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UNDERSTANDING DEEP ATLANTIC ECOSYSTEMS



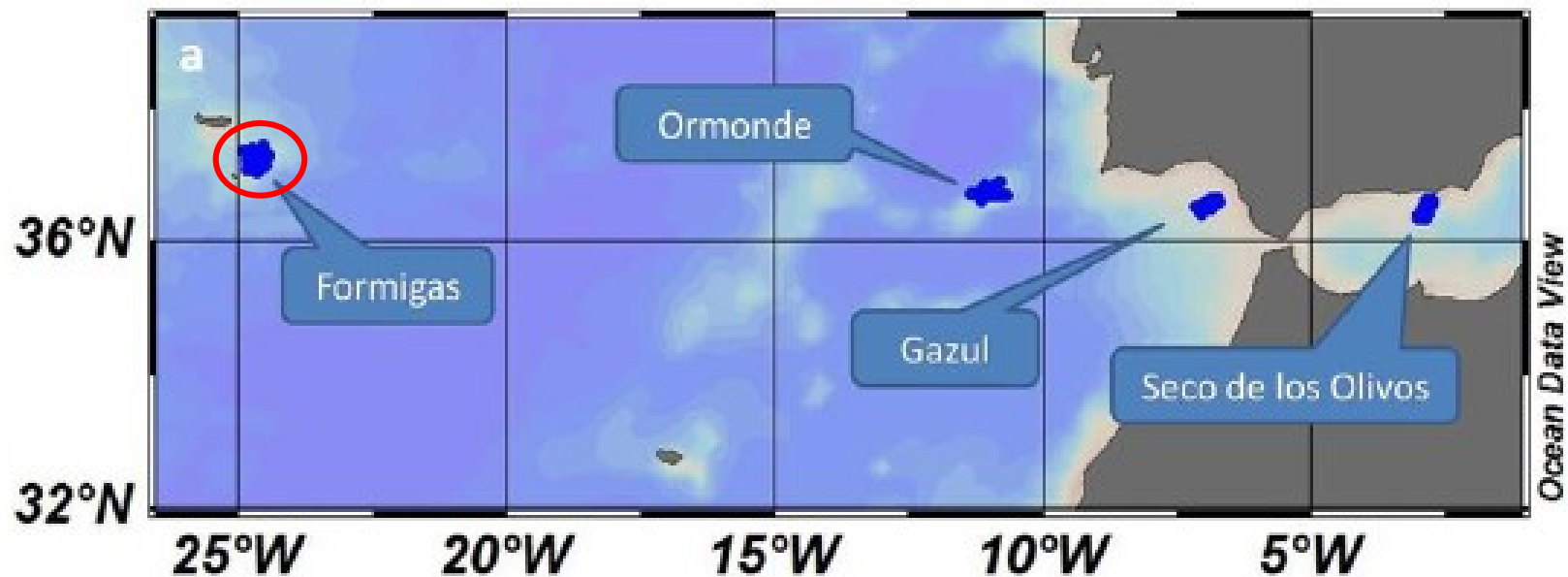
Biodiversity and benthic megafaunal communities inhabiting the Formigas Bank (NE Azores)

ATLAS 2nd General Assembly, Mallorca, 25-28 April

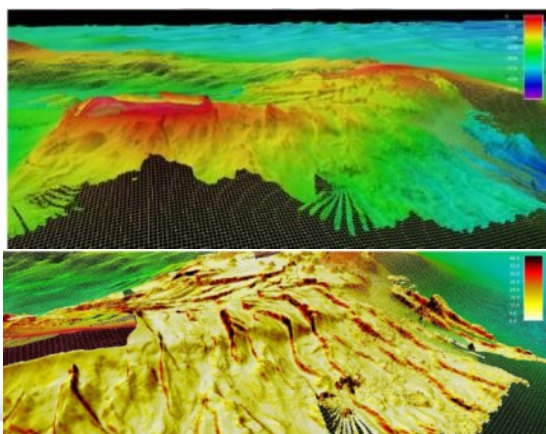
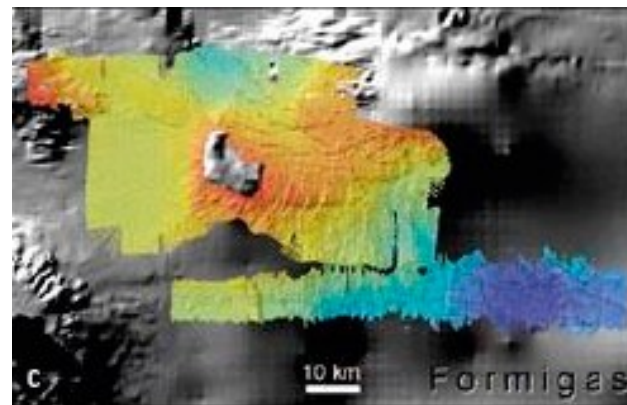
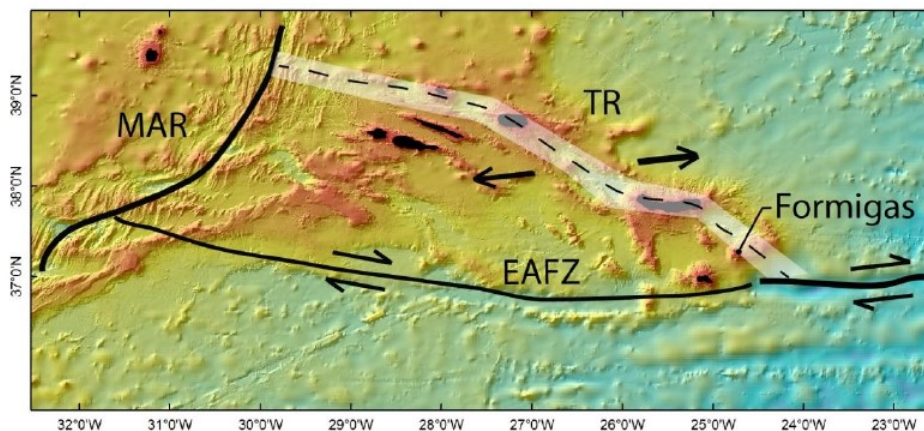
Carreiro-Silva M., Henry LA., Bilan M., Sampaio I, Rivera J, Rakka M, Taranto GH, Ramos M, Rueda JL, Mateo-Ramirez A, Urra J, Gallardo M, Arnaud-Haond S, Movilla J, Hermida M, Morato T, Tempera F, Orejas C



The MEDWAVES cruise



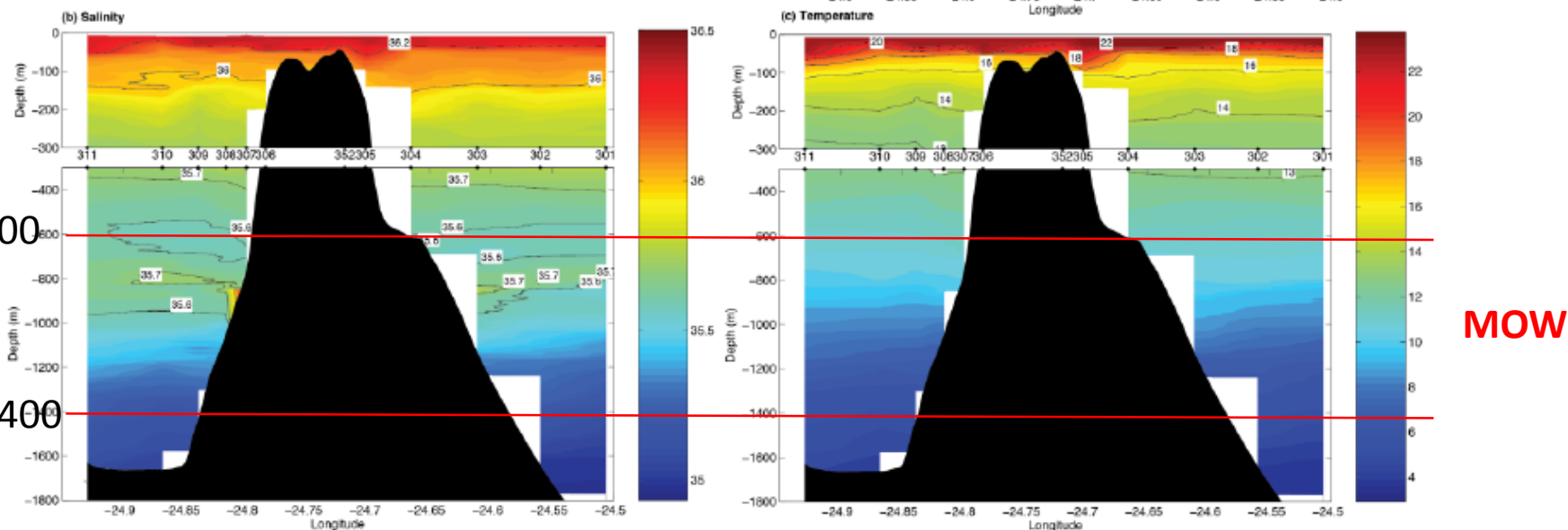
Formigas Seamount - Geomorphology



Conservation:
 Natura 2000 Special Area of Conservation
 OSPAR MPA
 RAMSAR site
 Nature Reserve under Azores network of MPAs

Oceanography

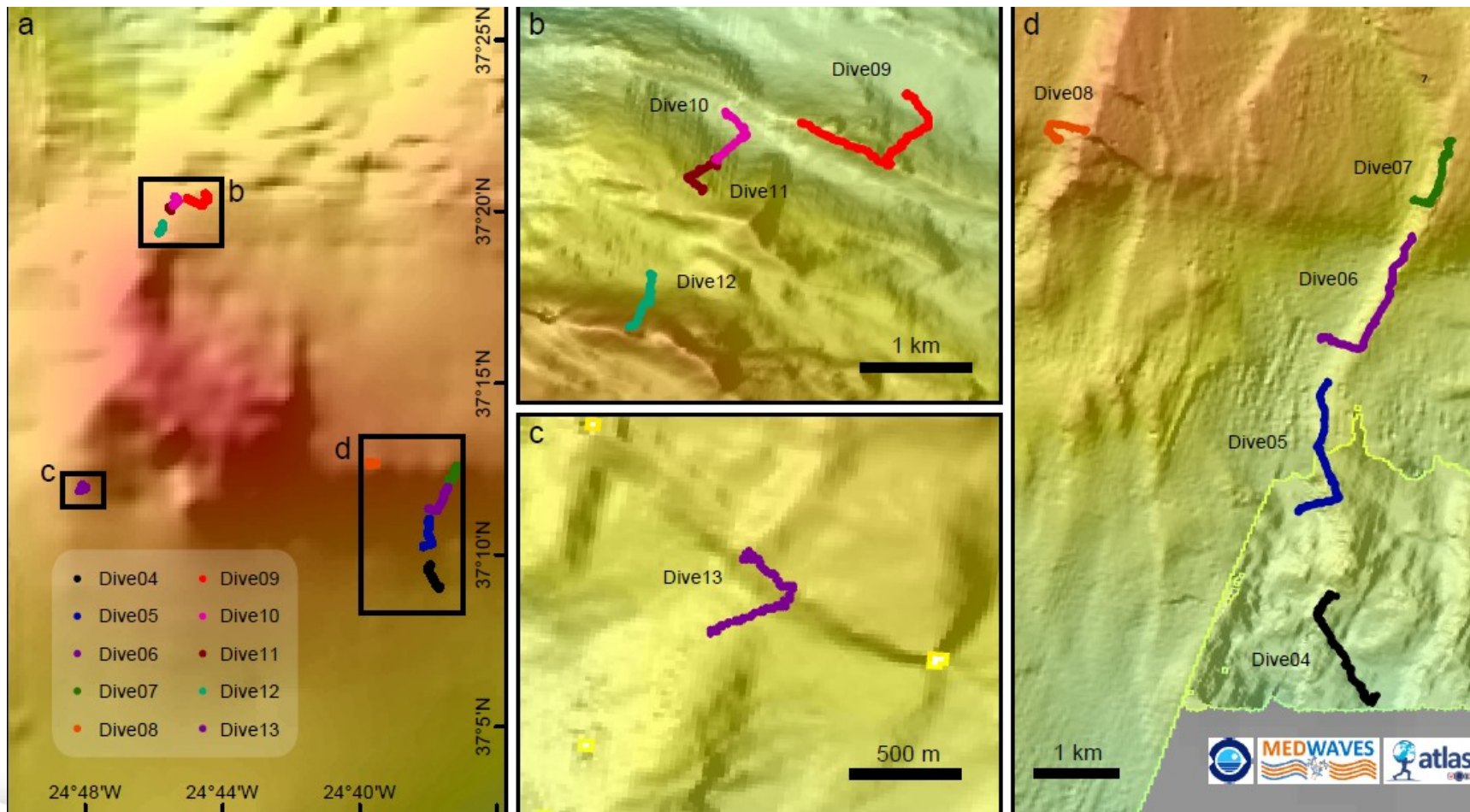
The Formigas seamount shows the vertical distribution of waters masses characteristic of the central subtropical Atlantic.



- NACW – North Atlantic Central Water
- AAIW – Antarctic Intermediated Water
- MOW – Mediterranean Outflow Water
- uNADW – upper North Atlantic Deep Water

The MEDWAVES physical oceanography team

ROV transects

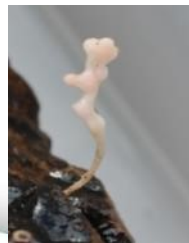
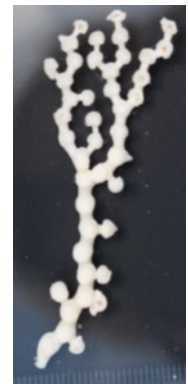


The MEDWAVES geomorphology team

Species diversity - corals

11 sp. Alcyonacea; 3 sp. Antipatharia; 1 Stolonifera, 5 sp. Scleractinea; 3 sp. Stylasteridae

Several potential new species of octocorals (Family Plexauridae), 1 new species of Antipatharia



Fishes & Decapods



Coelorhincus sp.



Synaphobranchus sp.



Chaunax sp.



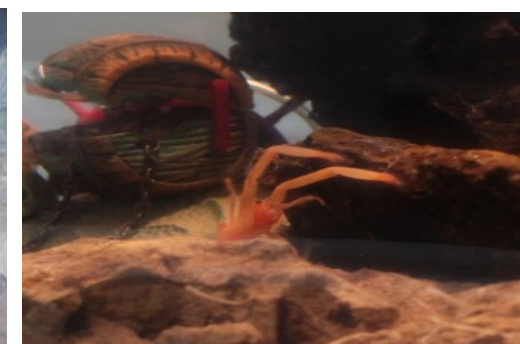
Bathypterois sp.



Hoplostethus atlanticus



Lophius sp.



Acanella associated
Galatheid crab

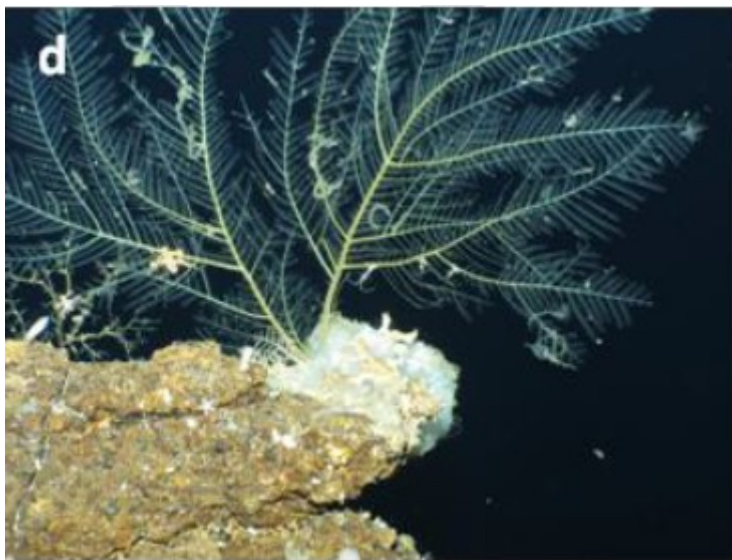


Geryonidae crab

ATLAS questions:

- relate fish communities to geomorphology & oceanography
- investigate possible essential fish habitat for eels

Hydroids

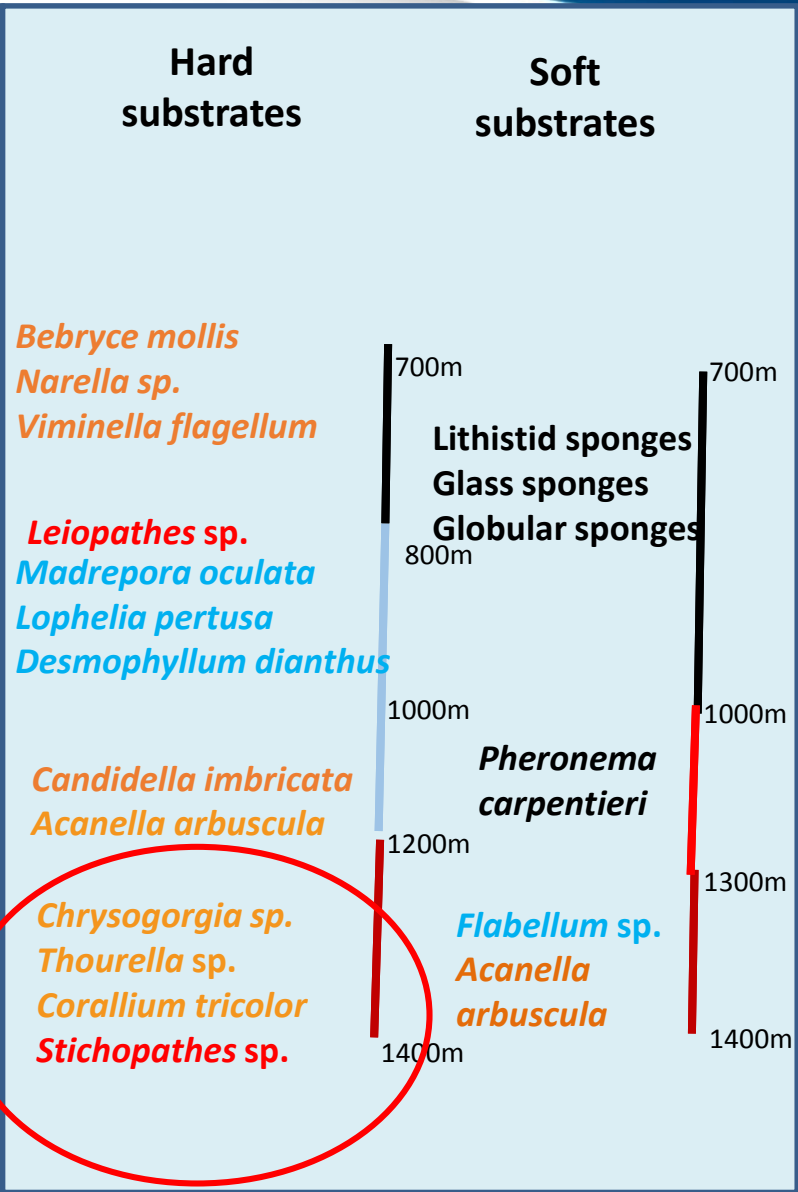
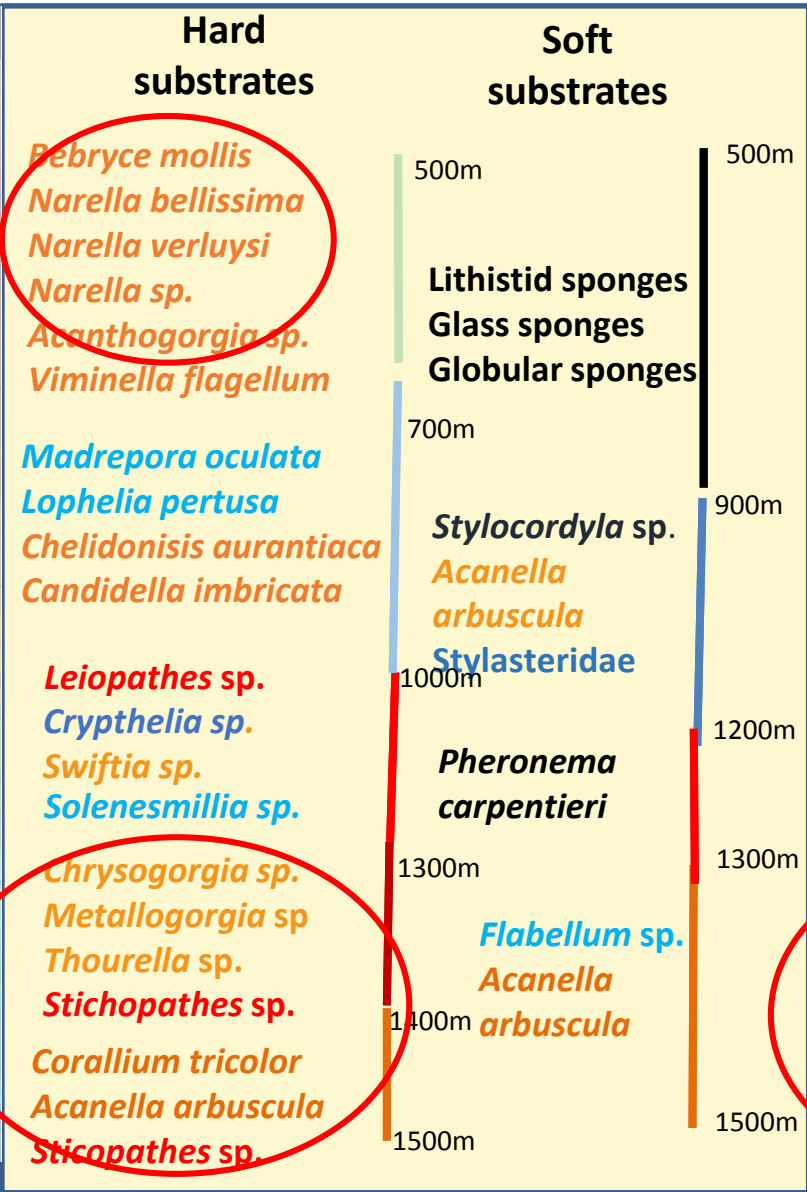
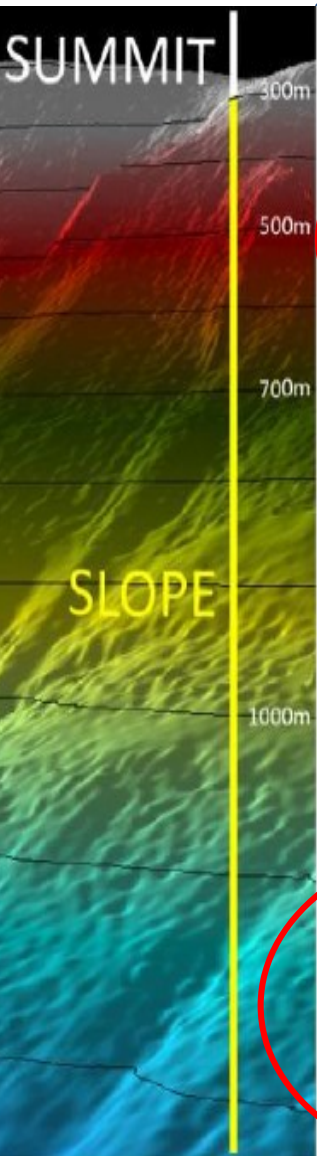


ATLAS questions:

- Are Formigas hydroids similar to the Med? Trans-Atlantic?
- Does depth affect the species present?

SE Flank

NW Flank





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Mixed coral garden on hard substrate

Species composition: Gorgonians *Acanella arbuscula*, *Thourella* sp., unidentified *Plexauridae* gorgonians, stylasterids

Flank: SE flank

Depth: 1200-1400 m

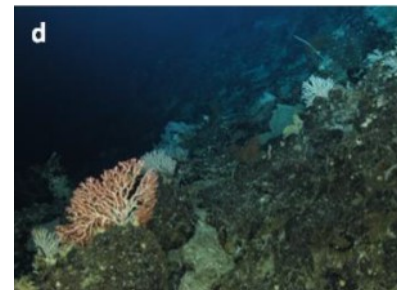
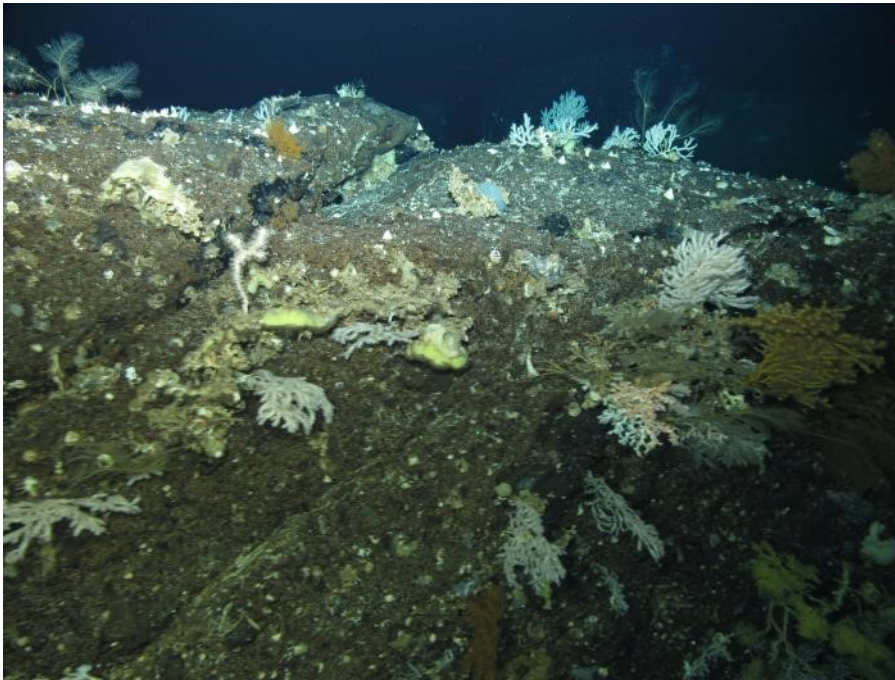


Mixed coral garden on hard substrate

Species composition: Gorgonians *Acanella arbuscula*, *Corallium tricolor*, unidentified *Plexauridae*, scleractinians *Madrepora oculata*, *Lophelia pertusa*, *Solenosmilia variabilis*, *Desmophyllum dianthus*, black coral *Leiopathes* sp., stylasterids, Lithistidae sponges

Flank: SE flank

Depth: 900-1200 m

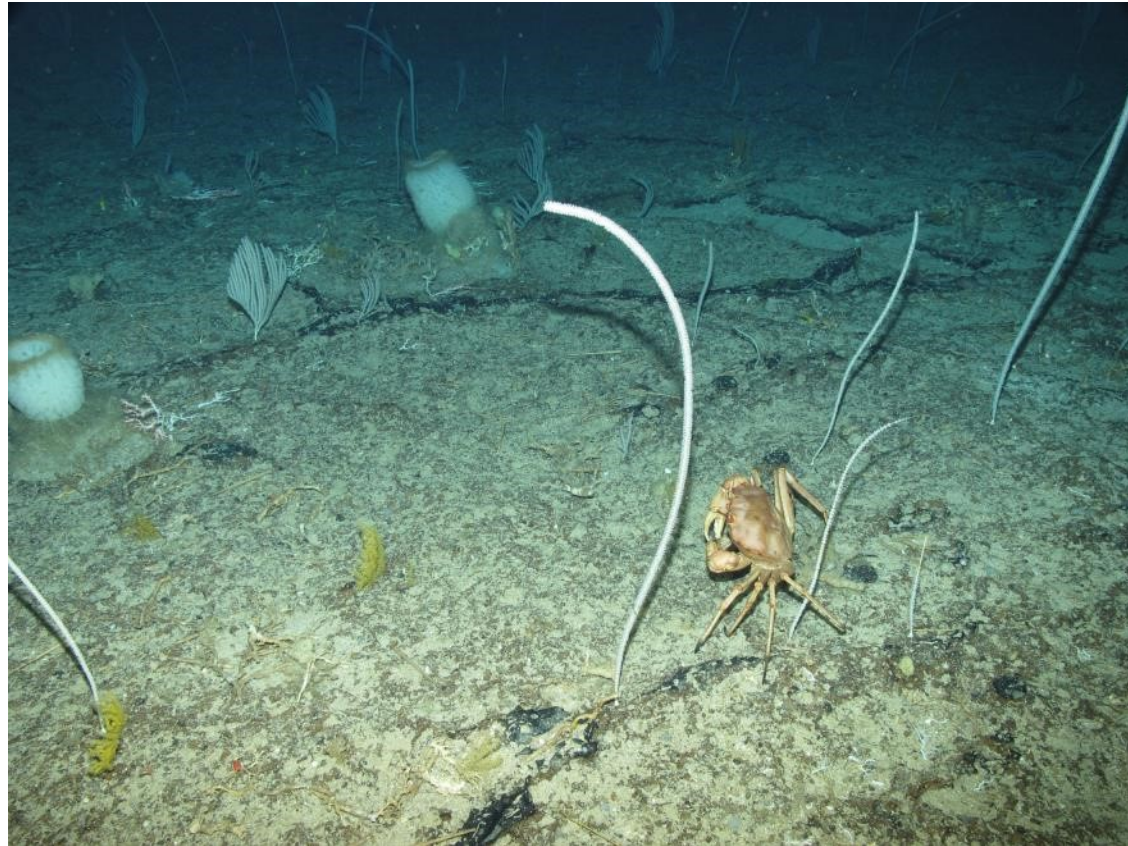


Mixed coral garden on hard substrate

Species composition: Gorgonians *Narella bellissima*, *Narella verluysi*, bird-nest sponge *Pheronema carpentieri*

Flank: SE flank

Depth: 700-1000 m

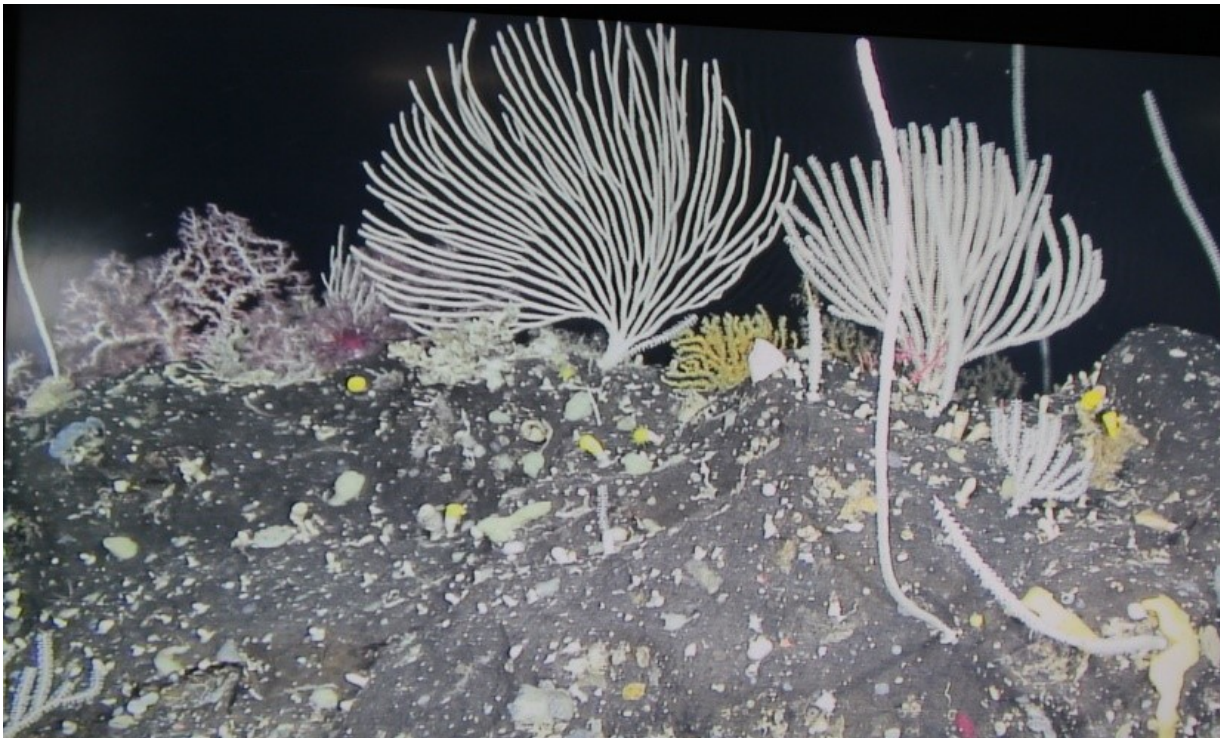


Mixed coral garden on hard substrate

Species composition: *Narella bellissima*, *Acanthogorgia cf. armata*, *Narella verluysi*, unidentified *Plexauridae*, *Corallium tricolor*, encrusting sponges

Flank: SE flank

Depth: 700-1000 m

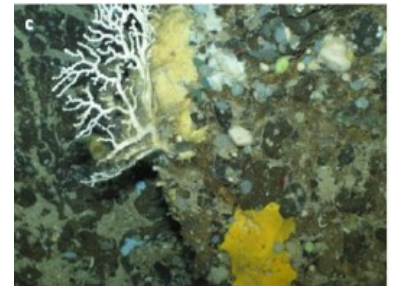


Mixed coral garden on hard substrate

Species composition: Gorgonians *Viminella flagellum*, unidentified flagelliform gorgonians, stylasterids, *Rosella*-like and glass sponges, encrusting sponges

Flank: SE flank

Depth: 500-700 m

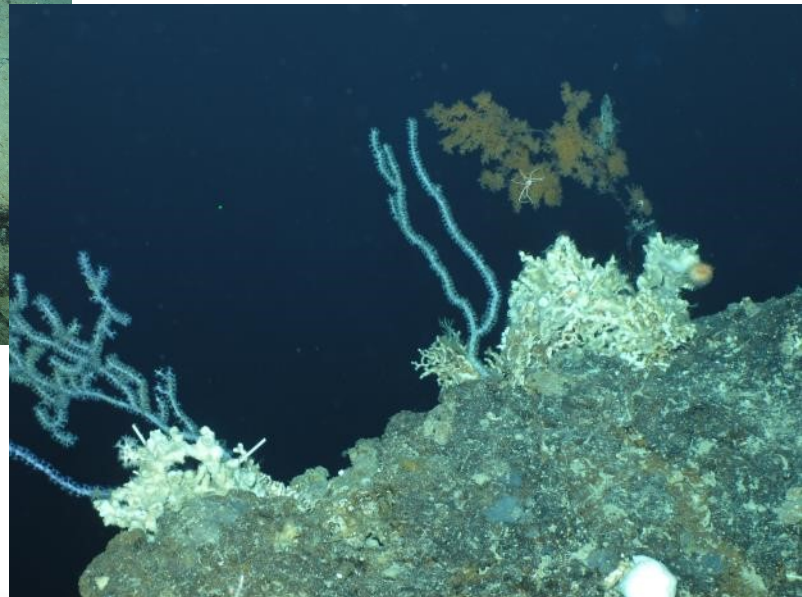
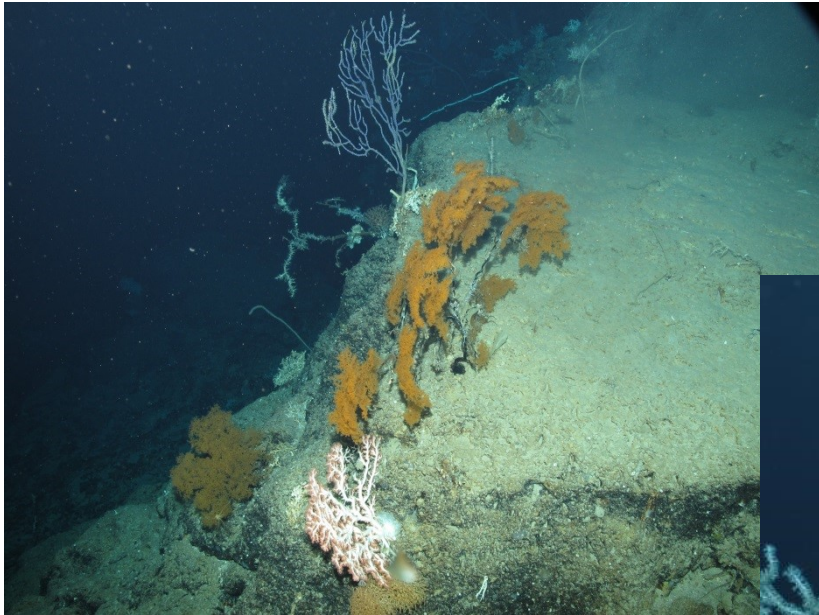


Mixed coral garden on hard substrate

Species composition: Black coral *Leiopathes sp.*, gorgonians *Acanella arbuscula*, *Corallium tricolor*, unidentified Plexauridae, scleractinians *Madrepora oculata* and *Lophelia pertusa*

Flank: NW flank

Depth: 700-1,400 m



Mixed coral garden on hard substrate

Species composition: Scleractinians *Lophelia pertusa*, *Madrepora oculata*, octocoral *Acanella arbuscula*, *Phakelia*-like and other sponges

Flank: S flank

Depth: 1,000-900 m



Sponge aggregation on hard/soft substrate

Species composition: Sponge *Pheronema carpentieri*, coral rubble

Flank: SE and NW flanks

Depth: 700 m



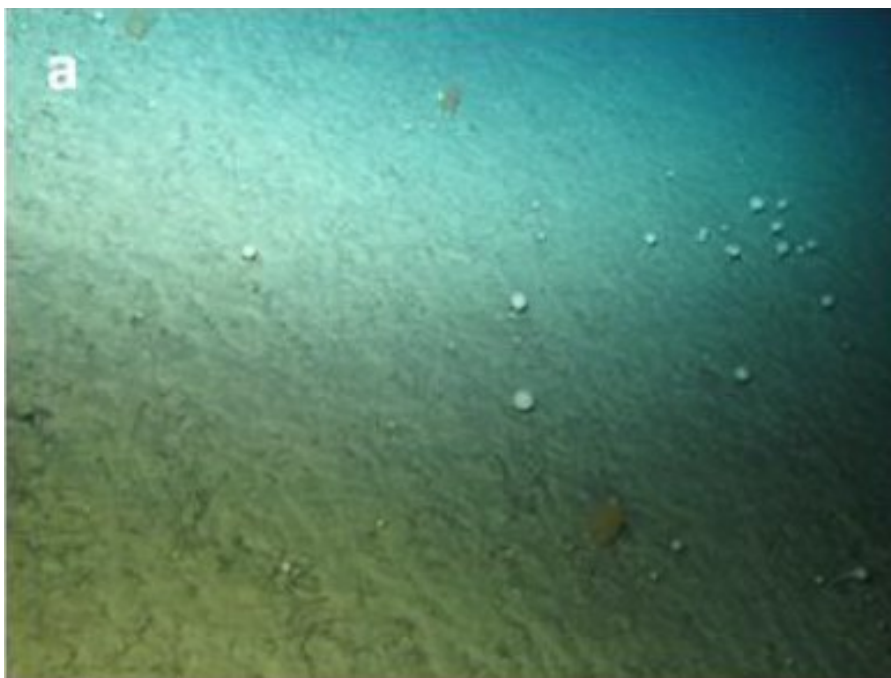


Sponge aggregation on soft substrate

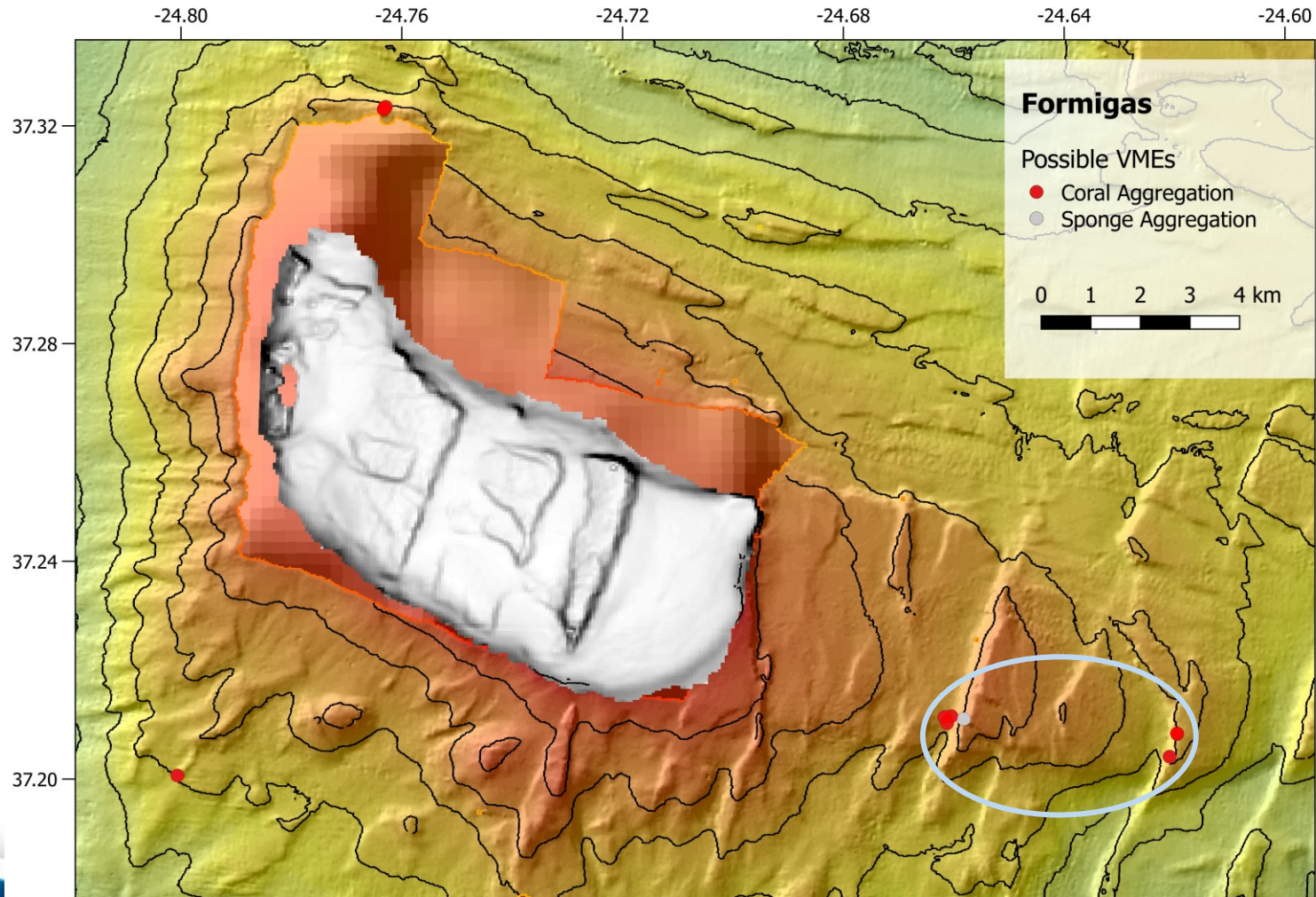
Species composition: *Stylocordylia* sp. sponges

Flank: SE flank

Depth: 900-1200 m



Vulnerable Marine Ecosystems



Why differences in diversity and occurrence of VMEs between different seamount flanks?

Evidence for the influence of the MOW?

Higher diversity of benthic assemblages coincident with the depth of occurrence of the MOW, especially in the SE flank, may provide evidence of the important role of the MOW as a connectivity pathway between the Mediterranean and the Atlantic;

Lophelia pertusa and *Madrepora oculata* were more conspicuous in this bank, and at the MOW depth, than in other regions of the Azores;

Octocoral species (e.g. *Narella* sps, *Candidella imbricata*, *Thouarella*, *Chelidonisis aurantiaca*) and black corals (*Leiopathes* sp.) seemed more abundant here than in other parts of the Azores;



The Mediterranean biogeographic affinity may be stronger on eastern Azores than on western Azores, where meddies have already been highly disrupted by the interaction with the rugged Azores Plateau topography.

Why differences in diversity and occurrence of VMEs between different seamount flanks?

Other important factors:

- Oceanographic conditions (e.g. ocean circulation around the seamount, current speed) on both sides of the flanks
- Seasonality of the MOW
- Biogeochemistry (e.g. productivity, O₂, carbonates)
- Geomorphology (steeper walls on the NW flank)
- Comparison with assemblages found in Ormond



Ecological importance

- High taxonomic diversity of cold-water corals and sponges were observed, at both the species and family level;
- Dense coral garden habitats and sponge grounds were identified on several occasions, confirming the presence of *vulnerable marine ecosystems* (VMEs) and pointing out potential *ecologically or biologically significant areas* (EBSAs);
- Data provided by this study will be useful for understand the biodiversity and biogeography of the deepwater Azores fauna associated with these habitats, and will also contribute to ground-truth the new GOODS biogeographic classifications scheme for WP3.



Thank you to all the MEDWAVES team!



Template developed by AquaTT



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Image credit: BGS