SUSTAINABLE FISHERIES MANAGEMENT IN SW ATLANTIC:

A SCIENTIFIC APPROACH

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Interactions between fishing activities and Vulnerable Marine Ecosystems: lessons learnt on seabed mapping from ATLANTIS project

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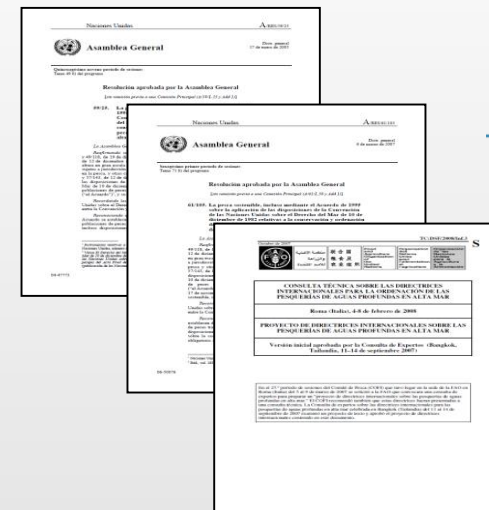# INTRODUCTION

Spanish fishing activities in SW Atlantic

- Fishing activities started in1983.

- High Sea of the Patagonian Shelf (HSPS)(Div. 42-46) and Falkland Islands Outer Zone (FOCZ).

- Bottom trawl fleet.

- Target species: hake (*Merluccius hubbsi - M. australis*) and cephalopods (*Illex argentinus – Doryteuthis gahi*).

- No Regional Fisheries Management Organization (RFMO) in High Sea of the Patagonian Shelf.
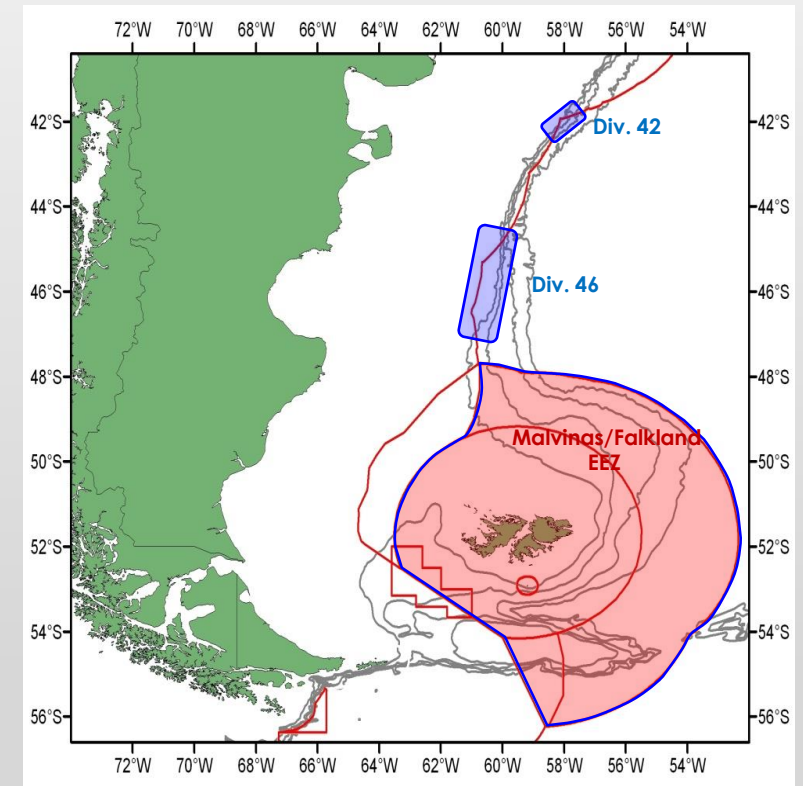
INTRODUCTION

ATLANTIS Spanish project. Study of VMEs HSPS

- Since 2004, discussions on VMEs at the United Nations General Assembly (UNGA). UNGA Resolution 59/25 and 61/105.

- 2008. FAO published the "*International Guidelines for the Management of Deep-Sea Fisheries in the High Seas*".

- 2008. Council Regulations (EC) 734/2008 on the protection of VMEs in the High Seas from the adverse impacts of bottom fishing gears (Art. 8. *Member States shall identify areas with presence VME that shall be closed to fishing in respect of their vessels…*).

INTRODUCTION

ATLANTIS Spanish project. Study of VMEs HSPS

- 2007-2010. Spain has undertaken an ambitious and costly program of scientific mapping of the seabed (IEO-SGP).

- Objetives: map the seabed, identify VMEs, study the interaction with bottom fisheries and select suitable areas to preserve VMEs.

- Multidisciplinary research. Conventional Fisheries Science + Geomorphology + Benthic ecology + Sedimentology.

- PRIORITY: Implementation of UNGA resolutions.
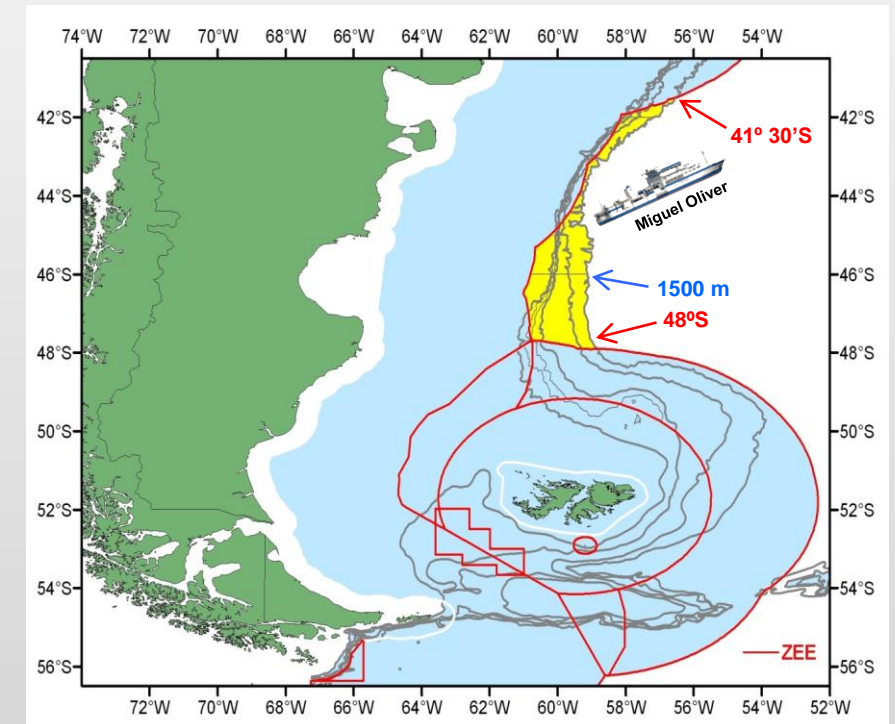

Total prostected area

59,000 km²

FINDINGS

Fishing effort

- Sources of information:
  - Scientific monitoring by IEO since 1989.
  - Commercial data (catch & effort).
  - Multidisciplinary research cruises.
  - Vessel Monitoring Systems.

- Fishing effort 2019:
  - 25 vessels.
  - 5577 days (3607 in HSPS).

- Fishery footprint.

- 99% fishing effort HSPS < 300 m depth.

Fishery footprint
VMS
1989-2019

VMS
2011-2019
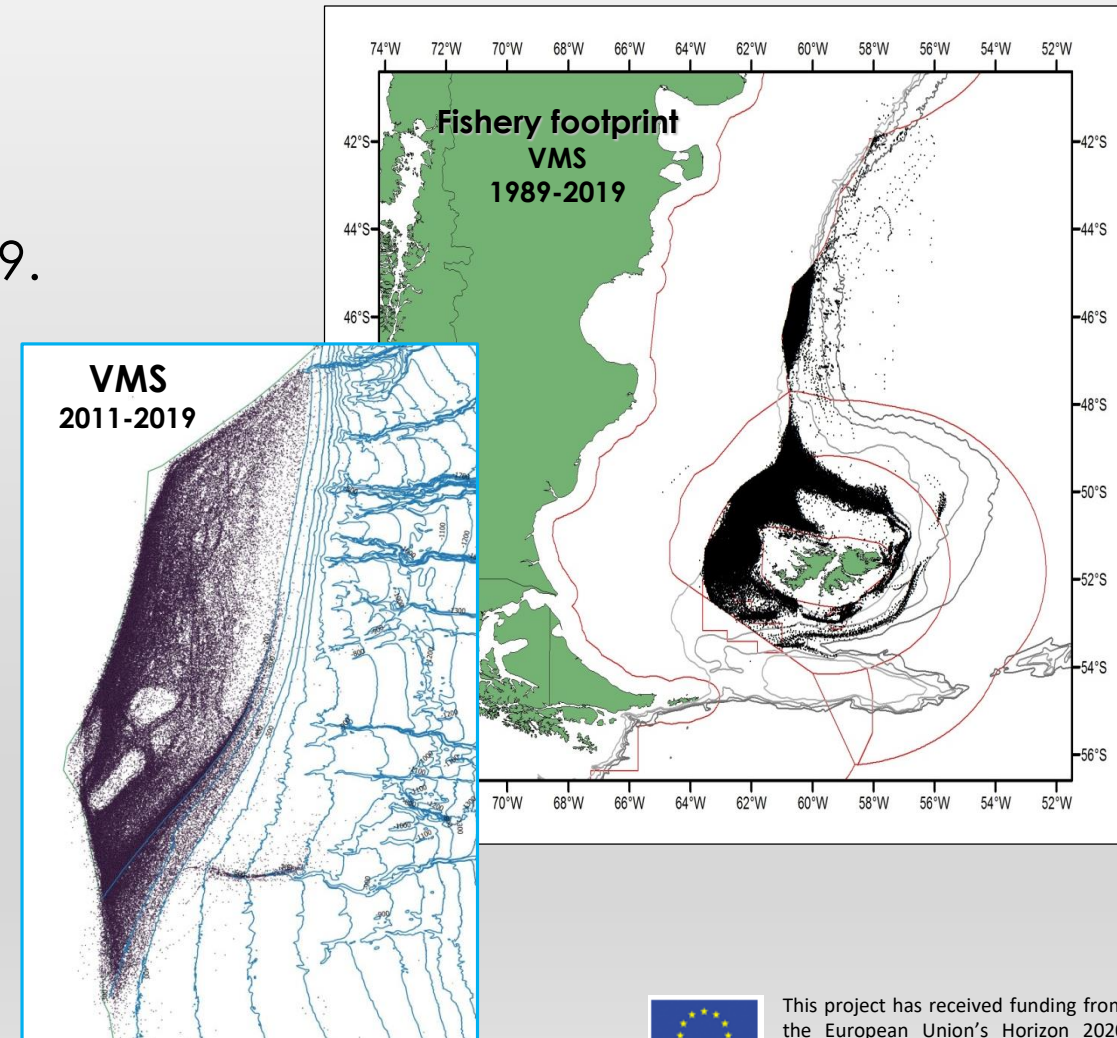
FINDINGS

Catch

- Argentine hake (*Merluccius hubbsi*).

- Shortfin squid (Illex argentinus).

- Rock cod (*Patagonotothen ramsayi*).

- Patagonian squid (*Doryteuthis gahi*).

- *By-catch*: Kingclip (*Genypterus blacodes*), Hoki (*Macruronus magellanicus), Red cod (Salilota australis)*, Southern blue whiting (*Micromesistius australis),* Patagonian toothfish (*Dissostichus eleginoides), Skate*.

- Discards: Rock cod (*Patagonotothen ramsayi*).

1989 - 2019 HSPS
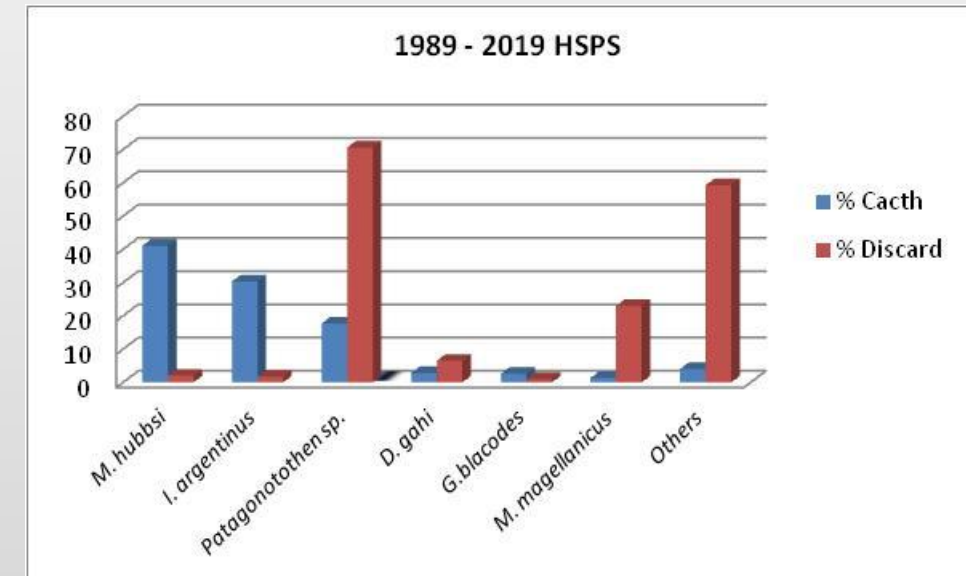
FINDINGS

13 Multidisciplinary Surveys (2007 – 2010)
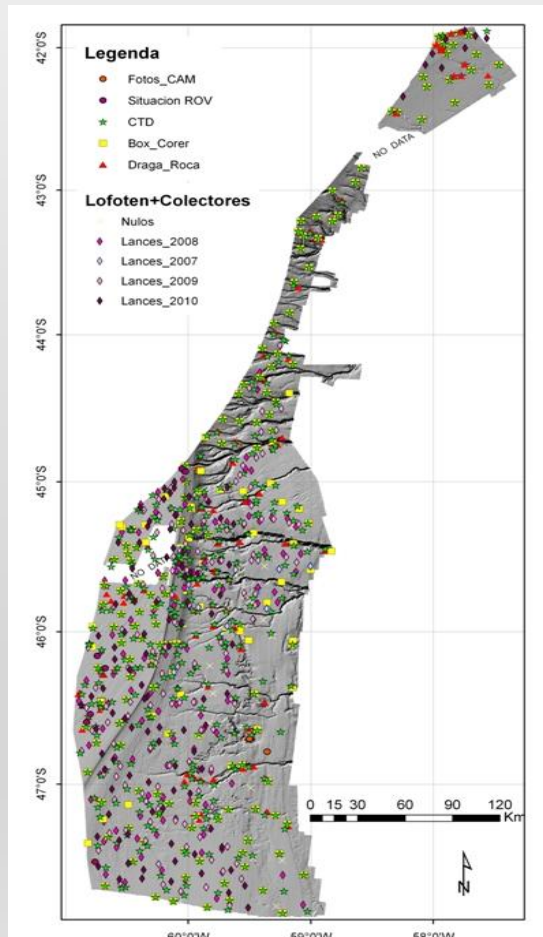
- Cartography and geology, benthos, fishing and imagery (ROV).

- 347 survey days.

- Multibeam bathymetry (~ 59,000 km^2).

- Sub-bottom profiles TOPAS (~ 91,900 km).

- 102 rock dredges & 209 boxcorer .

- 519 CTD stations.

- 413 bottom trawls & sediment colector samples.
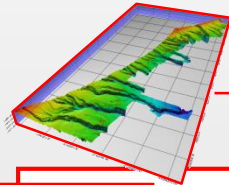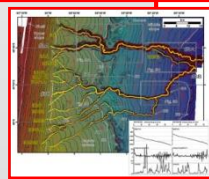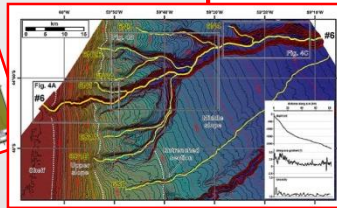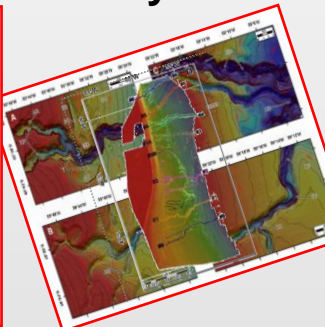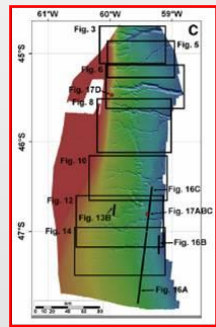
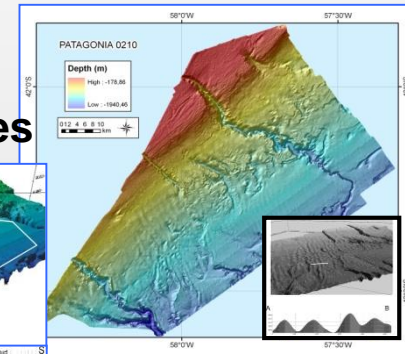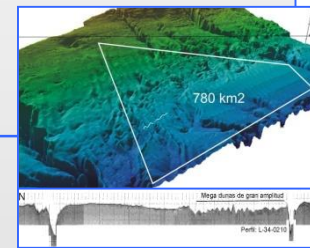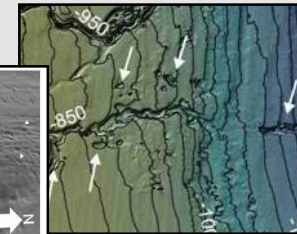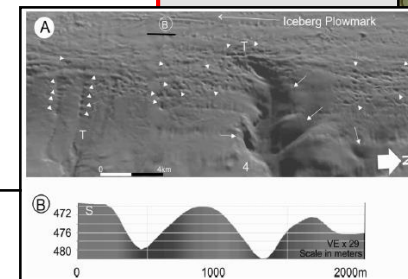- High resolution digital images & video (ROV).

FINDINGS

ATLANTIS project: Geomorphology
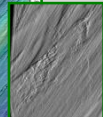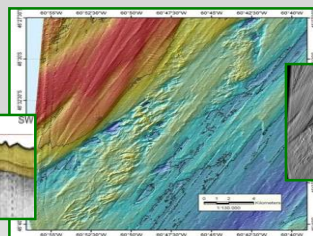

1. Canyons and gullies

5. Megaripples

4. Pockmarks

2. Rocky outcrops

O Caixón
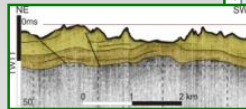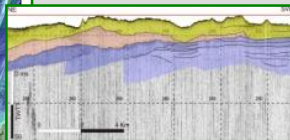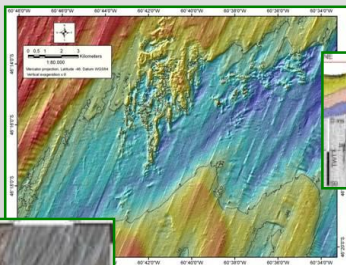
A Pistola
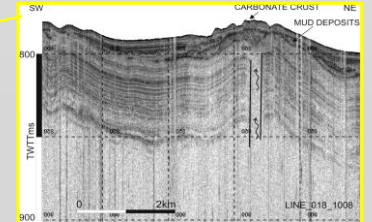
3. Mud volcanoes

Outcrops

FINDINGS

ATLANTIS project: Benthos
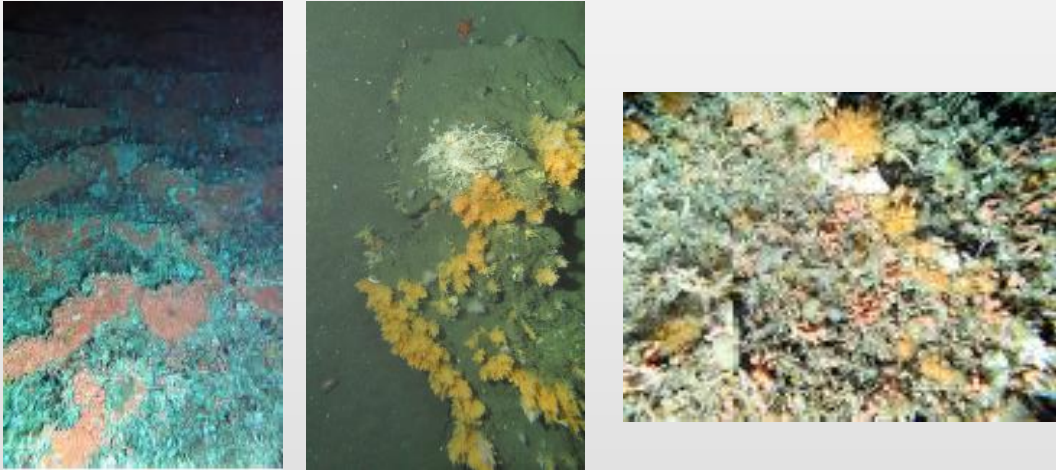
Vulnerable habitats HSPS
- Cold-water coral reefs
- Coral gardens
- Sponge fields
- Rocky outcrops environments

Indicators VMEs: taxon and organisms
- *Bathelia candida* (Cnidaria; Anthozoa; Hexacorallia; Scleractinia)
- Order Alcyonacea (Cnidaria; Anthozoa; Octocorallia)
- Order Gorgonacea (Cnidaria; Anthozoa; Octocorallia)
- Order Pennatulacea (Cnidaria; Anthozoa; Octocorallia)
- Class Hydrozoa (Cnidaria; Hydrozoa)
- Family Stylasteridae (Cnidaria; Hydrozoa; Anthoathecata)
- Family Rhodalidae (Cnidaria; Hydrozoa; Siphonophorae)
- Class Hexactinellida (Porifera)
- Class Demospongiae (Porifera)

FINDINGS

Identification and description of VMEs

Biological criteria

- *Cold-water corals*
- *Sponge fields*
- *Coral gardens*

Geomorphological criteria
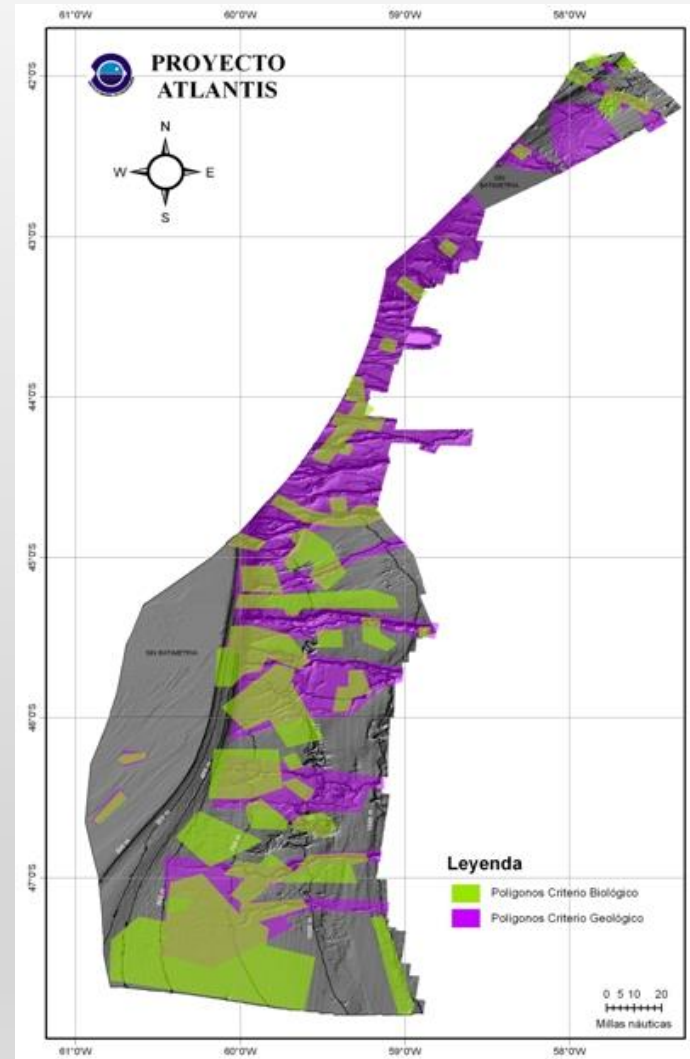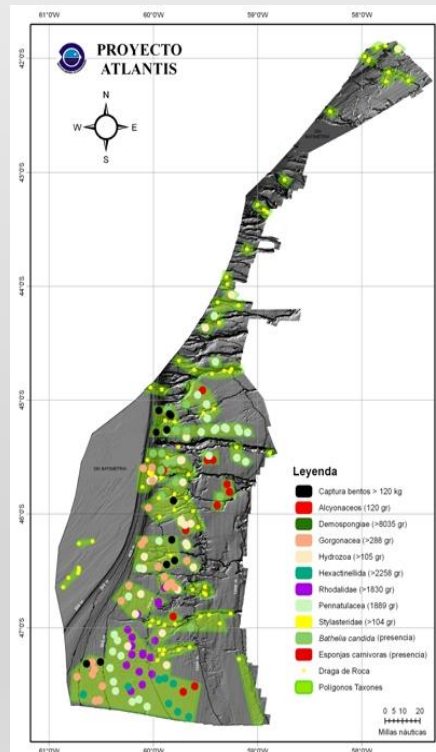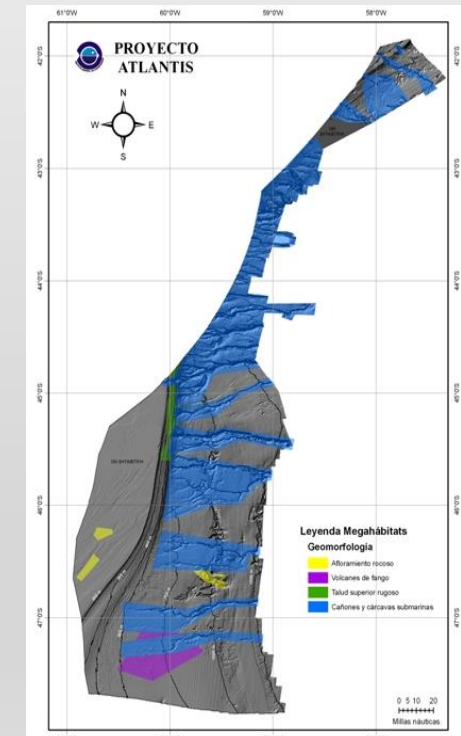
- *Canyons and gullies*
- *Rocky outcrops*
- *Mud volcanoes*
- *Pockmarks*

Biological + Geomorphological

ATLANTIS Project: Protection Proposal

FINDINGS

**9
VMEs candidate
areas** were
identified for
protection
in the high-seas

(~ 41,300 km²)

This results were
presented to the EC and
AGNU

**1st July 2011 SGP
fishing ban
Spanish bottom trawlers**

9 areas protected in 2011

Nº polígono	Nº vértice	Vértice y polígono	x	y
1	1	11	-58.82100669	-44.35274421
1	2	12	-58.91533862	-44.32618474
1	3	13	-58.90219078	-44.28795819
1	4	14	-59.06462294	-44.28724473
1	5	15	-59.08068086	-44.28730602
1	6	16	-59.10136188	-44.37502752
1	7	17	-59.09483168	-44.40332506
1	8	18	-59.17205887	-44.69808857
1	9	19	-59.14169605	-44.74849085
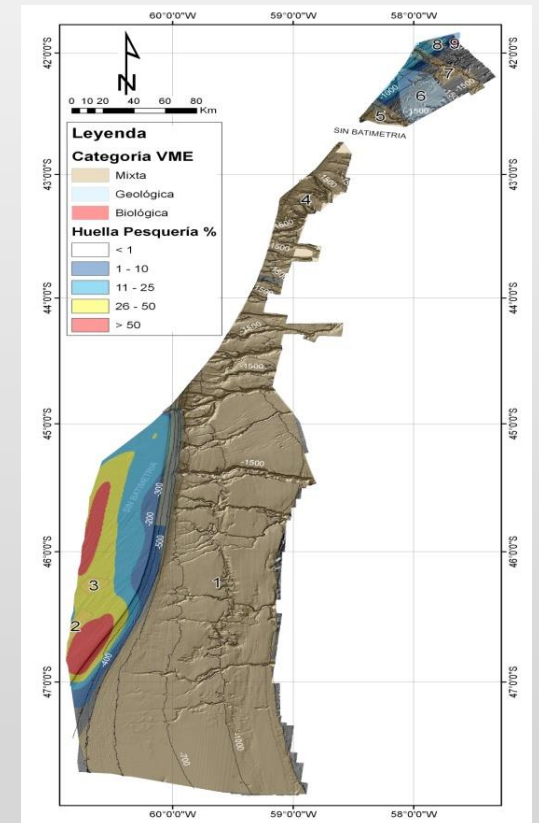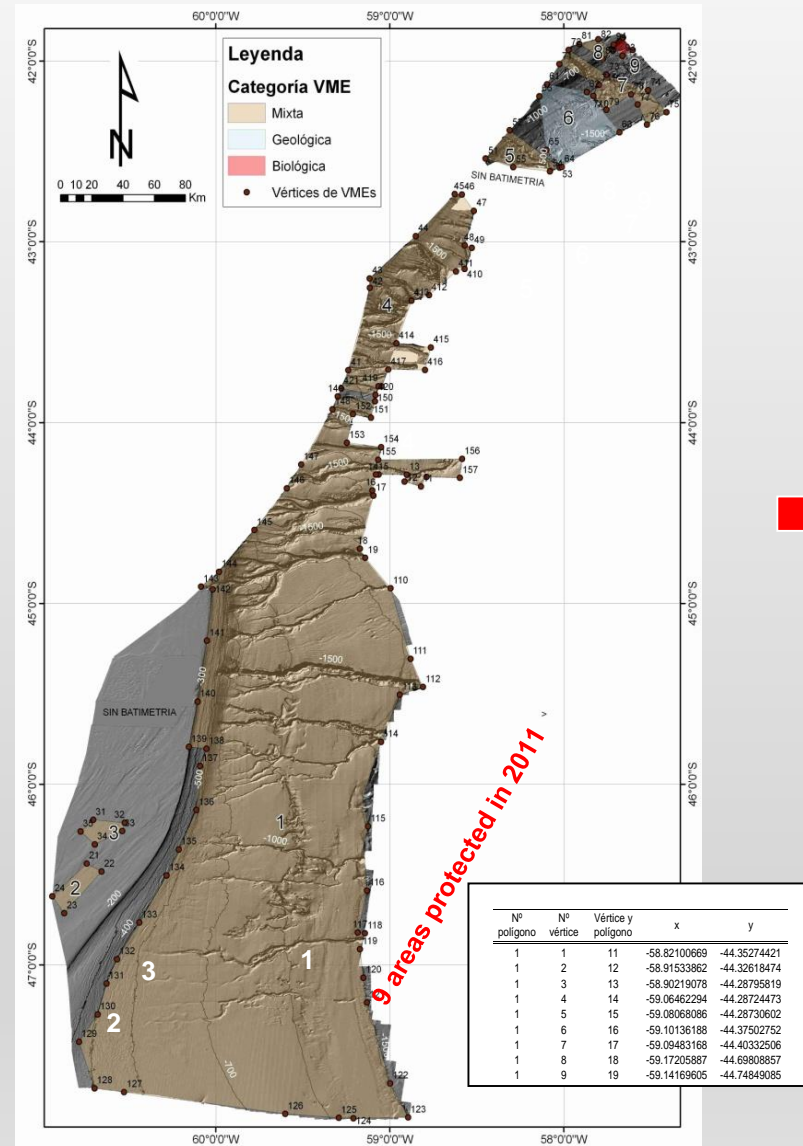
Interaction with fisheries

FINDINGS

Monitoring closed areas

- Council Regulations (EC) No 734/2008.

- Control Observers (SGP) report encounters with VMEs.

- Threshold values (indicator VMEs):

  - <u>Corals</u> (Scleractinia, Alcyonacea, Gorgonacea, Stylasteridae).

  - <u>Sponges</u> (Hexactinellida, Demospongiae).

  - <u>Pennatulacea</u>.

- Years 2018, 2019 and 2020. Hauls: 2787.

- Catch indicator VMEs > threshold values:

  5 hauls - Class Demospongiae
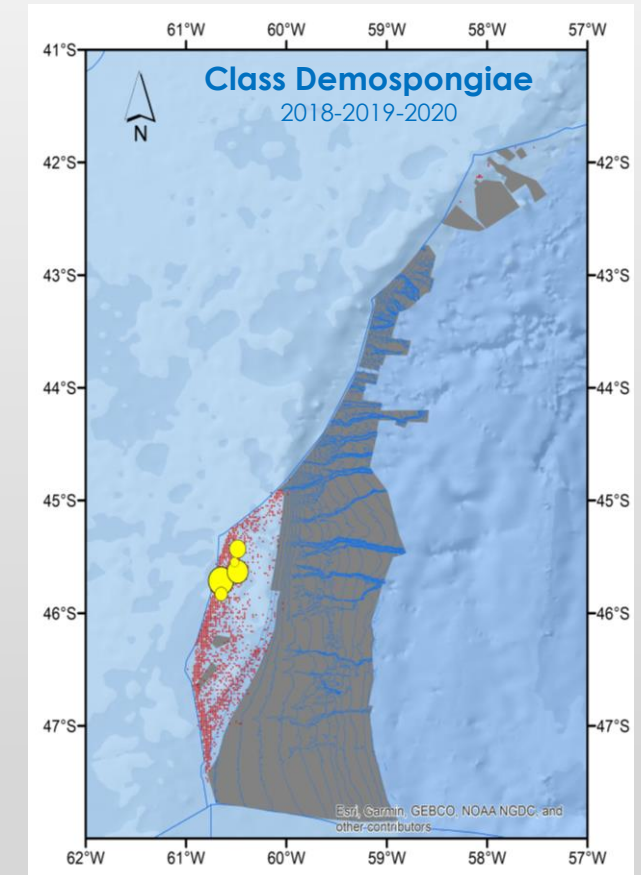
RESEARCH NEEDS AND PRIORITIES

- The obtained data in the project ATLANTIS has great scientific value because the HSPS is a poorly studied area.

- Unilateral measures would not be effective in protecting VMEs if other actors of the fishery did not implement similar measures.

- The VMEs protection measures should be reviewed and updated as scientific knowledge progresses (e.g., limits of closed areas, threshold values for "VMEs encounters").

- The non-existence of RFMO mean the absence of multilateral forums for providing scientific data in order to prepare advice and agree on regulatory measures in High Sea of the Patagonian Shelf.

CONCLUSION

- The fishery footprint plot shows that the activity of the Spanish fleet in HSPS has been located in the shallowest depth strata (< 300m).

- The vulnerable species groups, communities and habitats are mainly distributed beyond the 400 m depth. Alternatively, vulnerable species also be found in outcrop areas of continental shelf and is some restricted zones of the slope and the head of canyons.

- Nine areas along the Patagonian shelf and slope were identified as VMEs and the Spanish Government implemented a fishing ban for the Spanish bottom trawlers.

- The analysis of the fishery footprint and distribution VMEs evidenced that Spanish bottom trawling fleet has a negligible impact on identified VMEs.

- The integration of research & fisheries data under multidisciplinary approach presented here, is a good tool to map VMEs, contributing and improve the management of HSPS fisheries.

Thanks for your attention !

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