

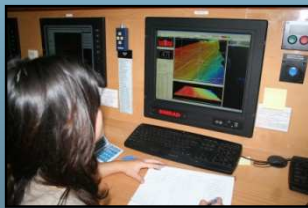


B/O MIGUEL OLIVER



B/O VIZCONDE DE EZA

MULTIDISCIPLINARY RESEARCH PROGRAMME OF SPAIN ON VMES FOR A RESPONSIBLE BOTTOM FISHING ON HIGH SEAS, SINCE 2005



INDEX

- 1. Why?**
- 2. Material And Methods**
 - 2.1. Geomorphological Characterization. Multibeam Echosounder And Parametric Sub Bottom Profiler.**
 - 2.2. Biological Characterization. Rock Dredge And Box Corer.**
 - 2.3. Other Media**
- 3. Projects**
 - 3.1. ECOVUL/ARPA**
 - 3.2. ATLANTIS**
 - 3.3. NEREIDA**
 - 3.4. WALVIS RIDGE IN THE SOUTH ATLANTIC**

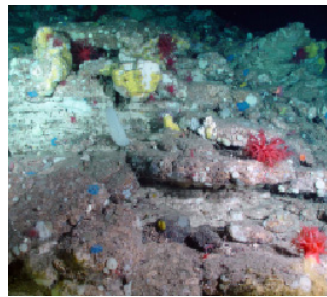
1. WHY?

Since 2004, discussions on VME have been taking place at the United Nations General Assembly (UNGA). This process culminated in 2006 with the adoption of the UNGA Resolution 61/105.

In line with the calls for increasing current knowledge on the location of VMEs, including those in the UNGA Resolutions 61/105 of 2006 and 64/72 of 2010, since 2005, Spain (by itself or in collaboration with other States) has undertaken an ambitious and costly program of scientific mapping of the seabed in different parts of the oceans, where the Spanish fleets fish using bottom gears including some areas where Spanish ships do not operate.



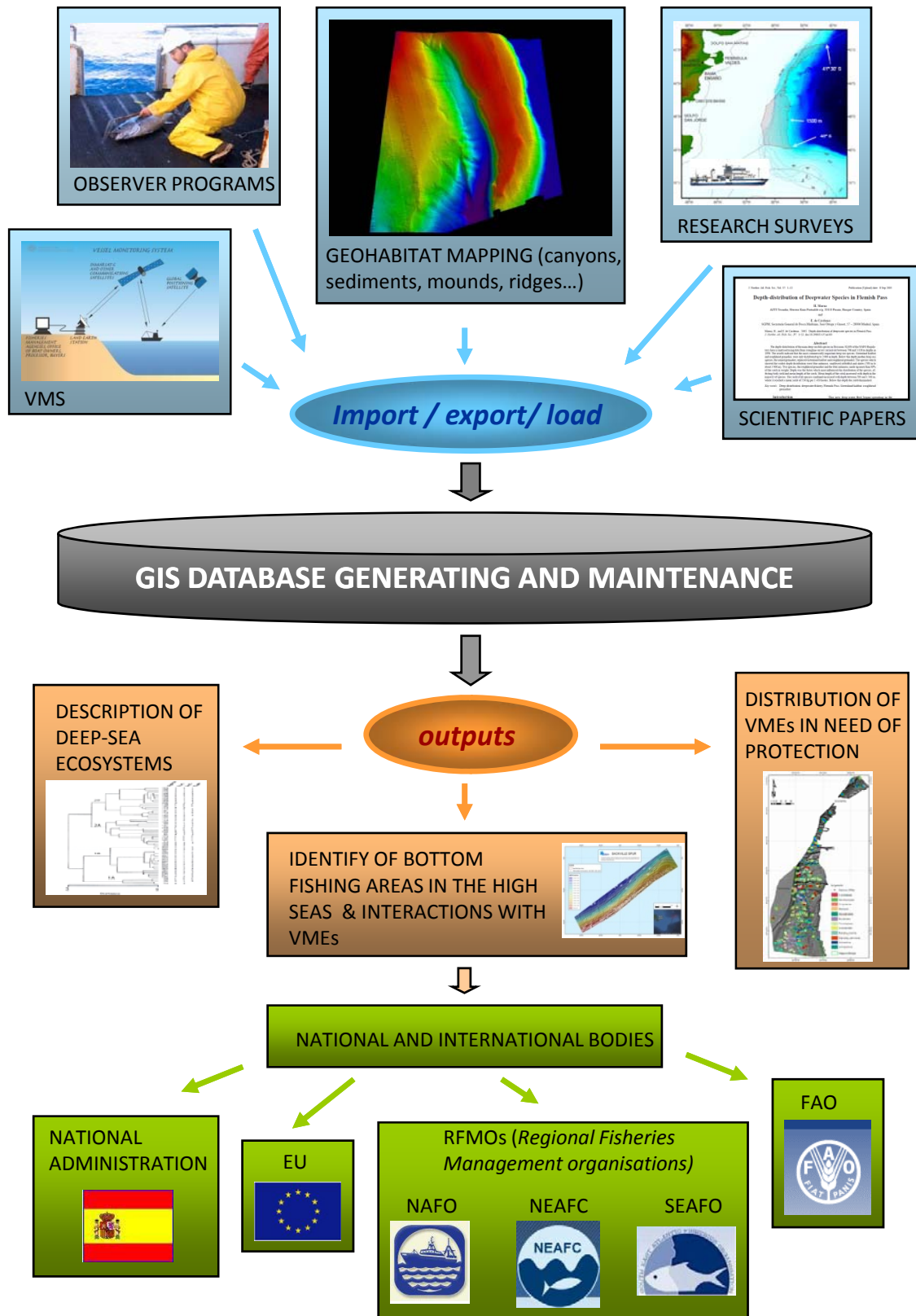
United Nations Headquarters



Images captured with ROV seabed, mainly cold water corals and sponges.

The appropriate multidisciplinary methodology to identify vulnerable marine ecosystems and to select closing areas to bottom fishing was put in place by Spanish scientists. The results of these research activities are being published in leading scientific journals. A short description of the methodology applied, and the objectives and main results is provided below.

MULTIDISCIPLINARY STUDY TO IDENTIFY VULNERABLE HABITATS



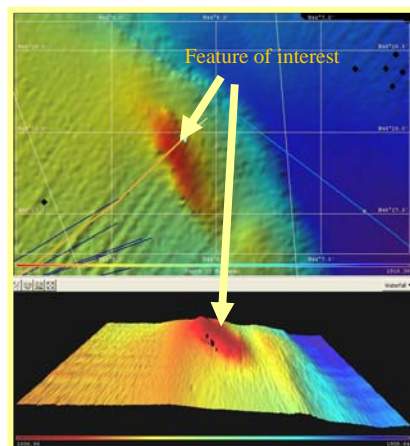
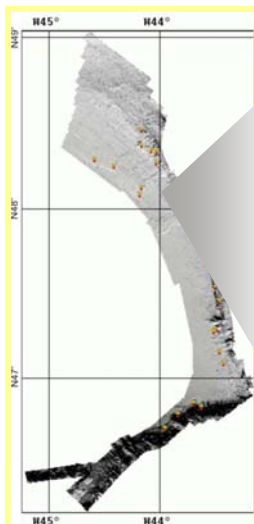
2. Material And Methods

2.1. Geomorphological Characterization. Multibeam Echosounder And Parametric Sub Bottom Profiler.

The **Multibeam Echosounder** bathymetry and reflectivity **provides** data of the seabed, giving **information on the geomorphology and texture of the surface sediments** of the study area.

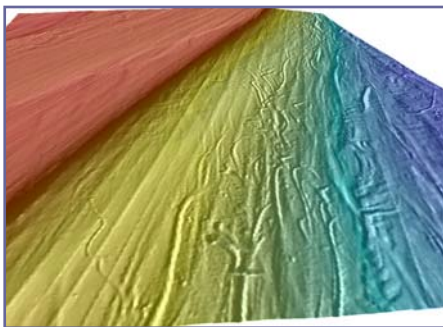
The swept area increases with depth.

To completely cover the study area transects are overlapped between them, using the criteria of the International Hydrographic Organization (IHO) and obtaining a **100% coverage of the seabed**.

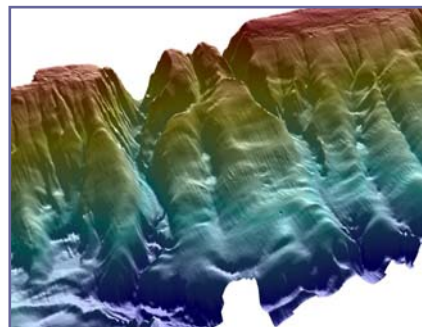


Part of the **acoustic data** is **processed** on board on research **vessels in real time** to provide workstations that collect samples to characterize marine ecosystems.

All data acquired during the survey are stored, then processed and made **digital terrain models** in land.



Three-dimensional image of the grooves left on the seabed by the keels of icebergs

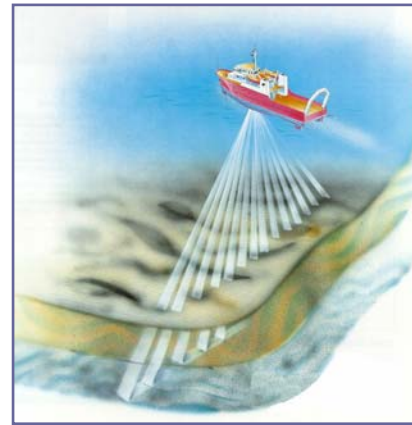


3D view of submarine canyon

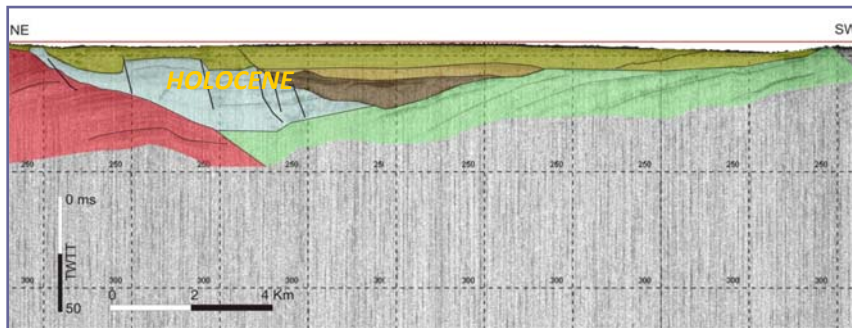
The **Parametric Sub Bottom Profiler** lets you **see** the subsurface structure.

Penetrations have been made **more than 150 meters** in a water **depth of 1000 meters** with a general resolution of 30 cm, depending on sediment characteristics and water depth.

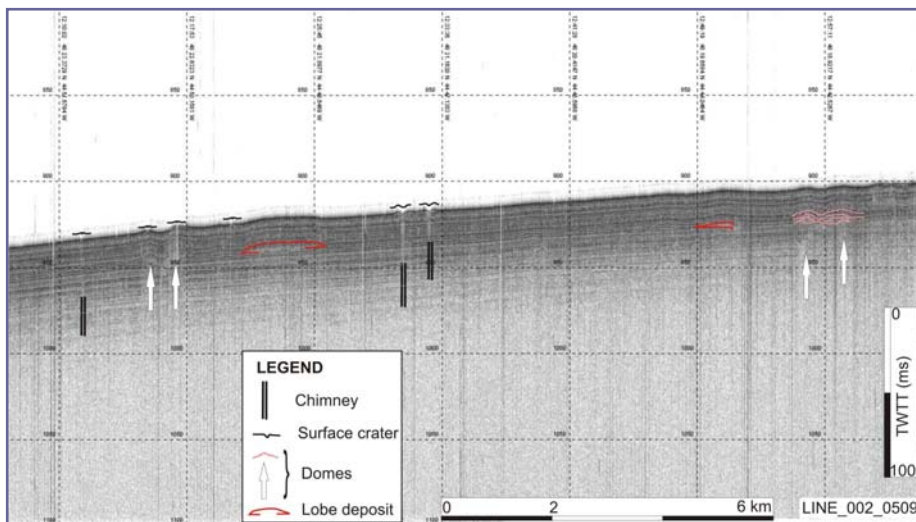
Seismic profiles are obtained showing the various structures that make up the seabed, such as mud volcanoes that can be of biological interest.



Seismic Reflection Profiles



Sediment stratification below the seabed up to approx. 100m



The profile shows several structures that disrupt the normal sedimentation in the area.

2.2. Biological characterization. Rock Dredge and Box Corer.

The rock dredge enables to obtain samples of rocks and semiconsolidated sediments in seafloor areas where existence of rock outcrops is expected.

Dredging last approximately 15 minutes with a low speed, between one and two knots.

The rock dredge provides information on the type of substrate that forms the background (volcanic rock, sandstone, limestone ...) and the organisms that live in it.

The fauna is identified to the lower taxonomic level possible. Some of the organisms are preserved for later study in the lab.



Rock Dredge Sampling

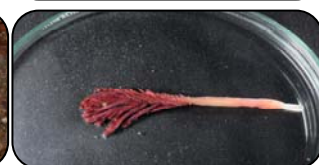
CHECKING THE NET



SAMPLE OF ROCK DREDGE



LABORATORY IDENTIFICATION IN LAND AND BOARD AND PRESERVATION OF ORGANISMS.



The **Box Corer** is a dredge for **sampling soft** and semiconsolidated **sediments**.

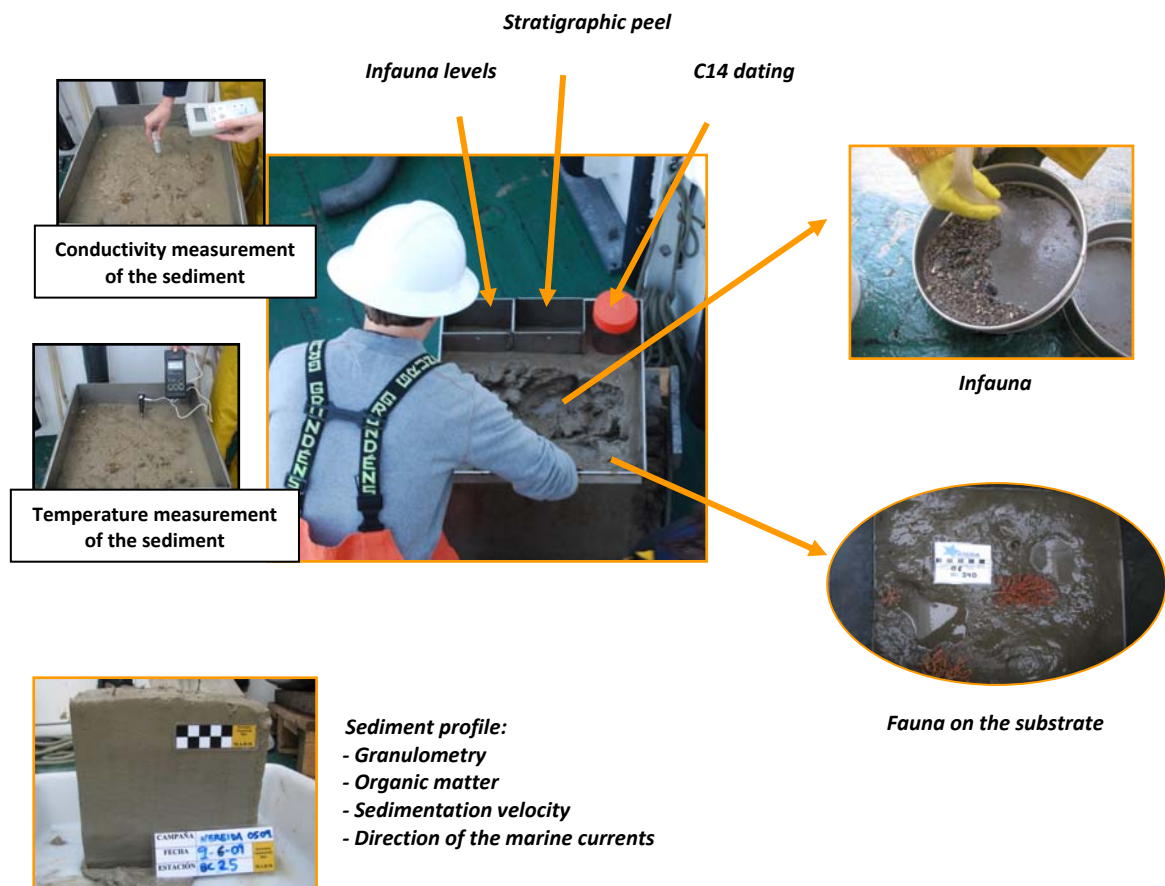
The sample obtained is a cube of seafloor and is representative of the area around the sampling point.

Once the sample is on the deck making measurements for conditions of temperature and conductivity.

Each sample is **sub-sampled for different analysis on land**: particle size distribution analysis, study of historic sedimentary processes (using carbon dating), geochemistry, and biological content at different sediment depths.



Box corer Sampling



2.3. Other Media

The **CTD** provides **information** on depth, temperature and salinity in the water column to determine the **hydrography** of the study area.

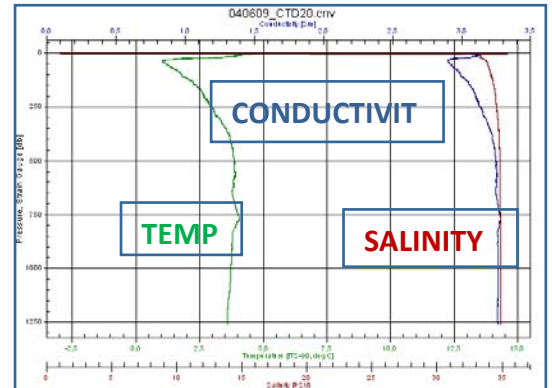
Sequence of work in a CTD station



CTD BATISONDA



LAUNCHING CTD



PROFILES OF TEMPERATURE, SALINITY AND CONDUCTIVITY IN THE WATER COLUMN

The ROV and underwater camera sled are used to make transects in areas especially sensitive to delimit distribution VMEs.

Underwater camera periodically produces images of the seafloor, this provides information for the **species composition** and its length by a calculated laser pointer.



UNDERWATER SLED

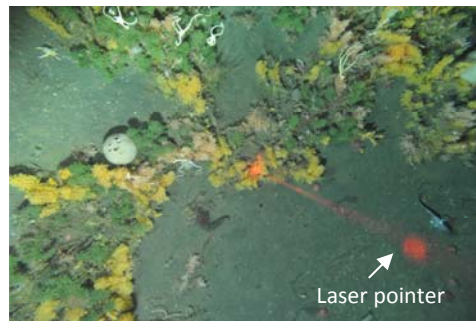


IMAGE OF THE SEAFLOOR

In addition, the **ROV** record **videos** on the seabed and collect **samples of benthic organisms**.



ROV



ROV SAMPLING

3. Projects

3.1. ECOVUL/ARPA

Participating Agencies

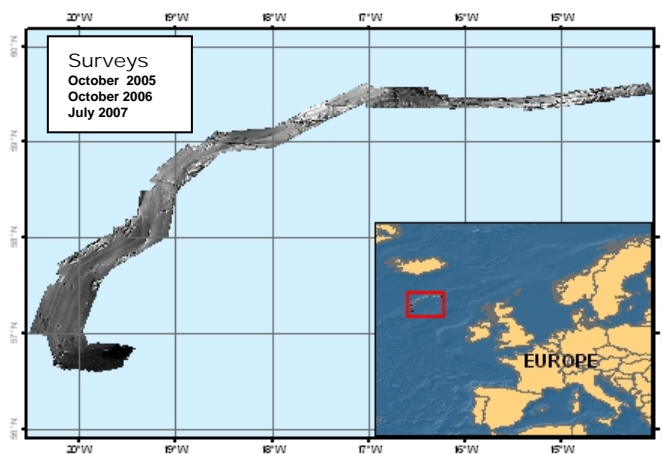
General Secretariat of the Sea (SGM). Ministry of Environment and Rural and Marine Affairs. Spain
Spanish Institute of Oceanography. Spain



Vessels Used

Miguel Oliver (Spain) y Vizconde de Eza (Spain)

Prospected Area



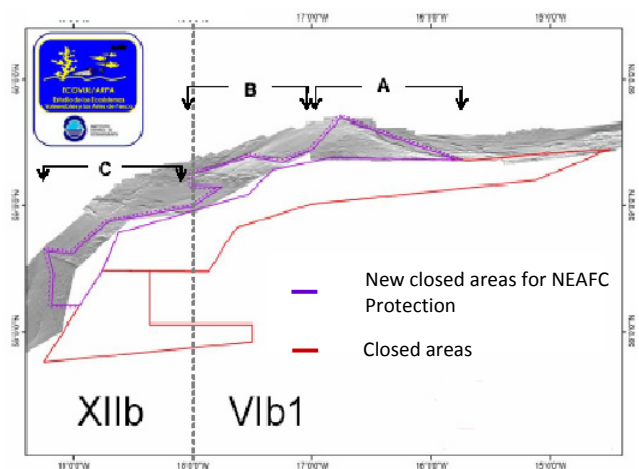
Scientific work carried out

| Sampling Activities | |
|---------------------------|-----------------------|
| Days at sea | 76 |
| Depth range | 580-1745 m |
| Multibeam prospected area | 18760 km ² |
| Topas Lines | 1121 km |
| Valid rock dredges | 22 |
| Valid box corer | 13 |
| Fishing hauls | 38 |
| Valid CTD stations | 0 |

Main results

Identification of the **presence of coral *Lophelia pertusa*** on prospected area, which were reported to ICES.
ICES used this information to **propose protection zone to NEAFC.**

ICES Proposal



3.2. ATLANTIS

Participating Agencies

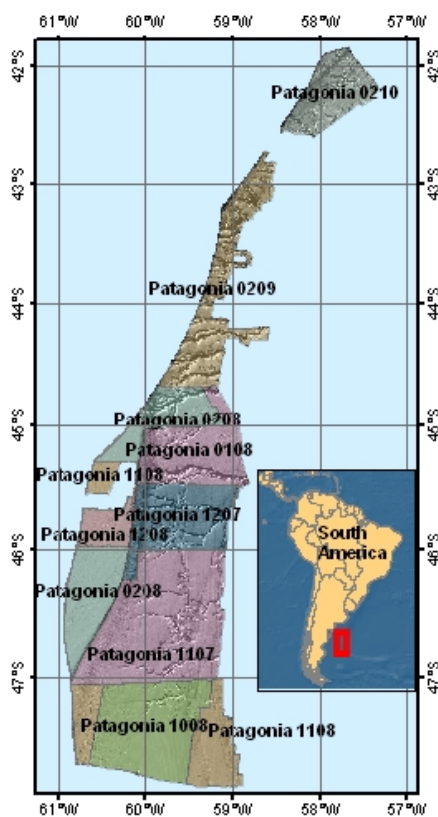
General Secretariat of the Sea (SGM). Ministry of Environment and Rural and Marine Affairs. Spain
Spanish Institute of Oceanography. Spain



Vessels Used

Miguel Oliver (Spain)

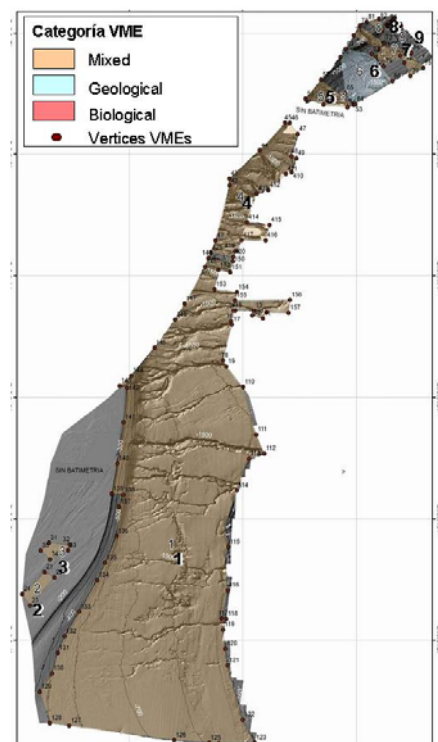
Prospected Area



Scientific work carried out

| Sampling Activities | |
|---------------------------|-----------------------|
| Days at sea | 347 |
| Depth range | 103-2553 m |
| Multibeam prospected area | 59105 km ² |
| Topas Lines | 91905 km |
| Valid rock dredges | 102 |
| Valid box corer | 209 |
| Fishing hauls | 413 |
| Valid CTD stations | 519 |

Scientists identified areas for protection



Main results

Through the exhaustive research carried out, Spanish **scientists identified 9 marine areas** in need of **protection** of **approximately 41.000 km²** (Nearly 70% of the prospected area).

According to the scientists proposal, **Spanish Government** took **unilaterally** the **decision** to close all the 9 high seas identified areas to Spanish vessels bottom fishing, since July 1 st 2011.

3.3. NEREIDA

Participating Agencies

General Secretariat of the Sea (SGM). Ministry of Environment and Rural and Marine Affairs. Spain

Spanish Institute of Oceanography. Spain

Geological Survey of Canada – Natural Resources Canada

Canadian Hydrographic Service – Fisheries and Ocean Canada

Ecosystem Research Division – Fisheries and Ocean Canada

Centre for the Environment Fisheries and Aquaculture Science (Cefas). UK

P.P. Shirshov Institute of Oceanology (RAS). Russia

Polar Research Institute of Marine Fisheries and Oceanography. Russia



Vessels Used

B/O Miguel Oliver (Spain), Hudson (Canada)

Prospected Area



Scientific work carried out

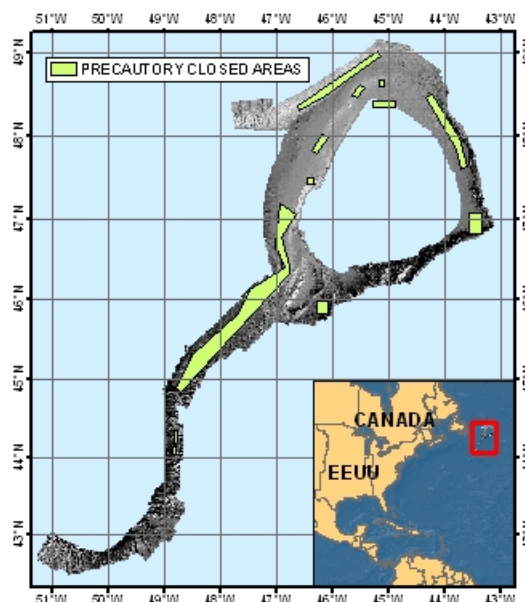
| Sampling Activities | |
|---------------------------|-----------------------|
| Days at sea | 156 |
| Depth range | 269-3395 m |
| Multibeam prospected area | 68385 km ² |
| Topas Lines | 28113 km |
| Valid rock dredges | 104 |
| Valid box corer | 368 |
| Fishing hauls | 0 |
| Valid CTD stations | 415 |

Main results

Sampling at sea has been completed.

The analysis of information is progressing as expected to finish by 2014 depending on funding.

NAFO Provisional precautionary closed areas



3.4. WALVIS RIDGE IN THE SOUTH ATLANTIC

Participating Agencies

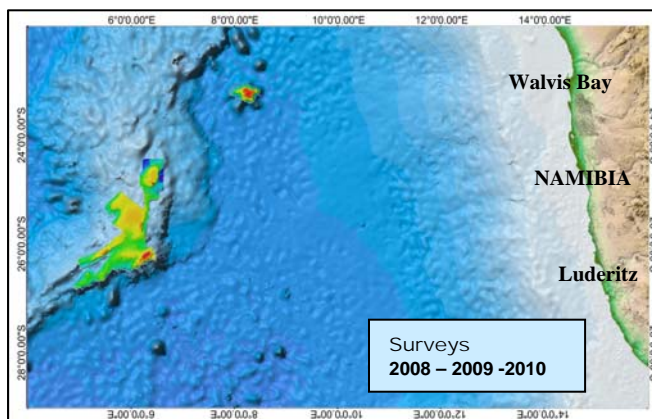
General Secretariat of the Sea (SGM). Ministry of Environment and Rural and Marine Affairs. Spain
Spanish Institute of Oceanography. Spain
National Marine Information & Research Centre. Namibia



Vessels Used

Vizconde de Eza (Spain)

Prospected Area

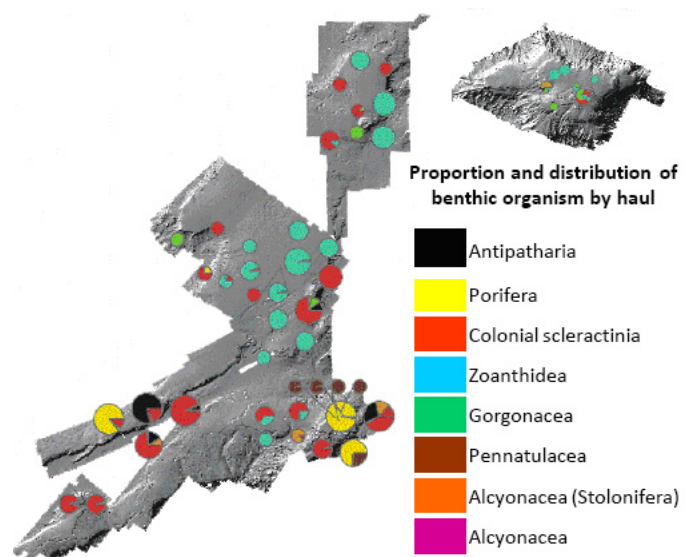


Scientificwork carried out

| Sampling Activities | |
|---------------------------|-----------------------|
| Days at sea | 63 |
| Depth range | 200-3000 m |
| Multibeam prospected area | 17899 km ² |
| Topas Lines | 1462 km |
| Rock dredges | 13 |
| Shipeck dredges | 18 |
| Beam trawl | 16 |
| Fishing hauls | 44 |
| CTD stations | 136 |

Main results

Benthic fauna which would constitute VMEs consisted primarily of scleractinian colonial and black coral (Anthipatharia).





www.marm.es

www.ieo.es