

Spatial management approach for the Azores deep-sea

a data driven approach

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(IMAR, Universidade Açores, Portugal)

Vision:

To advance the understanding of the natural diversity, ecosystem structure, function, connectivity and resilience of communities in a changing planet, **while informing the environmentally sustainable use of natural resources**



Guiding Principles

Data driven: based on the best available information

Adaptive approach: designed to be improved whenever new information is available

Transparency principle: should be transparent, objective, and easily understood

Goals: e.g. Rebuild fish stocks of commercially important species while maximizing protection and restoration of VMEs

Objectives: (SMART)

To rebuild fish stocks (detail spp) to those levels prior to 1990's by 2030

To halt significant adverse fisheries impacts on VMEs by 2025

Desing criteria:

Important resources: should capture areas that based on currently best available knowledge are considered to be important to achieve the planning goals;

Representativity: should conserve similar % of all Benthic Terrain Classification types within the spatial planning area;

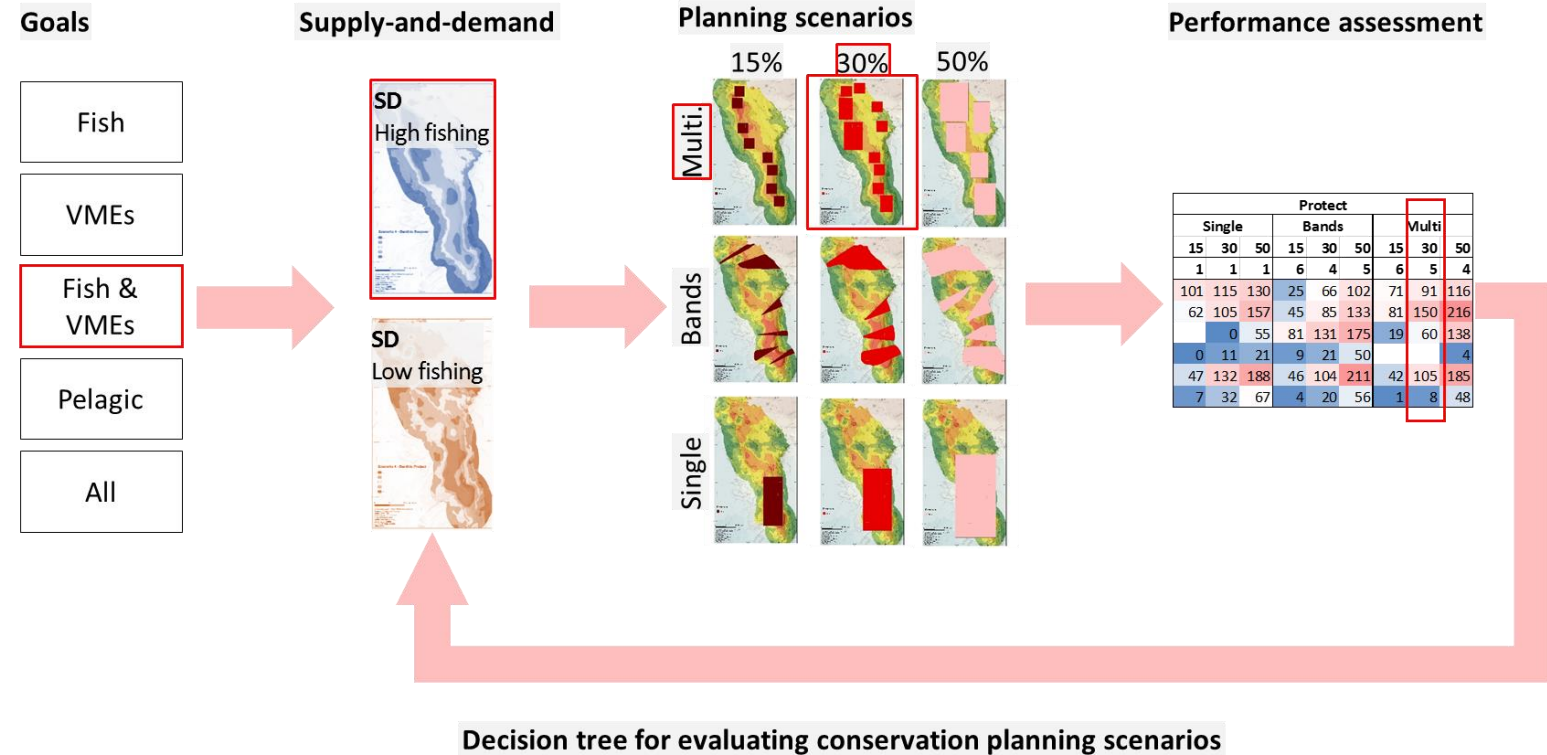
Connectivity: Spacing should ensure dispersal and connectivity across the entire spatial planning area, including both islands slopes; minimizing the average and maximum spacing between areas;

Replication: should be replicated within spatial planning area to capture local variations and protect against failures (and consider climate change)

Spatial management deep-sea

Decision tree

- 1- agree on the **goal** or goals are to be achieved;
- 2- decided if should target areas with high or low **human activities**
- 3- what **portion** should be targeted;
- 4- **type of area** (single area, bands, and multi checkered)
- 5- **performance assessment** indicators should be evaluated;
- 6- the process should be **repeated until multiple options are evaluated** and the performance assessments are compared





SIG Marítimo dos Açores / Imagem web-SIG

Na presente proposta também foi contemplada uma abordagem mais imagética para a apresentação do nome do website, quase como se fosse o "logotipo" do web-SIG Marítimo dos Açores.

Deste modo, e vivendo das formas do próprio logotipo do Departamento de Oceanografia e Pescas da UAç, à esquerda apresentamos a proposta para a referida imagem. Pretende-se que a mesma seja utilizada na área de header do website, para fins identificativos do mesmo.

Por outro lado, a mesma também poderá ser utilizada para divulgação da plataforma em outros suportes, digitais e não-digitais.

SIGMAR Azores:

GIS for the marine environment of the Azores in support of the MSFD and maritime spatial planning (MSP)



SIG Marítimo dos Açores / Imagem web-SIG

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1. Geomorphology

3. Biodiversity

4. Human uses

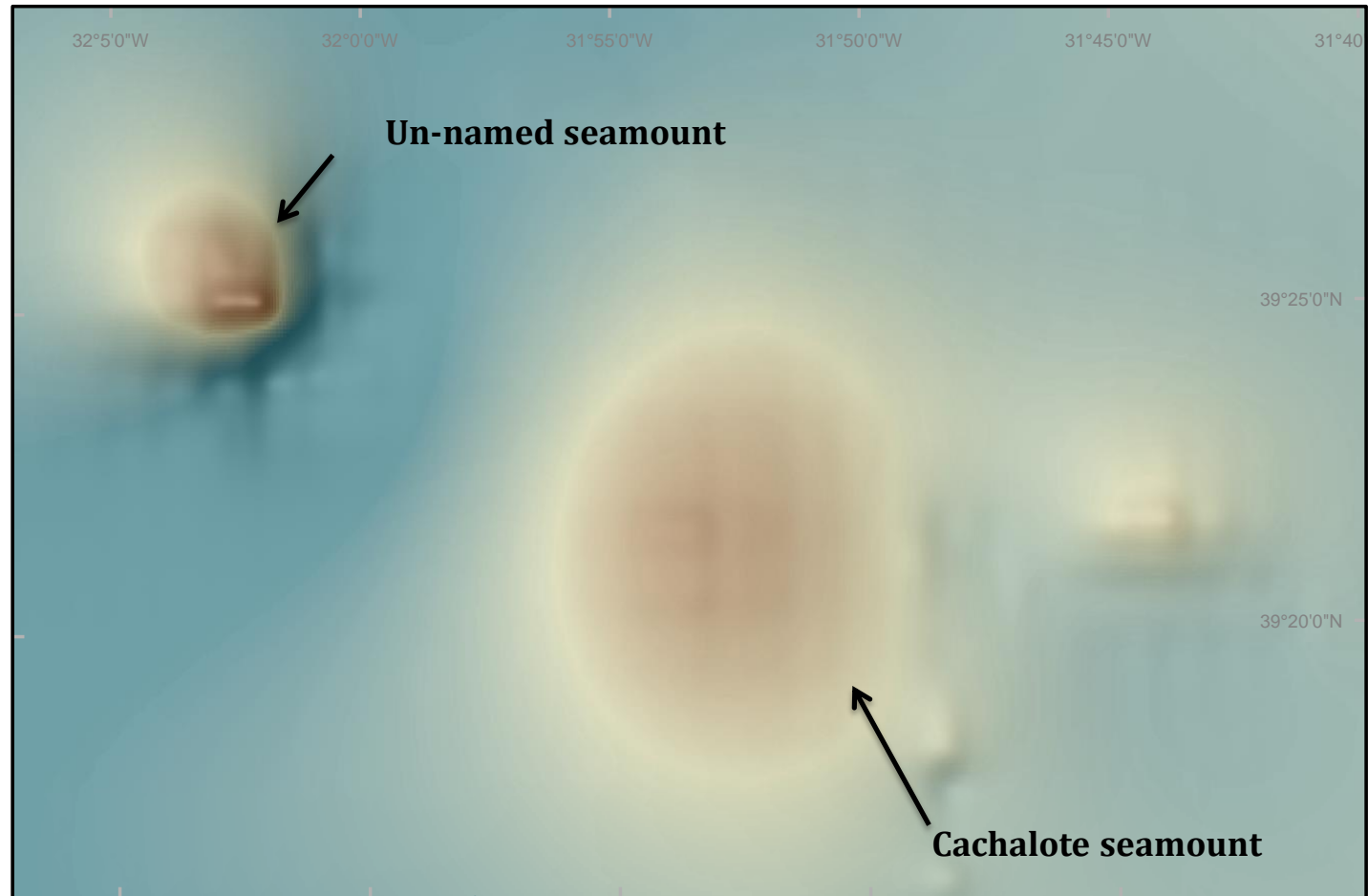
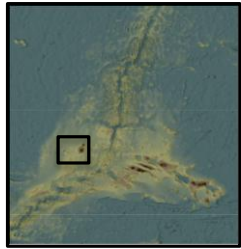
5. Legal issues

6. Socio-Economics

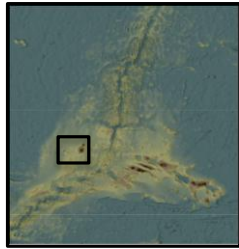
2. Environmental conditions

7. Infrastructures

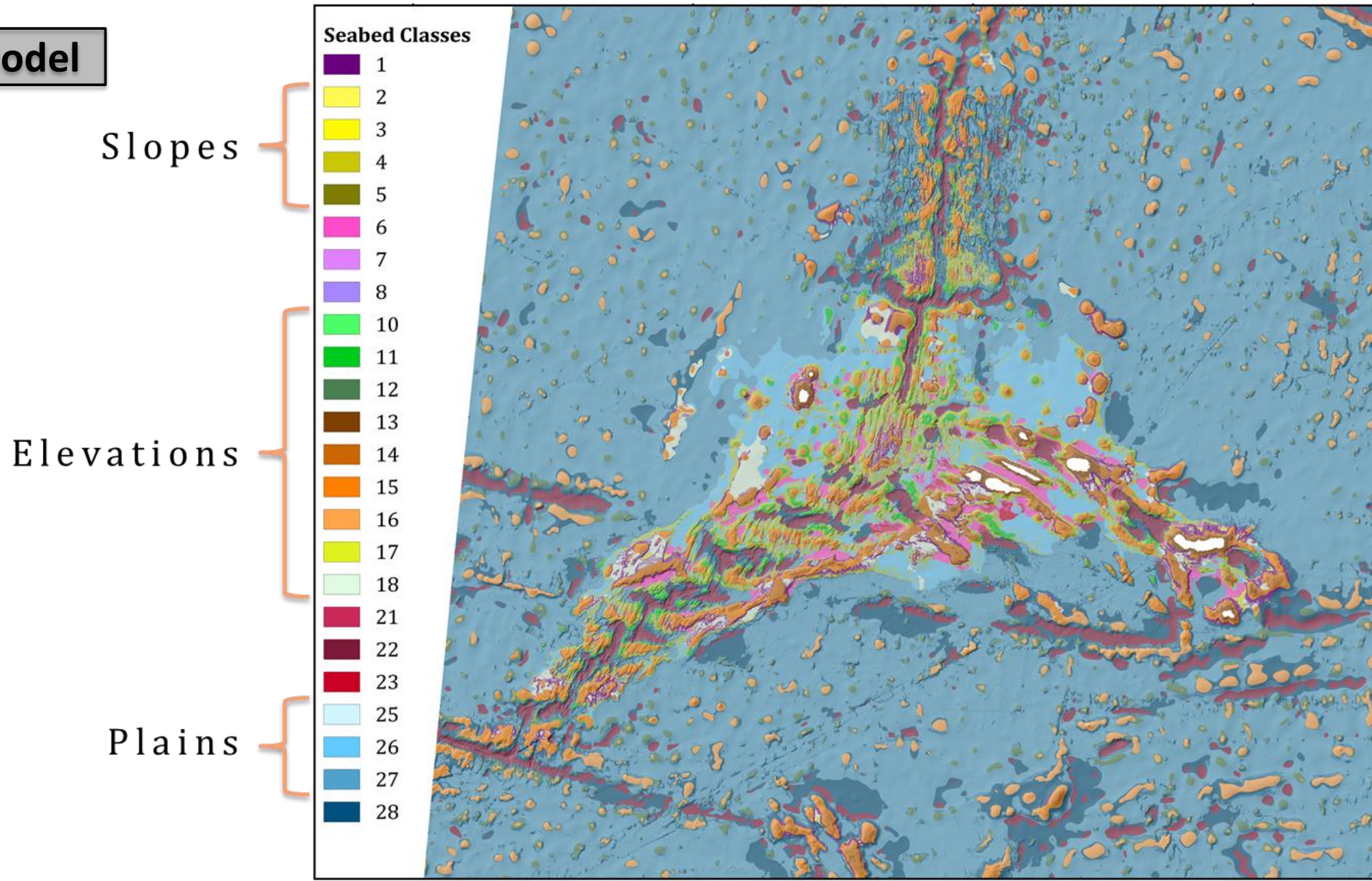
Good bathymetry is of paramount importance for understanding deep-sea biodiversity and biogeography



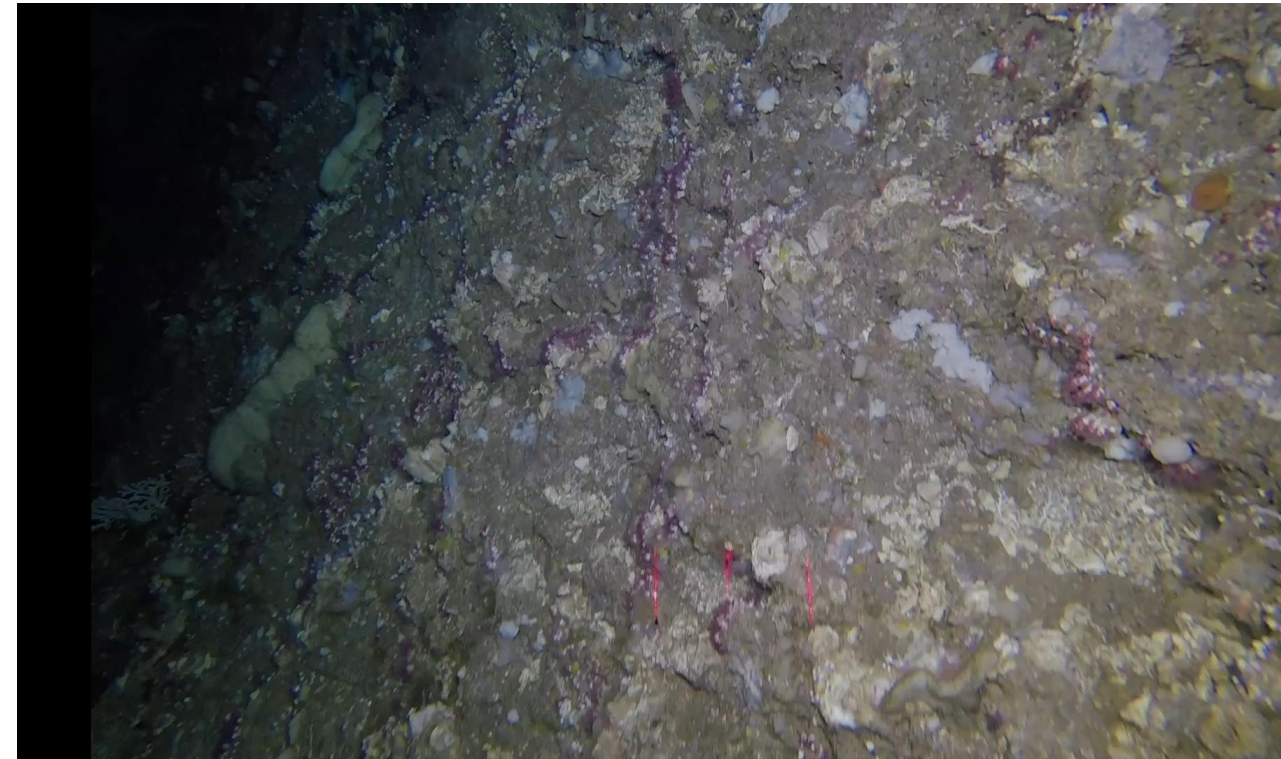
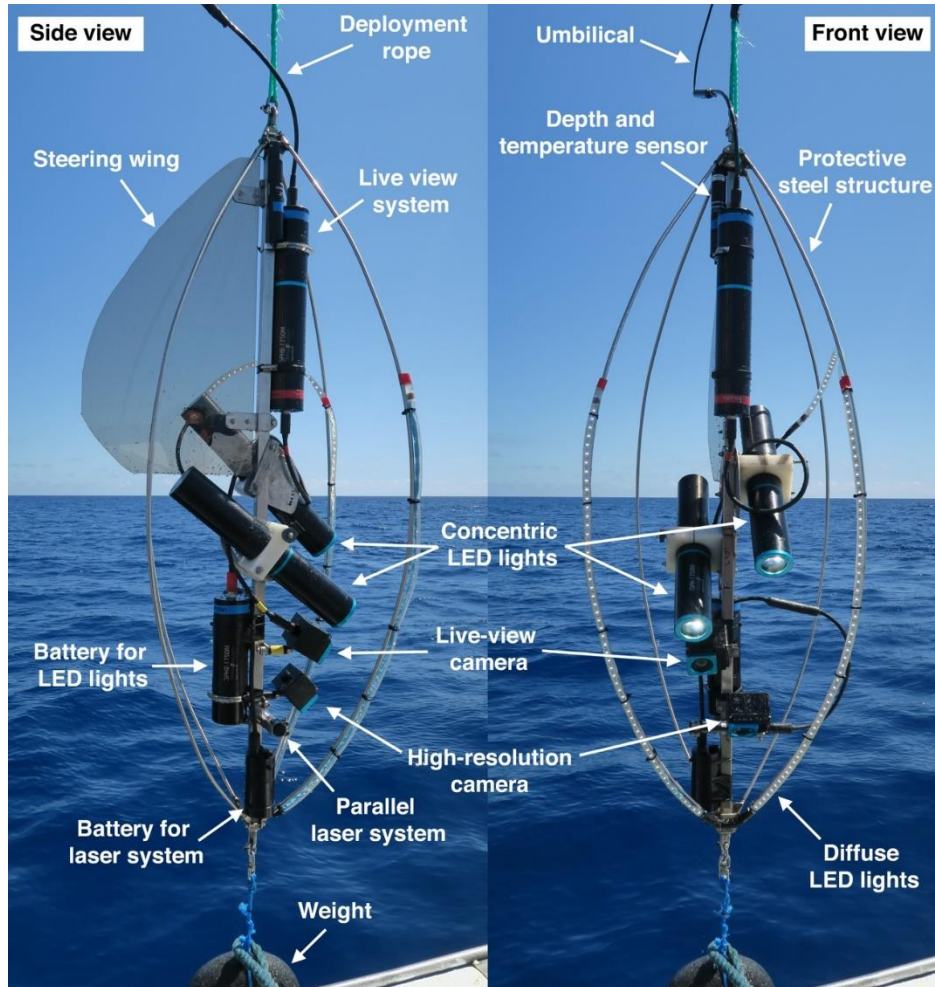
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Benthic Terrain Model

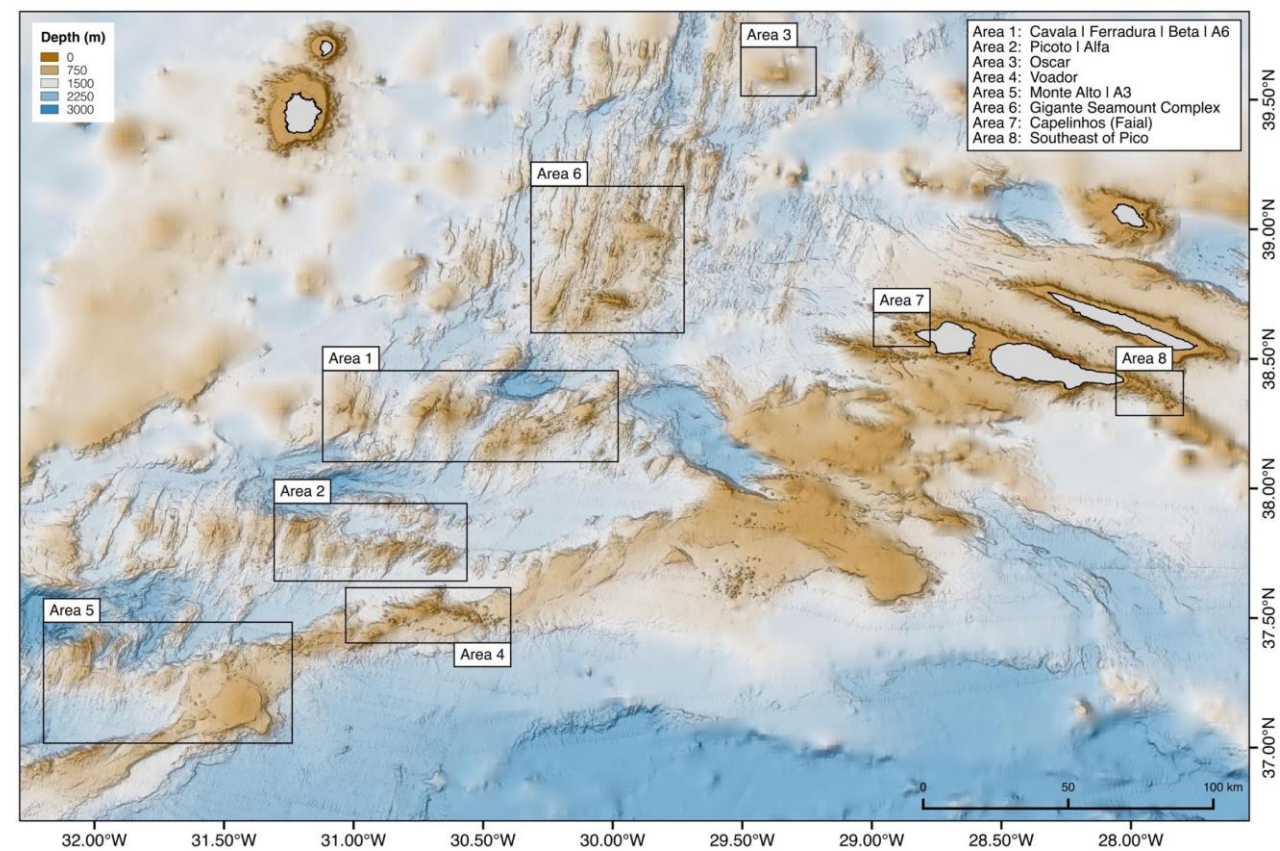


Recent surveys conducted with our new low cost system on board of N/I Arquipelágo



Benthic biodiversity

Recent surveys conducted with our new low cost system on board of N/I Arquipélago



Recent surveys conducted with our new low cost system on board of N/I Arquipélago

Some statistics

29 days cruise

23 days of work

150 dives

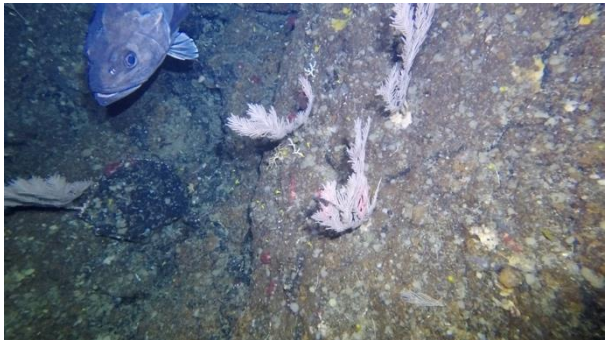
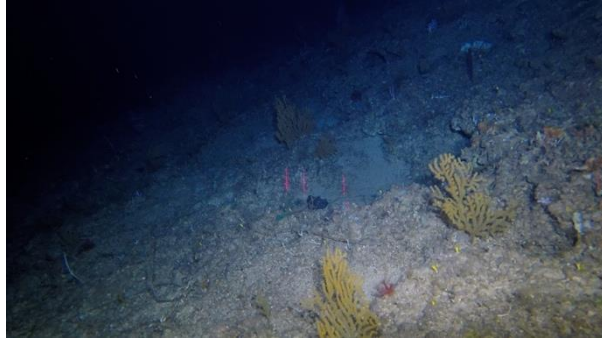
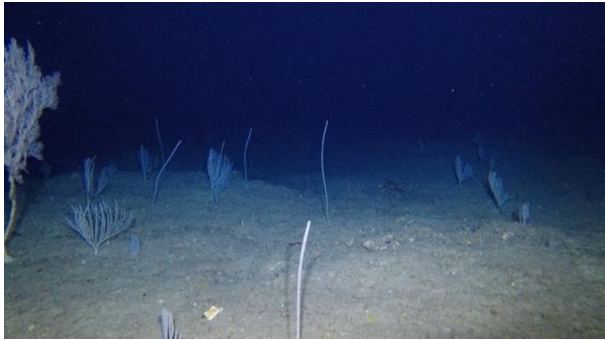
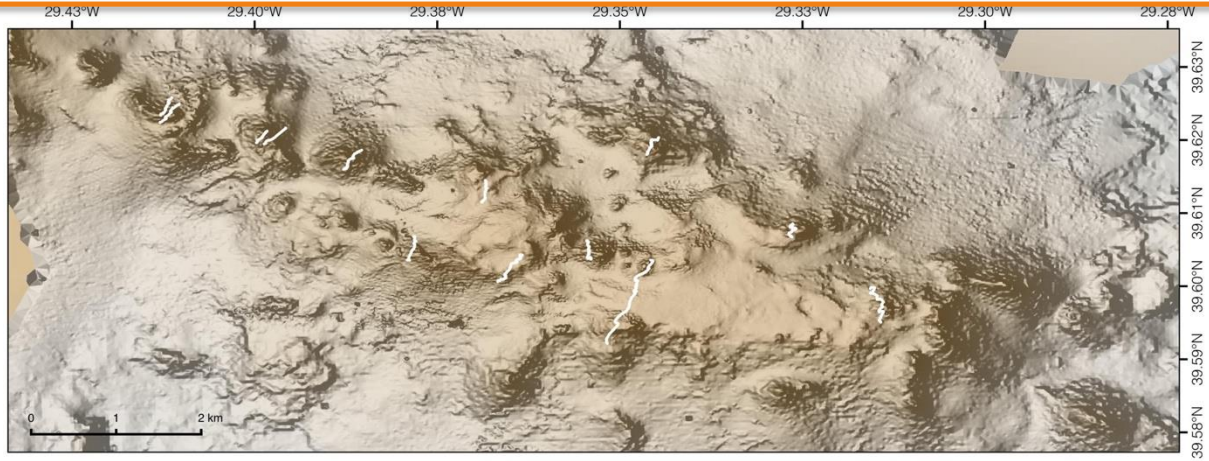
18 seamounts/ridge visited

81 km of seafloor sampled

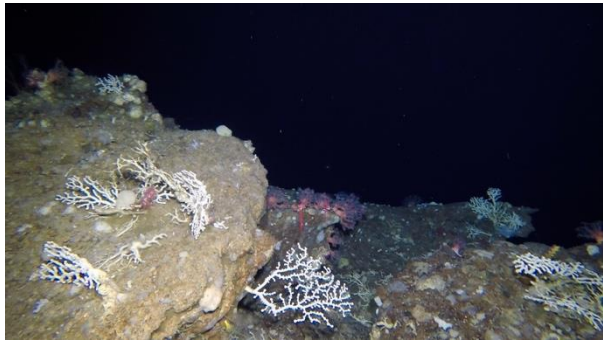
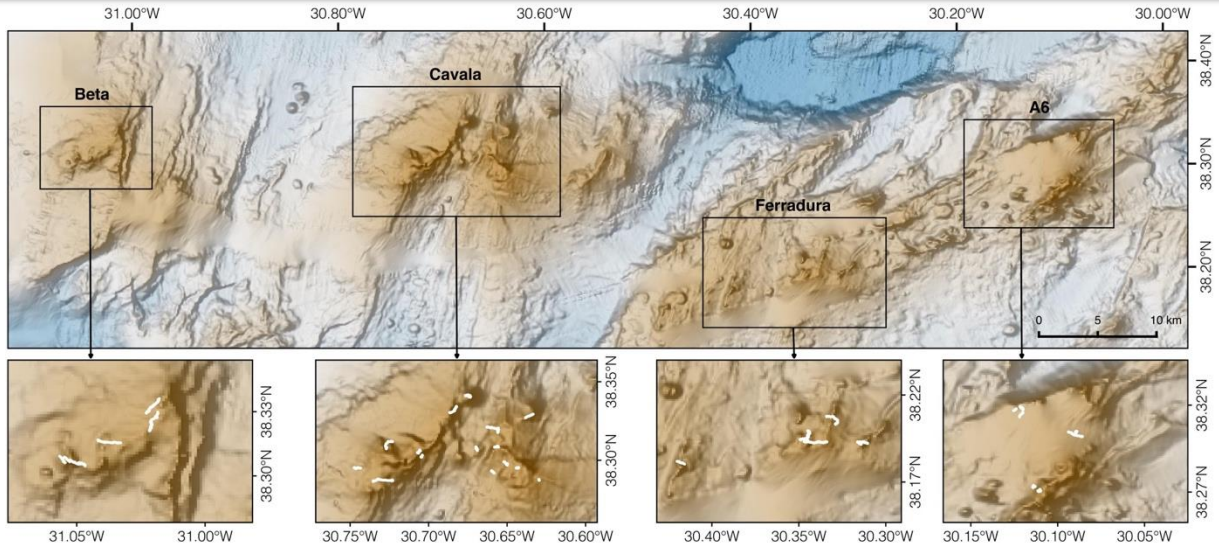
109:25 hours of bottom time

total cost of the survey **approx. 70k€**

Oscar seamount

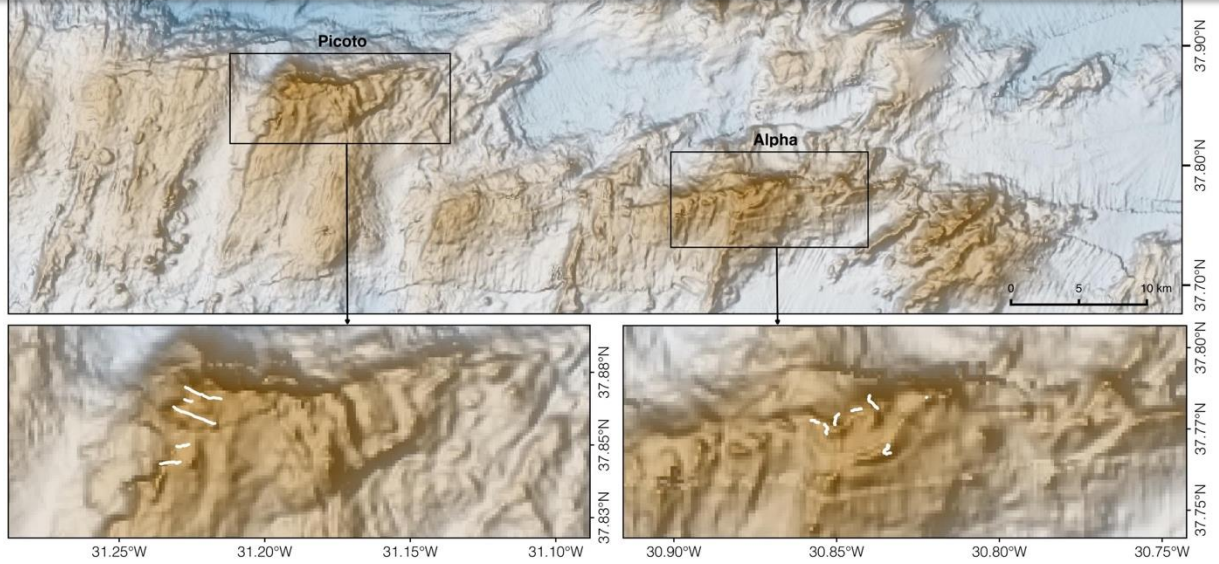


Beta | Cavala | Ferradura | A6

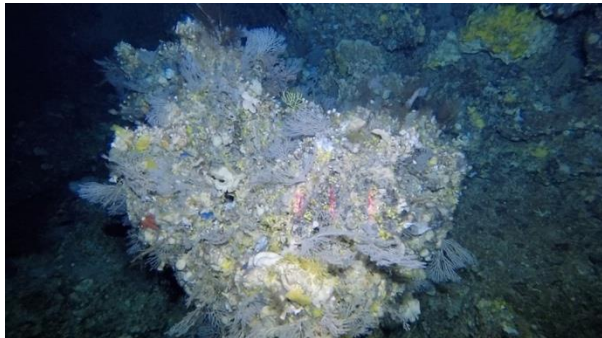
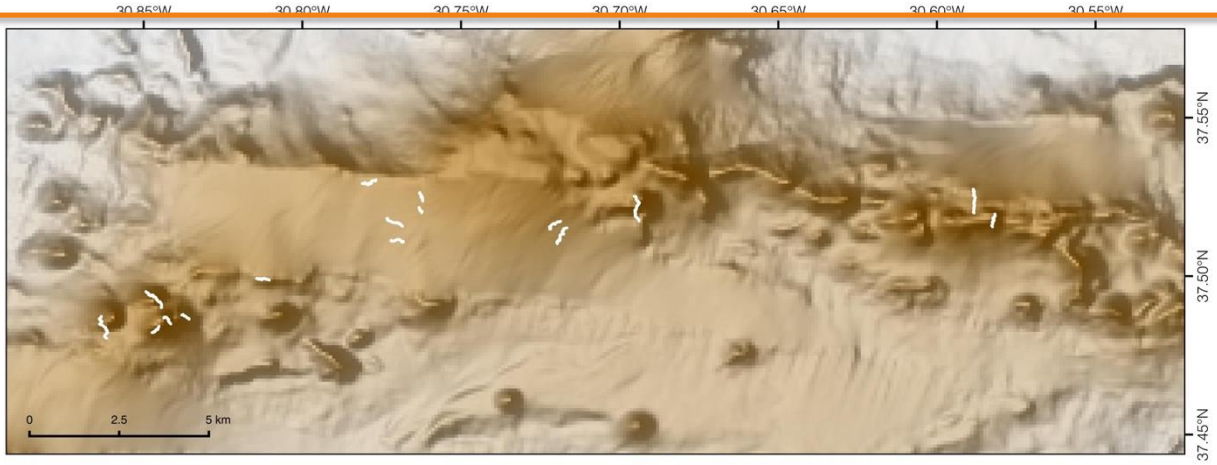


Picoto | Alfa

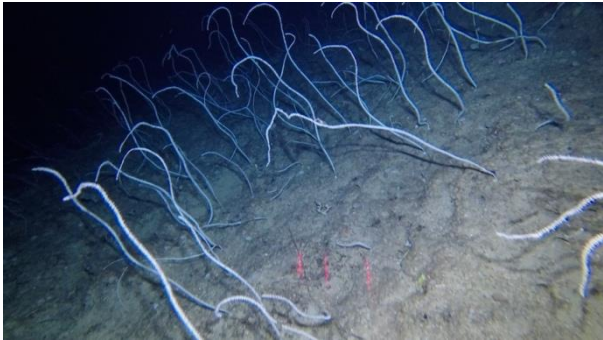
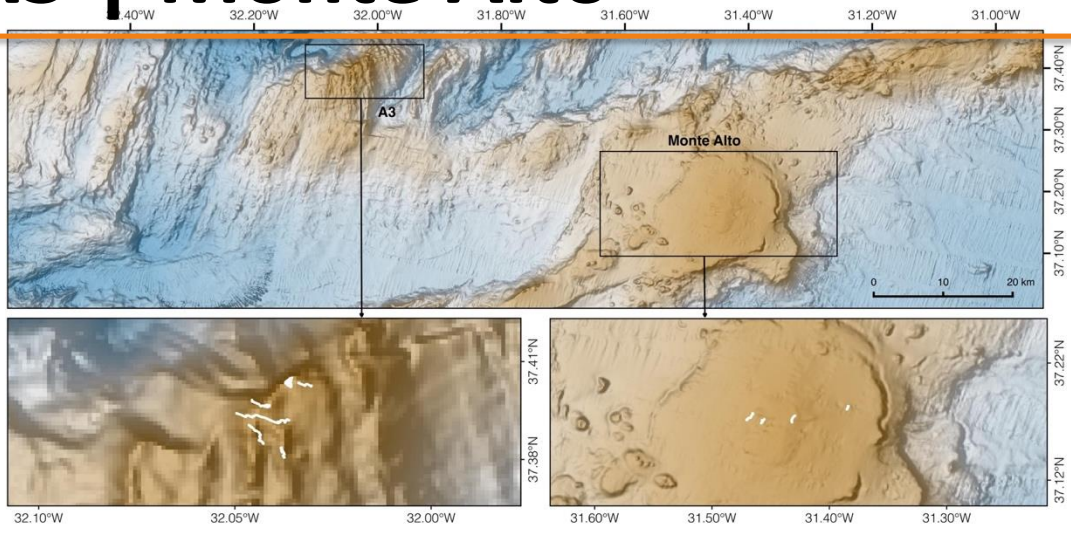
31.40°W 31.20°W 31.00°W 30.80°W 30.60°W



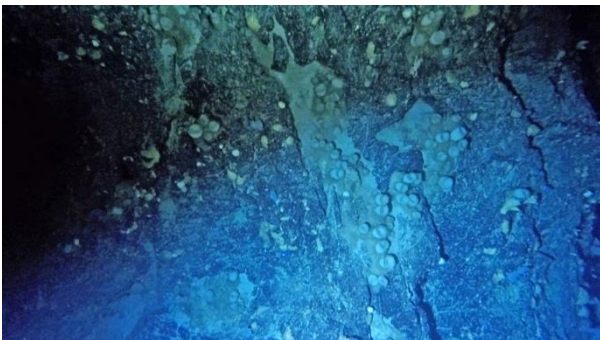
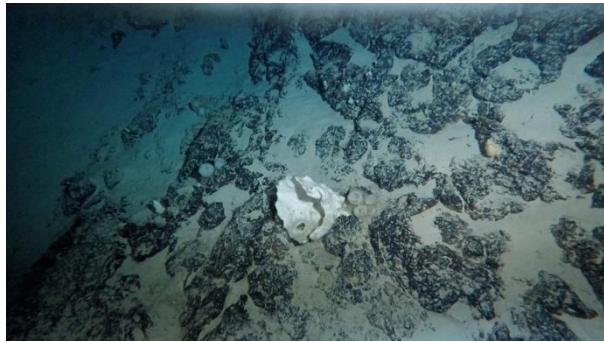
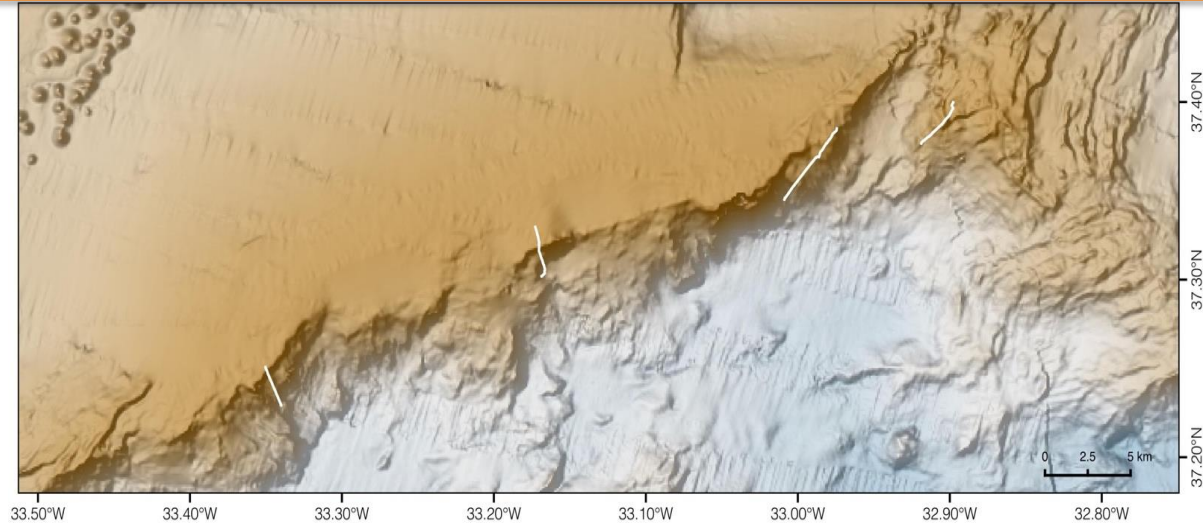
Voador



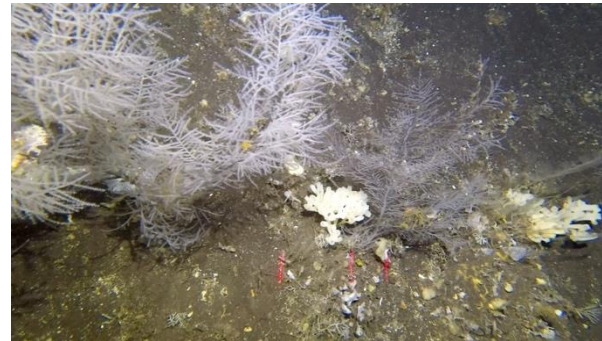
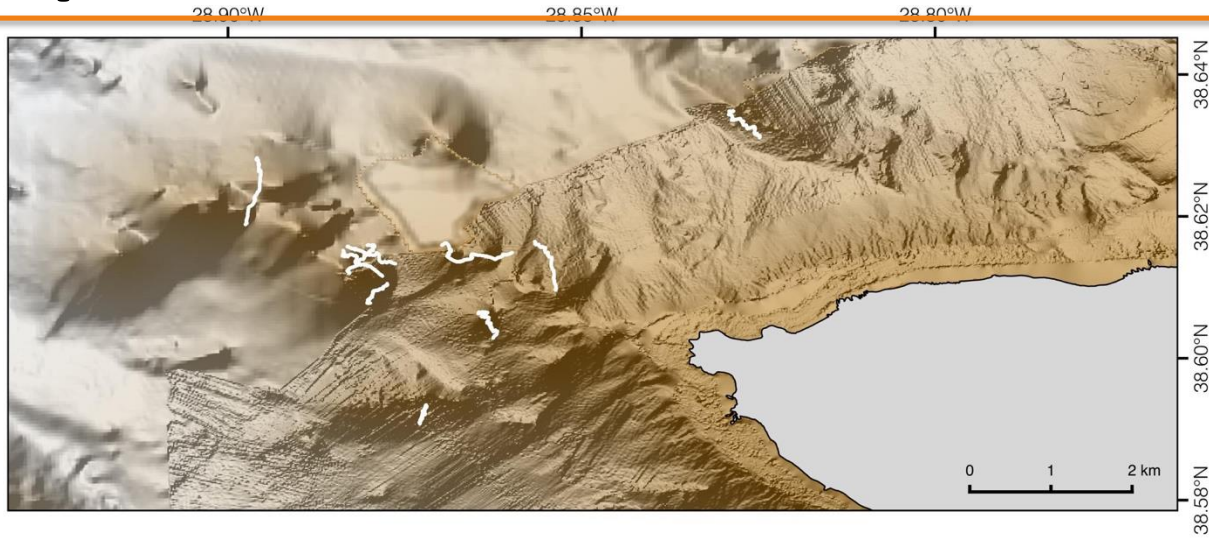
A3 | Monte Alto



Sarda



Capelinhos



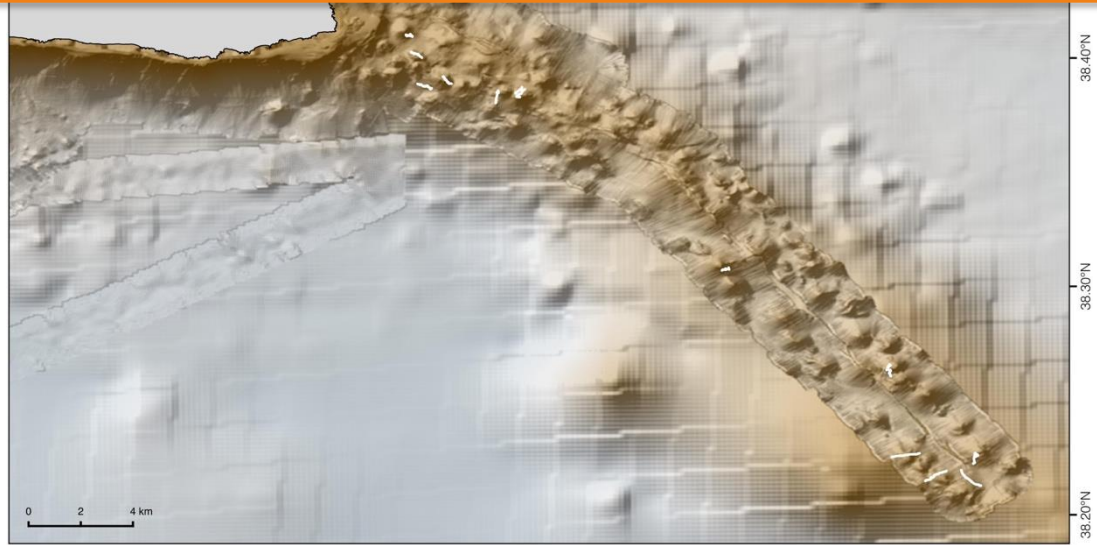
SE Pico

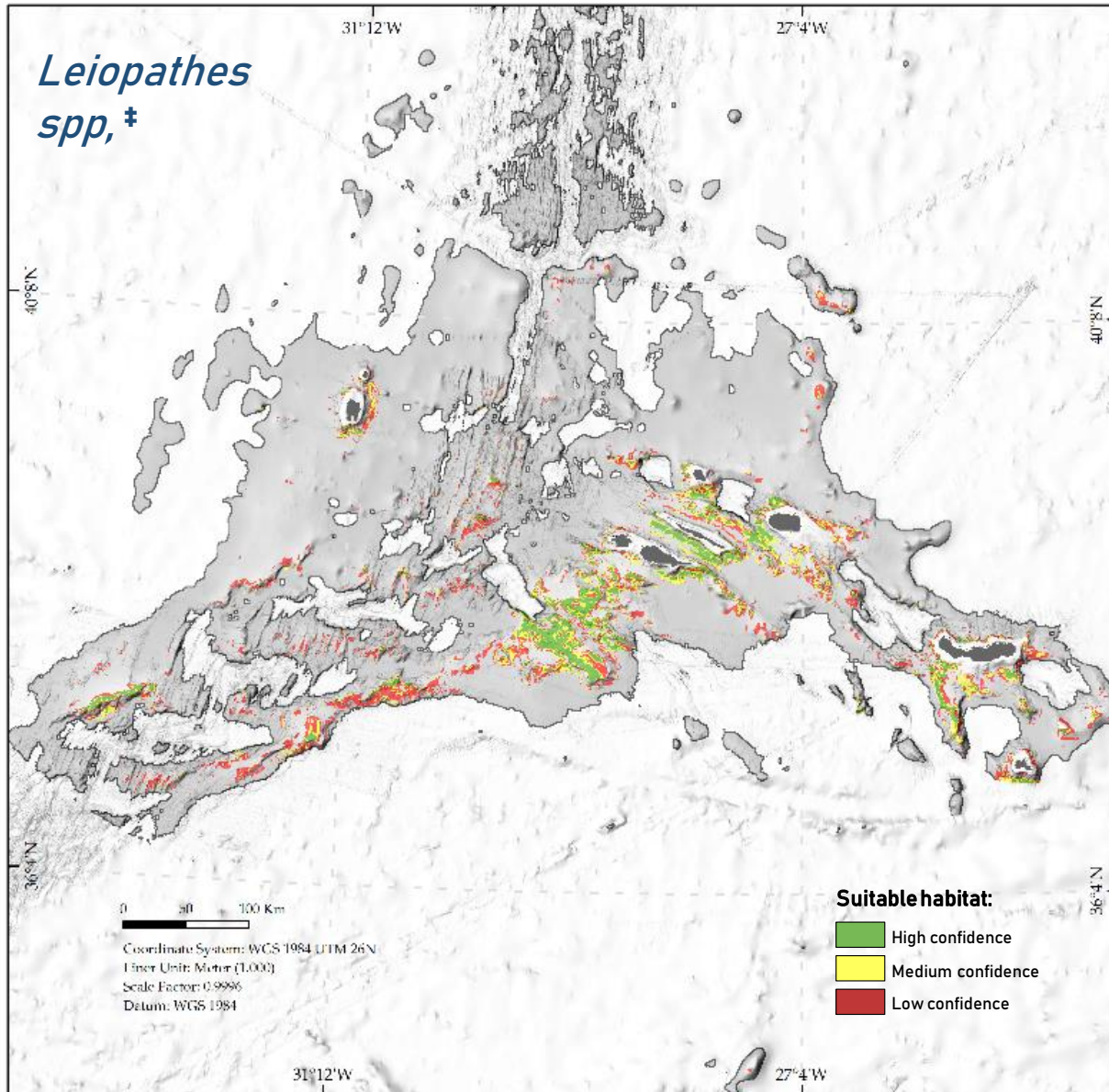
28.10°W

28.00°W

27.90°W

27.80°W





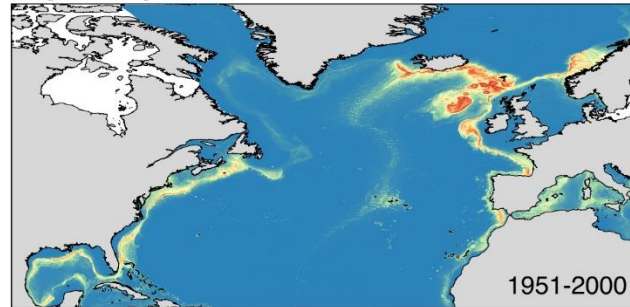
Climate change prediction

Scleractinian corals

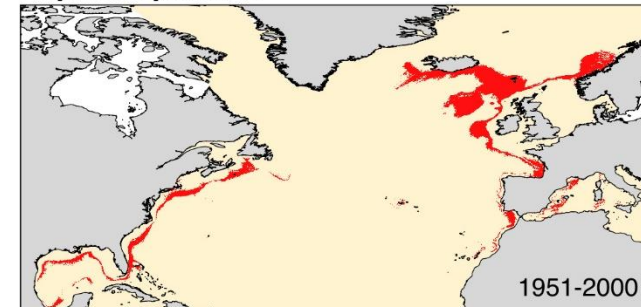
1951-2000

2081-2100

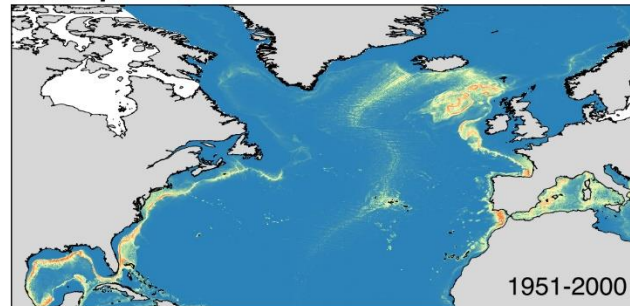
Lophelia pertusa



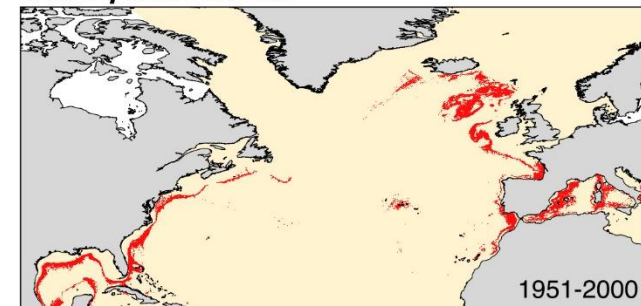
Lophelia pertusa



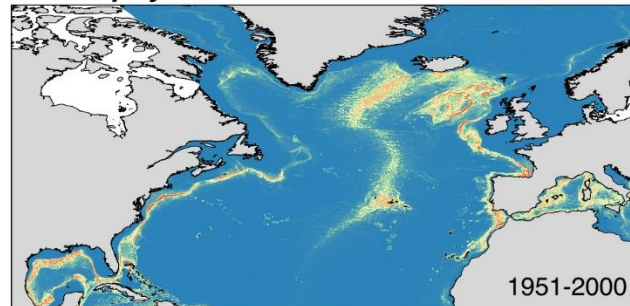
Madrepora oculata



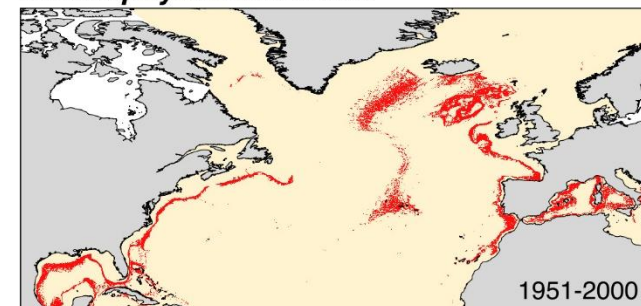
Madrepora oculata



Desmophyllum dianthus



Desmophyllum dianthus



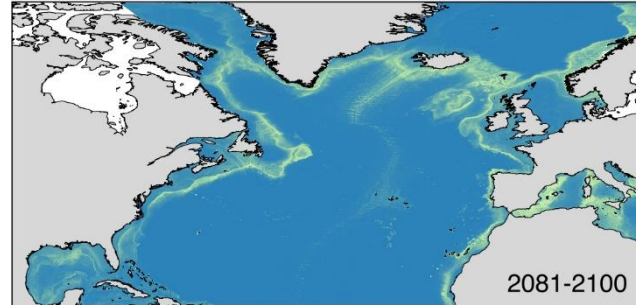
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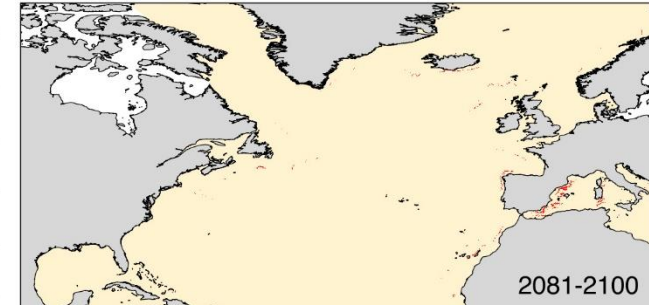
1951-2000

2081-2100

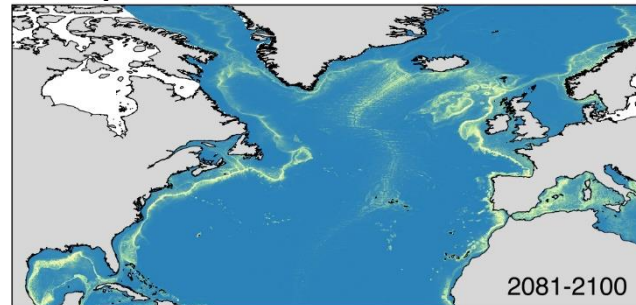
Lophelia pertusa



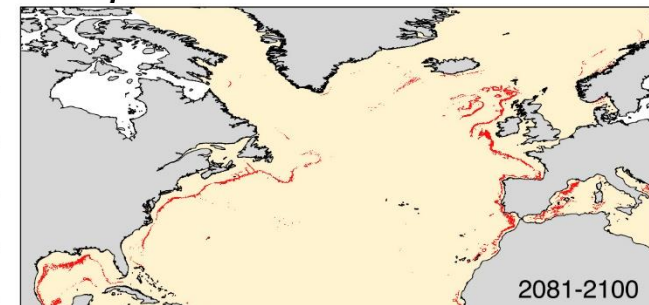
Lophelia pertusa



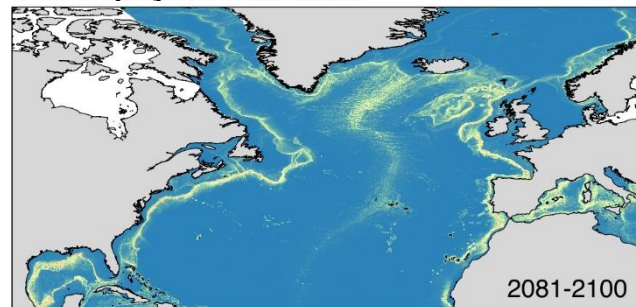
Madrepora oculata



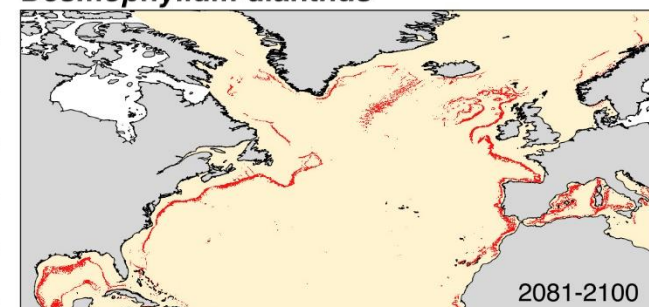
Madrepora oculata



Desmophyllum dianthus

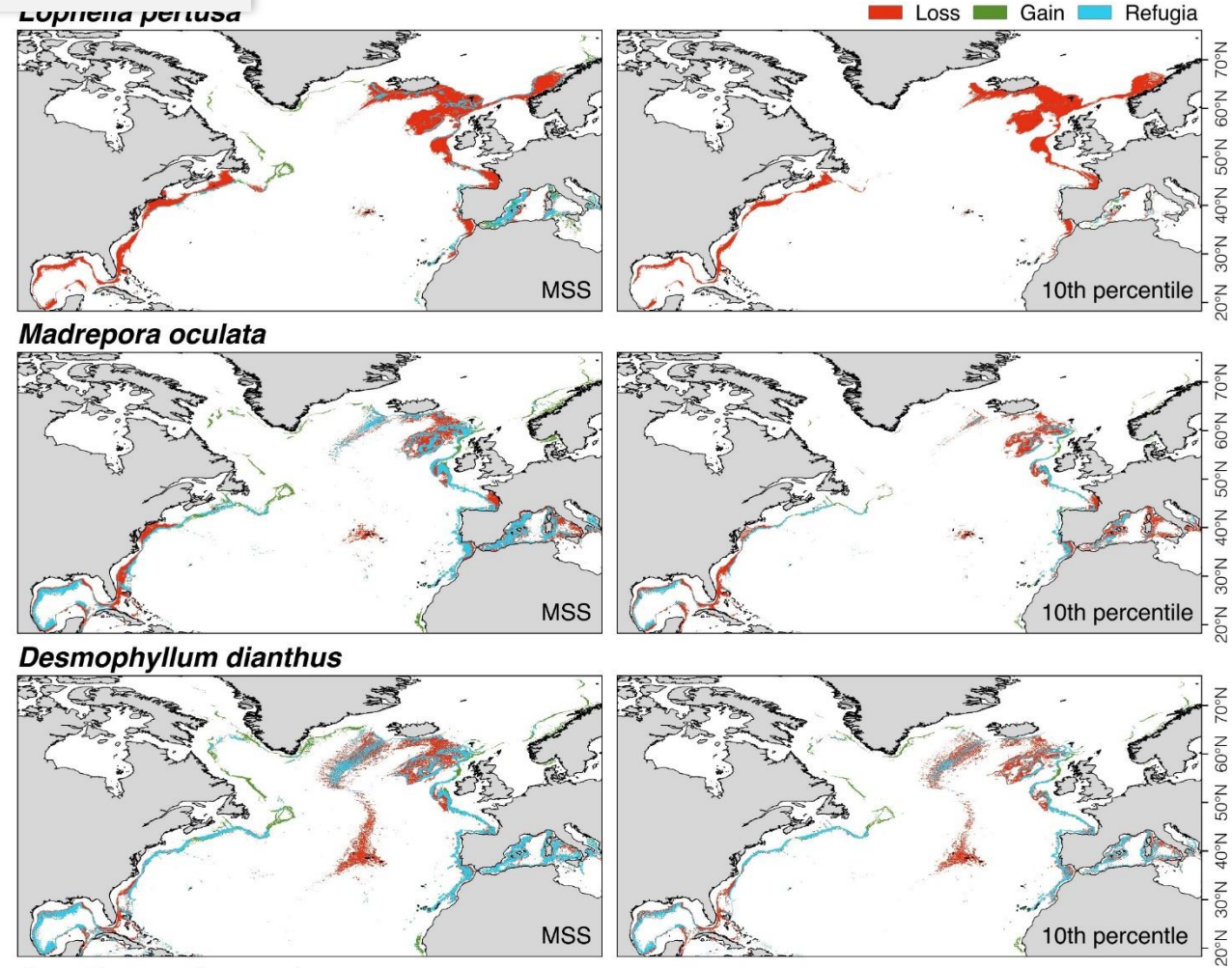


Desmophyllum dianthus



Climate change prediction

Scleractinian corals



Summary:

Improved knowledge of the geomorphology of the Azores

Improved knowledge on spatial distribution of:

Commercially important deep-water fish species

Deep-water sharks

Benthic communities (including VMEs)

etc.

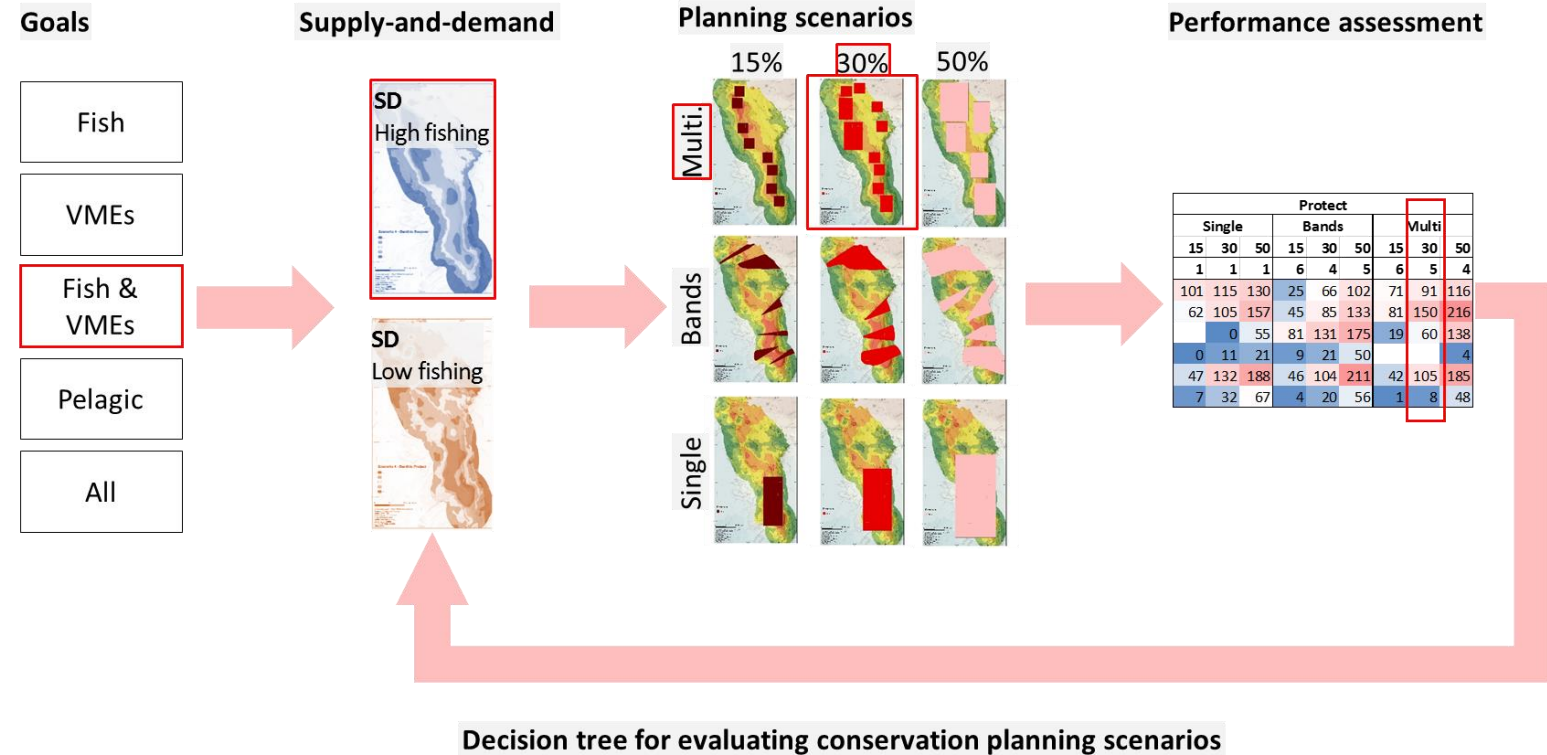
Inferred distribution of human activities; including fishing effort

Tools for implementing systematic planning approaches

Spatial management deep-sea

Decision tree

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Long-term strategy for mapping the seabed and biodiversity is necessary

Implementation of long-term vision requires long-term scientific teams

It requires up-to-date scientific infrastructures; including Research Vessels, Towed cameras, ROVs, AUVs...

Promoting sustainable blue growth and informing MSFD in a transparent, ecosystem-based, and science-based manner is possible

Quantitative, science-based, and transparent assessment of GES in the deep-sea is still not a reality

New data suggests that the Azores Marine Park could be revised to include some recently discovered Vulnerable Marine Ecosystems

Climate change should be taken into account when promoting sustainable blue growth and informing MSFD