Following the Mediterranean path through the Atlantic: the MEDWAVES cruise

Covadonga Orejas (IEO, SPAIN)
and
MEDWAVES scientific party

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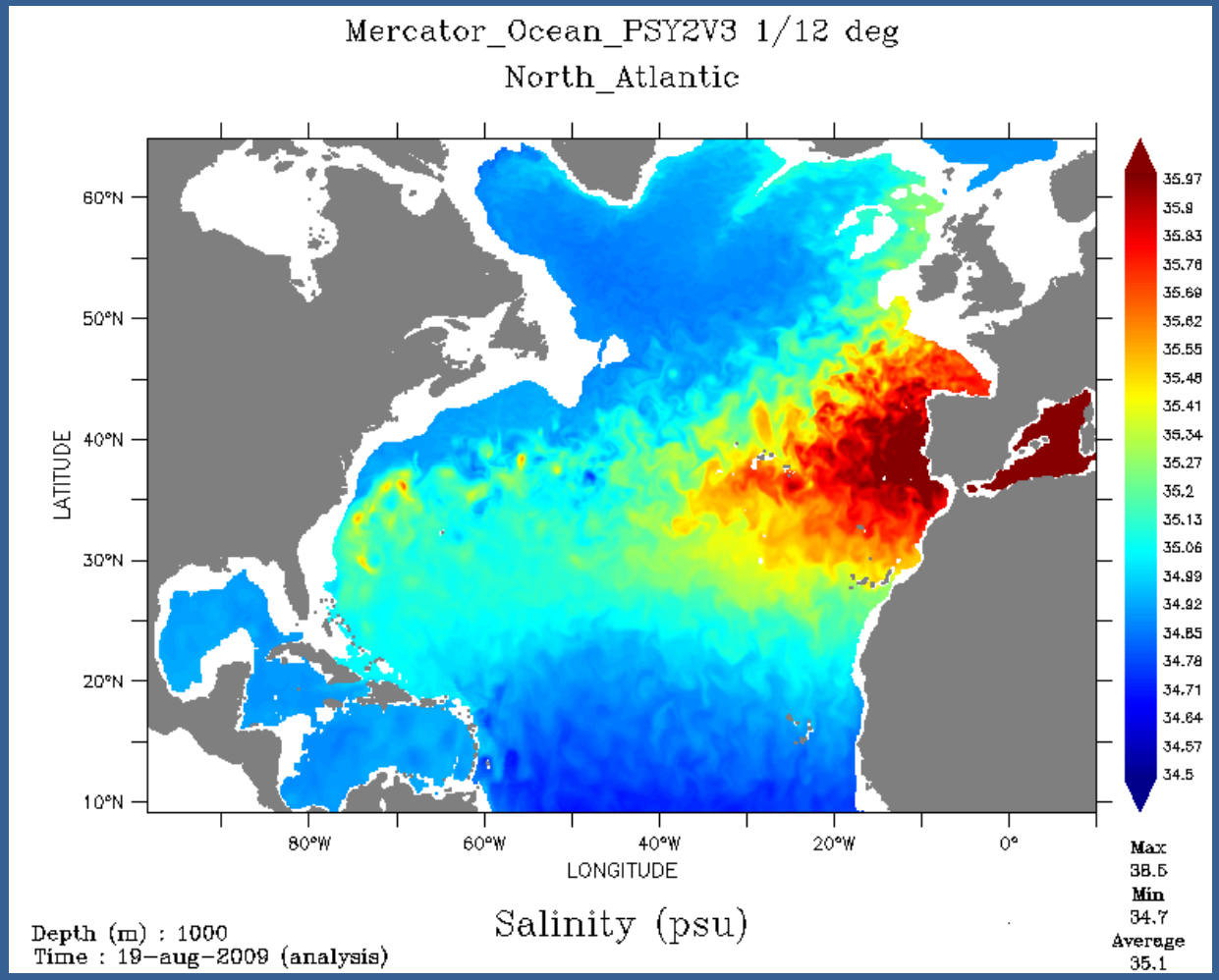
MEDWAVES Background



Mercator Ocean Salinity: Analysis map for 1,000 m on 19.08.2009. The high salinity water of the Mediterranean outflow (red) spreads out from the Strait of Gibraltar to fill the eastern Atlantic both to the north and south

MEDWAVES Background

MEDiterranean out flow WAter and Vulnerable EcosystemS

MEDWAVES was focused in contributing to a better understanding of the Atlantic-Mediterranean biodiversity and connectivity, and it addressed the role of the Mediterranean waters in making this connectivity across two of the ATLAS case study sites:

Alboran Sea - Strait of Gibraltar - Gulf of Cádiz (c.s. 7)

and

Azores (c.s. 8)

MEDWAVES Aims

(1) to characterize physically and biogeochemically the MOW to understand its interaction with the AMOC stream

(2) to explore the relationship between the oceanographic settings of the target areas and the ecosystems therein

(3) to characterize the communities of the targeted areas and identify potential VMEs and EBSAs

(4) conduct population genetic analysis aiming at understanding the connectivity between the Mediterranean Sea and the Atlantic Ocean

The MEDWAVES Research Vessel

RV Sarmiento de Gamboa

Operator: Unidad de Tecnología Marina (UTM, CSIC)
Country: Spain
Website: http://www.utm.csic.es/sarmiento.asp
Vessel Type: Multipurpose Research Vessel
Vessel Class: Global
Scientist berths: 26
Length: 70.5m

MEDWAVES participants

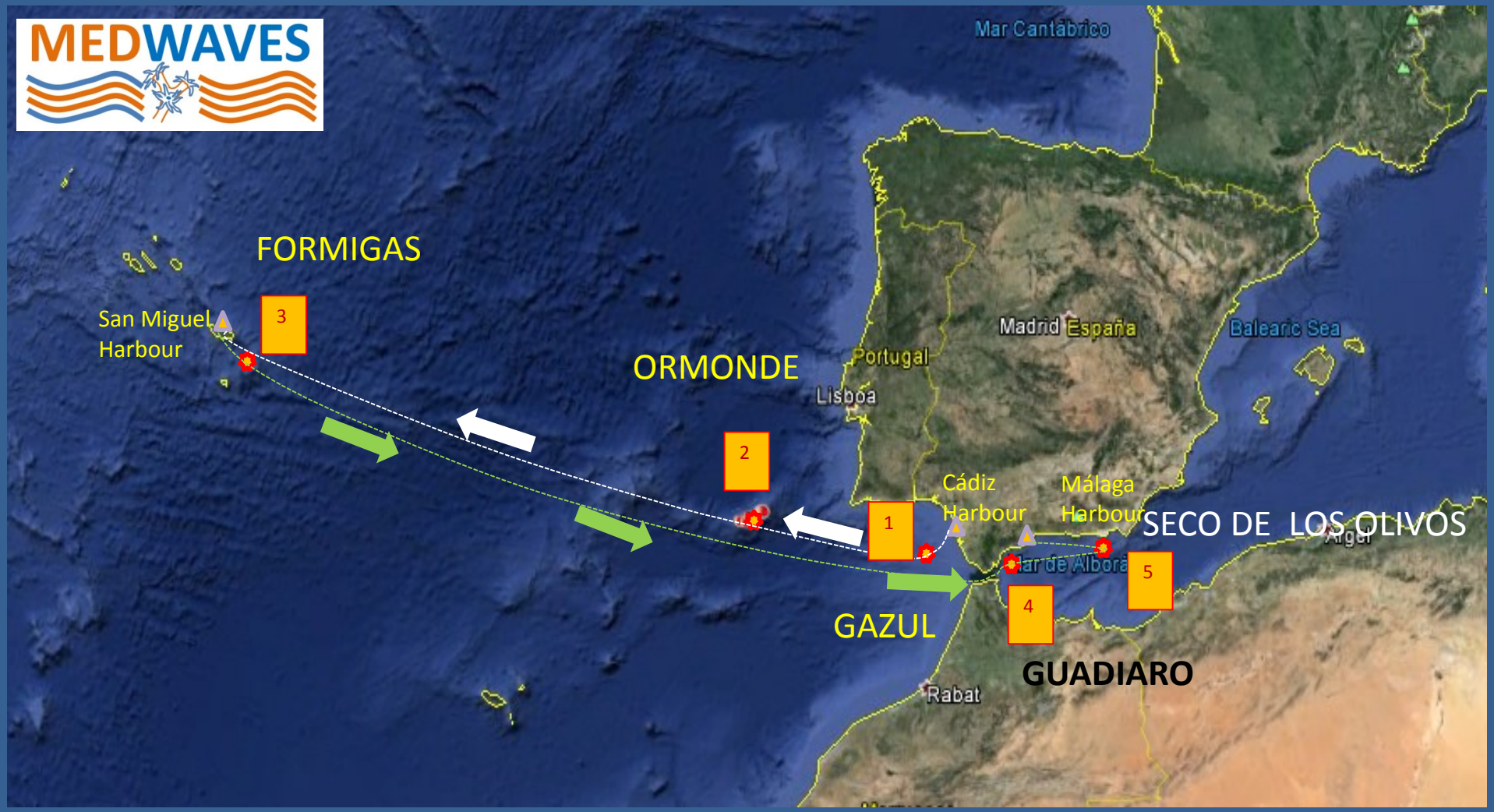
38 participants
(scientist /technicians)

19 participants
(crew)

Eight nationalities:

Spain, Portugal, Italy, France, Greece, Croatia, United Kingdom, Canada

MEDWAVES itinerary

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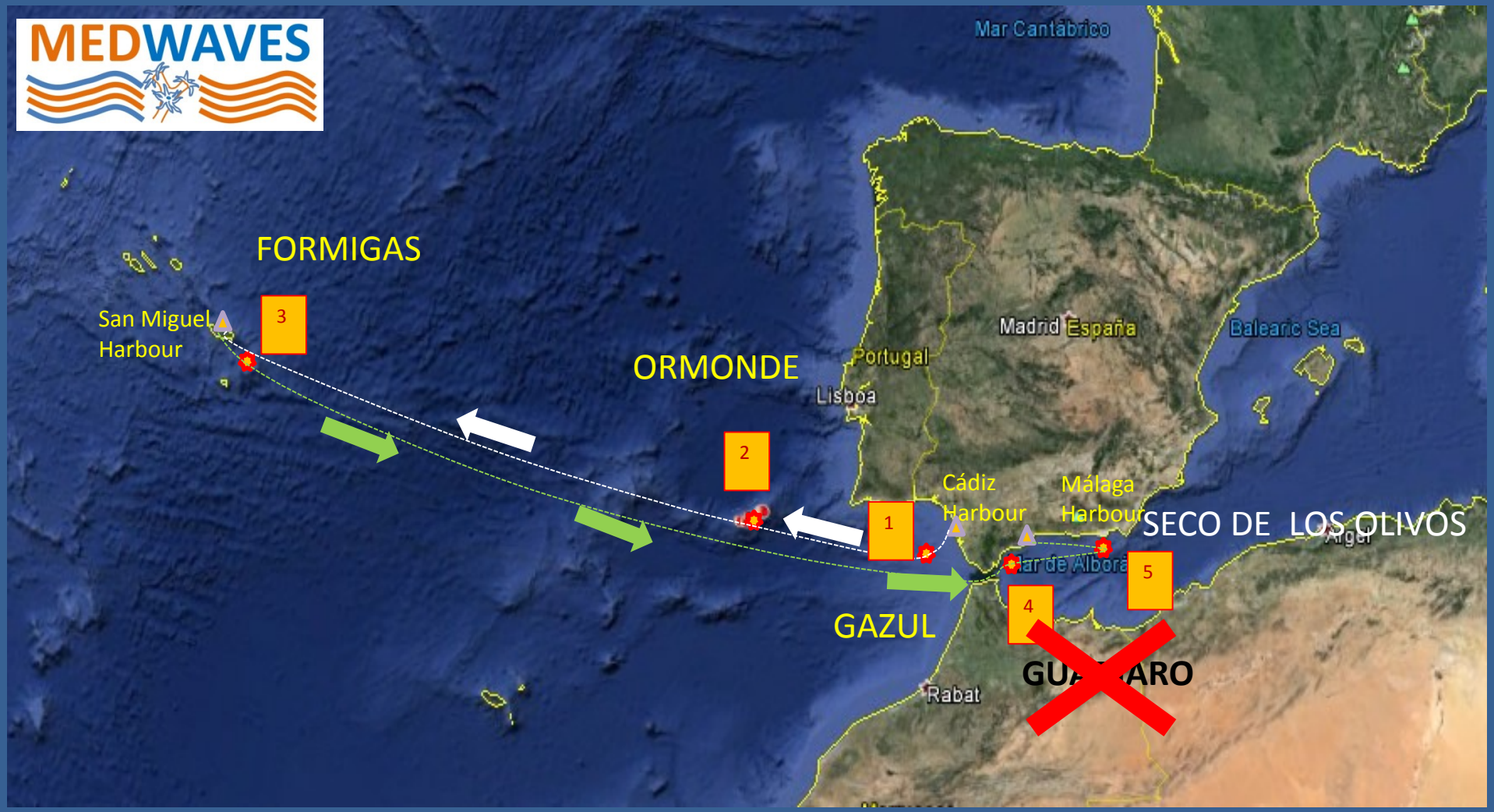
MEDWAVES itinerary



MEDWAVES teams

Physical Oceanography
WP1

Biogeochemical Oceanography
WP1 WP2

Geomorphology
WP3 WP6 WP7

OFOP Annotation ROV dives
WP3 WP6 WP7

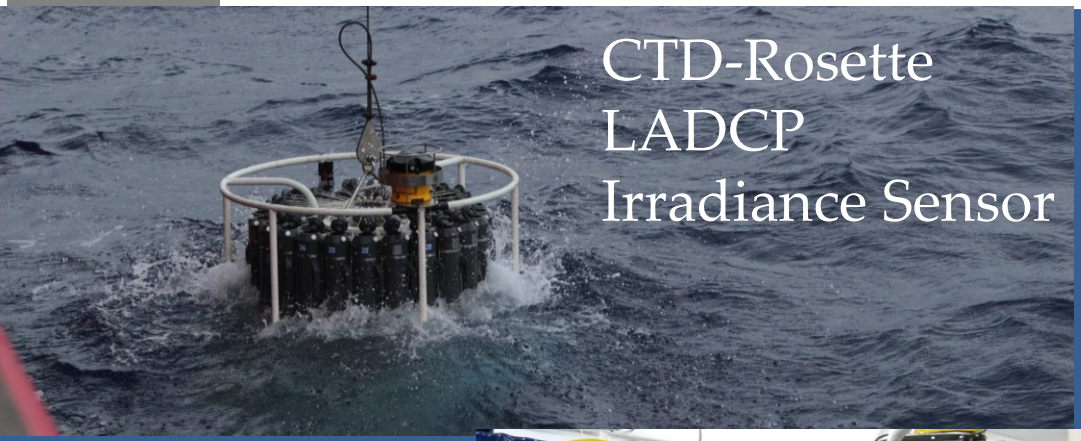
Organic Matter analyses Soft bottoms
WP2 WP3

Ecophysiology
WP2 WP6 WP7

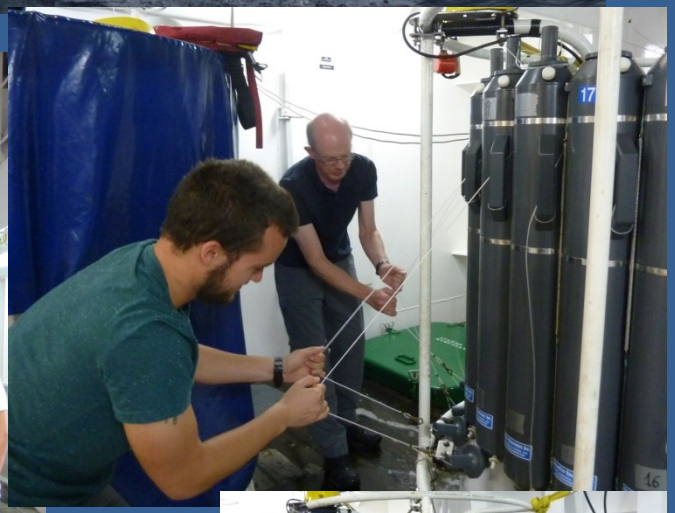
Evolutionary biology
WP4 WP6 WP7

MEDWAVES outputs will also feed WP5 WP8 WP9

MEDWAVES sampling

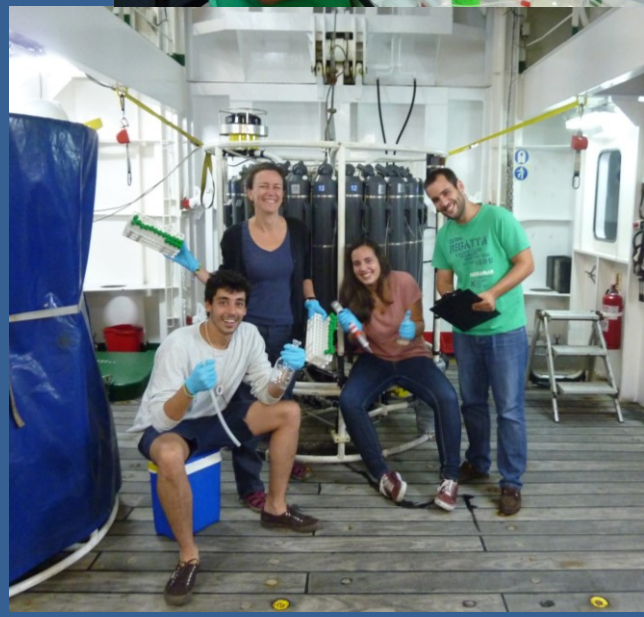


CTD-Rosette
LADCP
Irradiance Sensor

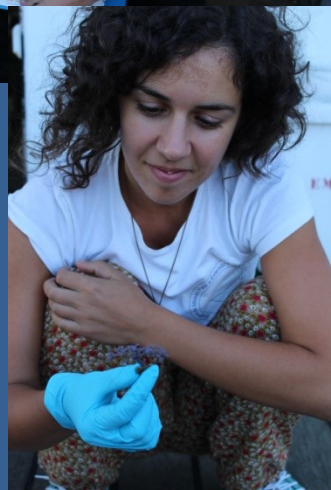


Physical Oceanography team

Biogeochemical Oceanography team

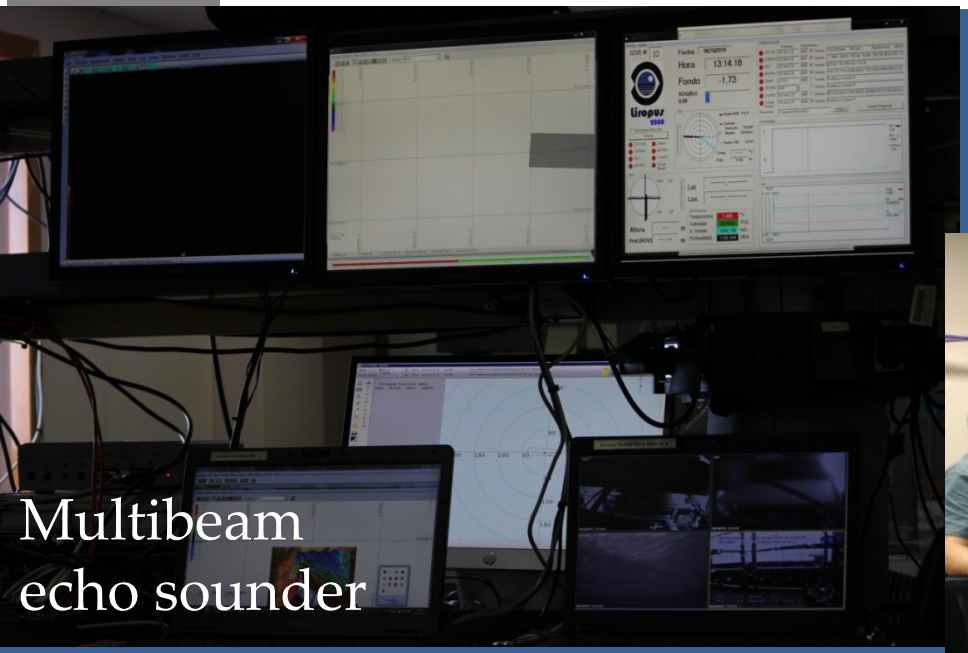


MEDWAVES sampling



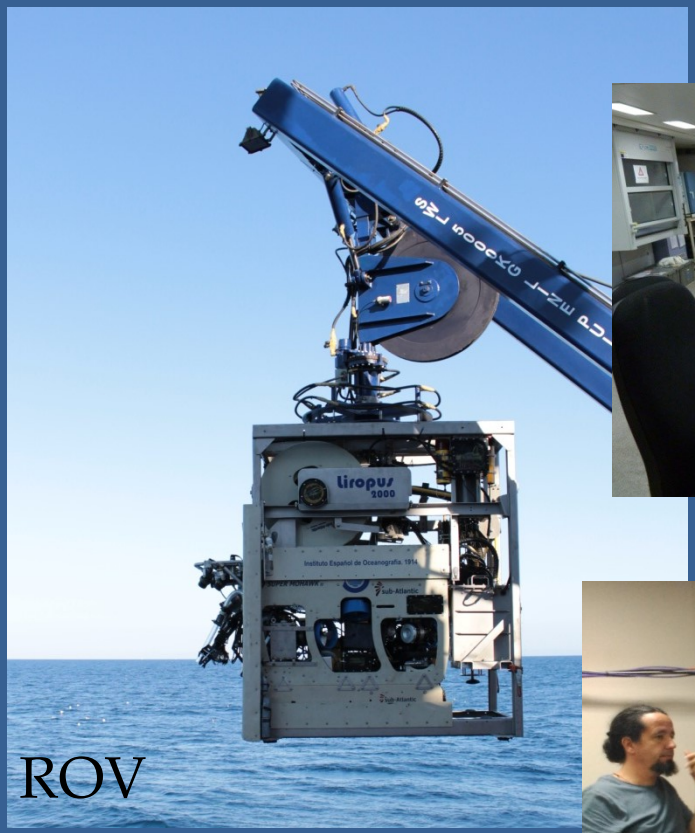
Benthic team. Biodiversity. Soft bottoms.
Sediment characterization

MEDWAVES sampling

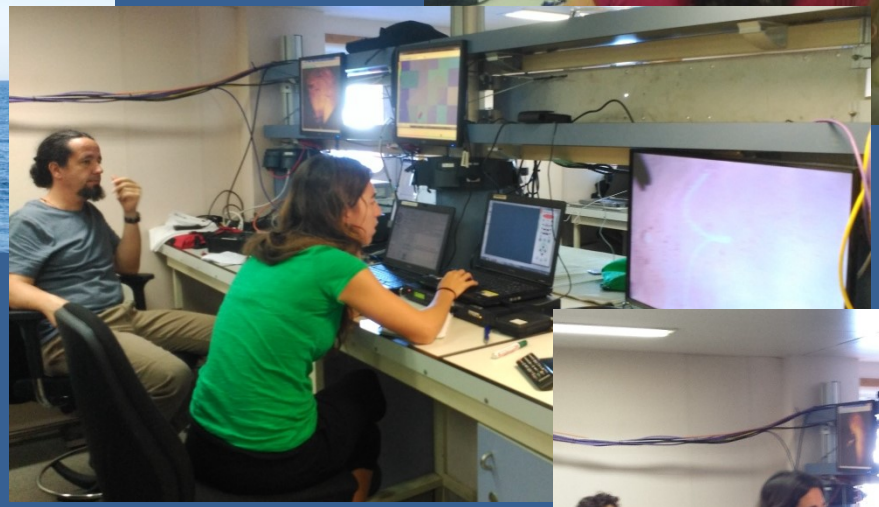


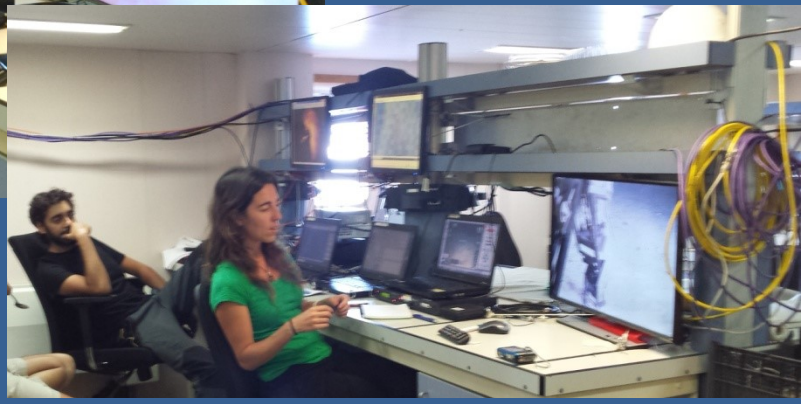
Geomorphology and Habitat mapping team

MEDWAVES sampling



ROV



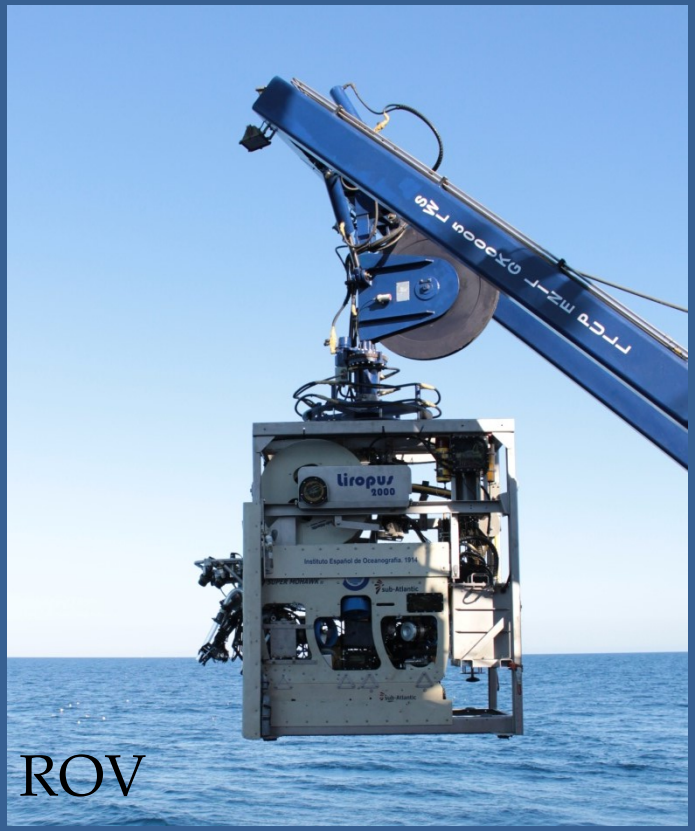


Benthic team. OFOP Annotation/
ROV dives

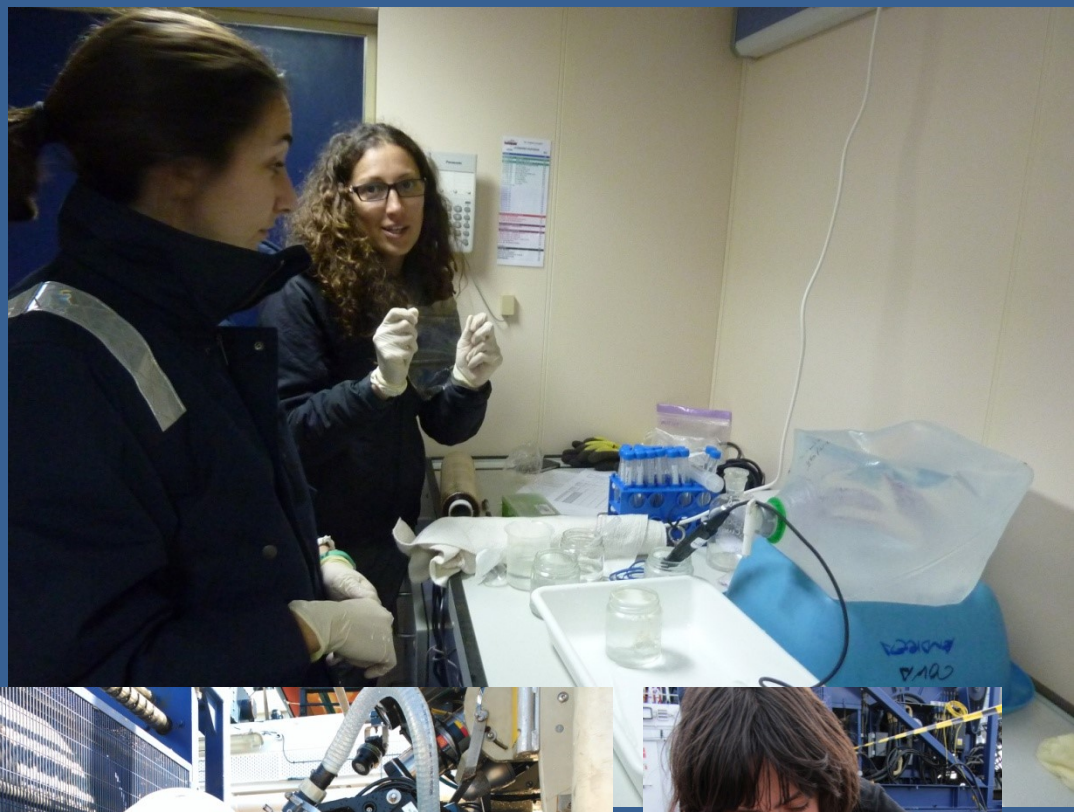
MEDWAVES ROV Liropus

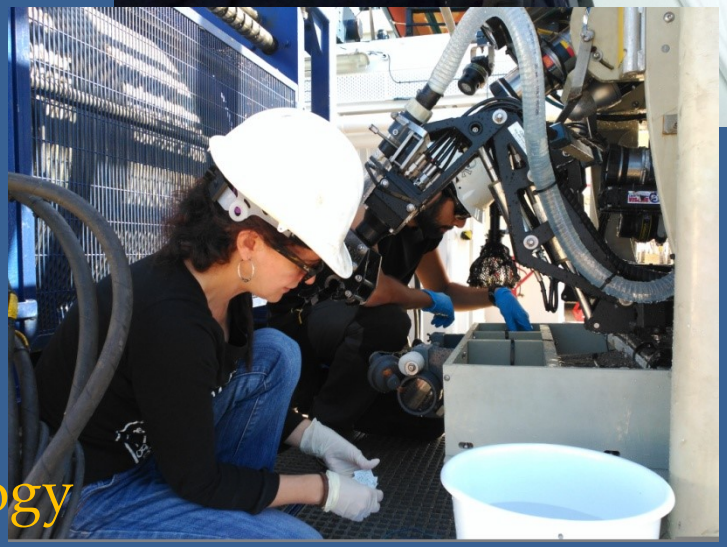
- Super Mohawk (subAtlantic)
- 2,000 meters depth
- HD video camera
- HD still digital camera

MEDWAVES sampling



ROV



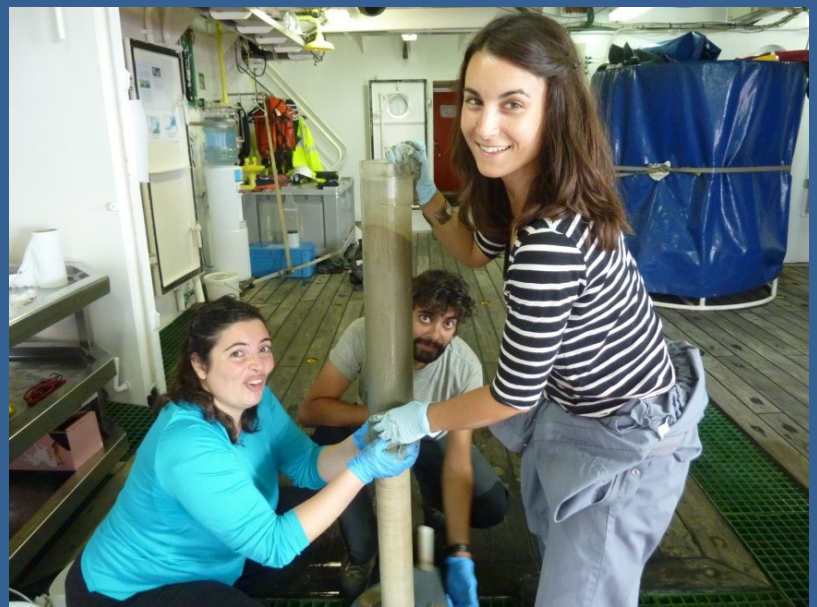


Benthic team. Ecophysiology

MEDWAVES sampling

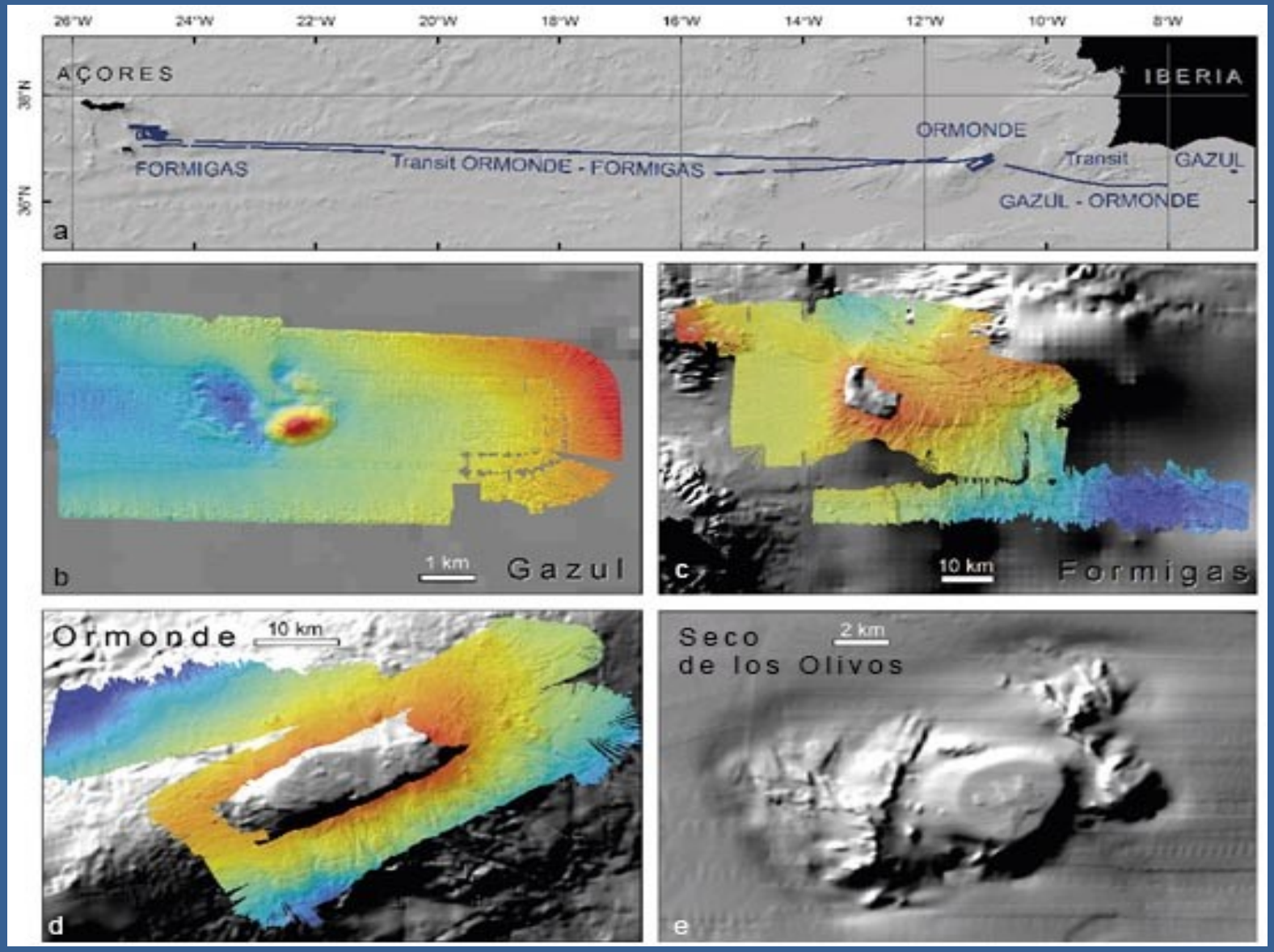
Multicore

ROV



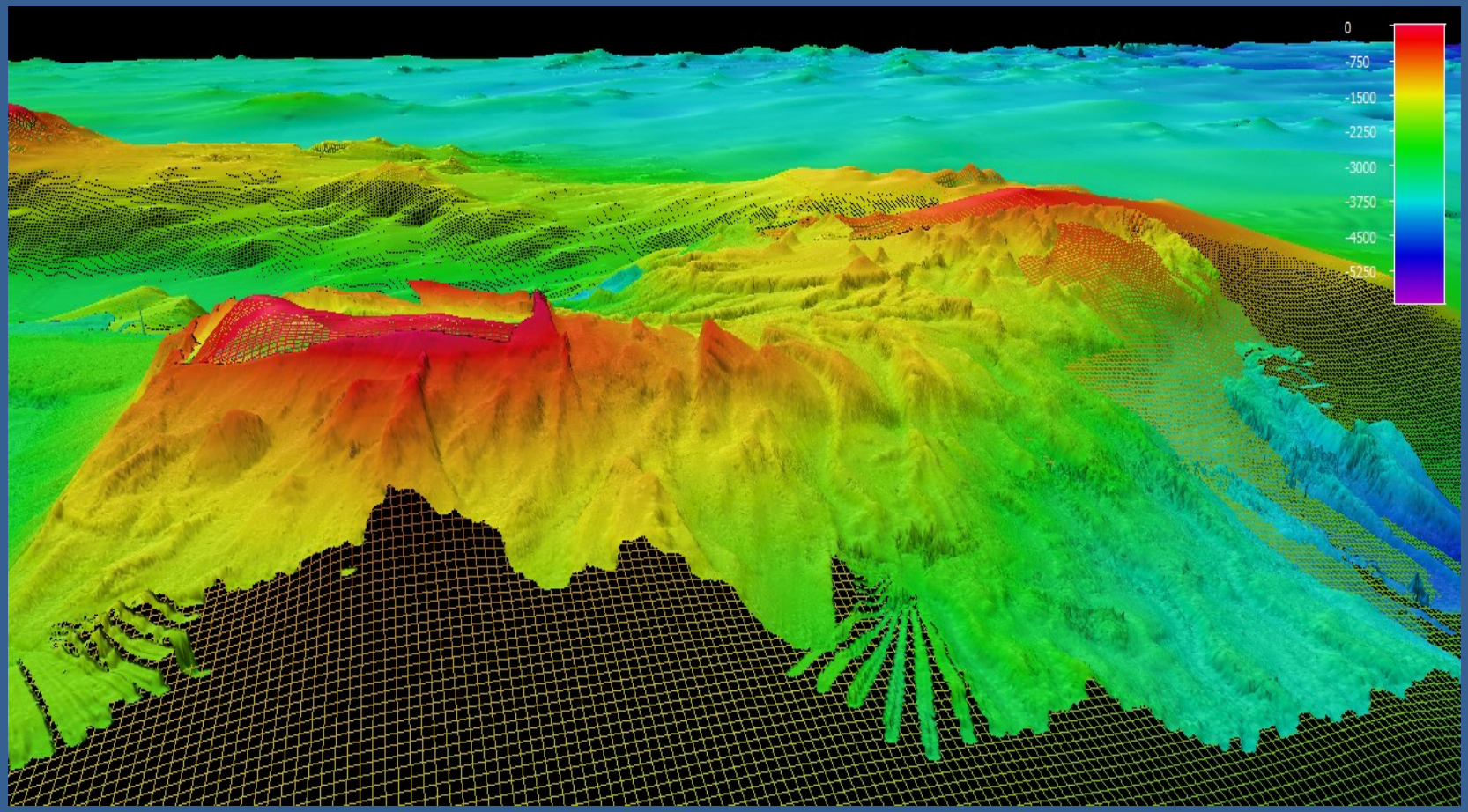
Benthic team.
Evolutionary biology

MEDWAVES Geomorphology



Geomorphology and Habitat mapping team_MEDWAVES

MEDWAVES Geomorphology



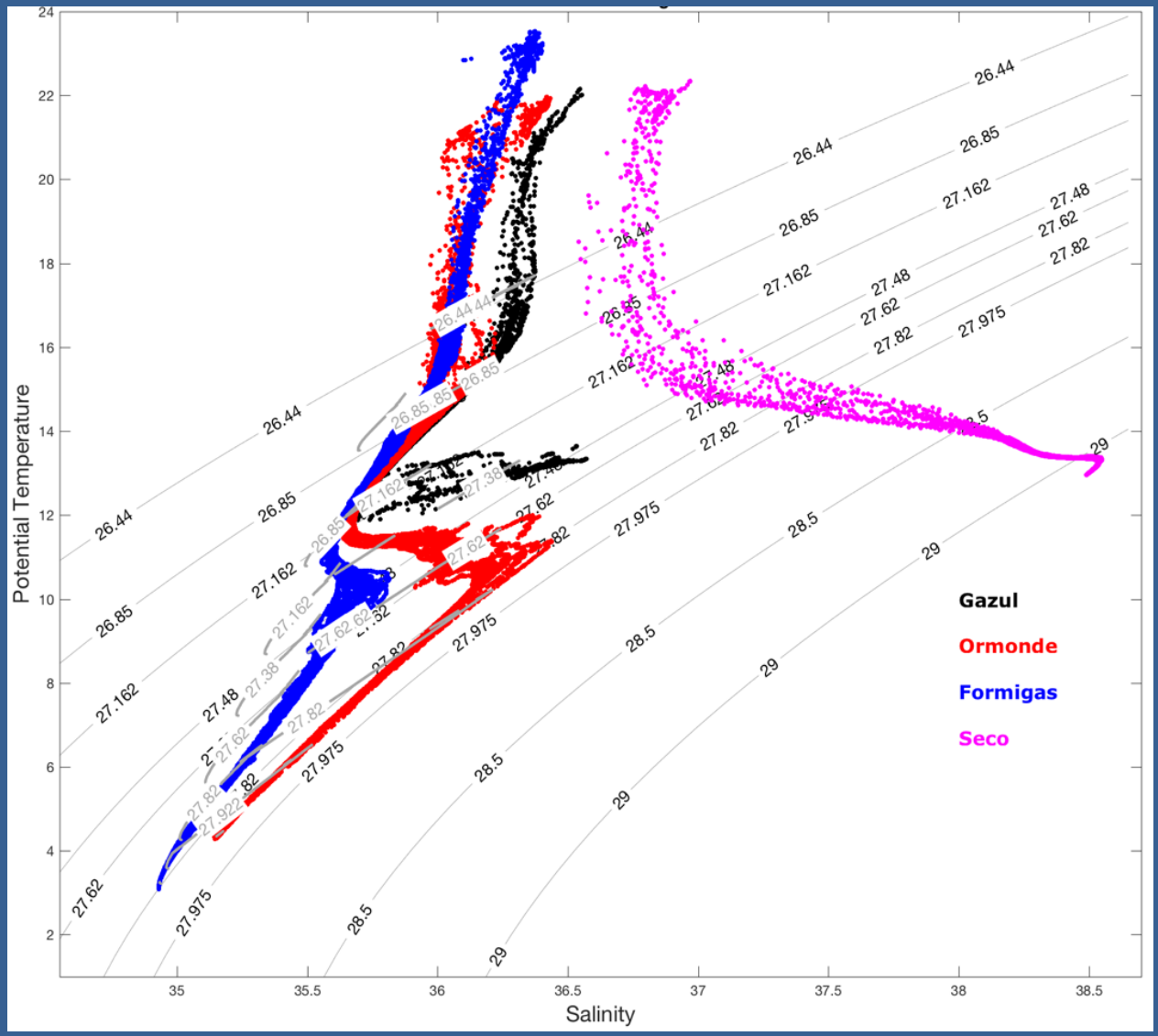
3D view of submarine landscape around Formigas Bank. The mesh is the previous available bathymetry from EMODNET and the solid model show swath bathymetry from MEDWAVES cruise.

Geomorphology and Habitat mapping team_MEDWAVES & EMODNET

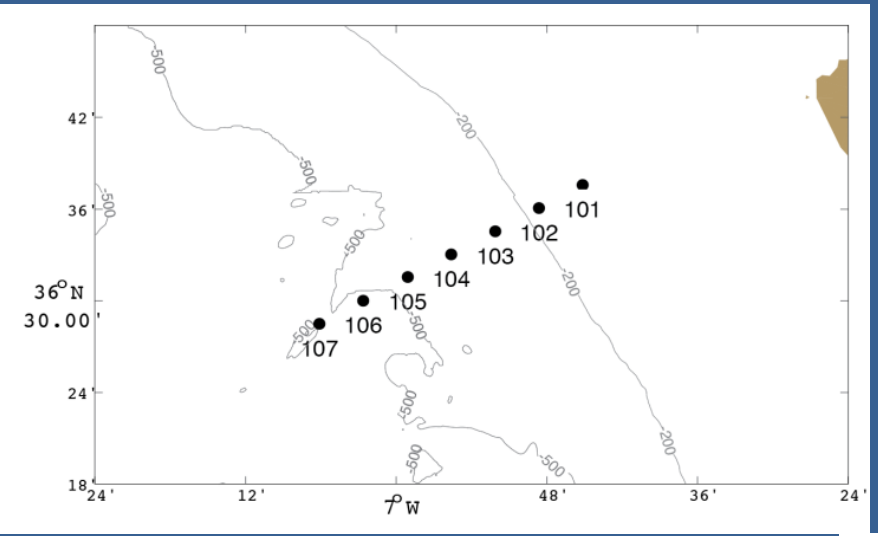
MEDWAVES Physical Oceanography

Decrease in salinity that characterizes the propagation of the MOW into the Atlantic.

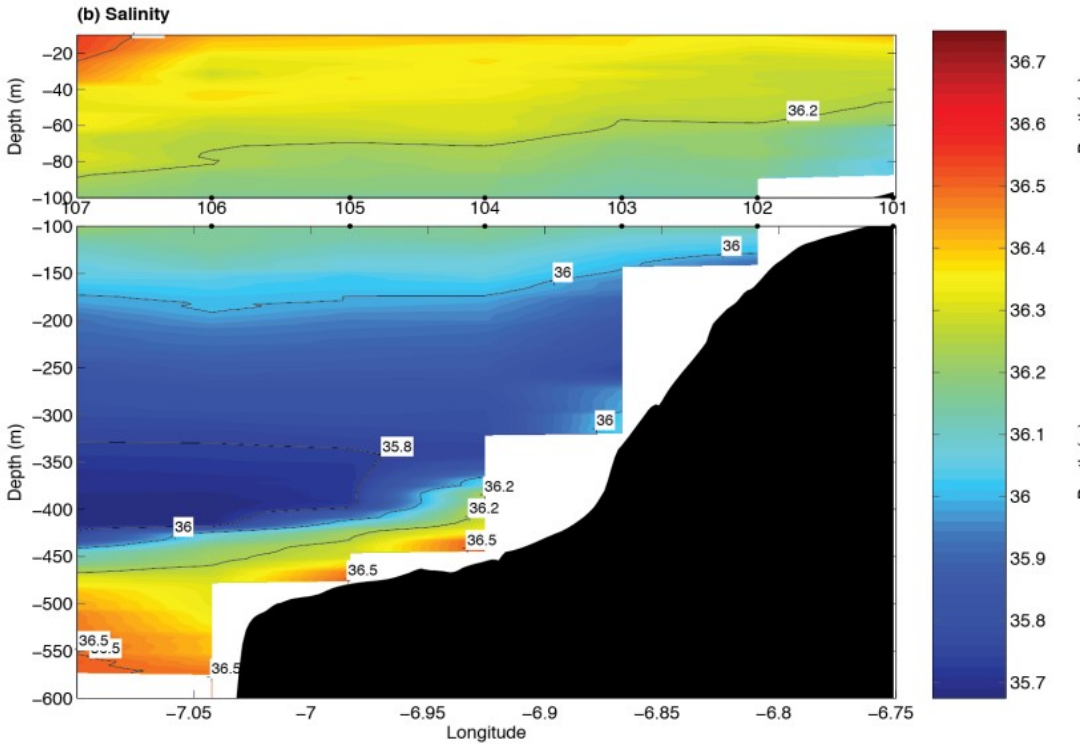
From the 38.5 find in the Seco seamount to the relative maximum of 35.50 found in the Formigas sea mount



MEDWAVES Physical Oceanography

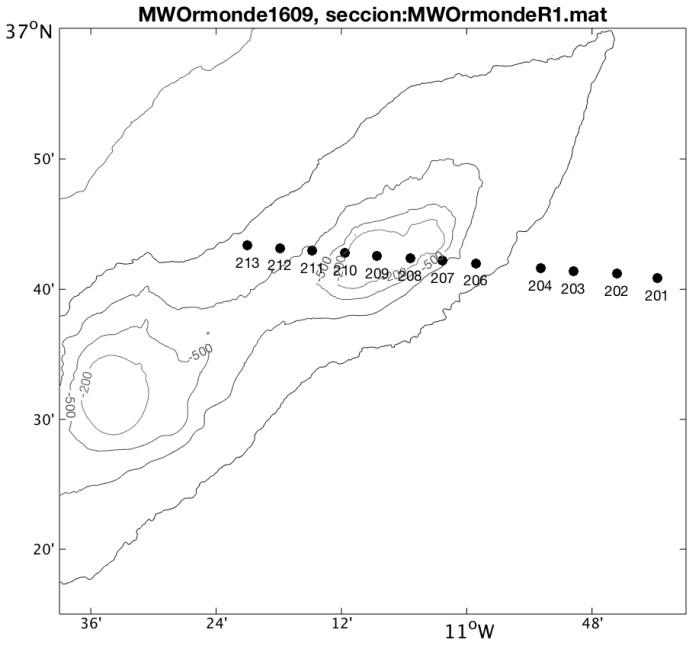


GAZUL

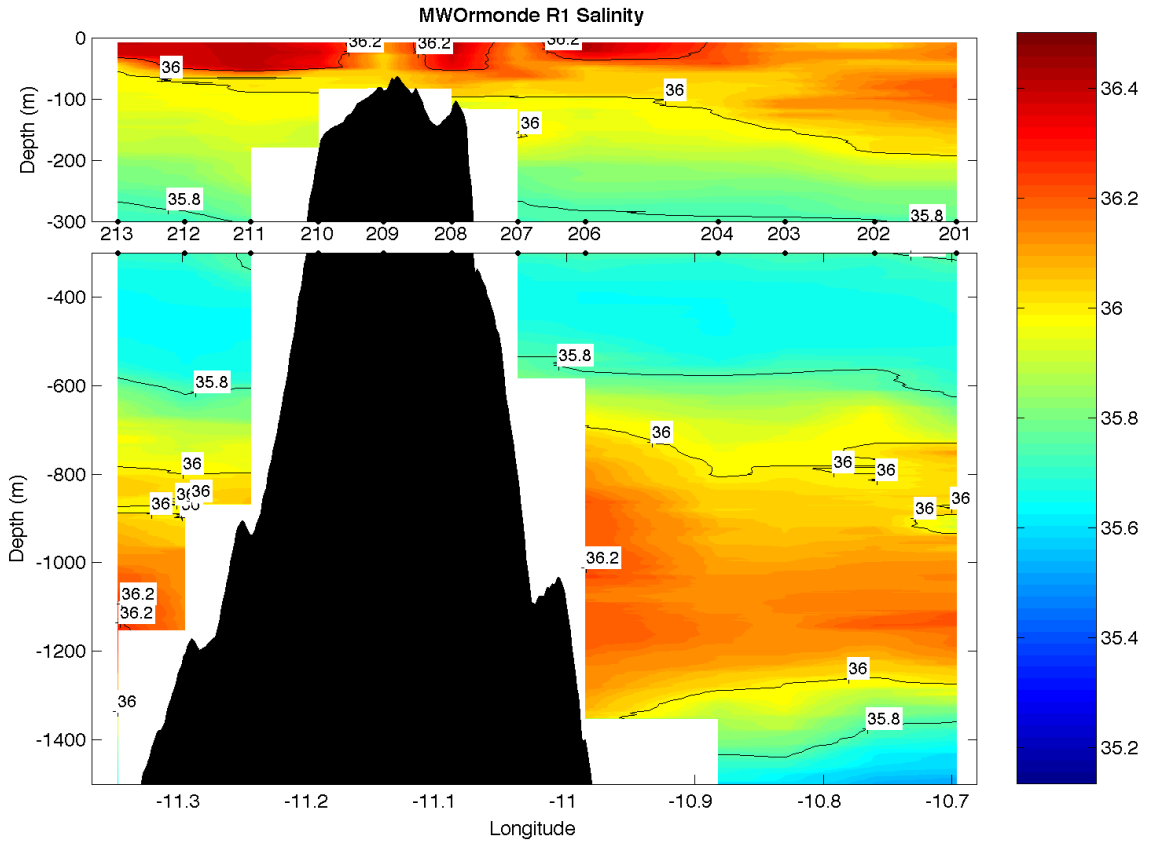


Oceanography team_MEDWAVES

MEDWAVES Physical Oceanography

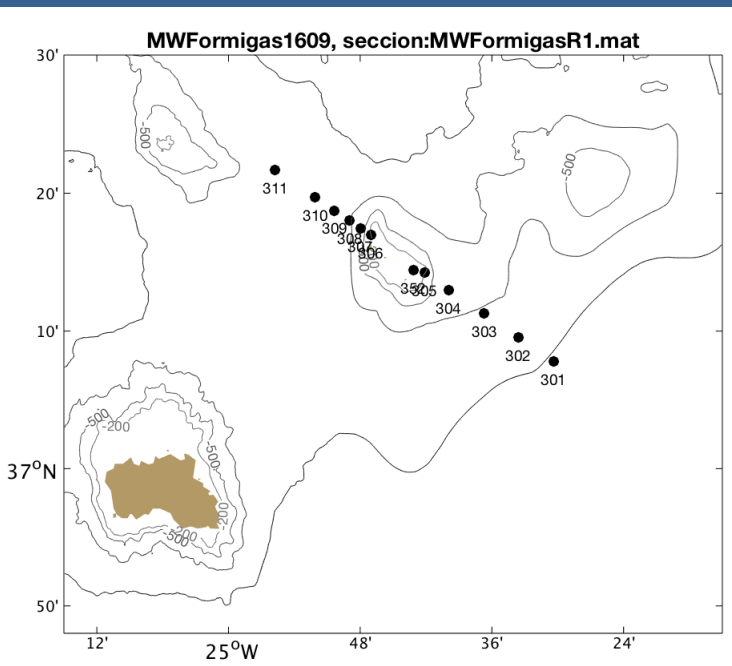


ORMONDE

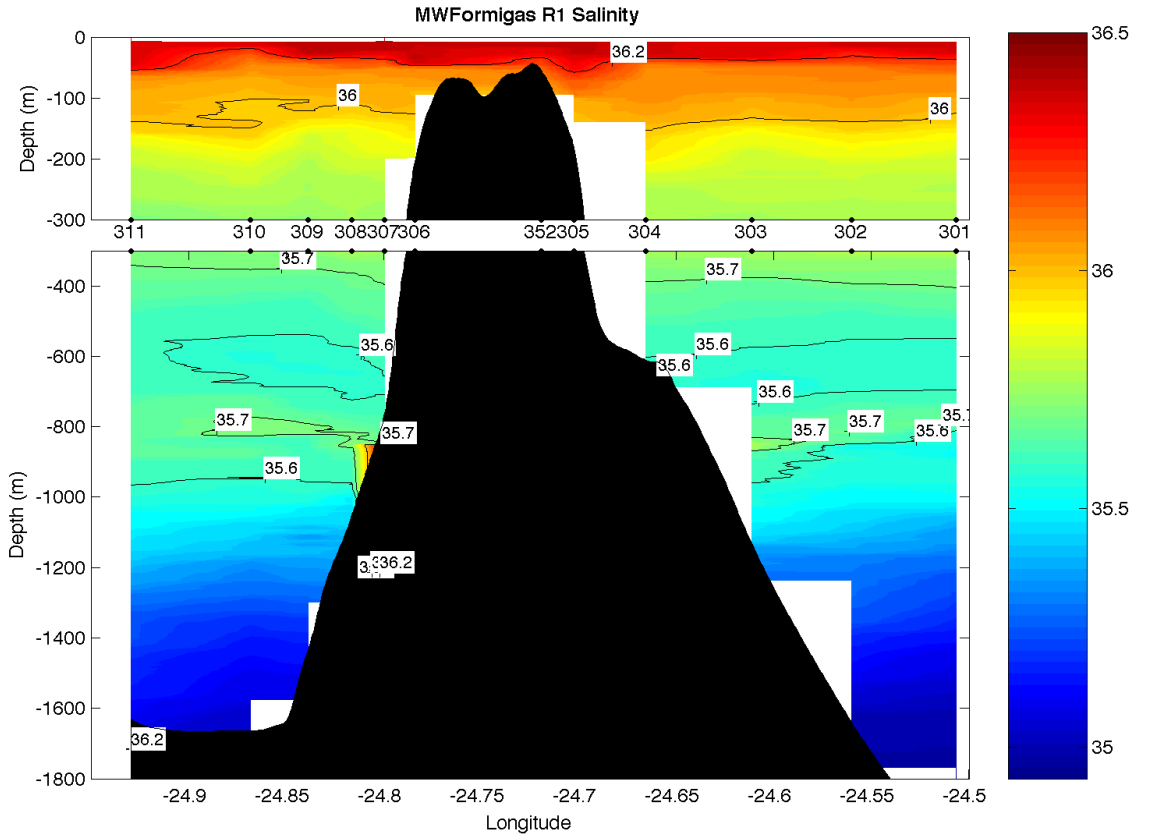


Oceanography
team_MEDWAVES

MEDWAVES Physical Oceanography

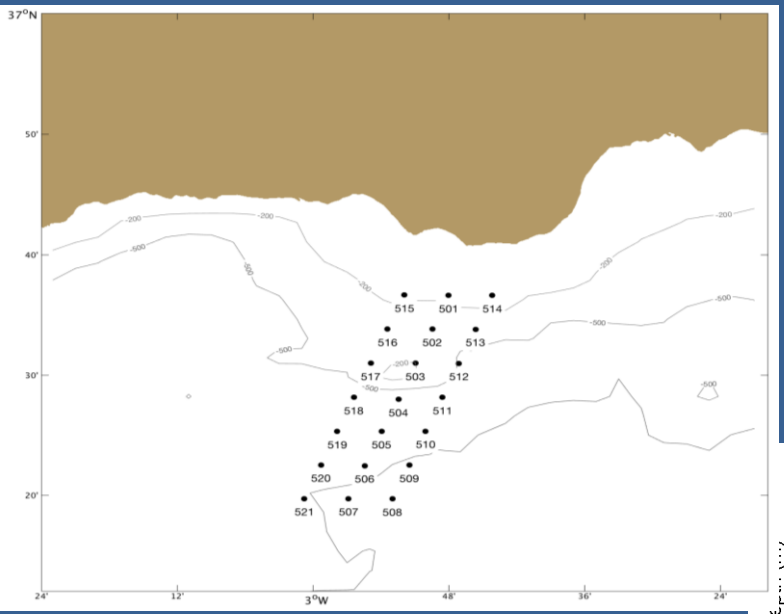


FORMIGAS

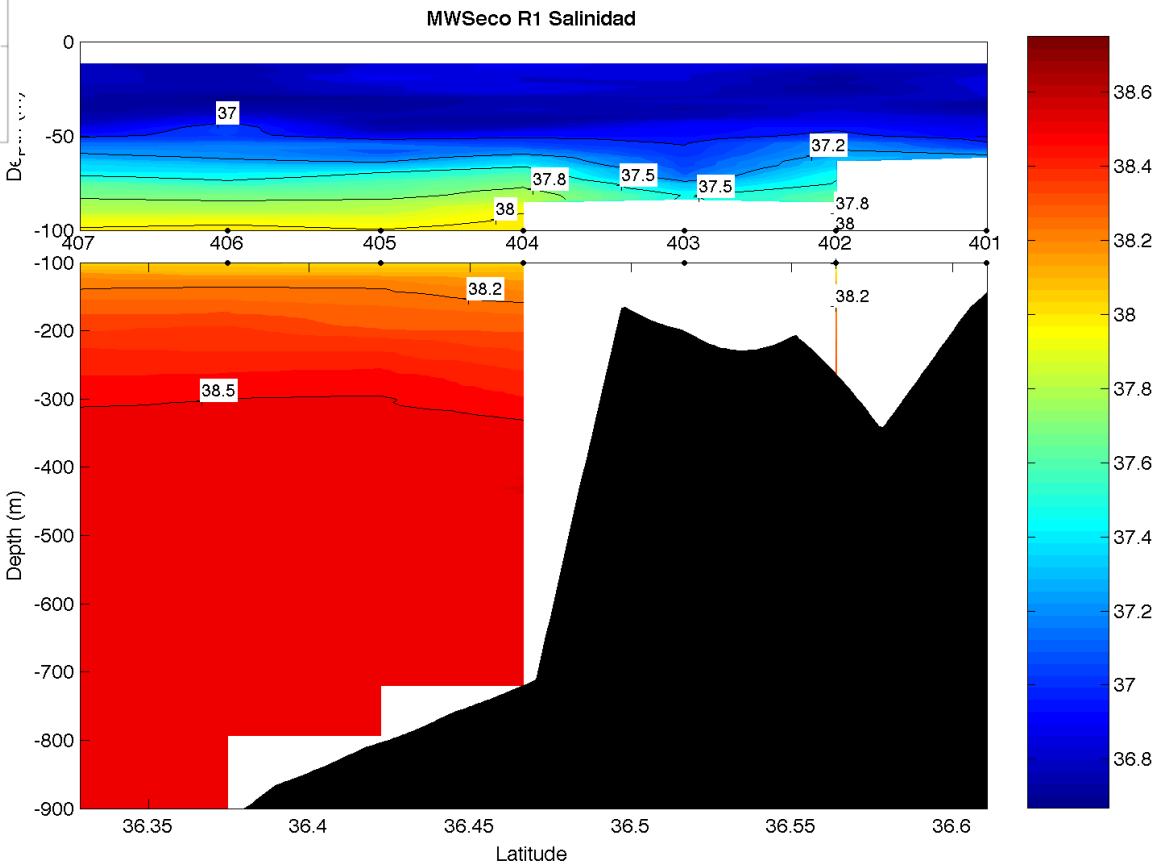


Oceanography
team_MEDWAVES

MEDWAVES Physical Oceanography

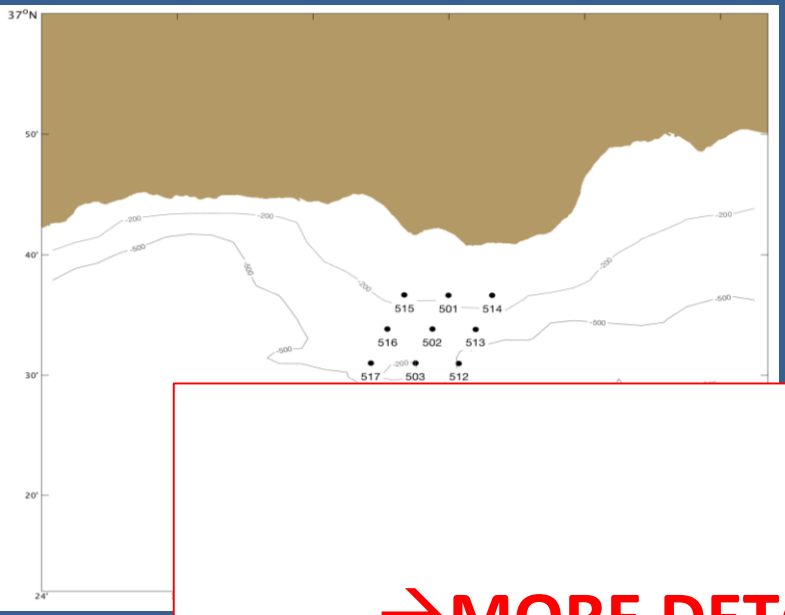


SECO DE LOS OLIVOS



Oceanography
team_MEDWAVES

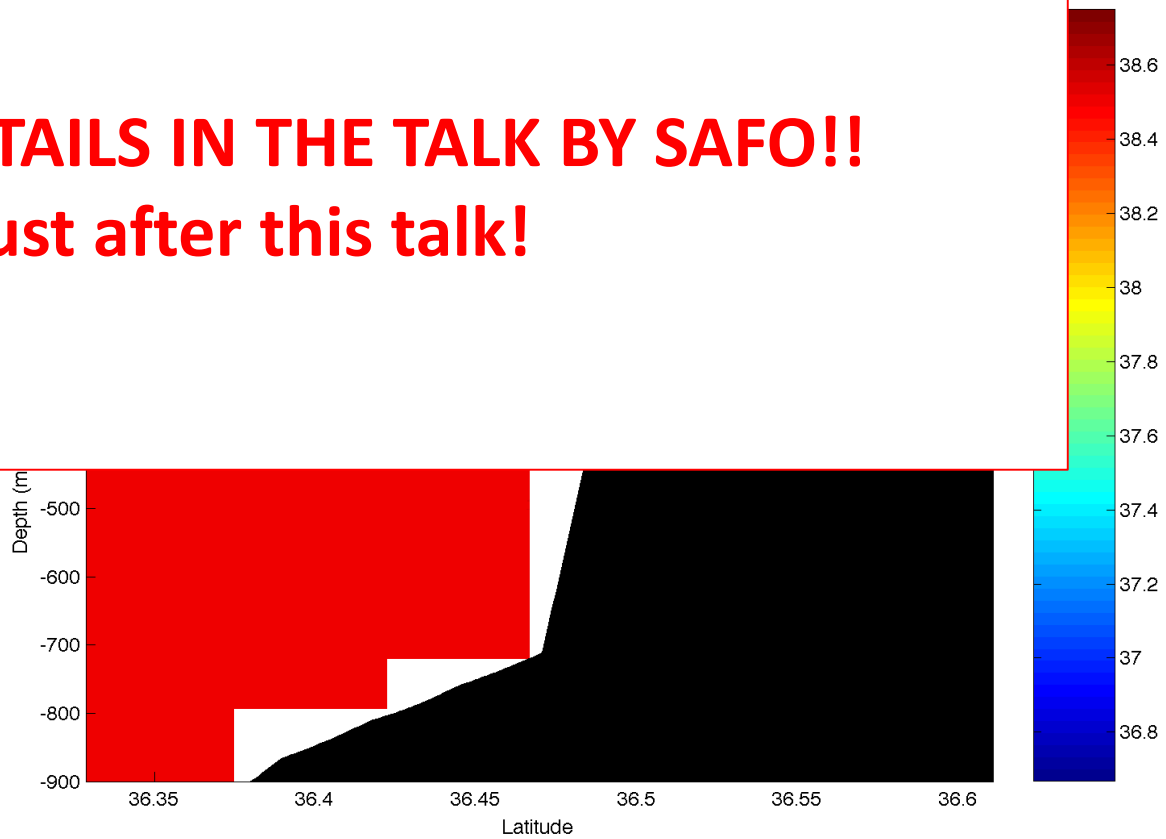
MEDWAVES Physical Oceanography



SECO DE LOS OLIVOS

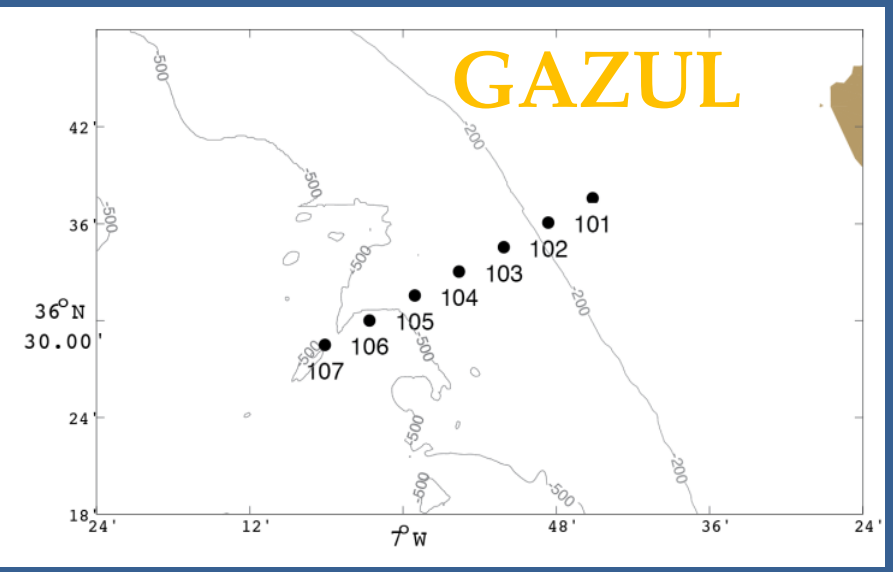
→MORE DETAILS IN THE TALK BY SAFO!!

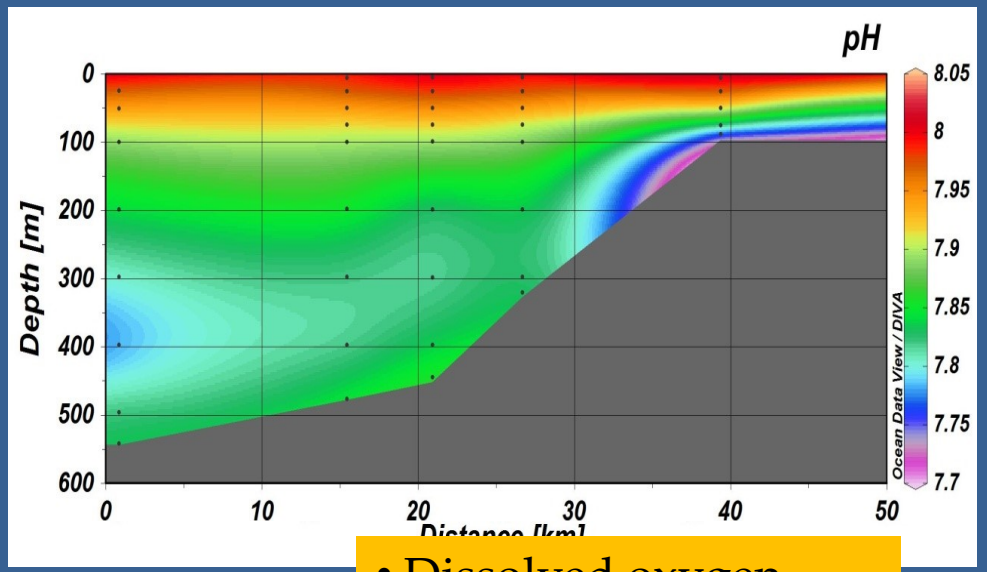
Just after this talk!

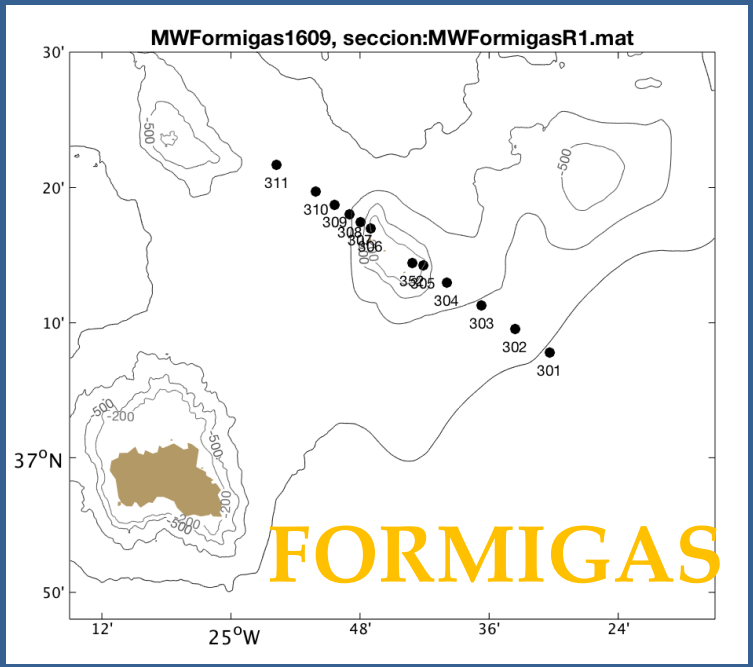


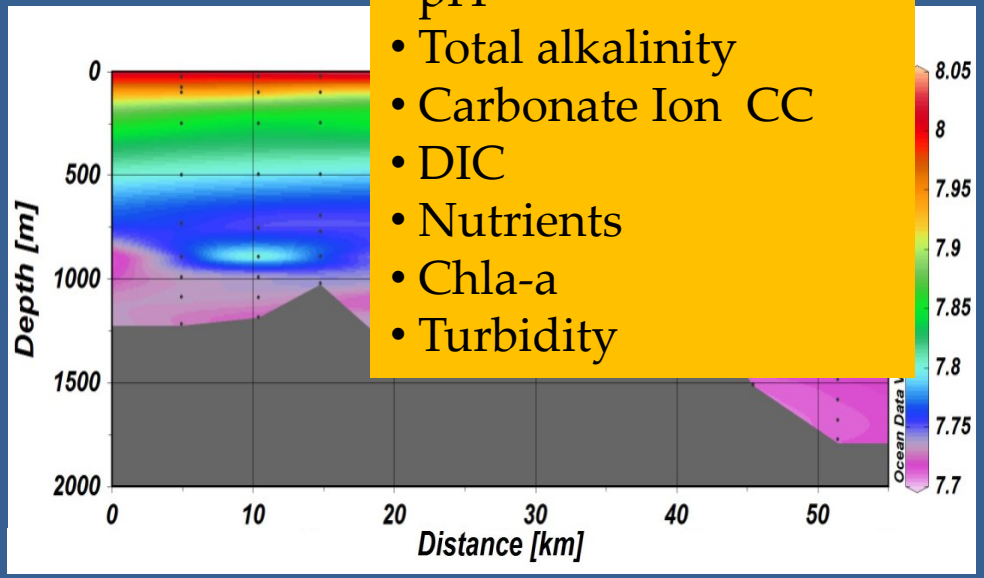
Oceanography
team_MEDWAVES

MEDWAVES Biogeochemical Oceanog.



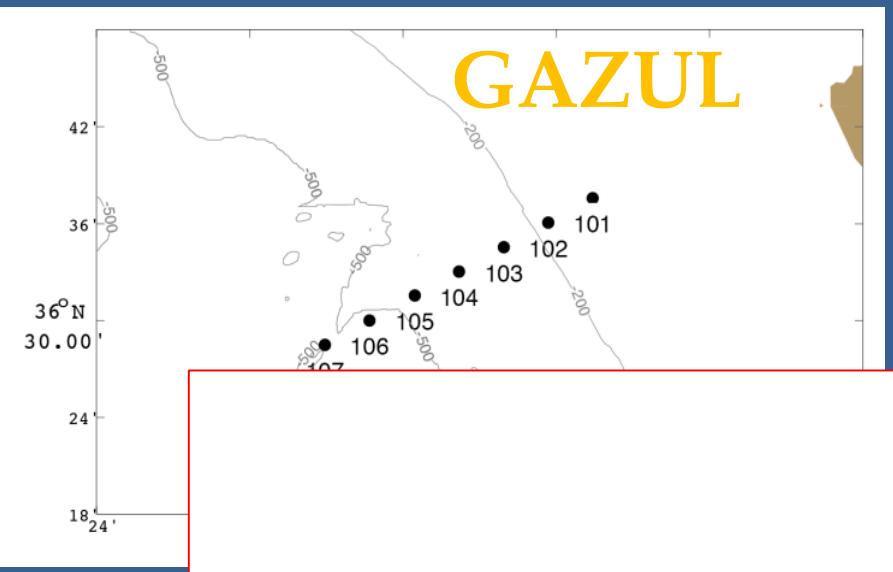


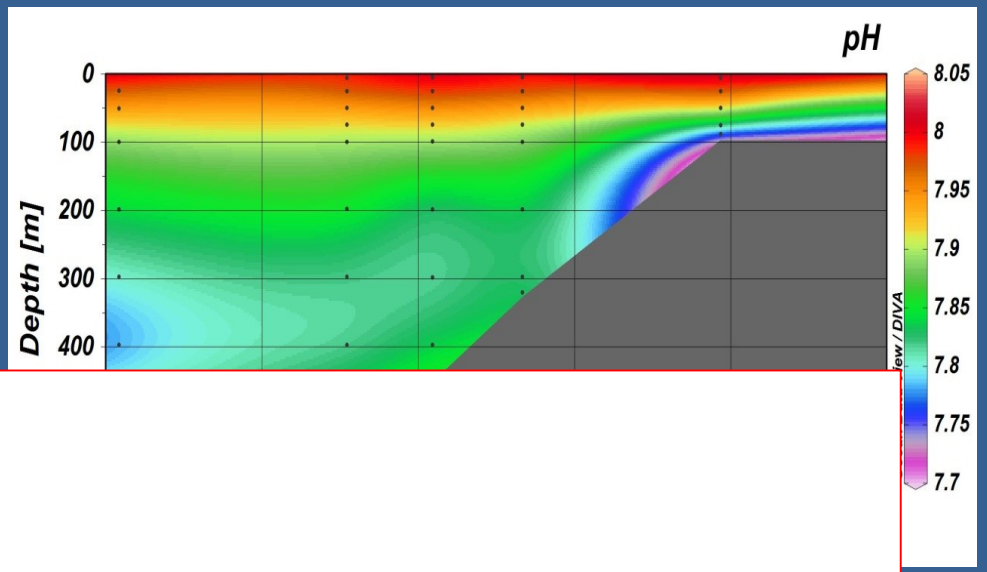




- Dissolved oxygen
- pH
- Total alkalinity
- Carbonate Ion CC
- DIC
- Nutrients
- Chla-a
- Turbidity

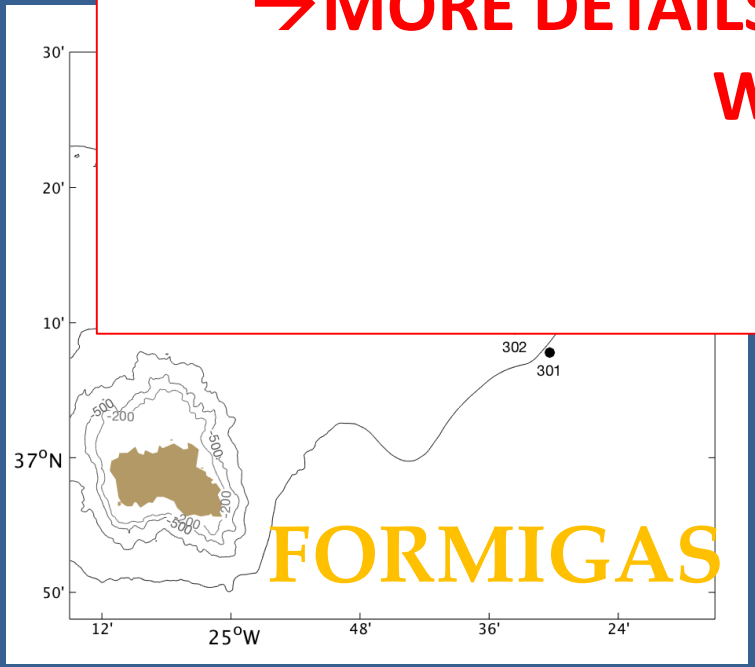
MEDWAVES Biogeochemical Oceanog.

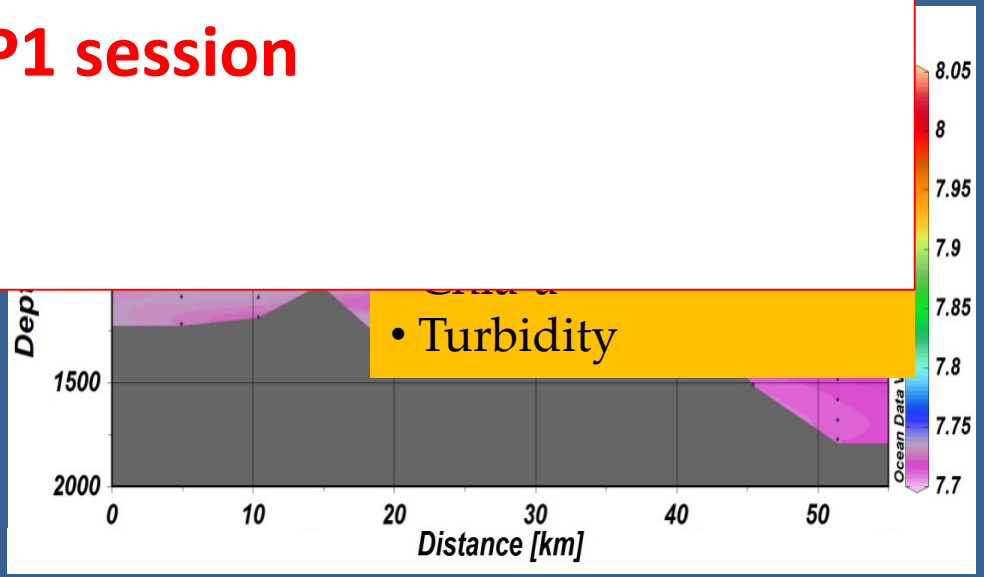




→MORE DETAILS IN THE TALK BY NOELIA!!

WP1 session



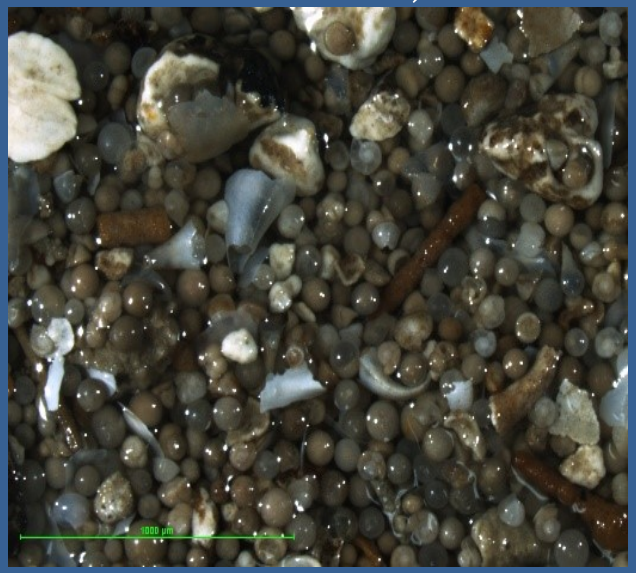


MEDWAVES Benthic ecology

Soft sediment samples

Mini-corer for sediment analyses at the home lab: OM, granulometry etc.

Surficial hemipelagic sediment collected in Ormonde displaying large numbers of foraminifera (dominating *Orbulina universa)*



Shells of pteropods (mainly *Cavolinia* and *Clio*) after sieving a sediment sample collected in Formigas

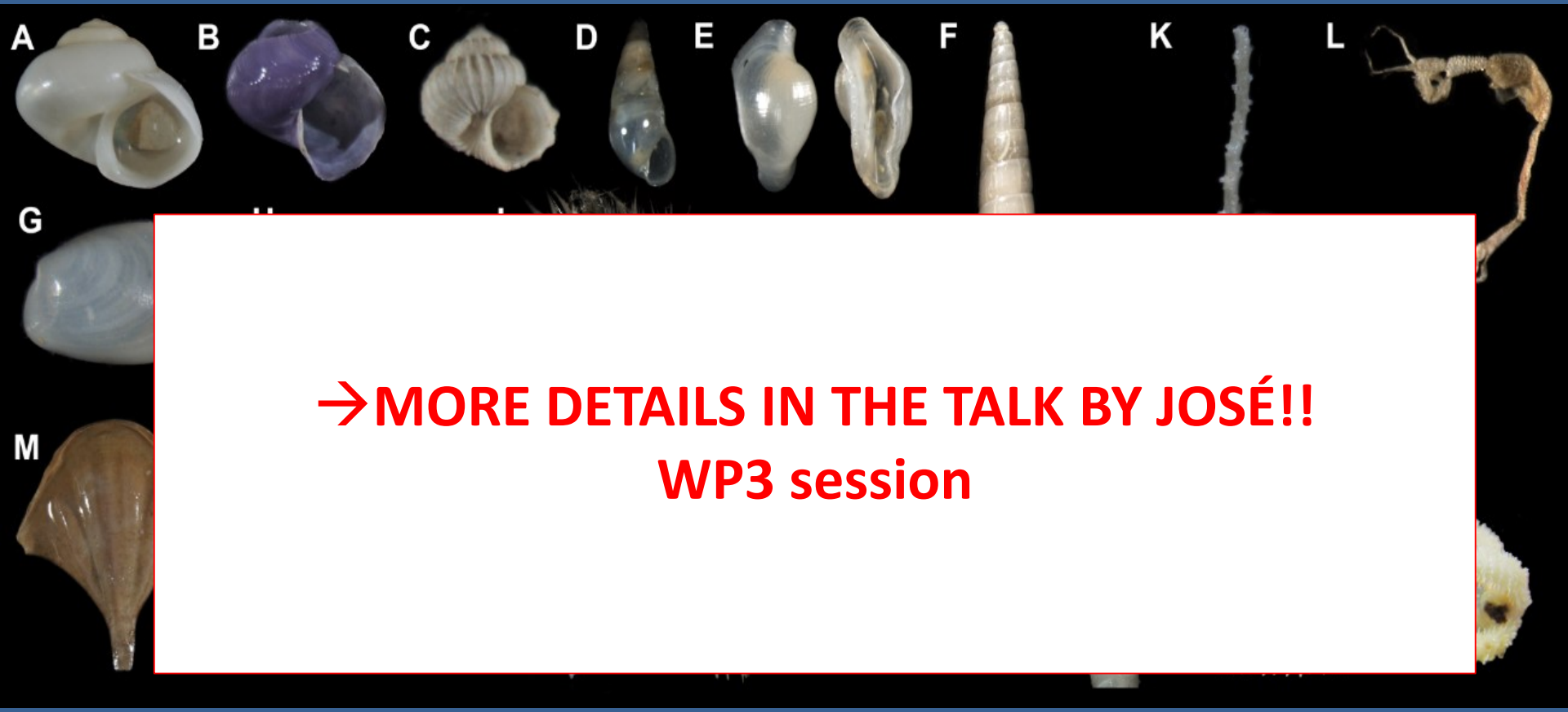
Benthic team_MEDWAVES

MEDWAVES Benthic ecology

A small representation of live and dead species collected in Formigas

Benthic team_MEDWAVES

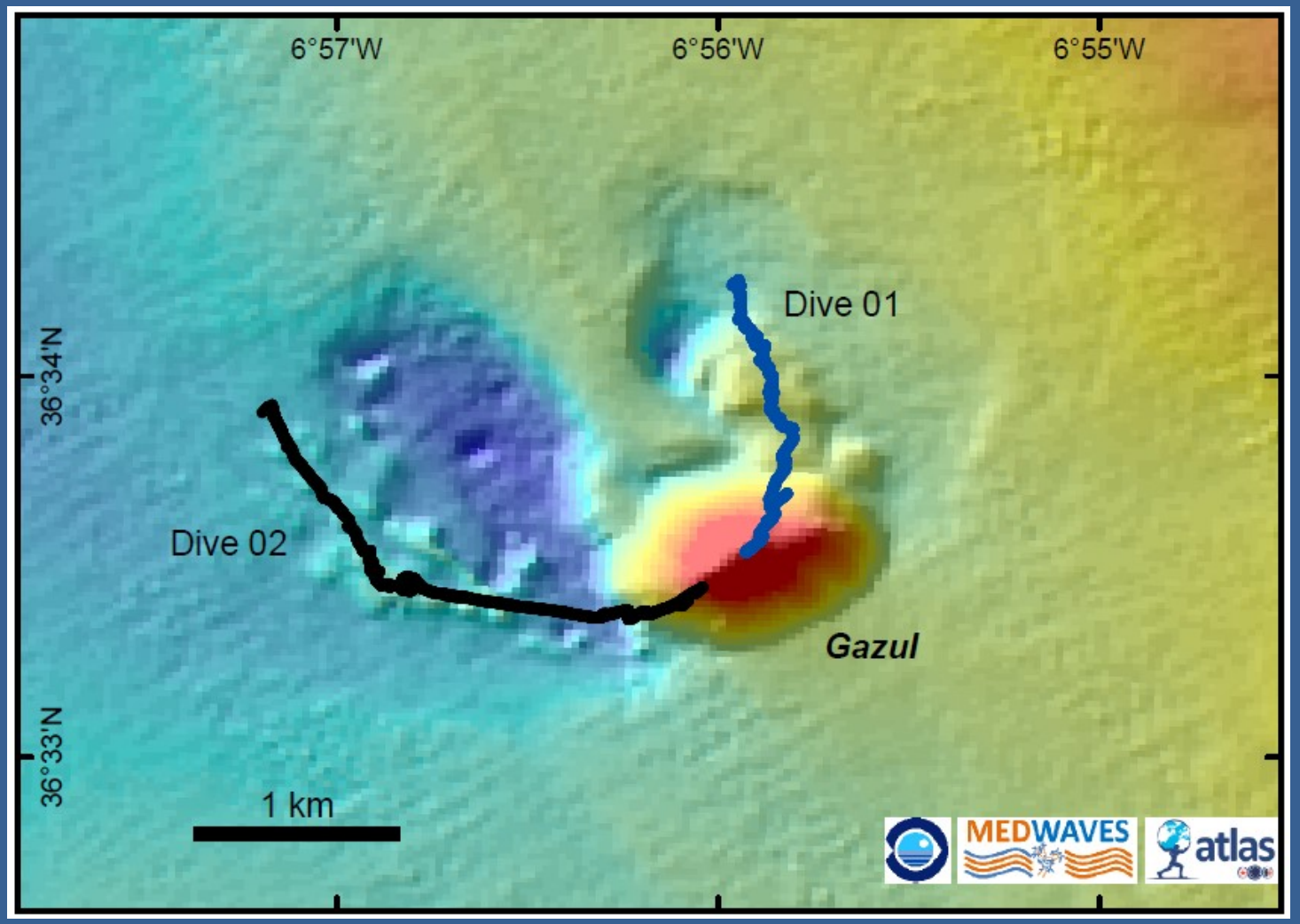
MEDWAVES Benthic ecology



→MORE DETAILS IN THE TALK BY JOSÉ!!
WP3 session

A small representation of live and dead species collected in Formigas

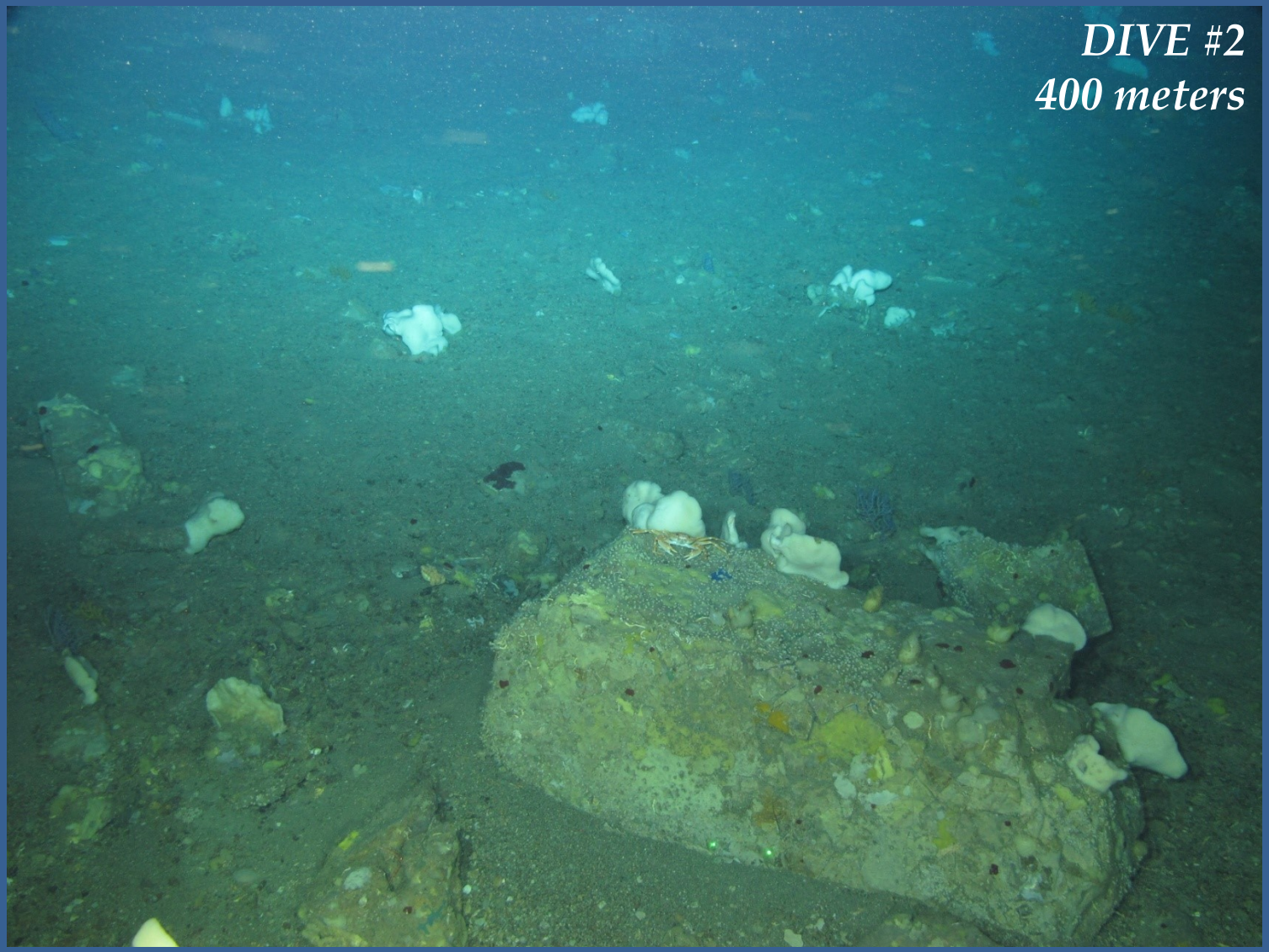
MEDWAVES Benthic ecology



GAZUL

Geomorphology team_MEDWAVES

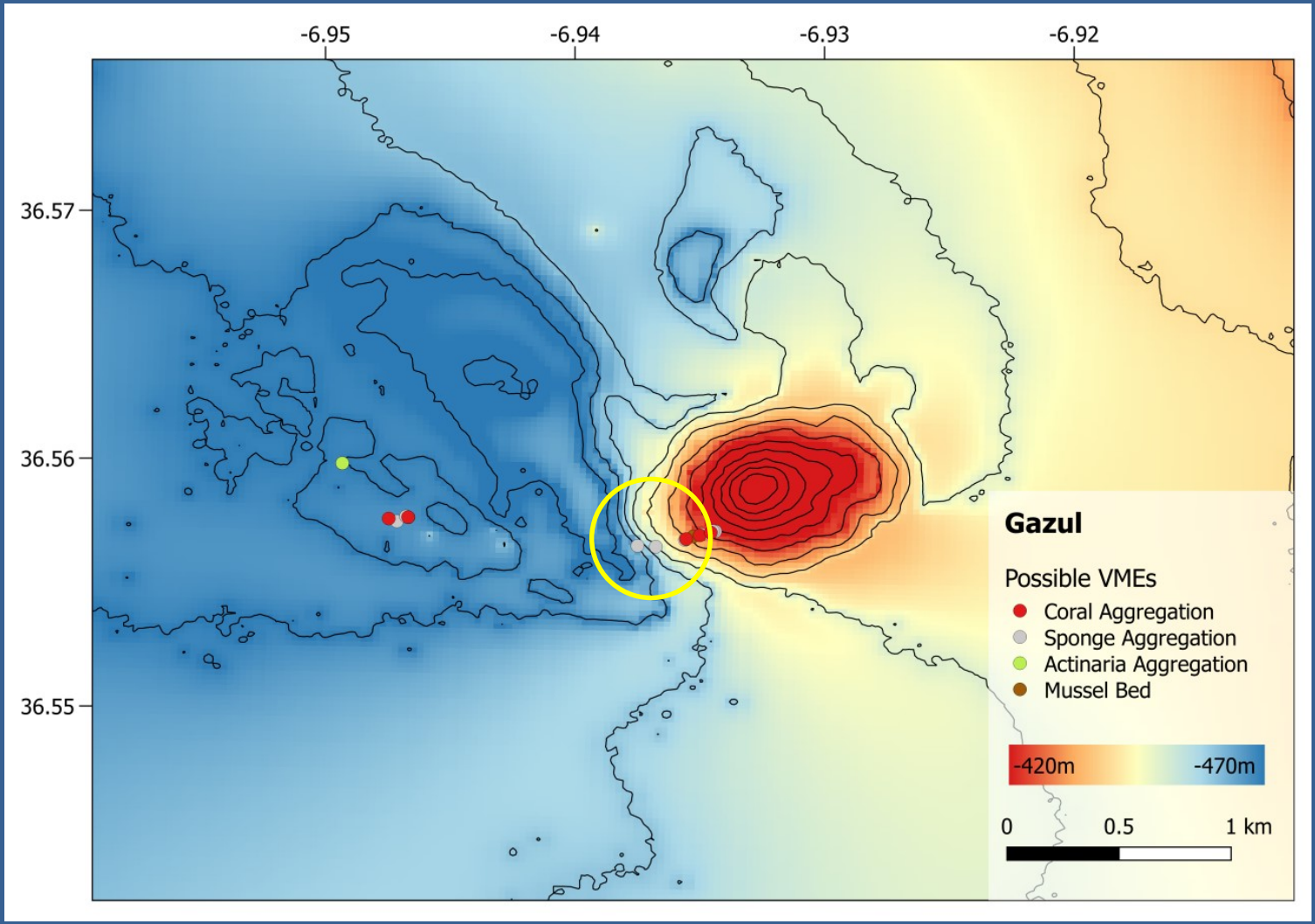
MEDWAVES Benthic ecology



GAZUL

MEDWAVES Benthic ecology

Vulnerable Marine Ecosystems (VMEs)

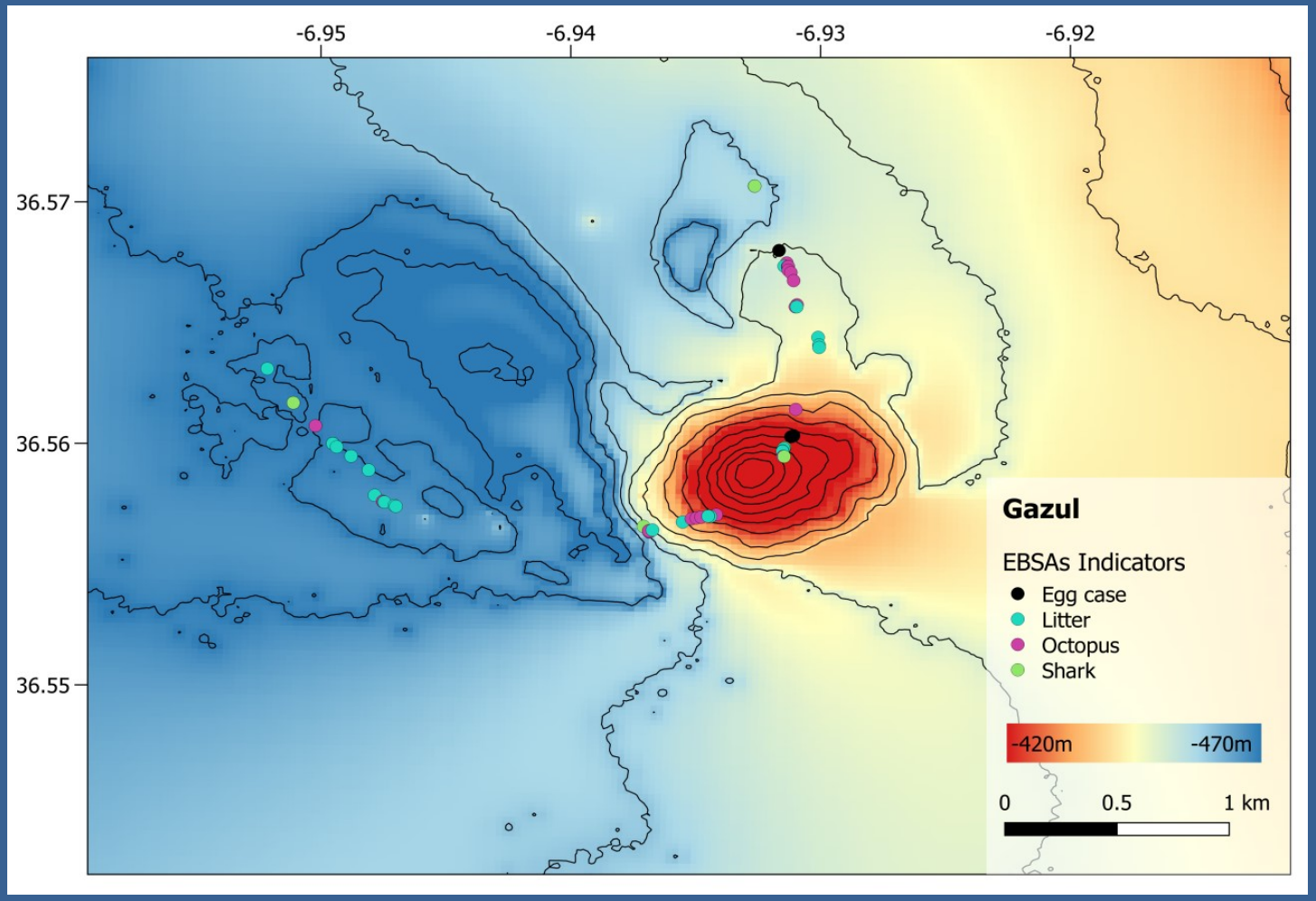


GAZUL

Benthic team_MEDWAVES

MEDWAVES Benthic ecology

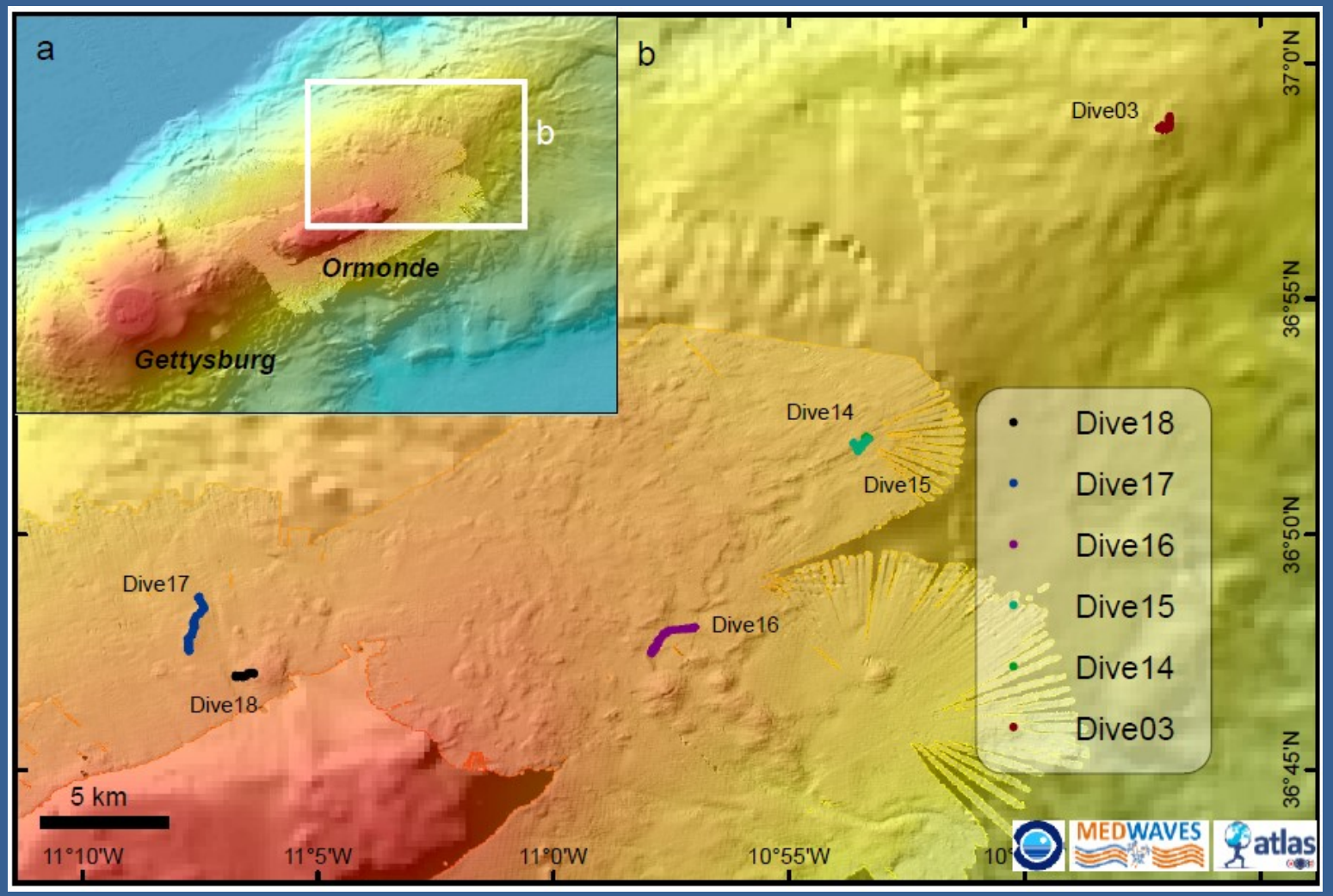
Ecologically or Biologically Significant Marine Areas
EBSAs



GAZUL

Benthic team_MEDWAVES

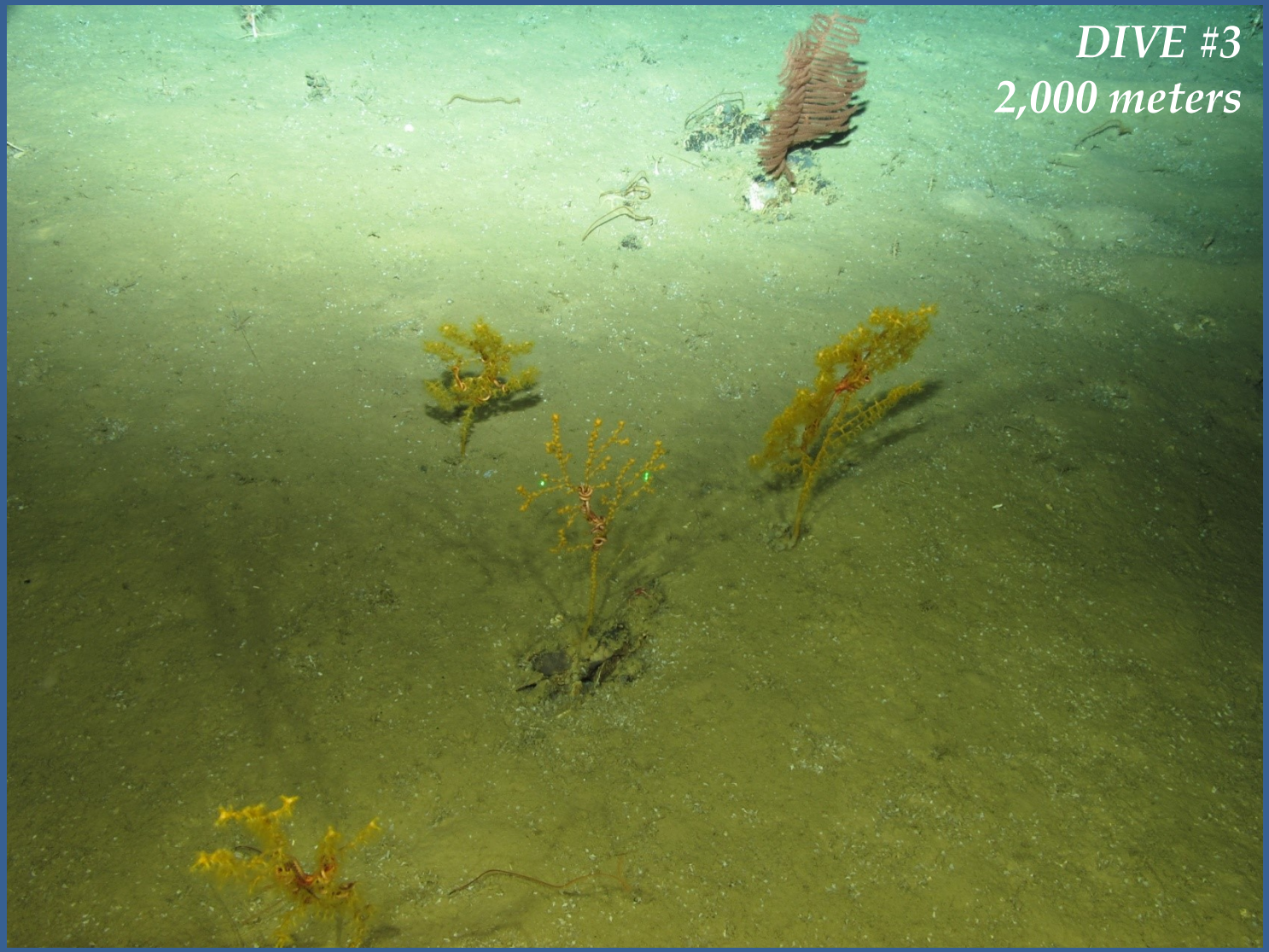
MEDWAVES Benthic ecology



ORMONDE

Geomorphology team_MEDWAVES

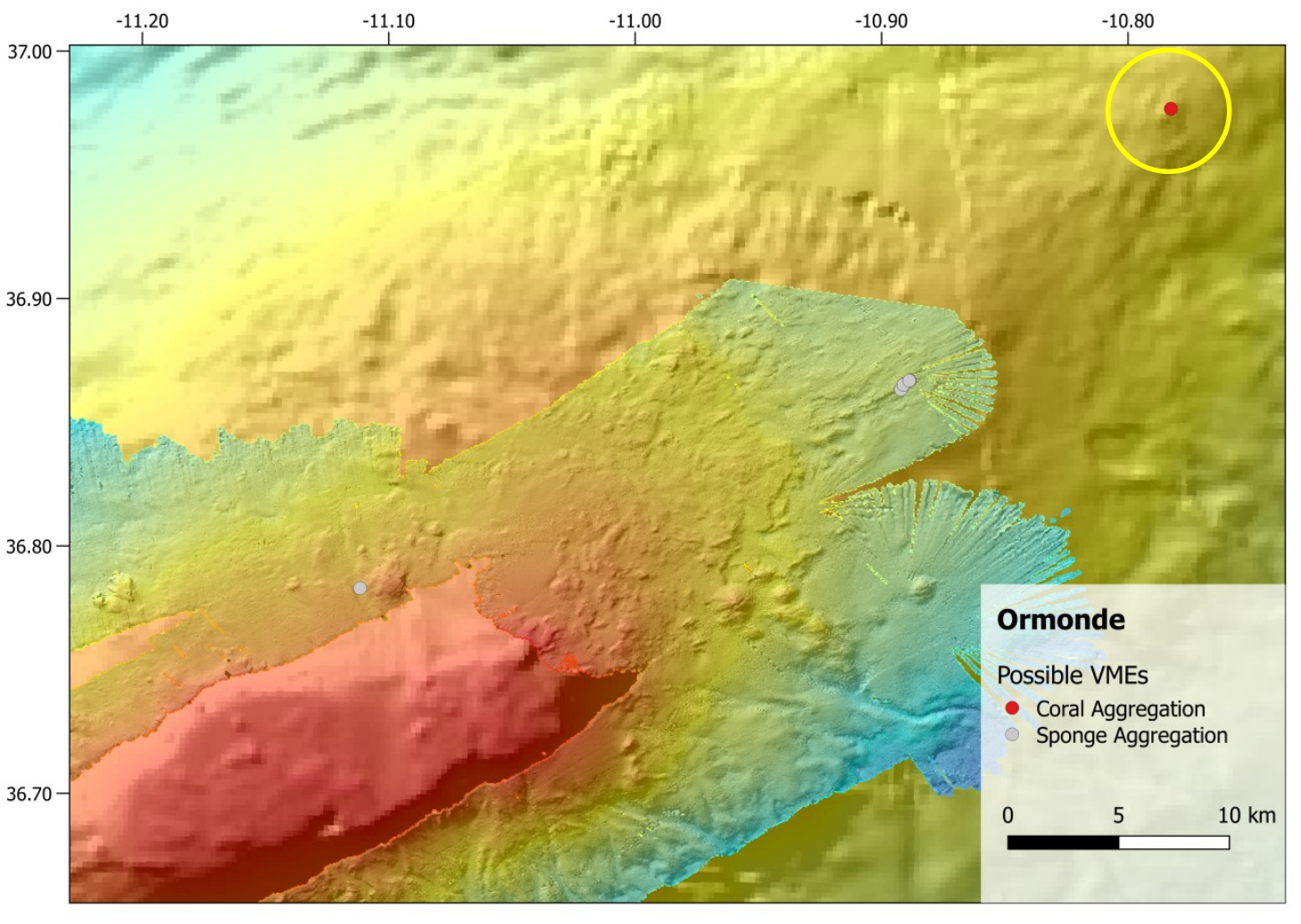
MEDWAVES Benthic ecology



ORMONDE

MEDWAVES Benthic ecology

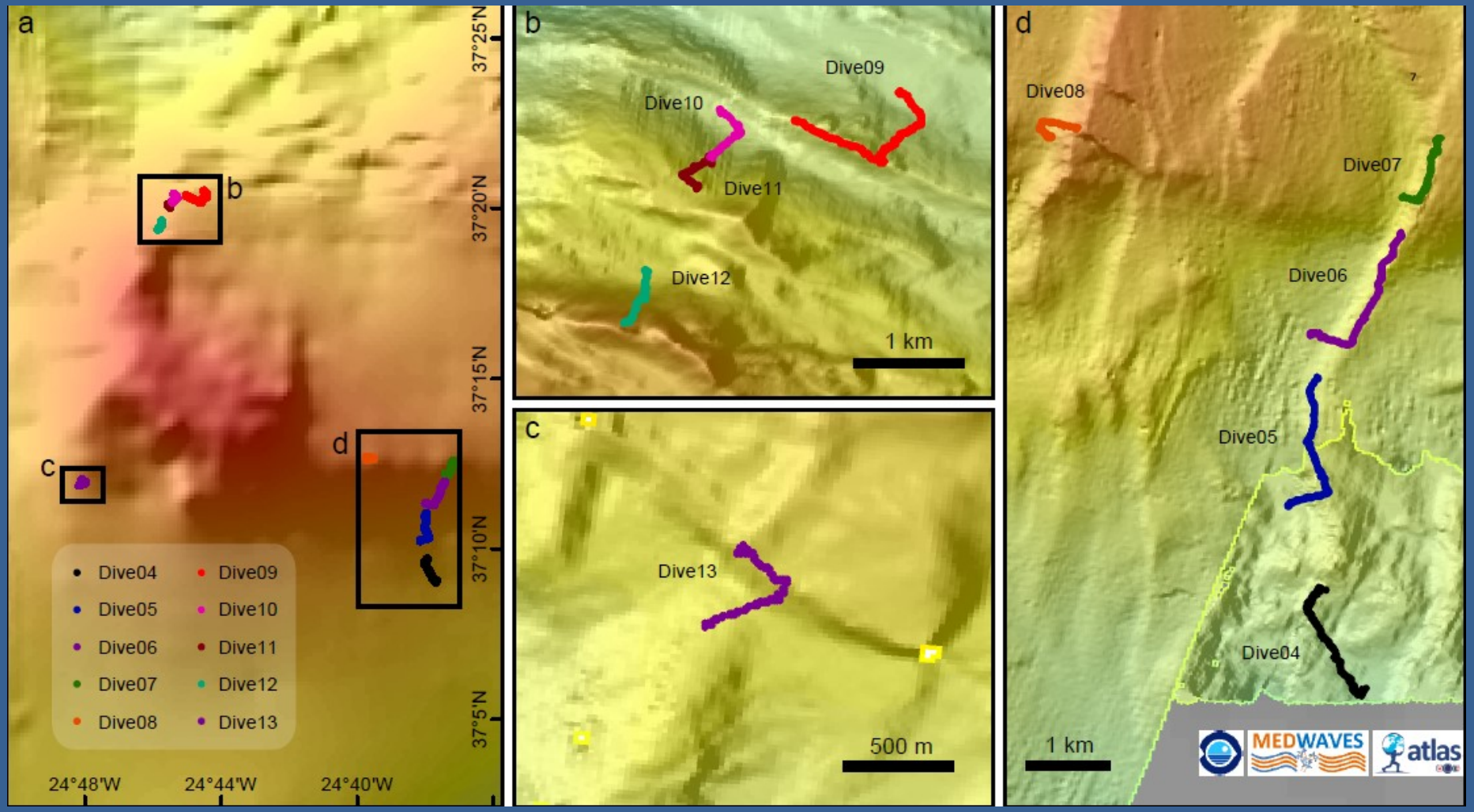
Vulnerable Marine Ecosystems (VMEs)



ORMONDE

Benthic team_MEDWAVES

MEDWAVES Benthic ecology



FORMIGAS

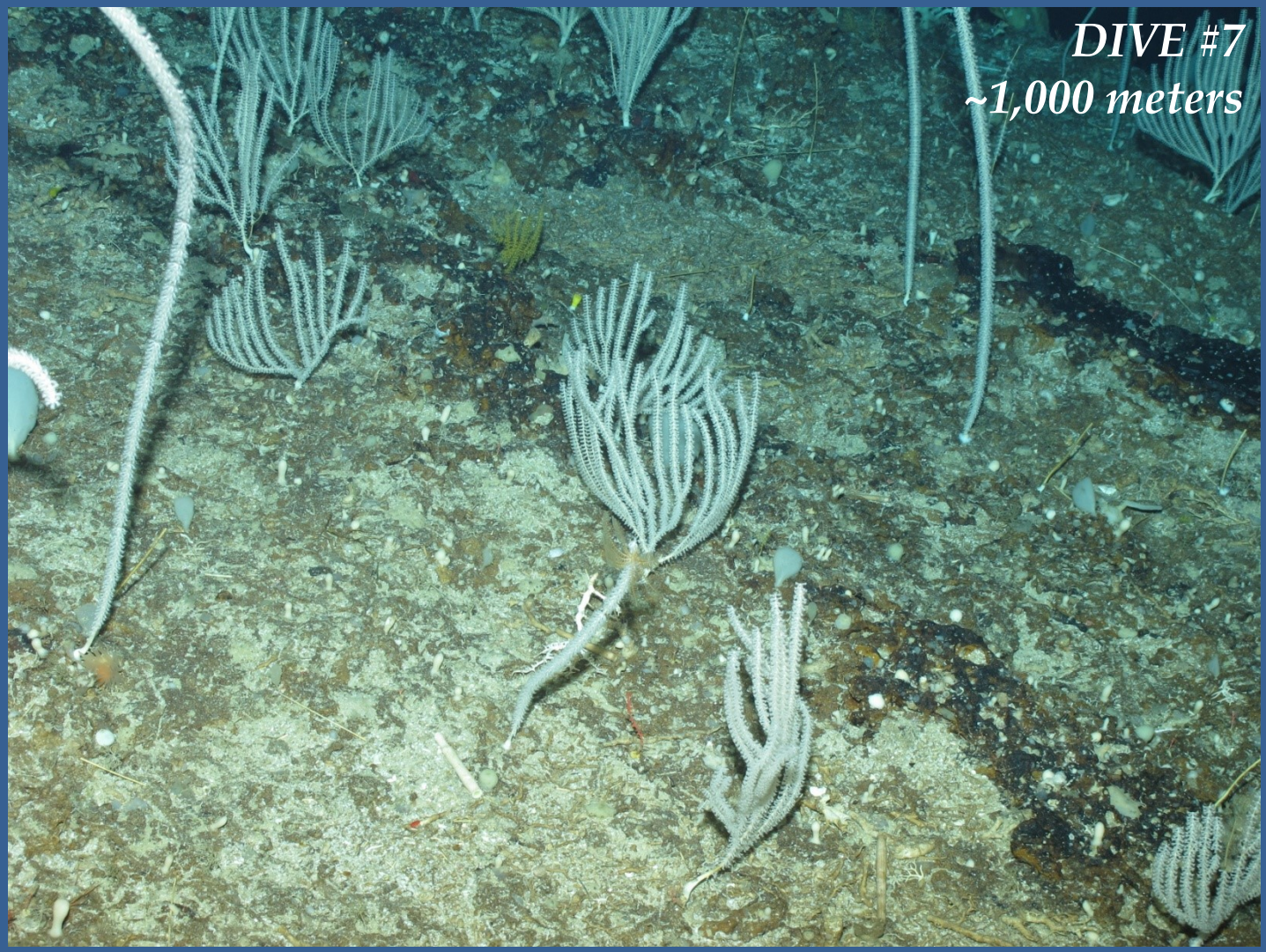
Geomorphology team_MEDWAVES

MEDWAVES Benthic ecology

FORMIGAS *DIVE #6*

~1,000 meters

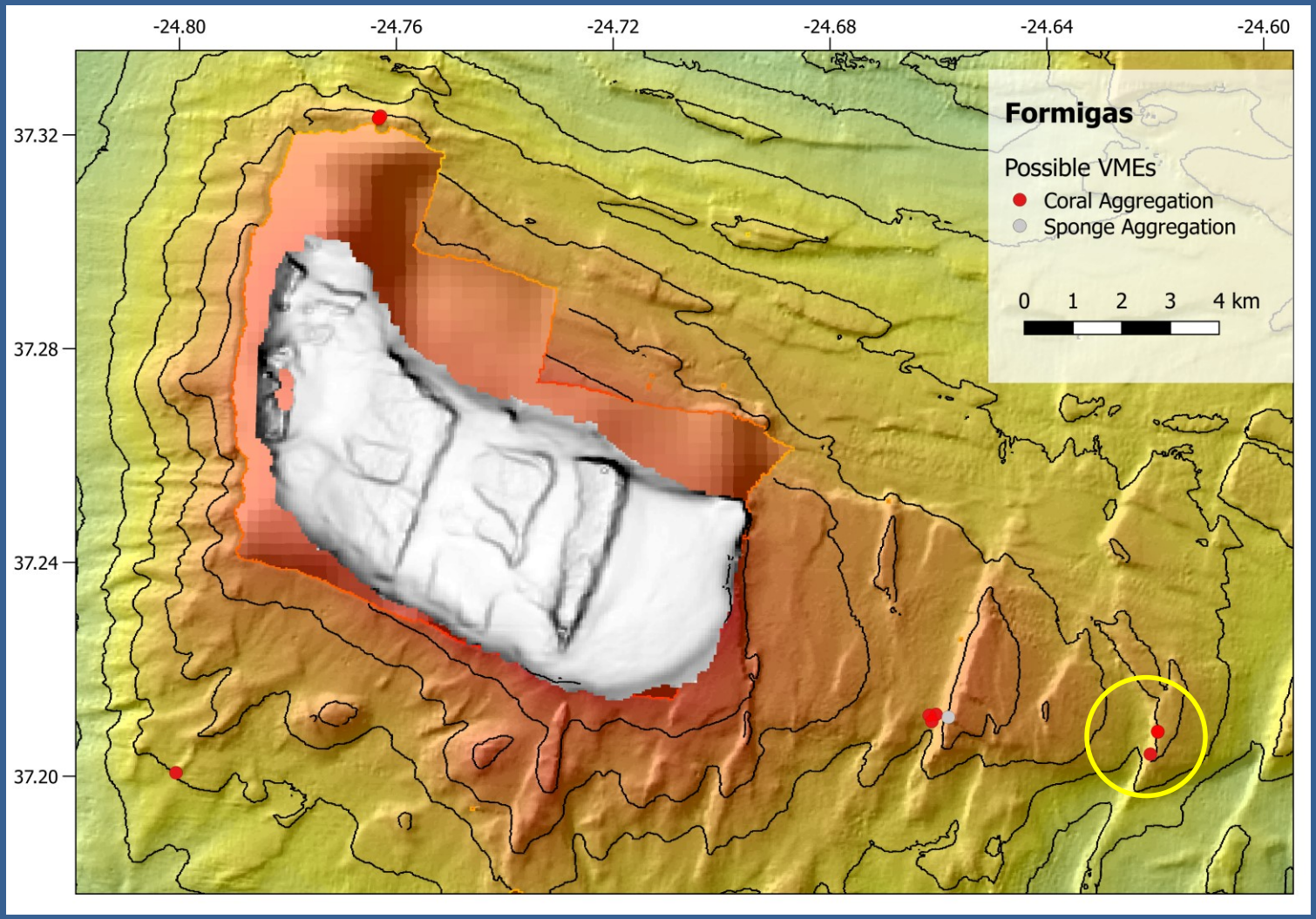
MEDWAVES Benthic ecology



FORMIGAS

MEDWAVES Benthic ecology

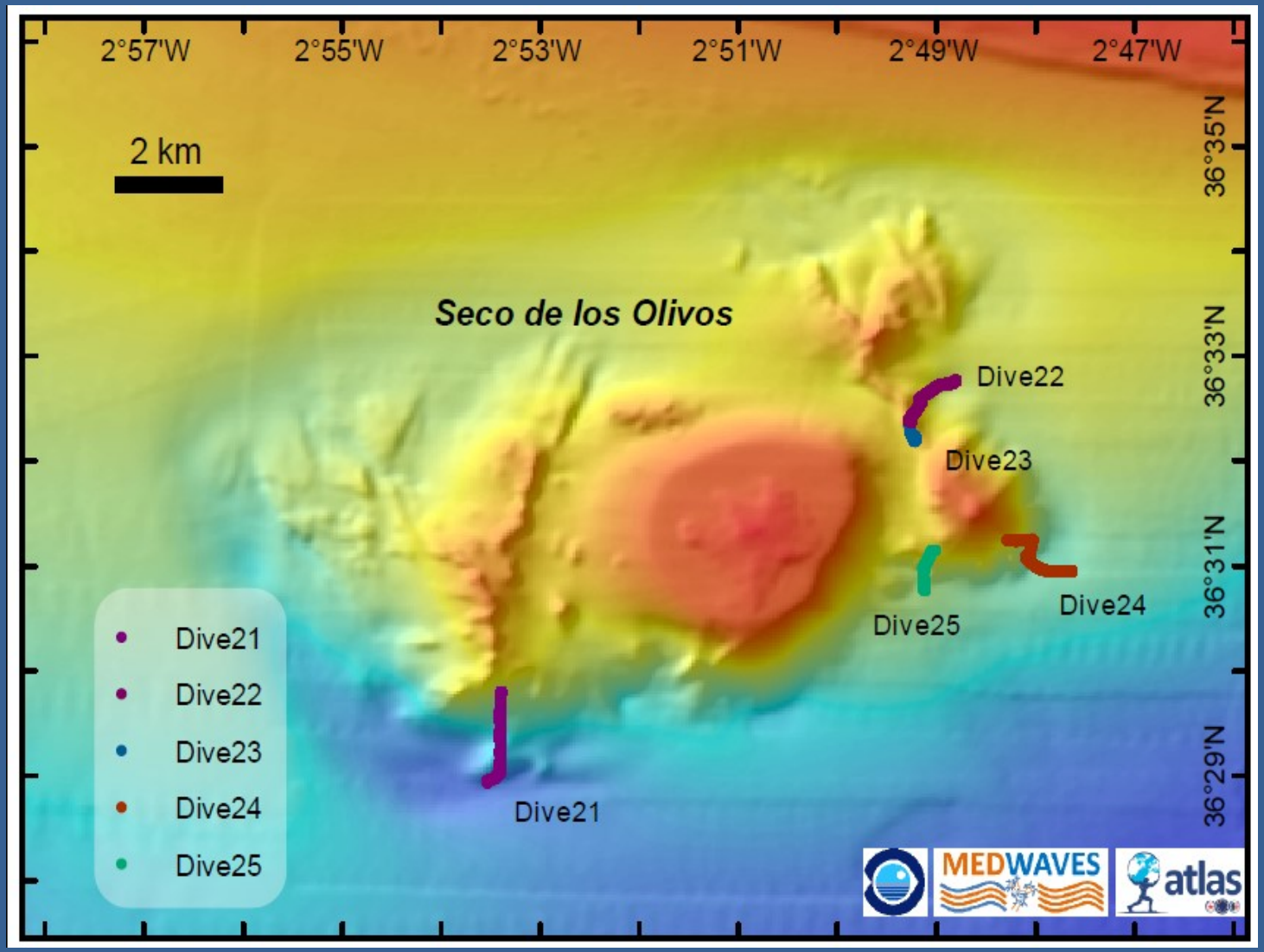
Vulnerable Marine Ecosystems (VMEs)



FORMIGAS

Benthic team_MEDWAVES

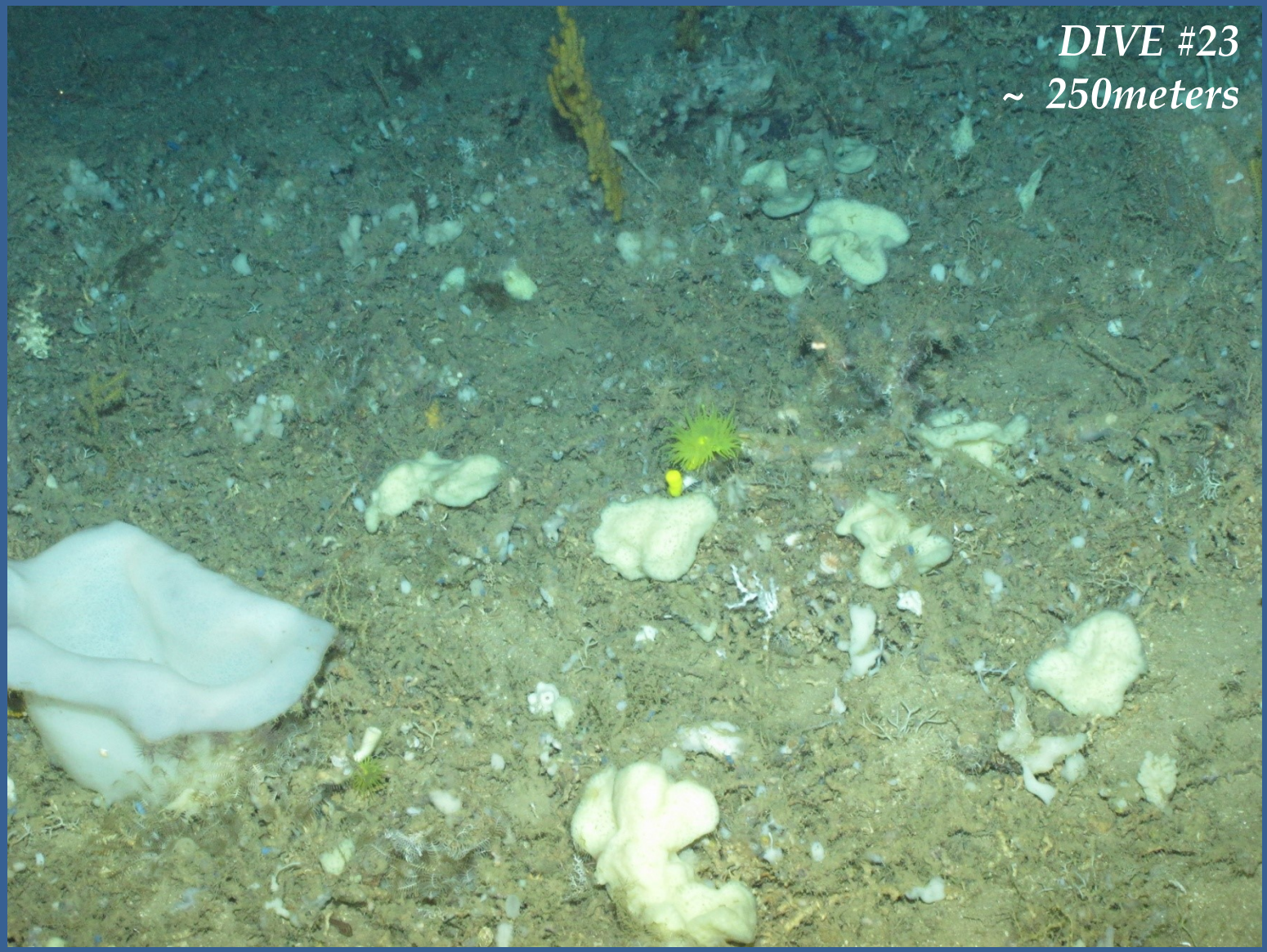
MEDWAVES Benthic ecology



SECO DE LOS OLIVOS

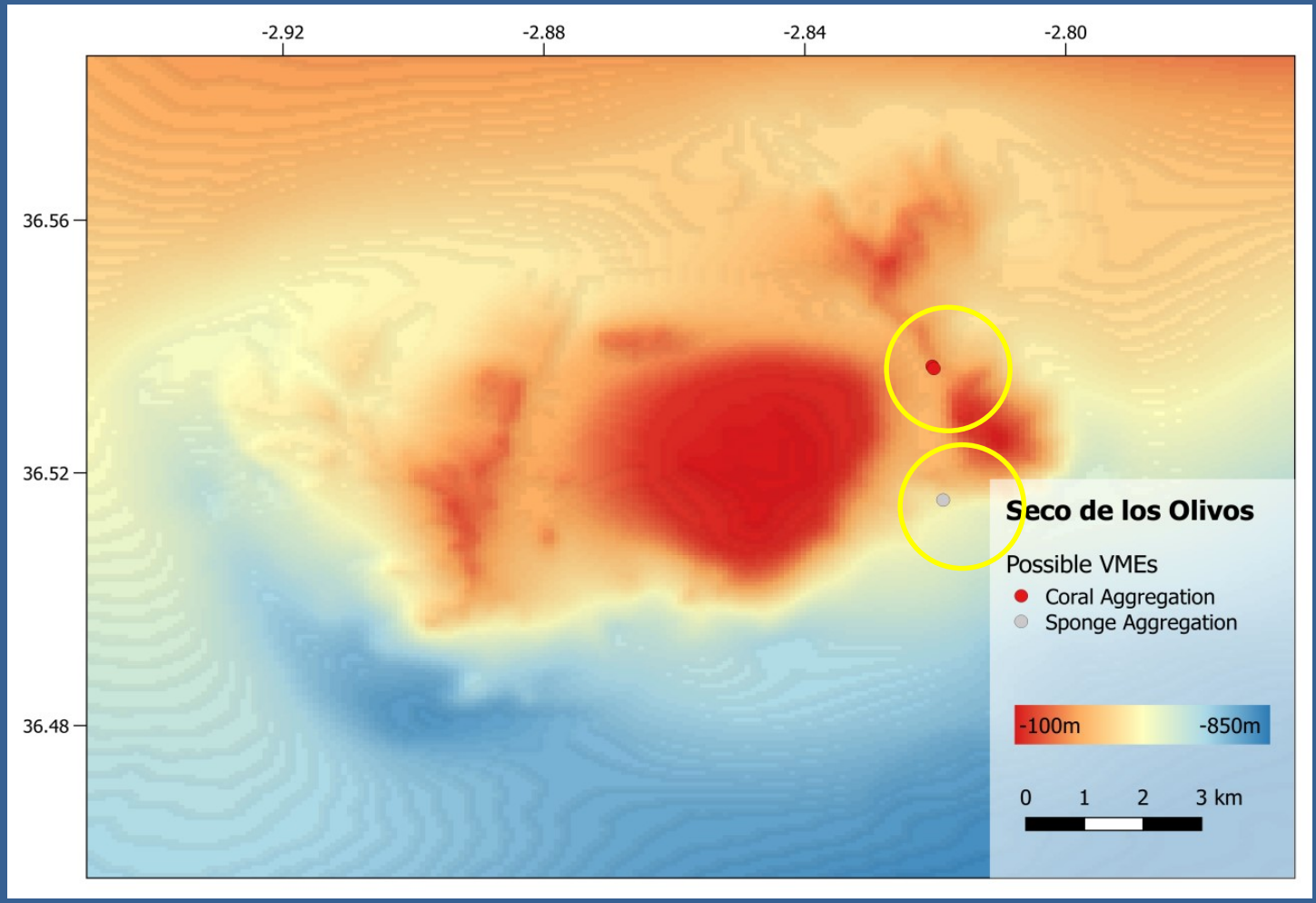
Geomorphology team_MEDWAVES

MEDWAVES Benthic ecology



SECO DE LOS OLIVOS

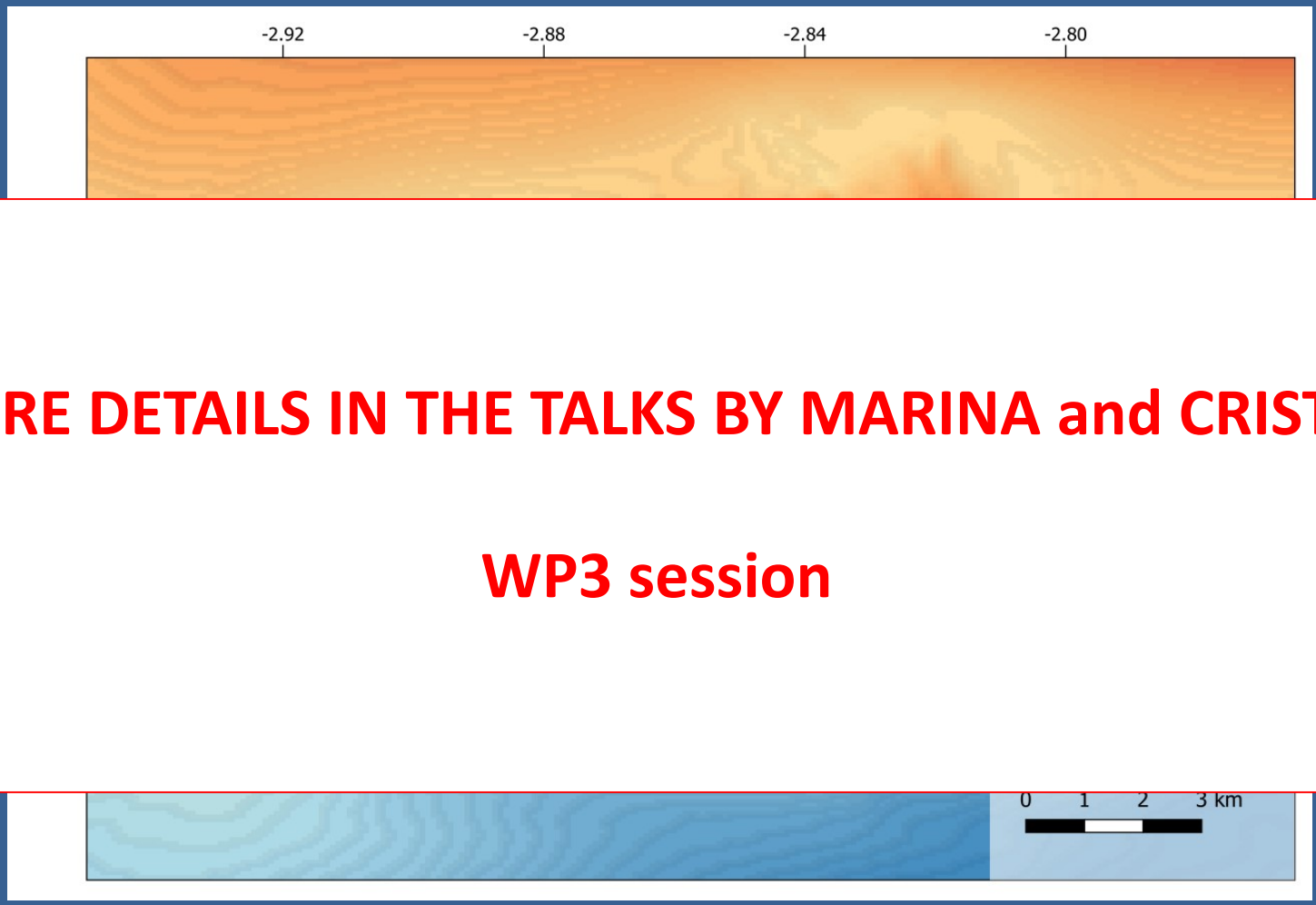
Vulnerable Marine Ecosystems (VMEs)



SECO DE LOS OLIVOS

MEDWAVES Benthic ecology

Vulnerable Marine Ecosystems (VMEs)



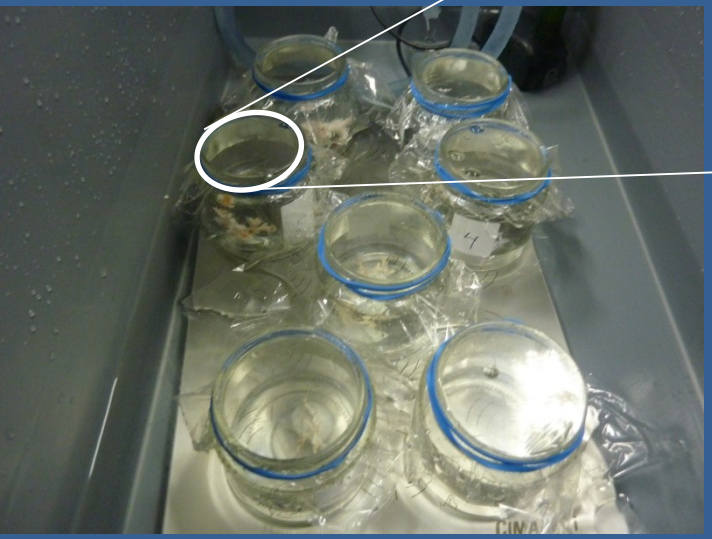
→MORE DETAILS IN THE TALKS BY MARINA and CRISTINA!!

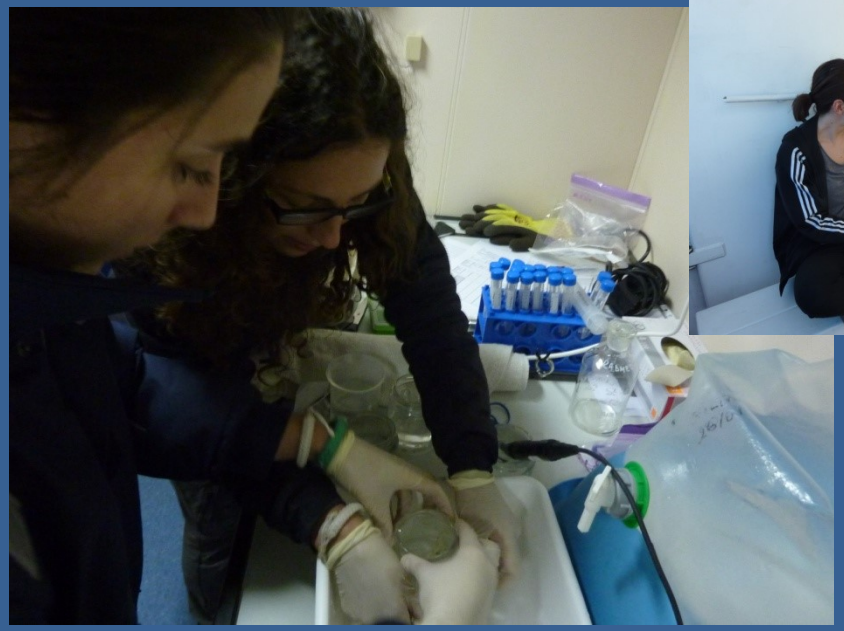
WP3 session

SECO DE LOS OLIVOS

MEDWAVES Ecophysiology

Cold-water coral response under the influence of the Mediterranean (warmer, saltier and more alkaline) and the Atlantic water (lower temperature, salinity and alkalinity)





- respiration
- ammonium excretion
- calcification

Ecophysiology team_MEDWAVES

MEDWAVES Ecophysiology

Cold-water coral response under the influence of the Mediterranean (warmer, saltier and more alkaline) and the Atlantic water (lower temperature, salinity and alkalinity)

→ MORE DETAILS IN THE TALK BY CHRISTIAN!!
WP2 Overview session

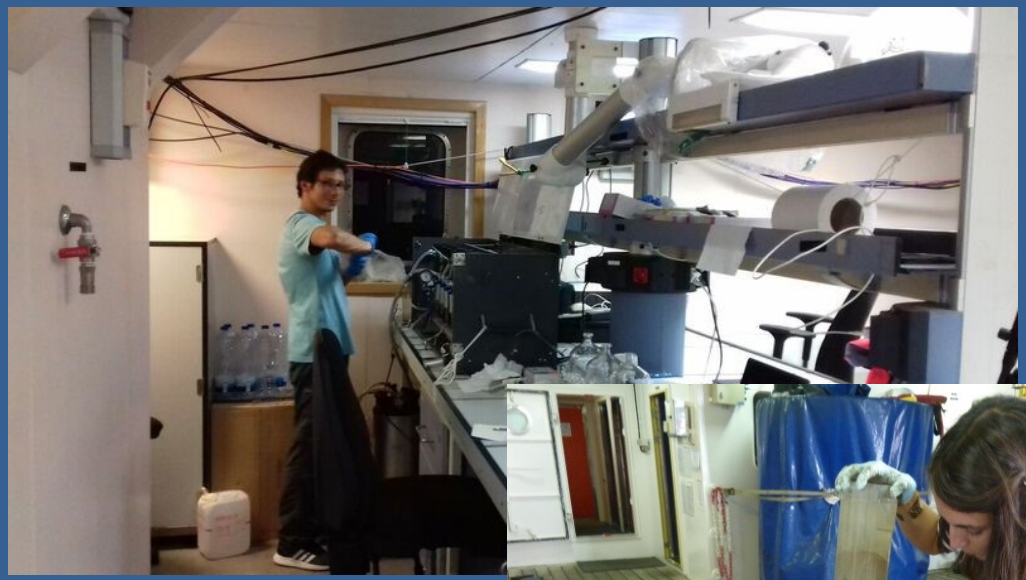
- respiration
- ammonium excretion
- calcification

Ecophysiology team_MEDWAVES

MEDWAVES Evolutionary ecology

Sampling of specimens → WP4 connectivity studies

Sampling of water and sediment→ WP3 environmental DNA studies



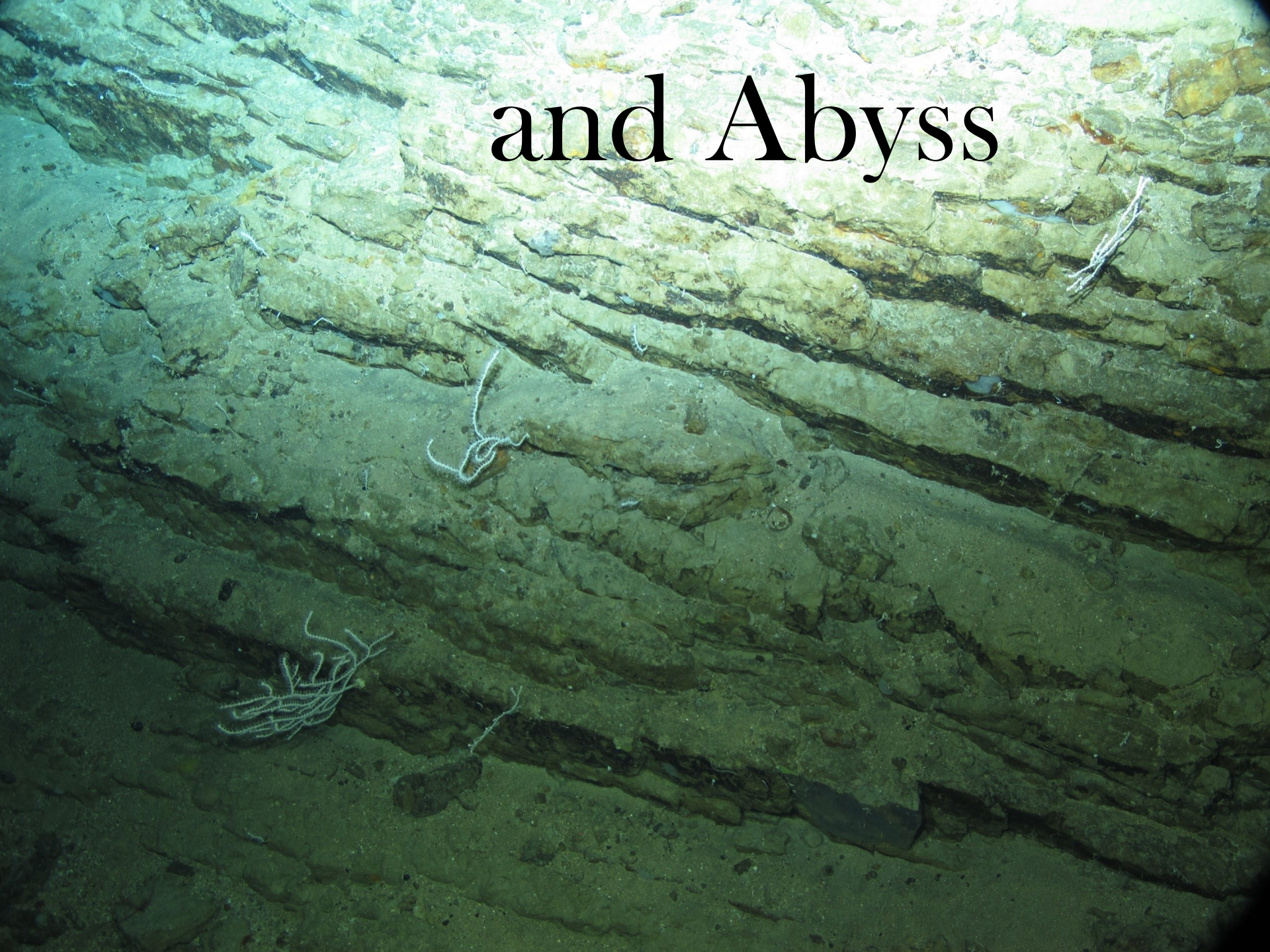
MEDWAVES Evolutionary ecology

Sampling of specimens → WP4 connectivity studies

Sampling of water and sediment→ WP3 environmental DNA studies

→MORE DETAILS IN THE TALKS BY SOPHIE AND JOANA!!

WP4 Overview session and talk

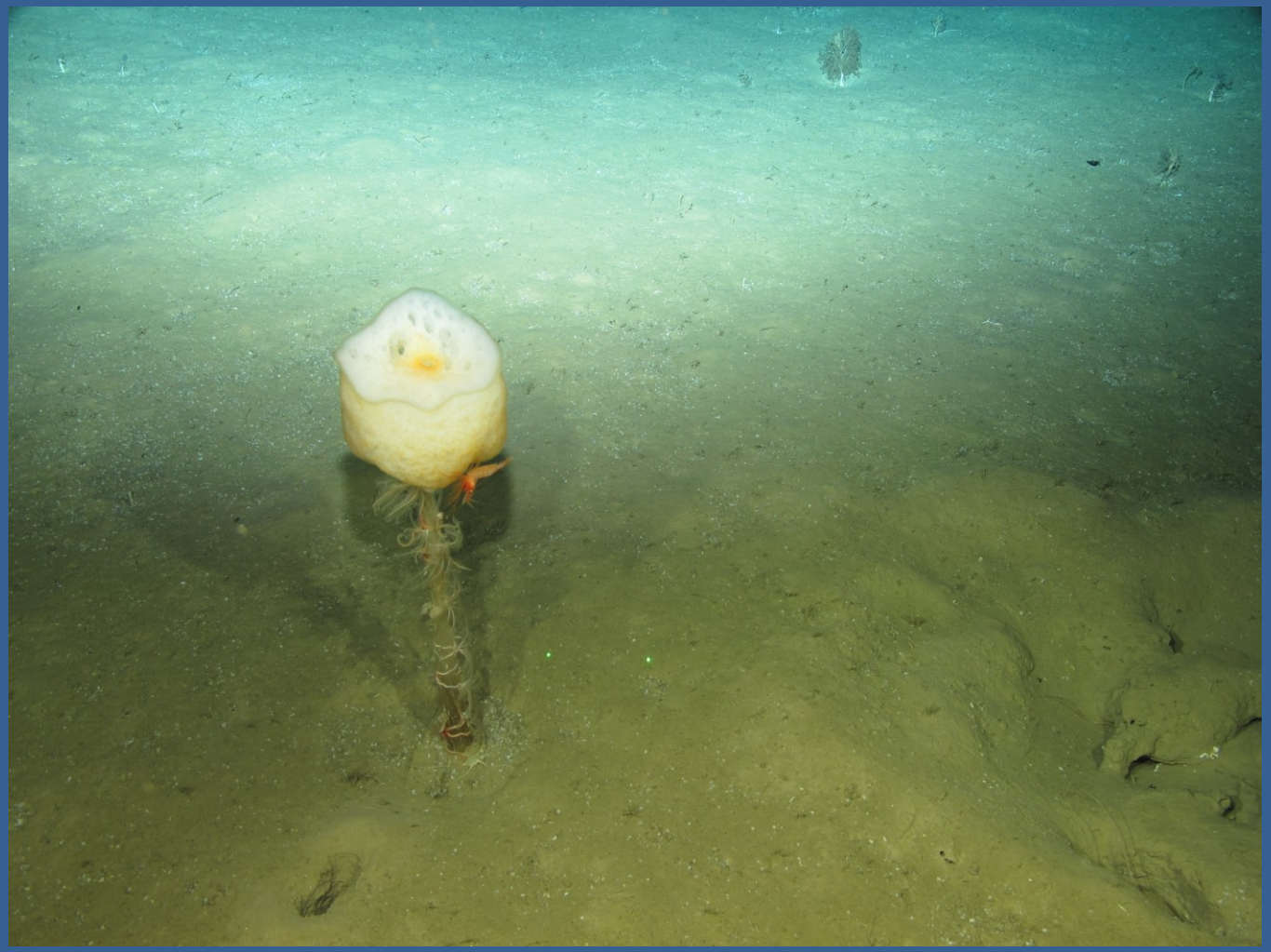


and Abyss

Sponge grounds in Gazul

Coral gardens

High diverse deep sea communities in Ormonde



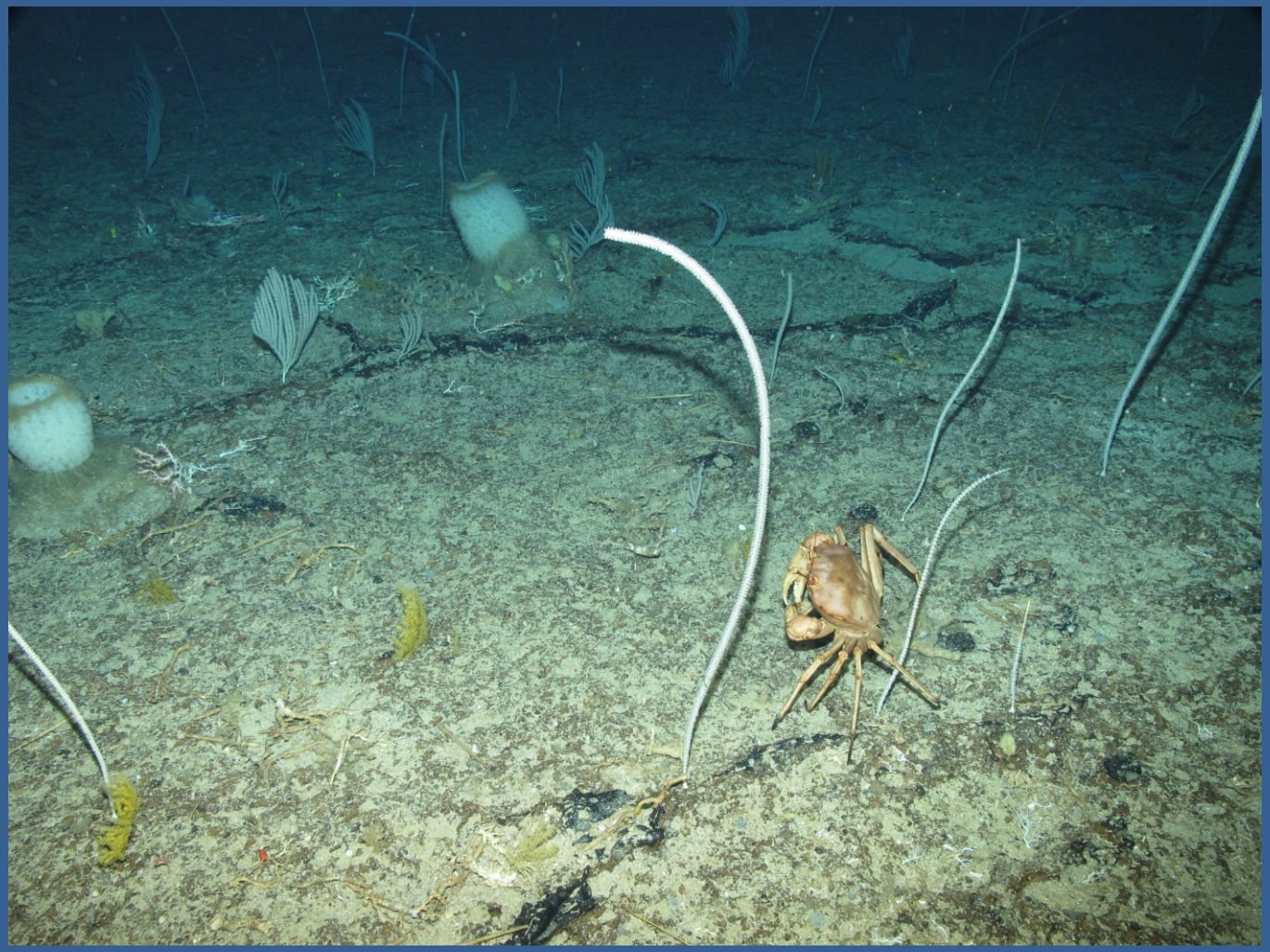
Dense and abundant *Acanella* forests

Steep slopes

Nest sponges

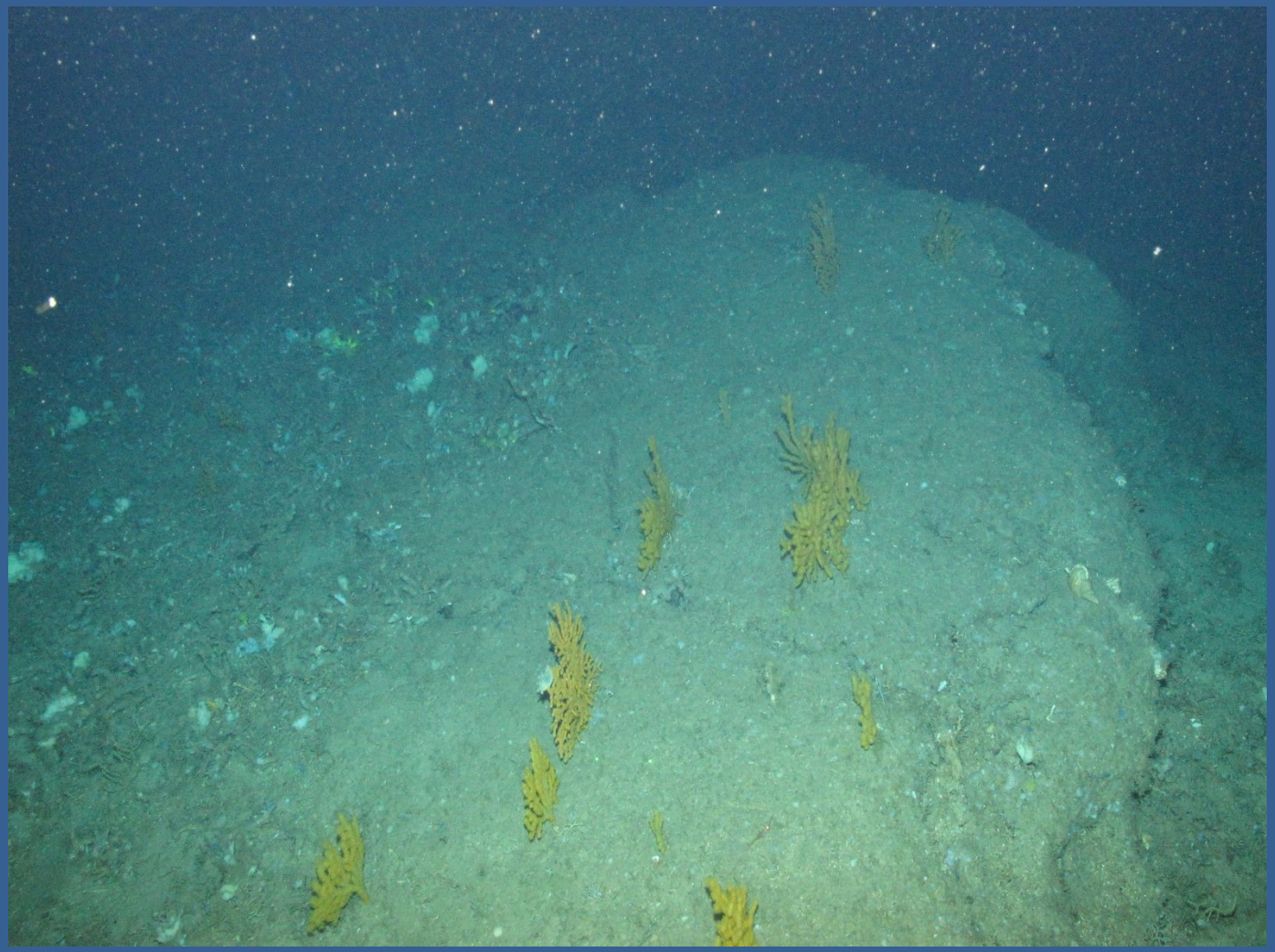
Dense and diverse coral gardens

Dense and diverse coral gardens



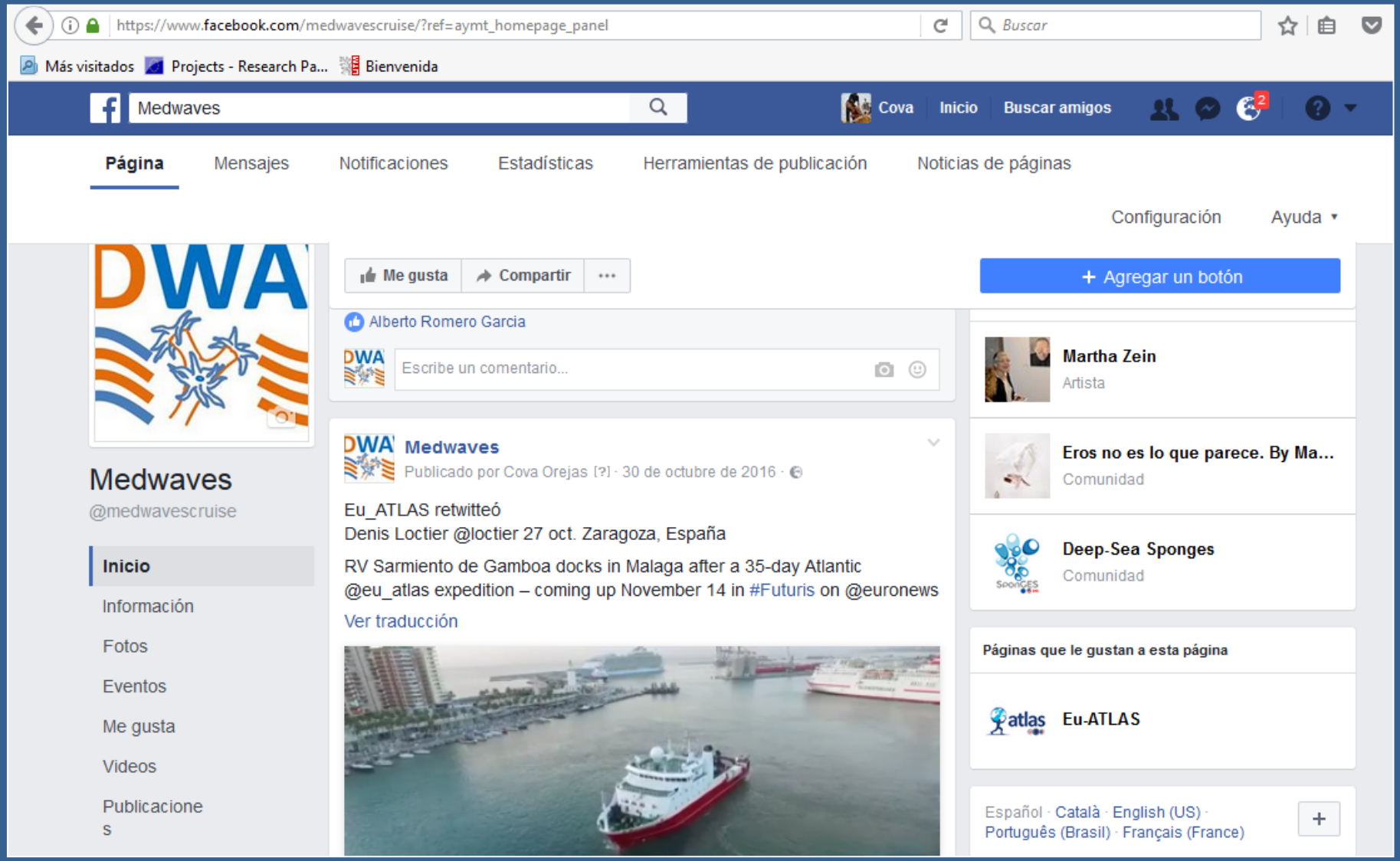
Sponge grounds in Seco de los Olivos

Coral gardens



MEDWAVES Dissemination

MEDWAVES facebook page: www.facebook.com/medwavescruise



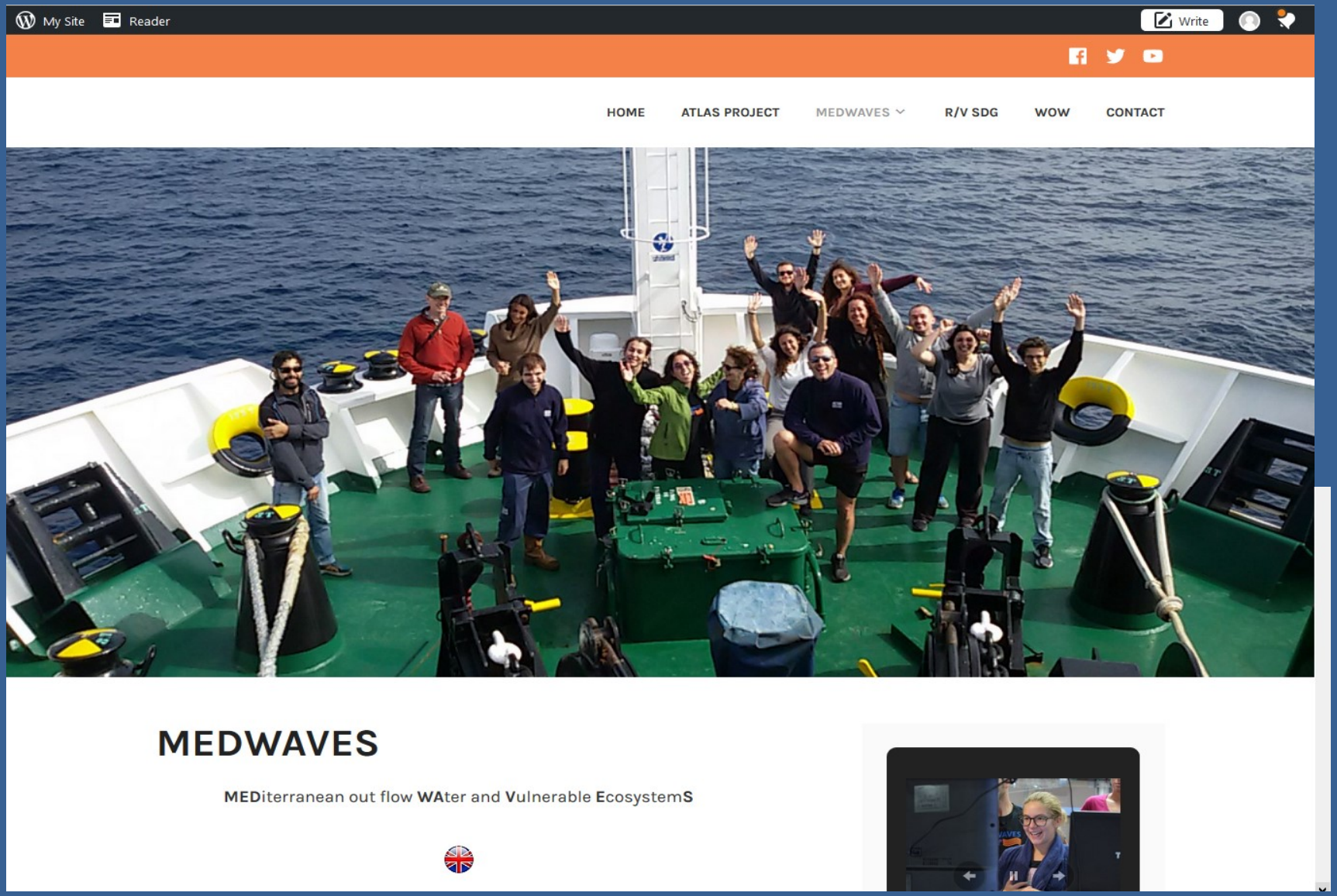
MEDWAVES Dissemination

MEDWAVES in the Spanish media and in euronews

http://www.euronews.com/2016/11/14/a-technological-eye-on-the-future-of-our-seas-and-our-agriculture

MEDWAVES Dissemination

MEDWAVES blog: https://medwavesblog.wordpress.com/medwaves/

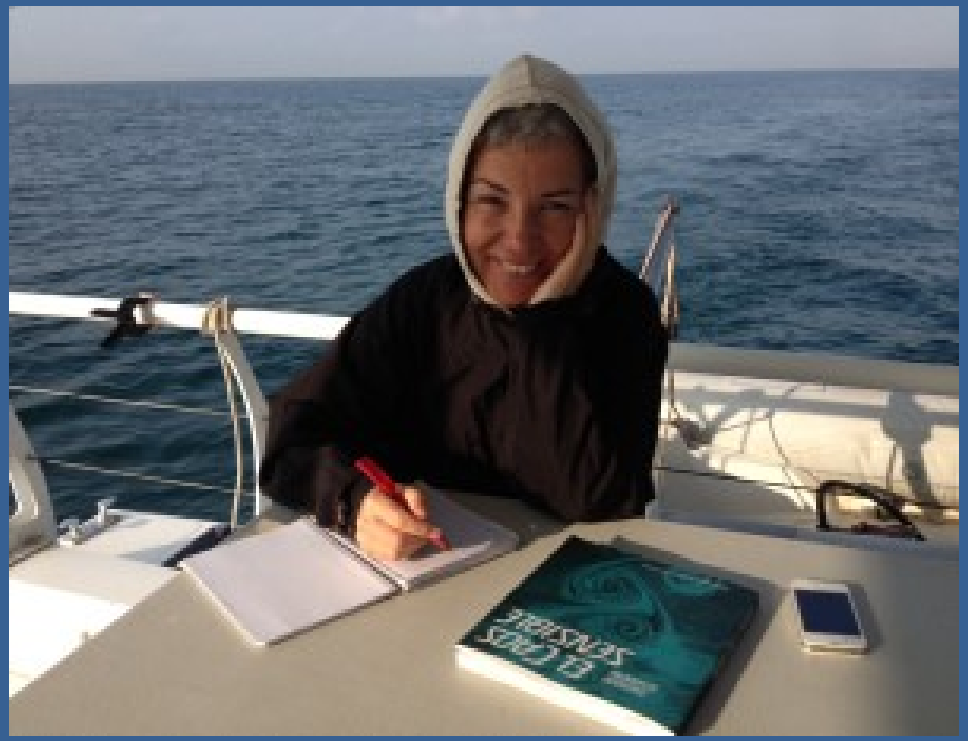


Ana Morillas & Cova Orejas

MEDWAVES Dissemination

Ways of the Waves
Scientific dissemination and Art
CONCIENCIARTE

Jose Luis Matoso
(film maker)



Martha Zein
(concept and direction)

MEDWAVES Dissemination

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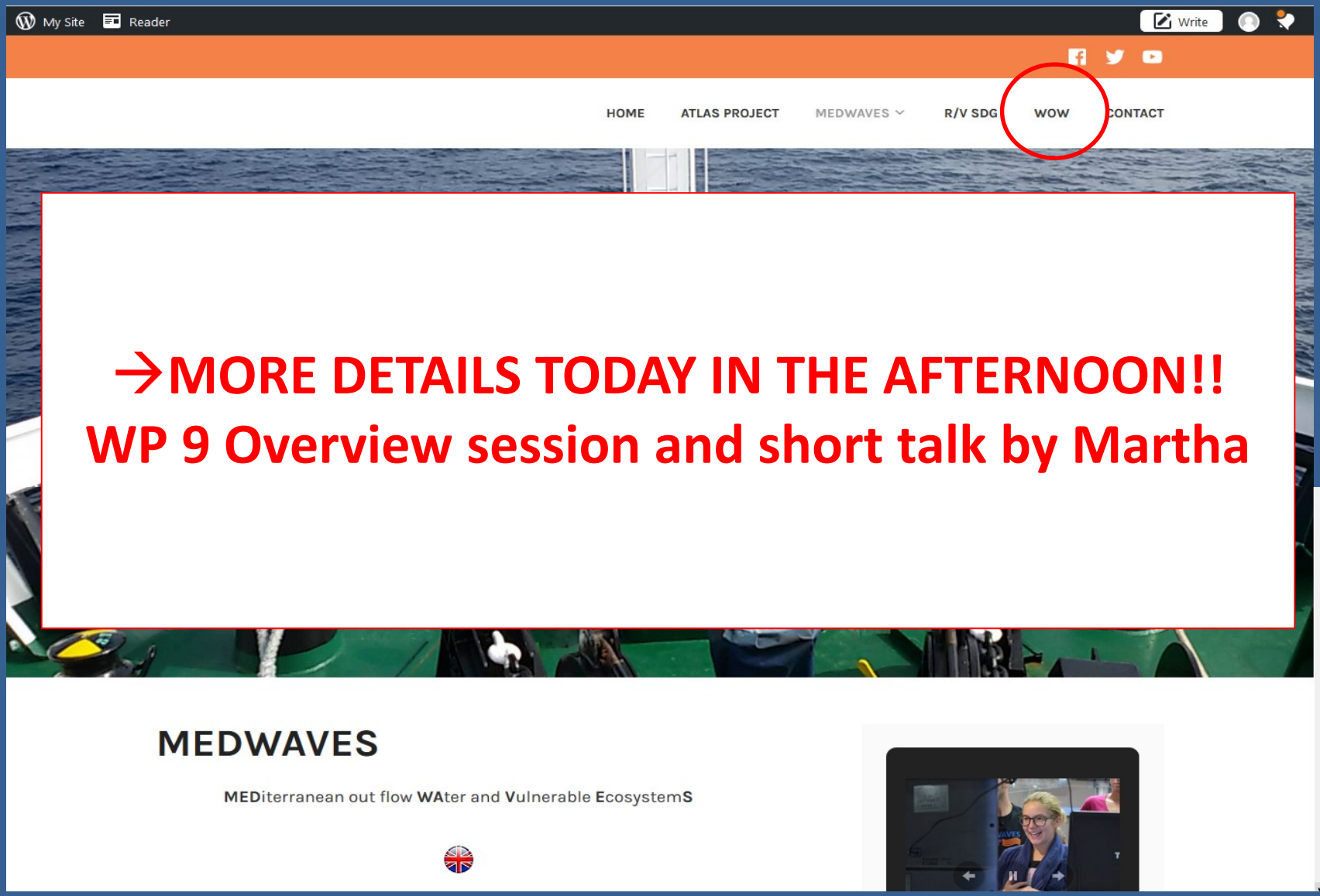

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- ACSM - ROV team
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GOBIERNO DE ESPAÑA MINISTERIO DE ECONOMÍA, INDUSTRIA Y COMPETITIVIDAD

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MEDWAVES scientific party

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