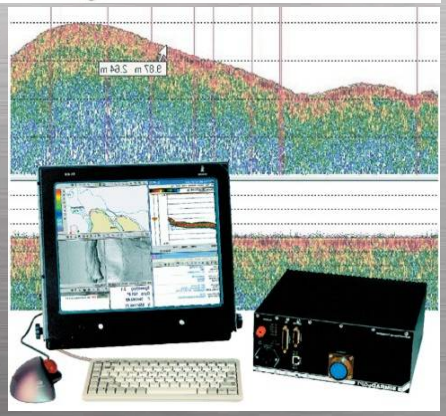
RESON SEABAT 8125	
Operating frequency	455 kHz
Number of beams	240
Max swath	120°
Resolution	6 mm
Depth range	0 - 100 m





RESON SEABAT 7125	
Operating frequency	200 - 400 kHz
Number of beams	512
Max swath	140°
Resolution	6 mm
Depth range	0- 400 m



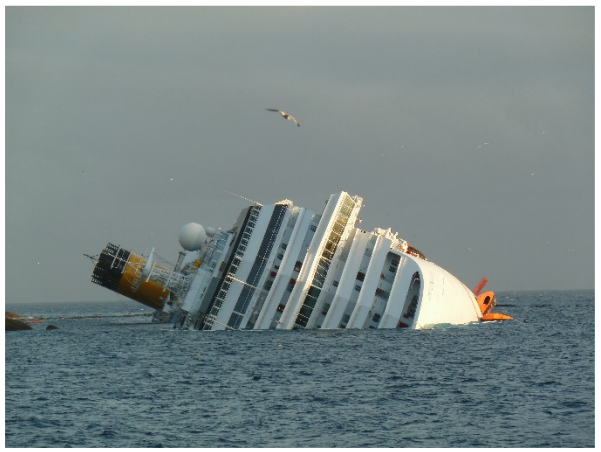


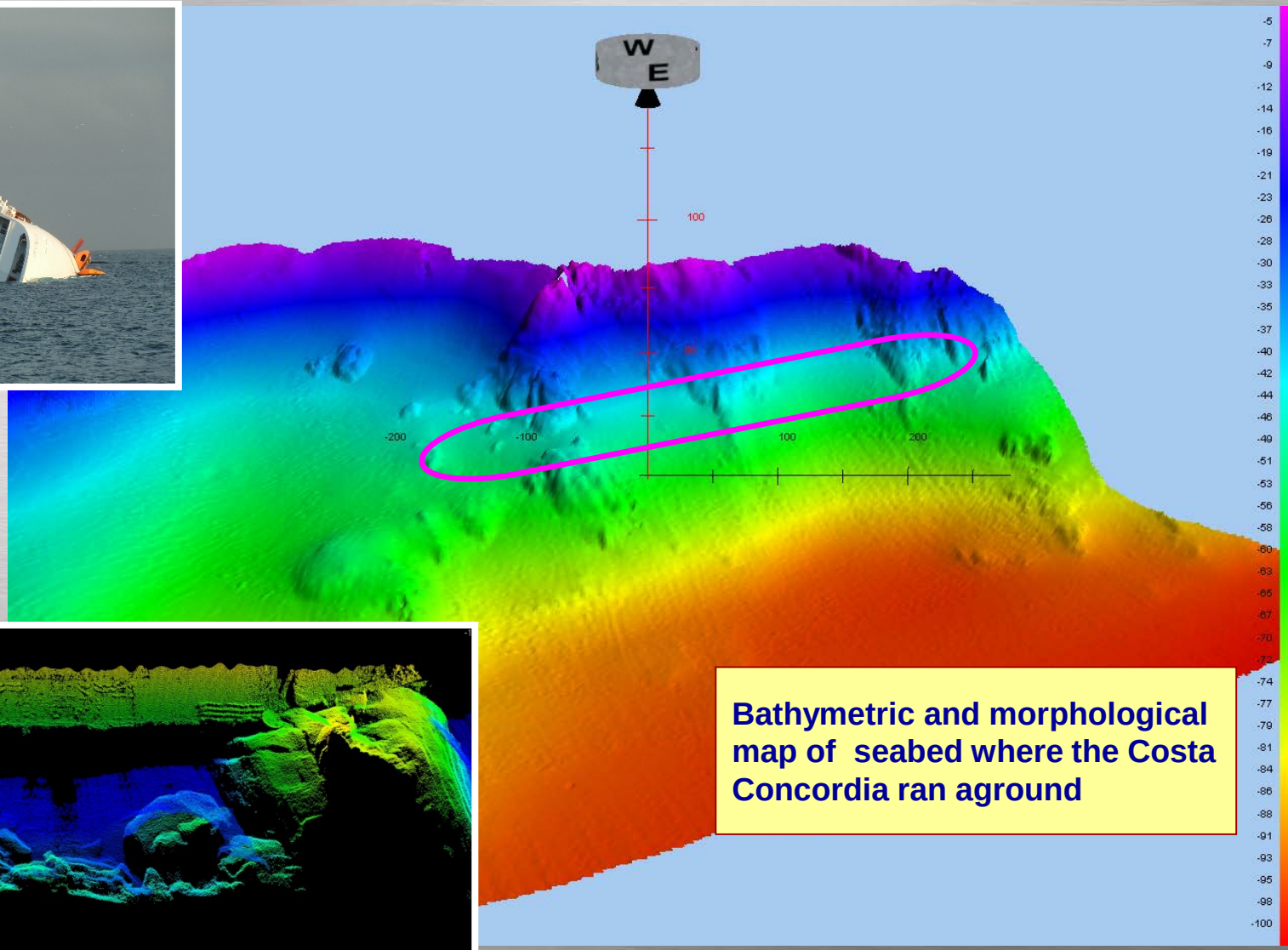
KONGSBERG EA400	
Operating frequency	50 - 200 kHz
Beam width alongtrack	7°
Beam width acrosstrack	10°-16°
Accuracy	1 / 5 cm

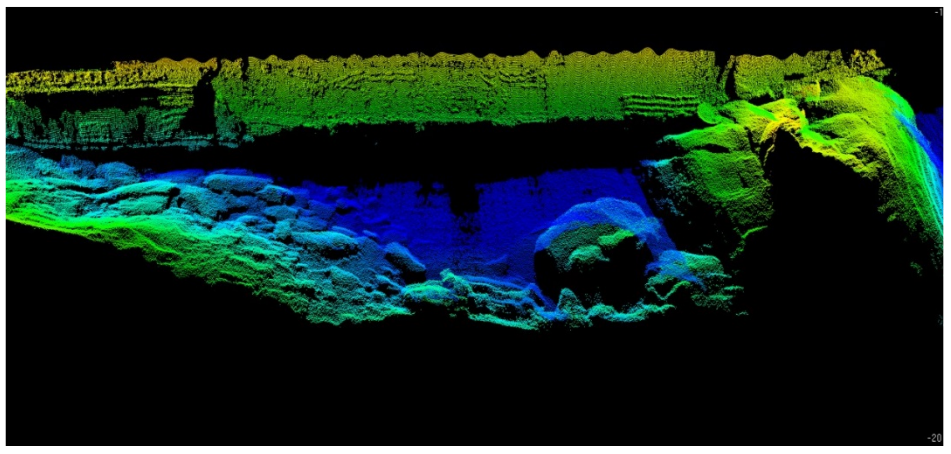
Acquisition soft.	PDS2000
Processing soft.	PDS2000

INSHORE GEOPHYSICS

MULTIBEAM ECHOSOUNDING







Bathymetric and morphological map of seabed where the Costa Concordia ran aground

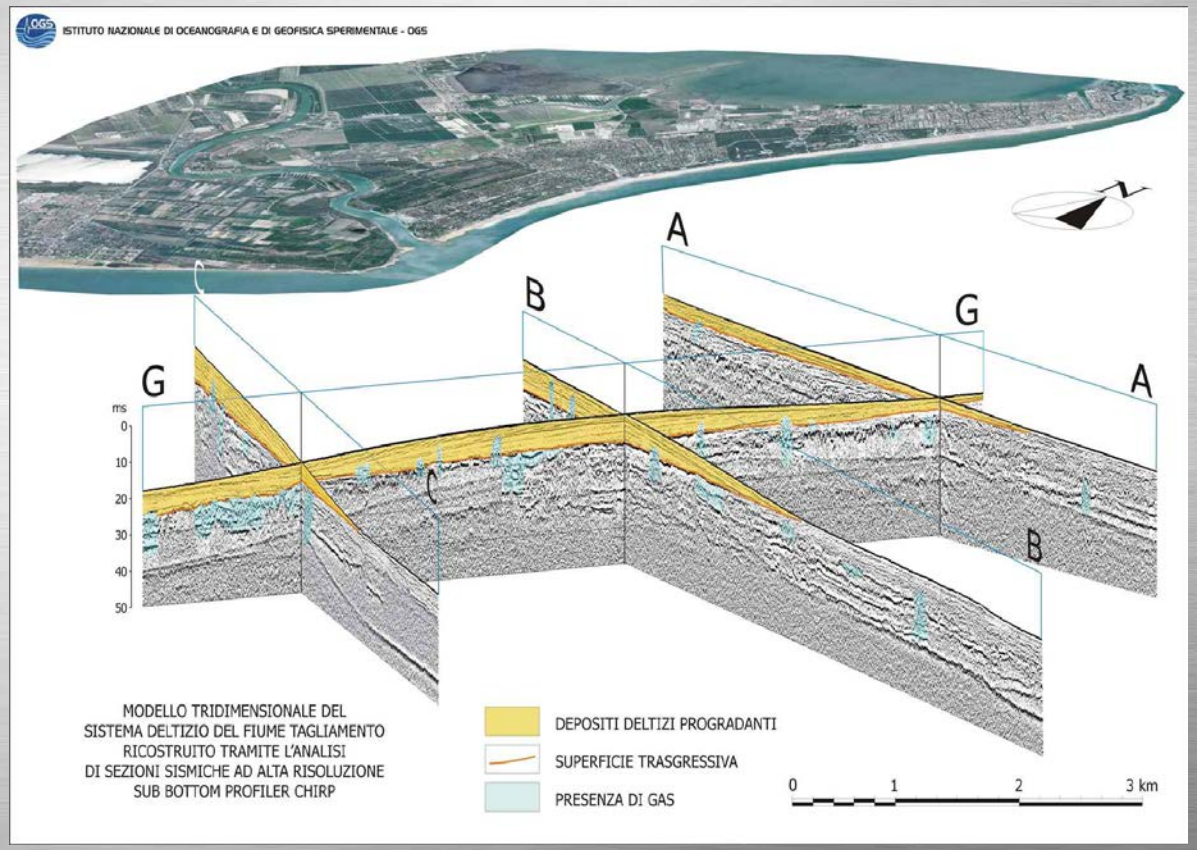
Courtesy of D. Cotterle, E. Gordini, and M. Deponte

INSHORE GEOPHYSICS

SUB BOTTOM PROFILING

EDGETECH 3200 XS	
Frequency range	2 ÷ 12 kHz
Pulse type	FM
Pulse length	20 ÷ 40 ms
Beam width	16° ÷ 32°
Vertical resolution	8 ÷ 20 cm
Penetration	20 ÷ 200 m
Max depth	300 m

Sub-bottom profiler CHIRP investigations of Tagliamento River delta (northern Adriatic Sea).



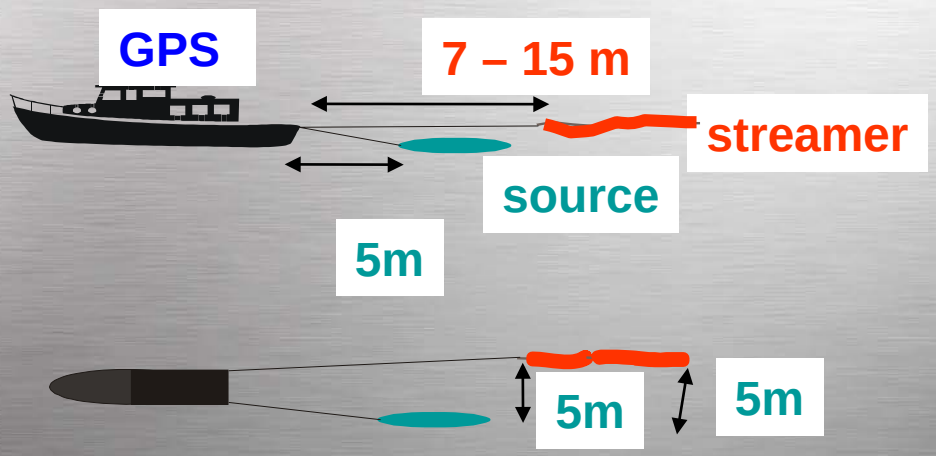
Tridimensional model of the Tagliamento River delta system from sub bottom chirp analyses. Courtesy of E. Gordini

INSHORE GEOPHYSICS

VERY HIGH RESOLUTION SEISMIC

SOURCE	
Model	Boomer
Pulse emission	2 – 8 pulse / sec
Upper frequency limit	9 kHz
Resolution	20 – 40 cm
RECEIVER	
Single channel streamer	

TYPICAL CONFIGURATION



INSHORE GEOPHYSICS

MULTICHANNEL SEISMIC

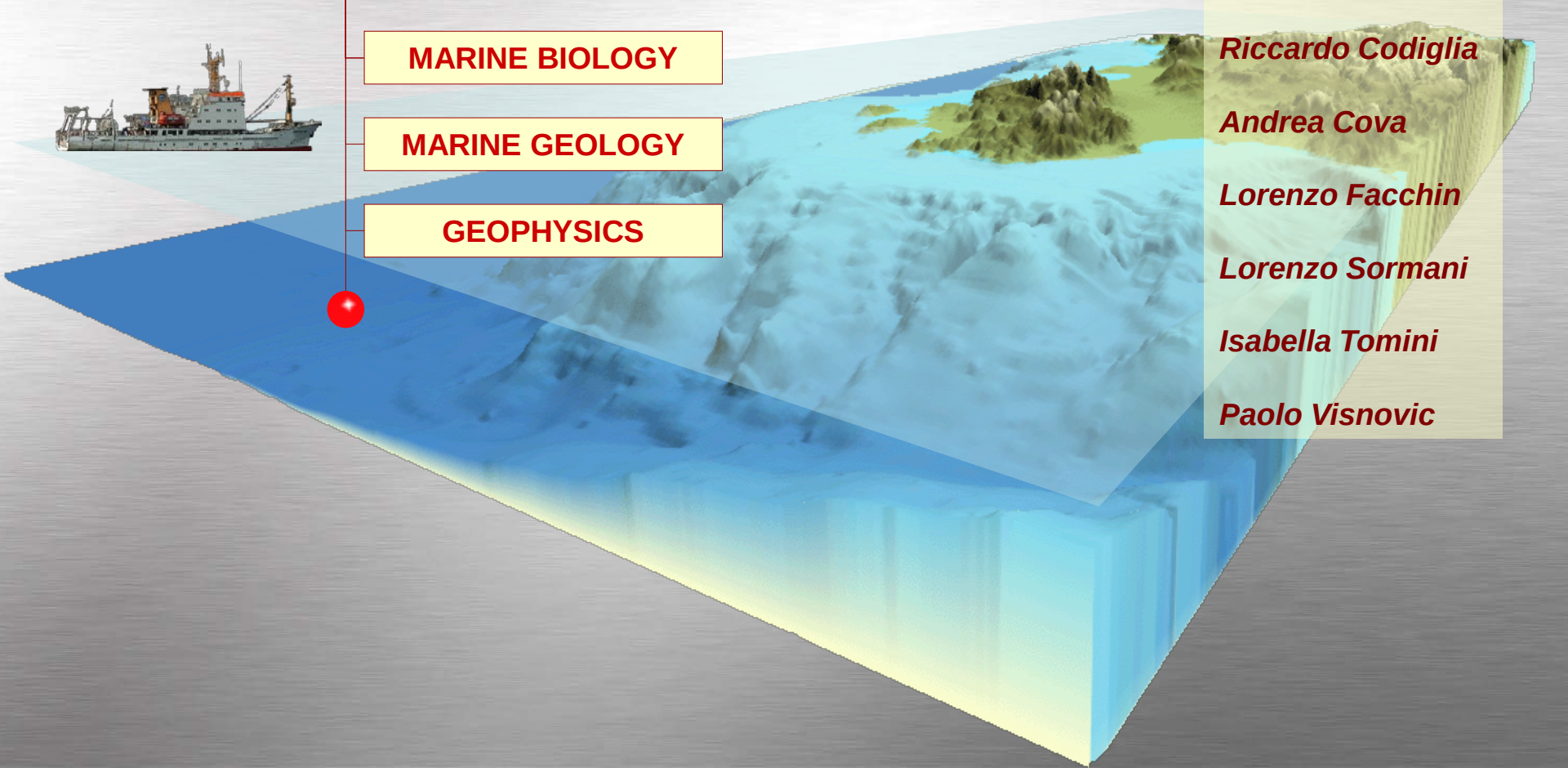
DAQ LINK II SYSTEM	
Channel number	24
Sampling rate	1/48 - 8 ms
Resolution	24 bit
Dynamic Range	144 dB
Data format	SEG2 - SEGY
GPS	Integrated

STREAMER	
Channel number	24
Channel interval	5 m
Length	120 m
Hydrophones	MARK p-44

OFFSHORE

OFFSHORE OPERATIONS

- OCEANOGRAPHY
- MARINE BIOLOGY
- MARINE GEOLOGY
- GEOPHYSICS



ADEST

Fabrizio Zgur

Daniela Accettella

Andrea Caburlotto

Riccardo Codiglia

Andrea Cova

Lorenzo Facchin

Lorenzo Sormani

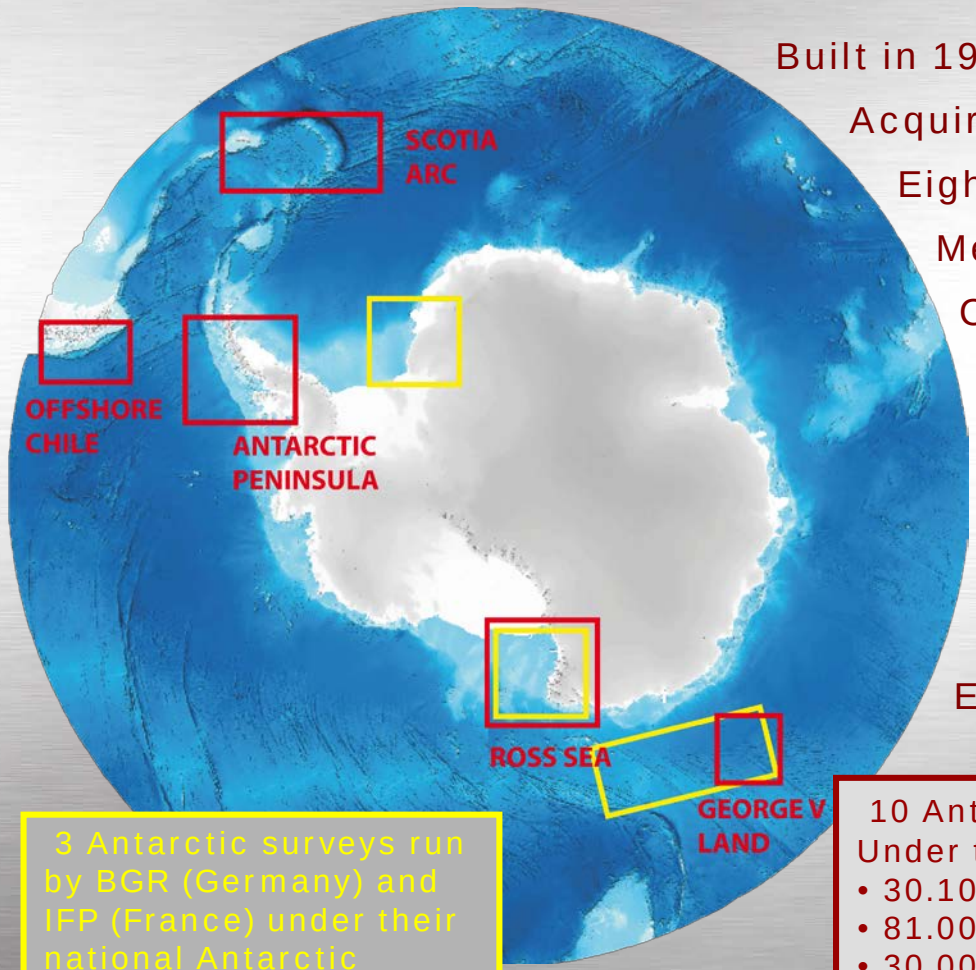
Isabella Tomini

Paolo Visnovic

OFFSHORE

OGS EXPLORA: A BRIEF CV

ANTARCTIC EXPEDITIONS



Built in 1973 in Kiel, Germany

Acquired by OGS in 1987

Eight PNRA antarctic cruises from 1988 to 1997

Mediterranean CROP Project

Chartered to Western Geophysical in 1997

Permanently back to OGS in 2000

Refitting (MBES, SBP, ADCP etc...) in 2002

Latest PNRA cruises in 2004 and 2006

First industrial survey in Greenland in 2007

First IPY polar survey (EGLACOM) in 2008

Enters the EUROFLEETS Project in 2010

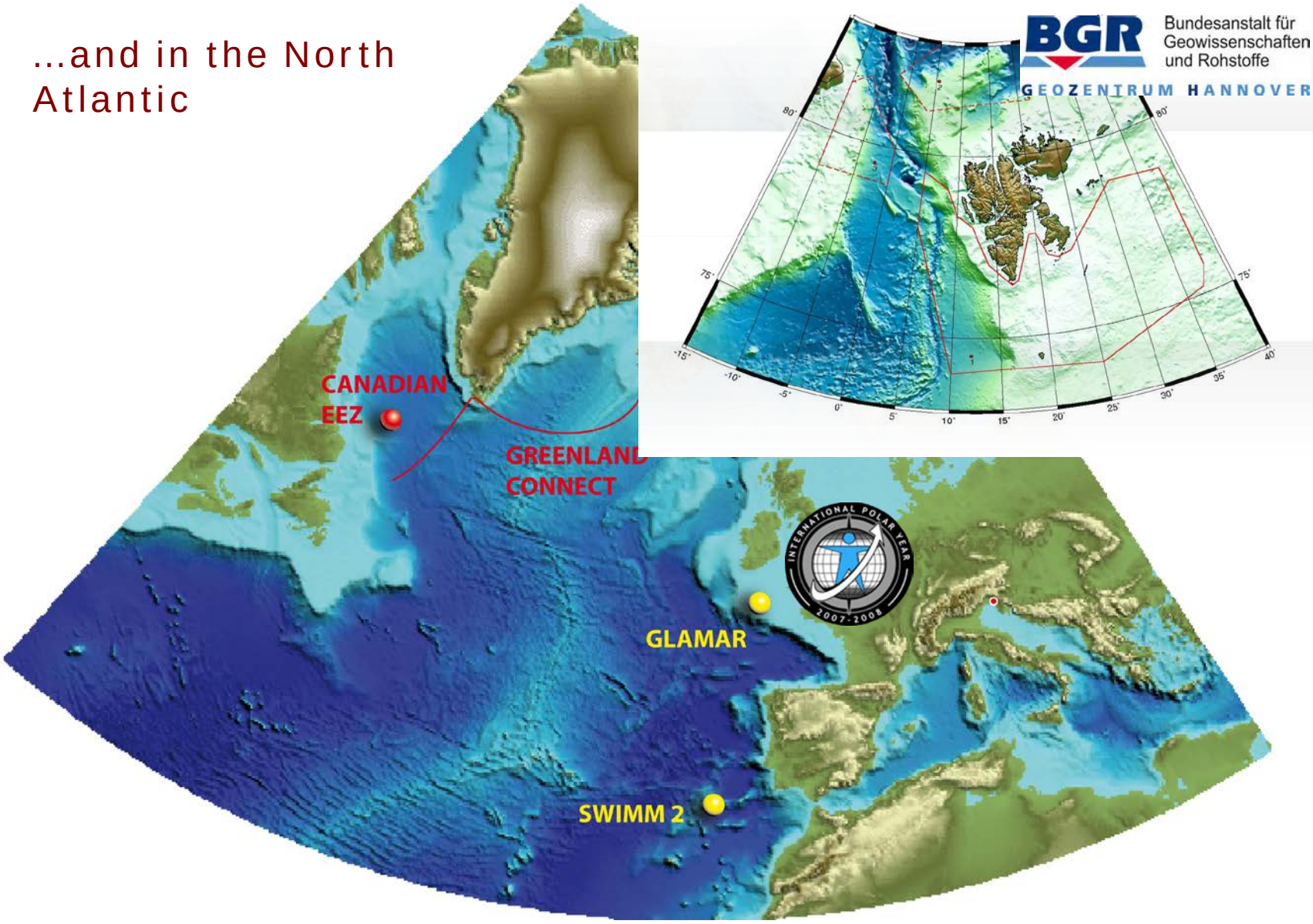
3 Antarctic surveys run by BGR (Germany) and IFP (France) under their national Antarctic Programs (1978-1982):
•17.000 km of MCS data

10 Antarctic surveys run by OGS Under the PNRA:
- 30.100 km of MCS data (1988-2006)
- 81.00 kmq of MB data (2004-2006)
- 30.000 km of Gravity data
- Gravity cores and grabs

OFFSHORE

OGS EXPLORA: A BRIEF CV

...and in the North Atlantic



OFFSHORE

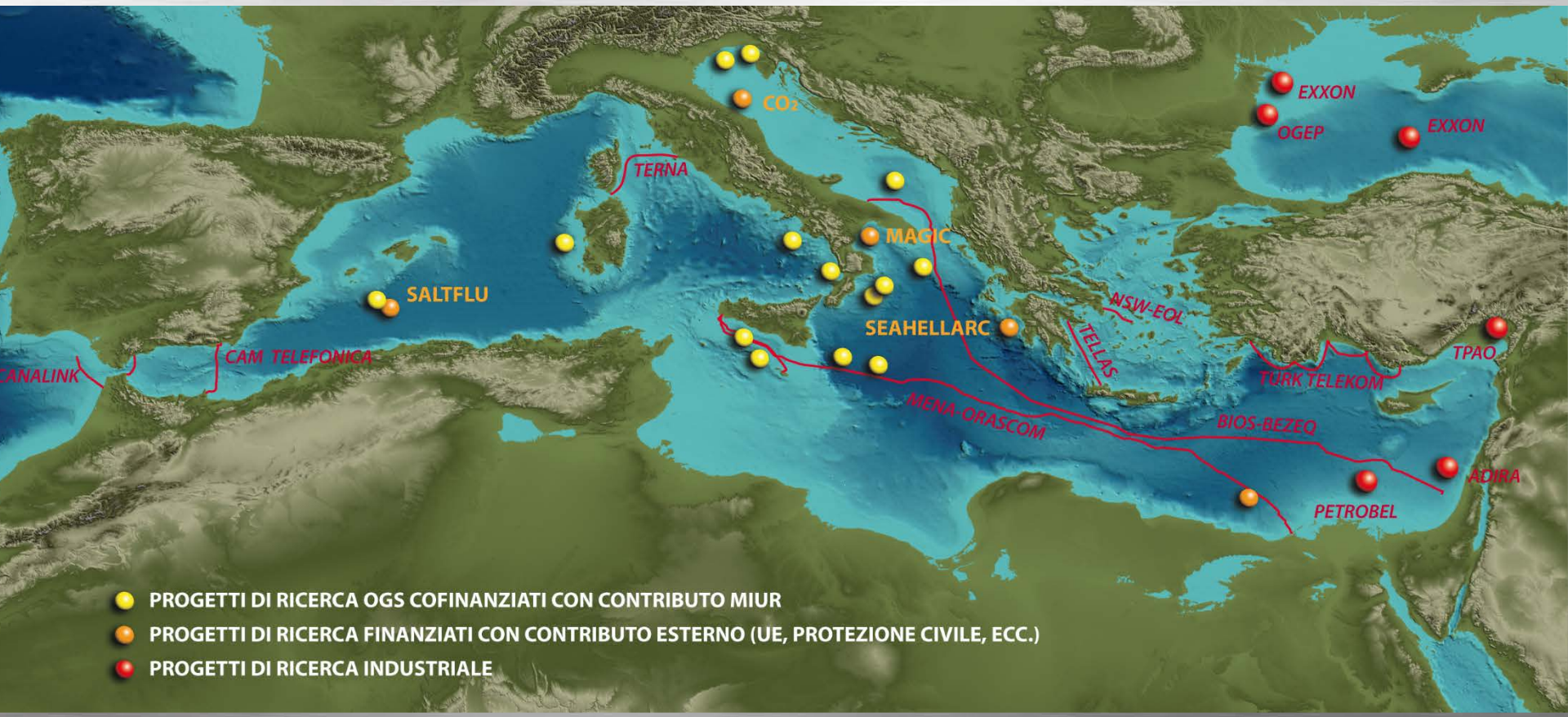
OGS EXPLORA: A BRIEF CV

2005-2015
RESEARCH AND SERVICES IN THE MEDITERRANEAN...

OFFSHORE

OGS EXPLORA: A BRIEF CV

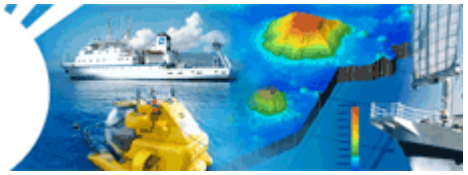
2005-2015
RESEARCH AND SERVICES IN THE MEDITERRANEAN...



THE EUROPEAN RESEARCH FLEETS

Eurofleets

Towards an Alliance
of European Research Fleets



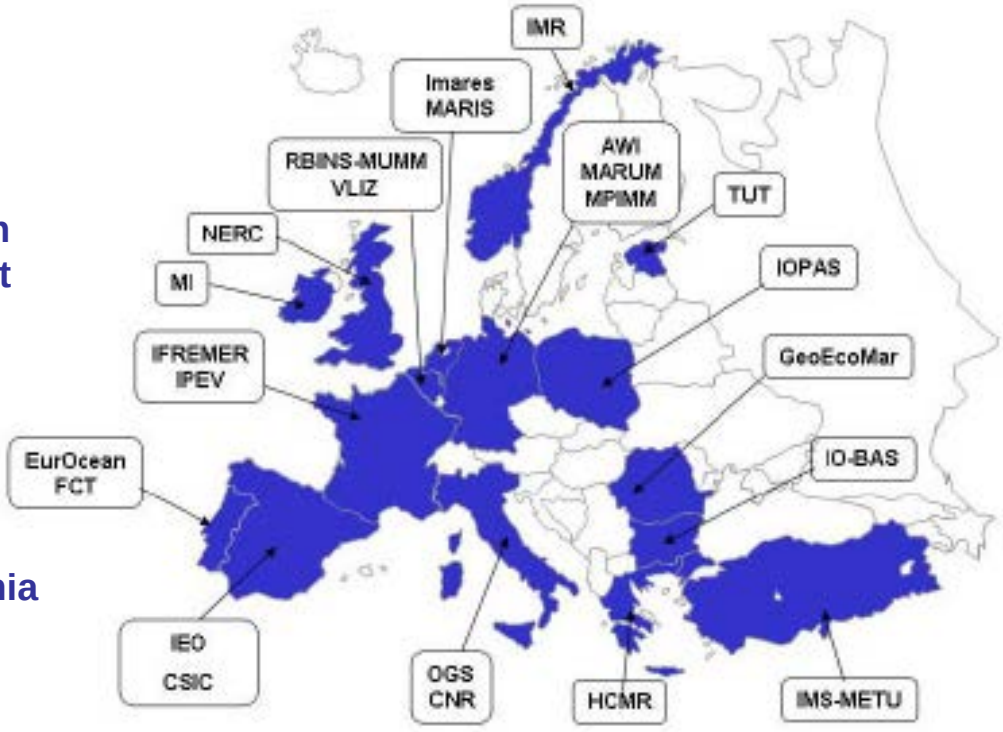
24 marine institutes, universities, foundations and SMEs, + 1 associated partner from 16 European countries, agree to propose together their research vessels, associated equipment,

and their know how within the EUROFLEETS project.

EUROFLEETS Coordinator: Ifremer, France

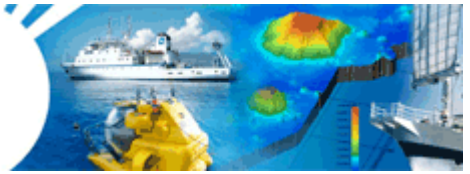
OBJECTIVES

- **define a common strategic vision for European research fleets and associated heavy equipment (e.g. underwater vehicles as ROV and AUV);**
- **use more efficiently the existing European Ocean/Global and Regional fleets, and develop their interoperability capacities;**
- **facilitate a wider sharing of knowledge and technologies across fields and between academia and industry;**



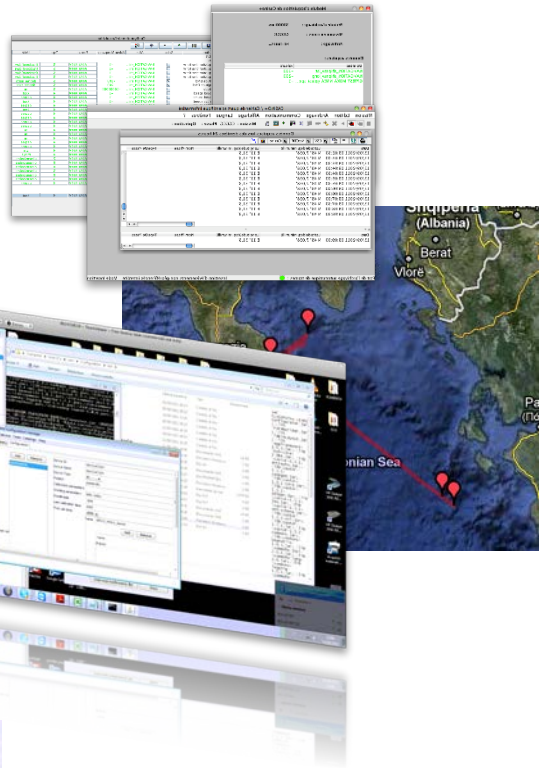
THE EUROPEAN RESEARCH FLEETS

Eurofleets Towards an Alliance of European Research Fleets

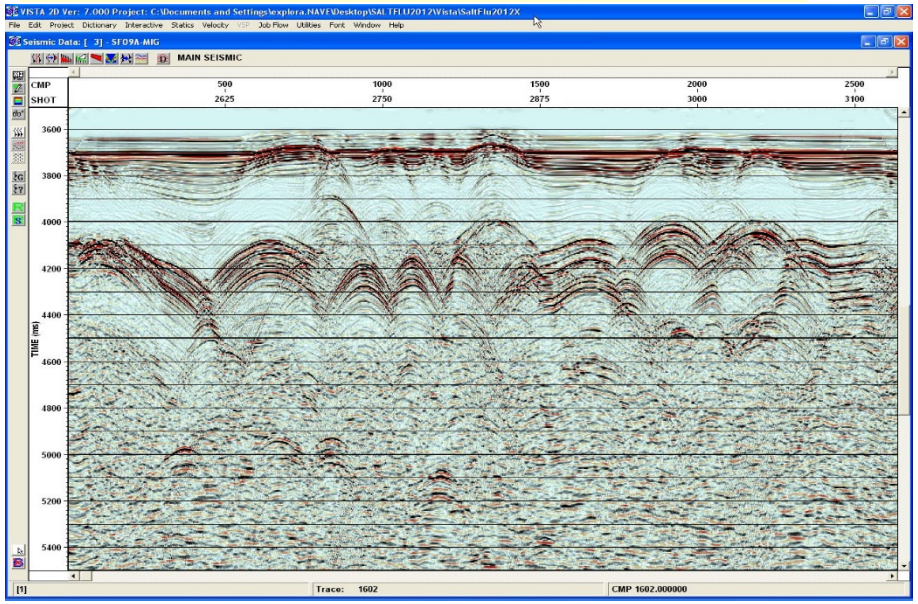


THE SALTFLU PROJECT (R. Urgeles, A. Camerlenghi)

To understand the influence of the thick salt layer of the Messininan Evaporites on pore fluid circulation during basin evolution in post-Messinian time (pre-Messinan *vs* post Messinian origin of fluids).



SALTFLU CRUISE, June-July 2012



Eurofleets (P. Diviacco)

- **Development of a logging tool**
- **Software that records all events and underway data of a survey**
- **Will be installed on the whole fleet**

OFFSHORE

OGS EXPLORA : COVERED FIELDS

Meteorological Measurements

OCEANOGRAPHY

Water Physical Properties

MARINE BIOLOGY

Water Acoustic Profiling

GEOPHYSICS

MARINE GEOLOGY

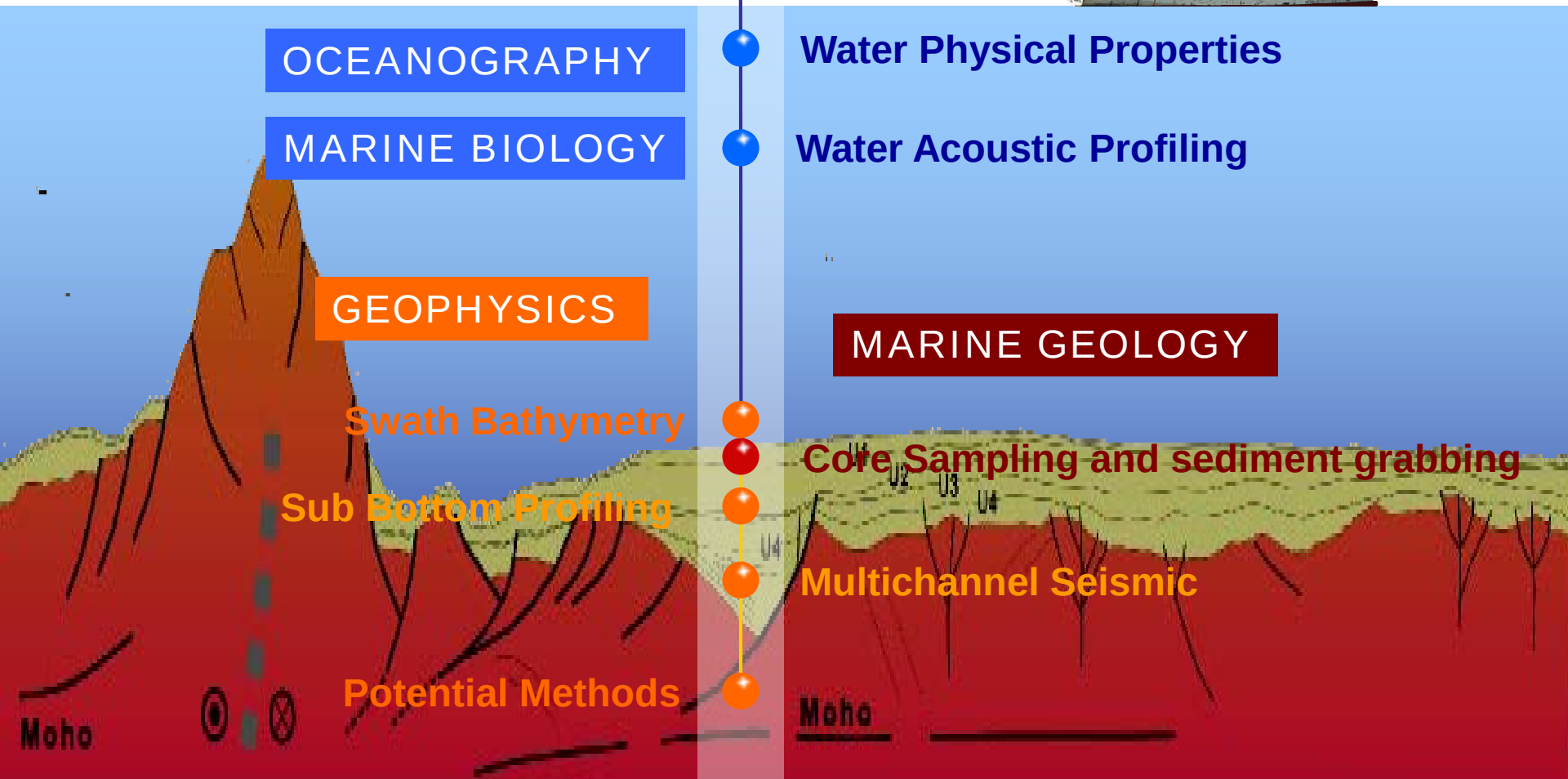
Swath Bathymetry

Core Sampling and sediment grabbing

Sub Bottom Profiling

Multichannel Seismic

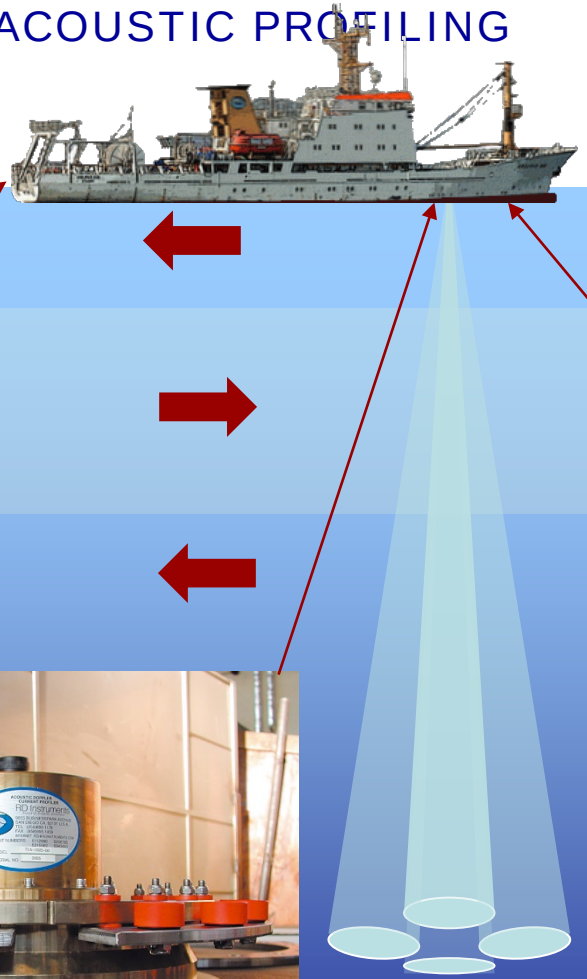
Potential Methods



OFFSHORE OCEANOGRAPHY & MARINE BIOLOGY

WATER PROPERTIES AND ACOUSTIC PROFILING

ROSETTE & CTD

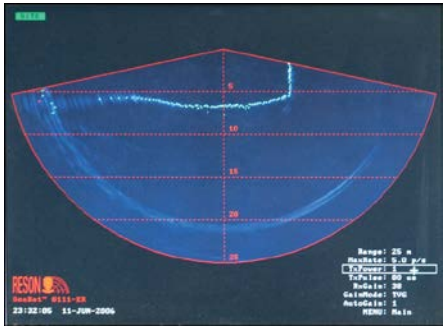


THERMOSALINOGRAPH

ACOUSTIC DOPPLER CURRENT PROFILER (ADCP)

OFFSHORE GEOPHYSICS

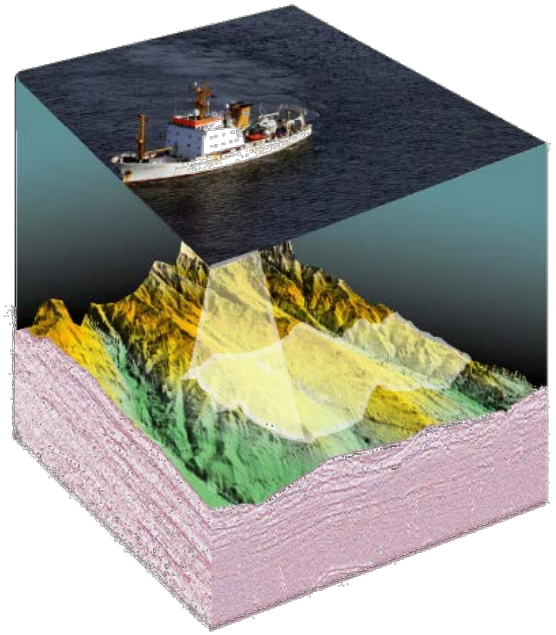
MULTIBEAM ECHOSOUNDING



RESON SEABAT 8111	
Operating frequency	100 kHz
Beamwidth across track	1.5°
Beamwidth along track	1.5°
Max swath	150°
Max swath coverage	7 x water depth
Depth range	20-600 m

RESON SEABAT 7150	
Operating frequency	12 kHz
Number of beams	880
Beamwidth	variable
Max swath coverage	5 x water depth
Pitch / roll compensation	+ / - 10°
Depth range	50 - 6000 m

Acquisition software	PDS2000
Processing software	PDS2000



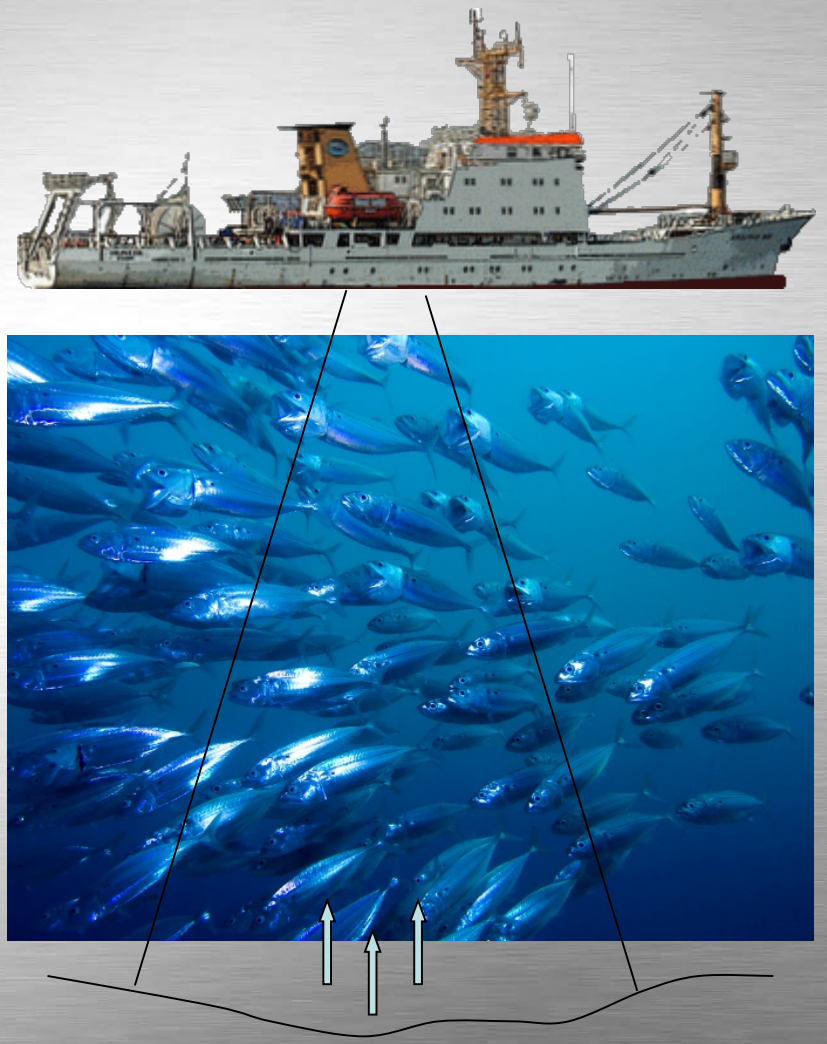
APPLICATIONS
GEOMORPHOLOGY
NEOTECTONICS
FLUID ESCAPES
SLOPE STABILITY STUDIES
WELL SITE SURVEY
CABLE SURVEY

OFFSHORE GEOPHYSICS

FLUID ESCAPE

FISHERIES

ENVIRONMENTAL MONITORING



OFFSHORE GEOPHYSICS

SUB BOTTOM PROFILING

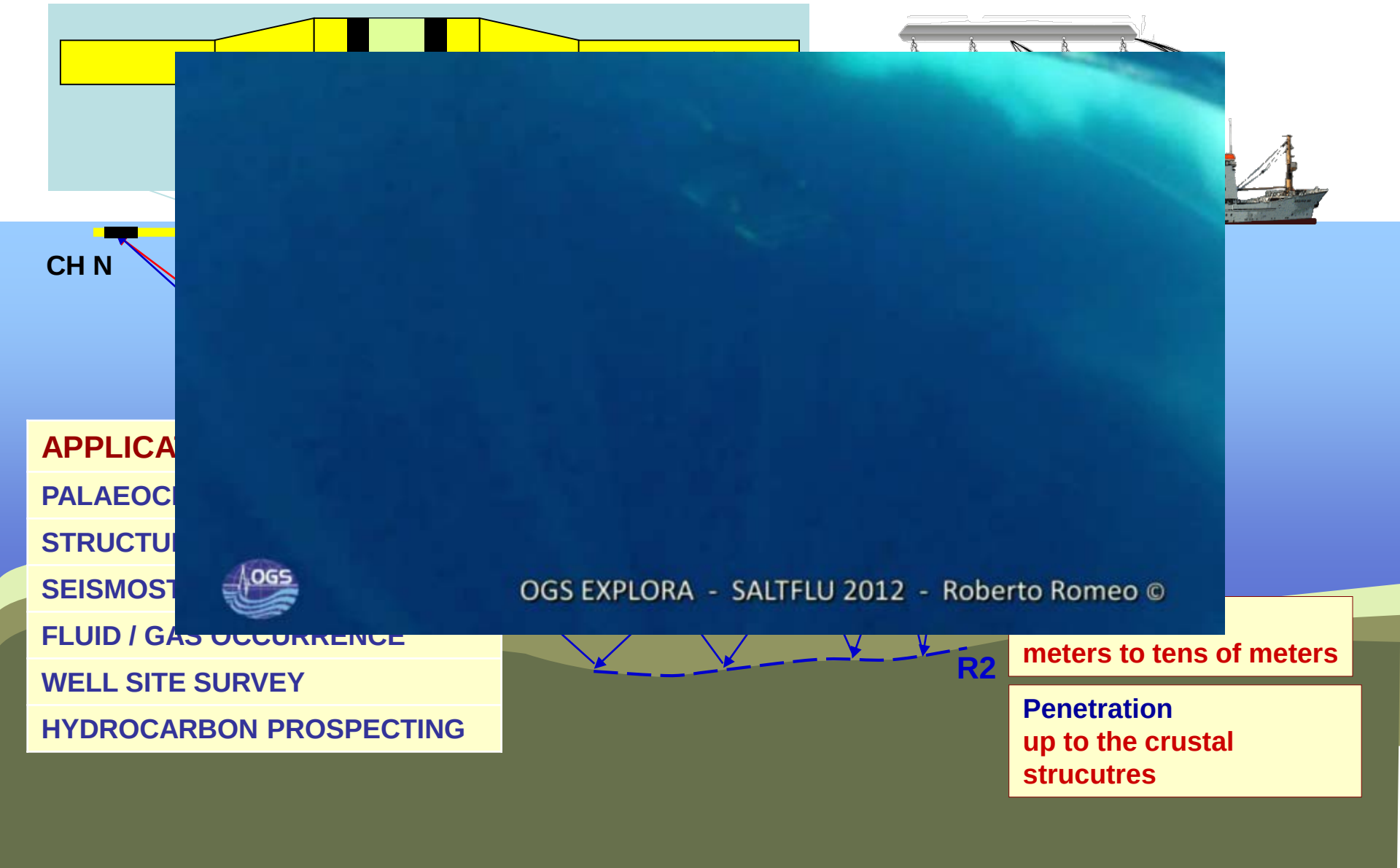
BENTHOS DATASONIC CHIRP II	
Operating sweep frequency	2- 7 kHz
Resolution	Decimetric
Penetration	10s of m
Number of transducers	16
Ping rate	Variable
Sweep rate	Variable
Acquisition software	Swan PRO

16 HULL MOUNTED TRANSDUCERS

APPLICATIONS
SEABED CLASSIFICATION
NEOTECTONICS
FLUID ESCAPES
SLOPE STABILITY STUDIES
WELL SITE SURVEY
CABLE SURVEY

OFFSHORE GEOPHYSICS

MULTICHANNEL SEISMIC



APPLICA

- PALAEOC
- STRUCTU
- SEISMOST
- FLUID / GAS OCCURRENCE
- WELL SITE SURVEY
- HYDROCARBON PROSPECTING

meters to tens of meters

Penetration
up to the crustal strucutres

OFFSHORE GEOPHYSICS

MULTICHANNEL SEISMIC

Very High Resolution System

GEOMETRICS CNT2	
Channel number	96
Sampling rate	1/48 - 8 ms
Resolution	24 bit
Dynamic Range	144 dB
Data format	SEG2 - SEGY
GEOEL GEOMETRICS DIGITAL STREAMER	
Channel number	96
Channel interval	3.125 m
Length	300 m
Hydrophones	MARK p-44

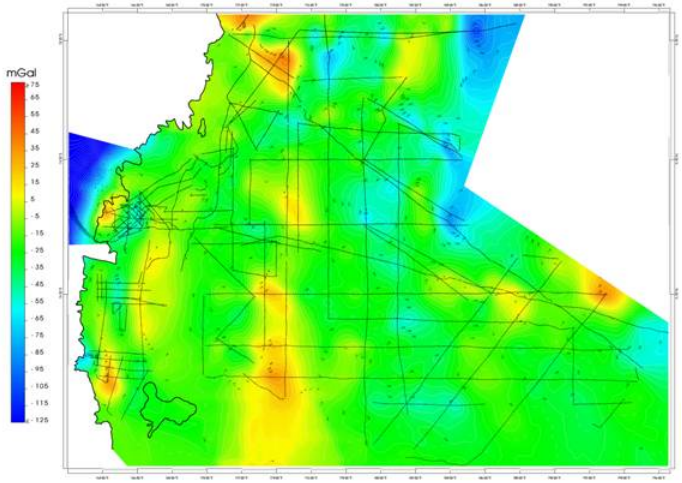
High Resolution System

SERCEL????	
Channel number	120
Sampling rate	1/8 - 4 ms
Resolution	24 bit
Dynamic Range	136 dB
Data format	SEG2 - SEGY
GEOEL GEOMETRICS DIGITAL STREAMER	
Channel number	120
Channel interval	12.5 m
Length	1500 m
Hydrophones/Ch	4

OFFSHORE GEOPHYSICS

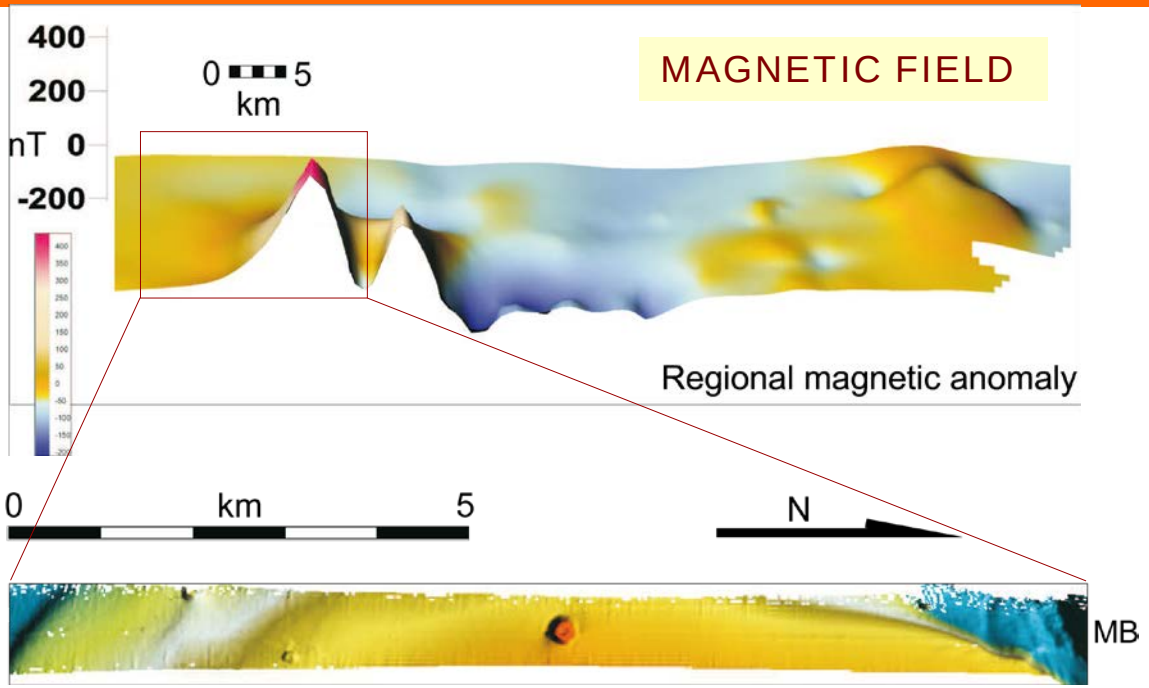
POTENTIAL METHODS

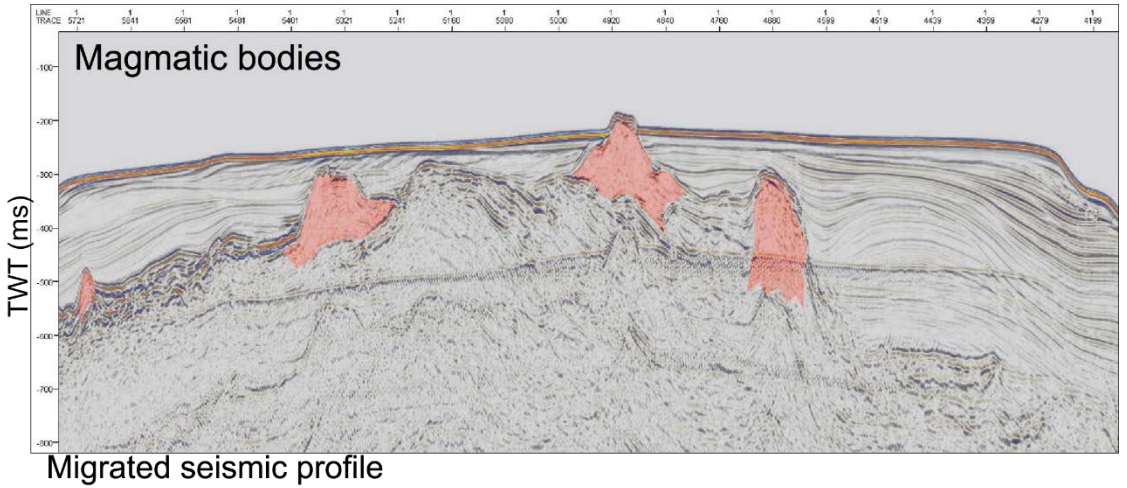
GRAVITY FIELD



Ross Sea Gravity Map (by C. Zanolla)

MAGNETIC FIELD





Migrated seismic profile

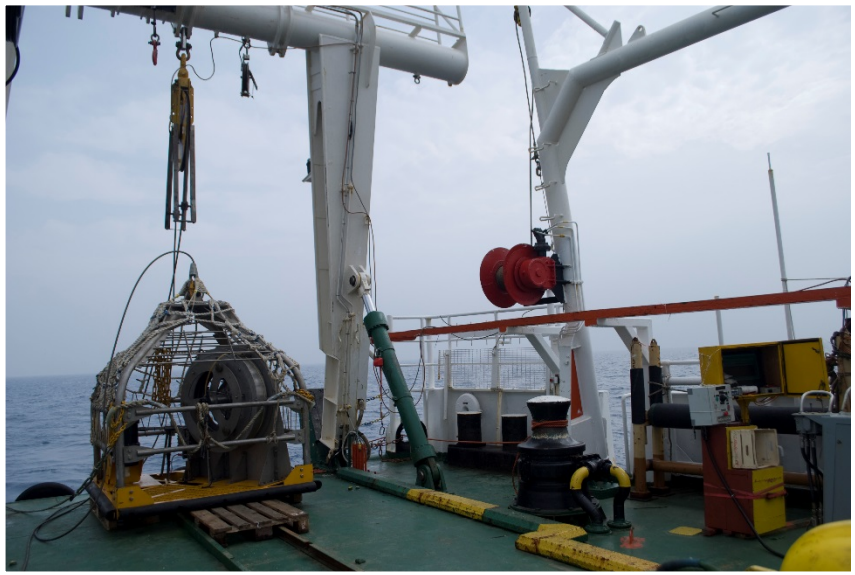
Offshore Sardinia Project (by R.Geletti, F.Zgur, A. Delben)

OFFSHORE MARINE GEOLOGY

SEDIMENT SAMPLING

GRAB

GRAVITY CORER



CPT - CONE PENETRATION TEST

OFFSHORE

THE PRESENT

OGS EXPLORA REFITTING

- to comply with the Special Purpose Ship requirements
- to improve of the safety standard
- to improve the comfort on board
- to re-arrange the back deck facilities
- to upgrade scientific some equipment

OFFSHORE

THE NEAR FUTURE

THE MAIN IMPLICATIONS TO MEET THE COMPLIANCE WITH IMO RES A.535(13) – SPS CODE

a. **All linings, insulation and furniture in the accomodation spaces and all insulation in machinery spaces, including funnels will be removed and replaced;**

b. **Electrical, hydraulic and HVAC plants will be rebuilt (according with the new layout);**

c. **Cargo hold will be split in two parts by means of a new watertight steel bulkhead and the capacity plan will be modify in order to satisfy the stability requirement related to SPS code;**

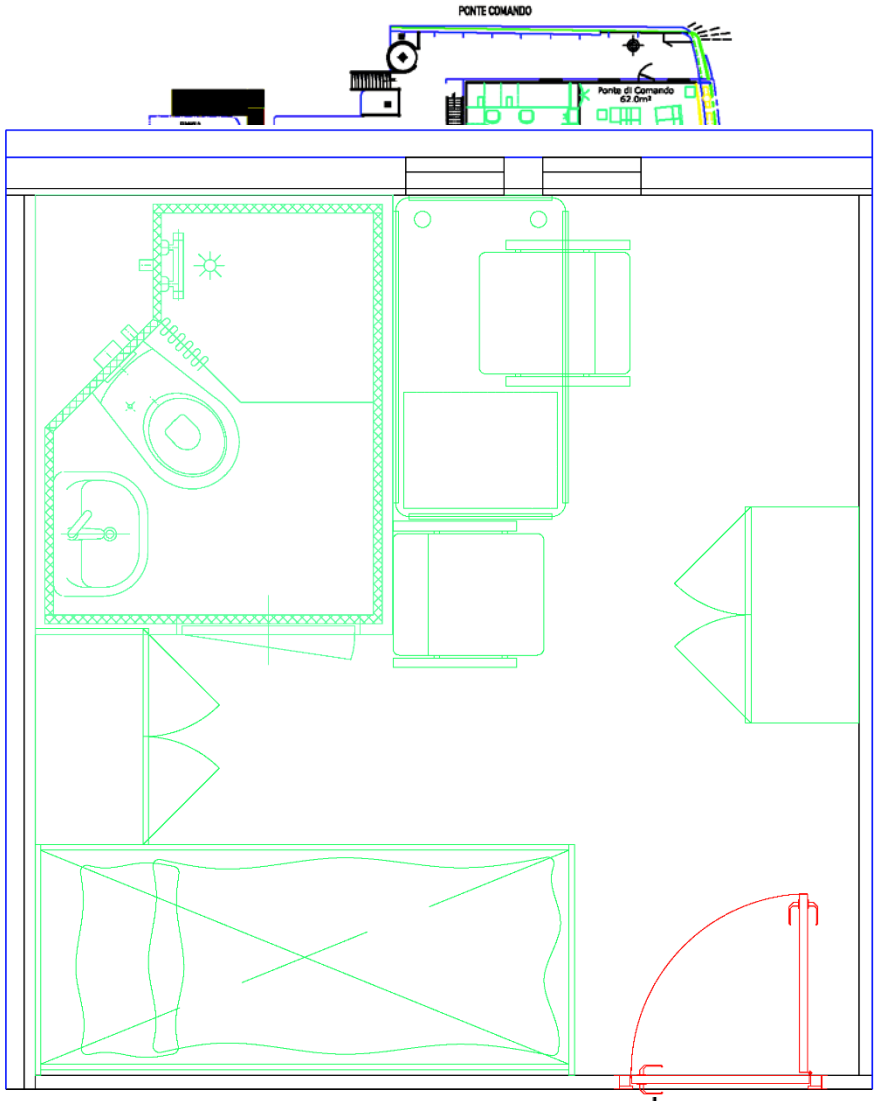
d. **Several safety items will be modify or installed (emergency exit, alarms..).**

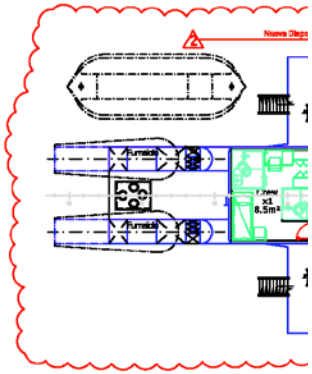
OFFSHORE

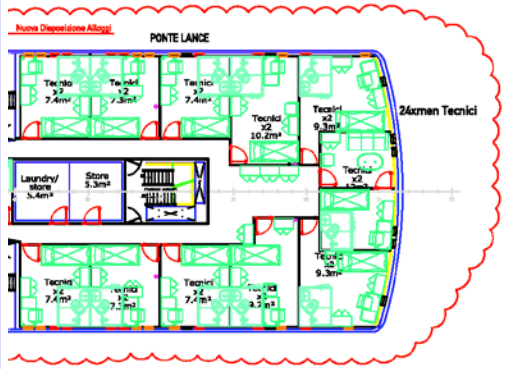
THE NEAR FUTURE

THE EXPECTED CREW/TECHNICIANS CAPABILITY

			DOPO REFITTING	
		Cabina uso singola	Cabina doppia	TOT
Ponte cabine (B)	equipaggio	8	1	10
	tecnici	0	1	2
Ponte Lance (C)	equipaggio	0	0	
	tecnici	0	12	24
1° ponte sottocoperta	equipaggio	0	4	8
	tecnici	0	0	
TOTALI	equipaggio	8	10	18
	tecnici	0	26	26







DIMENSIONI PRINCIPALI
MAIN CHARACTERISTICS

LUNGHEZZA FUORI TUTTO / LENGTH OVER ALL	72.63 m
LUNGHEZZA FRA LE PERPENDICOLARI / LENGTH BTW PERPENDICULARS	64.40 m
LARGHEZZA MASSIMA F.O. / BREADTH mld	11.80 m
ALTEZZA AL PONTE PRINCIPALE / DEPTH TO MAIN DECK	6.55 m
ALTEZZA AL 1° PONTE INFERIORE / DEPTH TO 1st LOWER DK	4.15 m
INTERVALLO OSSATURA / FRAME SPACING	60 m

	-	-	-	-
	-	-	-	-
	-	-	-	-
lussolillo	26.01.2015	Ing.G.Russolillo	26.01.2015	Issue after meeting with OGS
lussolillo	-	Ing.G.Russolillo	-	-
lussolillo	24.09.14	Ing.G.Russolillo	24.09.14	Preliminary issue - not for class approval - not good for cor
ked by	on	Approved by	on	Description of modifications

4.C.GR.24

EXPLORA

Title:

ELABORATO PROGETTUALE DI MASSIMA
DEGLI INTERVENTI NECESSARI PER
L'OTTENIMENTO DELLA CONFORMITA'
AL CODICE SPS E MIGLIORIATIVI

MEDEA
MARINE DESIGN & CONSULTING

Id. Reg. No.:	68
Drawing No:	C024.14.G.00
Scale	1:
Size	
Sheet	5 of 5

OFFSHORE

THE NEAR FUTURE

THE EXPECTED OPERATIONAL CAPABILITY

a. **Possibility to install 5 ISO Container (10 and 20 ft) as labs, workshop and storage in order to increase the multidisciplinarity;**

b. **Develpment of the A-frame increasing the clearance in order to handle bigger instruments;**

c. **Develpment of a new deploy/recovery system for the AirGuns;**

d. **Intallation of a new side-frame (winch a control station) suitable for oceanographic purpose (e.g. water sampling, CTD…).**

e. **Removal of the existing derrick crane and installation of a hydraulic crane SWL 50tm**

OFFSHORE

THE FUTURE

WHY REFIT A 42 YO SHIP?

AND WHEN A NEW SHIP?