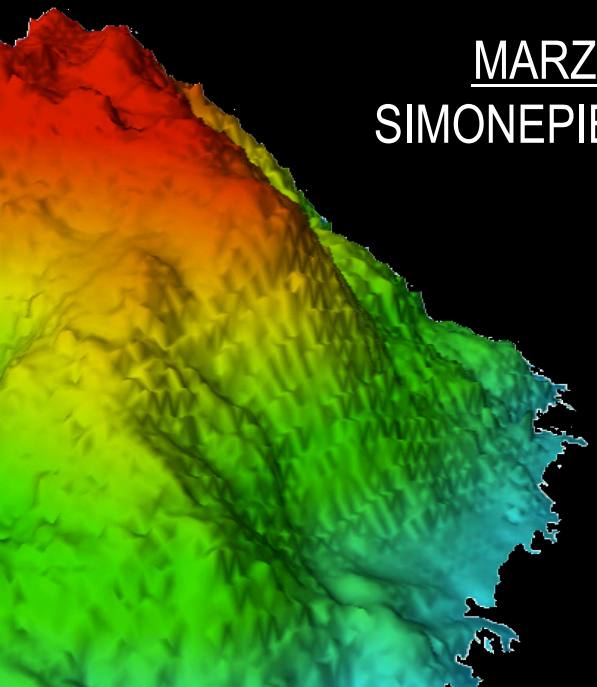
LIGURIAN SEAMOUNTS:
KNOWN VULNERABILITY OF UNKNOWN ECOSYSTEMS

MARZIA BO, MARTINA COPPARI, SIMONE BAVA,
SIMONEPIETRO CANESE, RICCARDO CATTANEO-VIETTI,
GIORGIO BAVESTRELLO





78th UZI Congress
20th September 2017

BIOMOUNT
Biodiversity patterns of Tyrrhenian Seamounts

Ecological importance of Seamounts

Seamount effects on **circulation** affect pelagic and benthic ecosystems over and around seamounts

Deep-sea corals are commonly associated with seamount providing food and refuge for associated species

Benthopelagic fish species and **pelagic top predators** aggregate for spawning or feeding over seamounts



Seamounts act as stepping stones in the migratory routes and **dispersal** paths of the species

Migratory behaviour along the seamount flanks of the large number of **mesopelagic** organisms

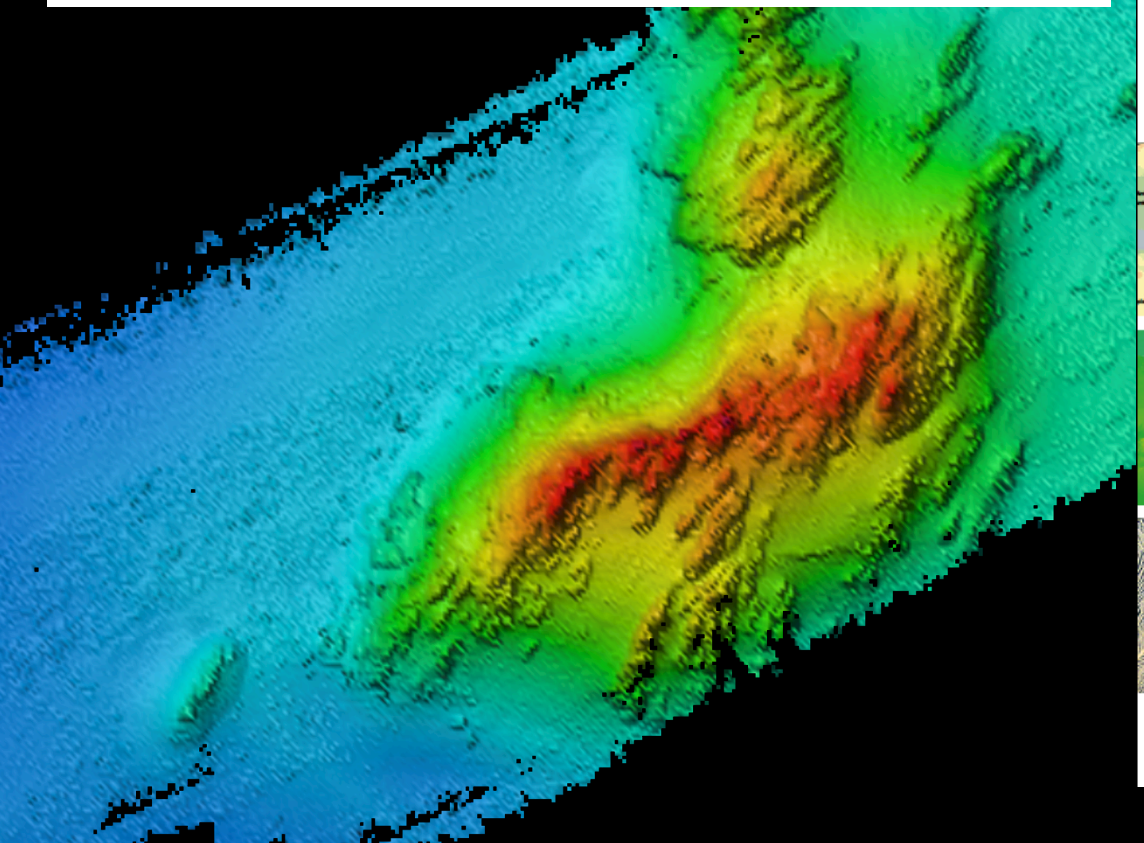
Role of seamount and hydrothermal activities in the organic sink, **productivity** and microbial loop

Mediterranean Seamounts

In the Mediterranean Sea, our knowledge about seamounts is marked by large gaps, but also by an asymmetry between the amount of geological studies and the biological ones.

Life on and around the Seamount

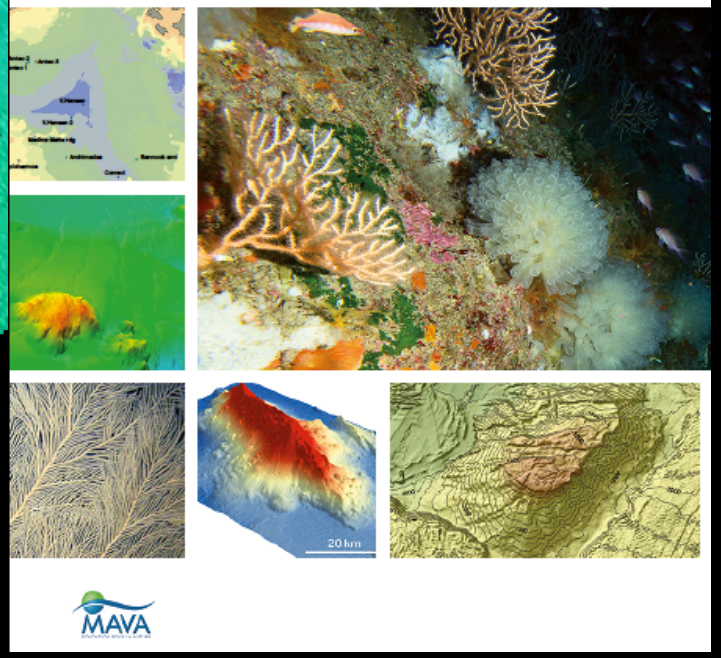
No information about the benthic and pelagic communities of the Los Martines and Riba Seamounts has been found in the scientific literature.



IUCN

Atlas of the Mediterranean Seamounts and Seamount-like Structures

Maurizio Würtz and Marzia Rovere (Editors)



MAVA

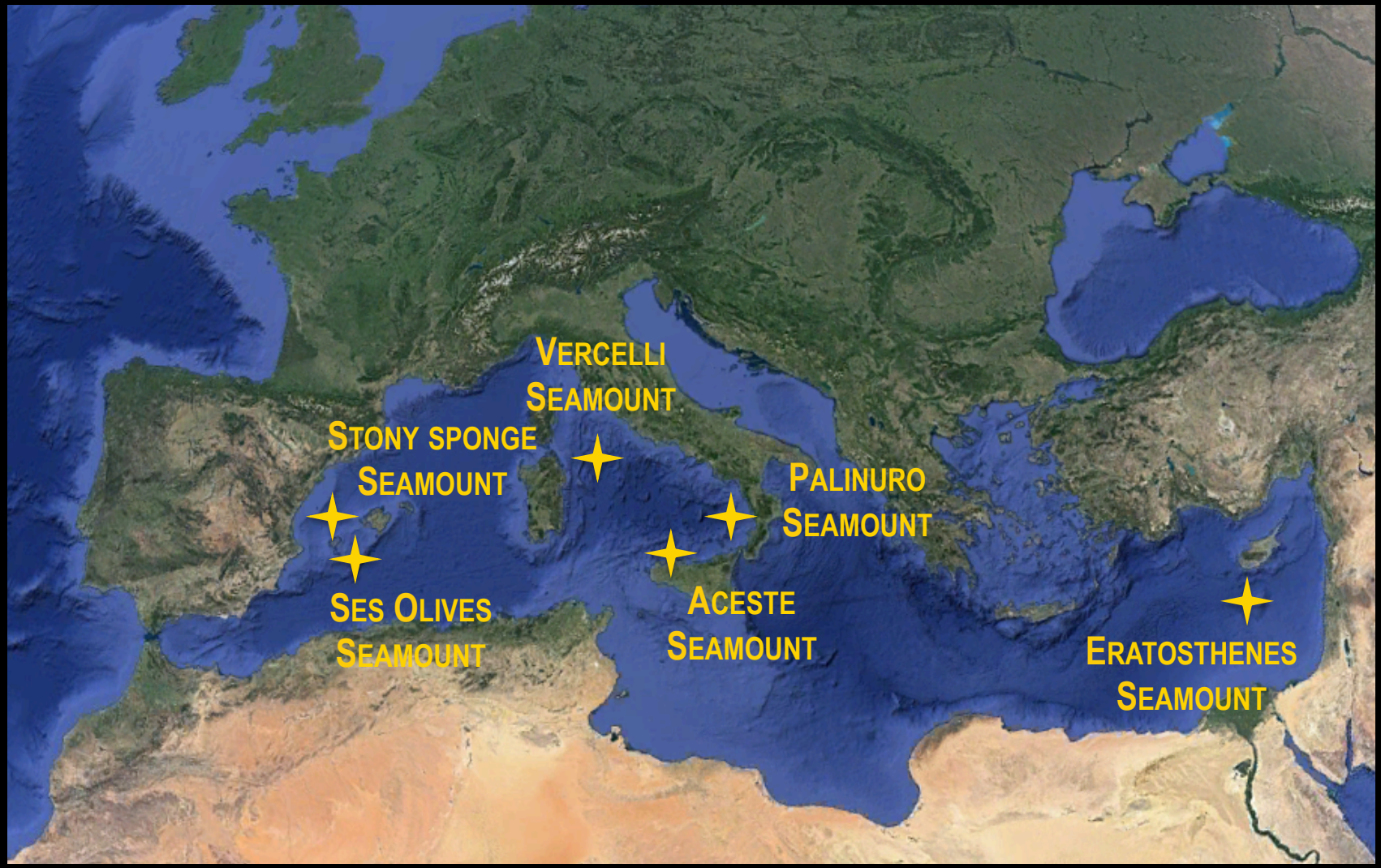
LIFE AROUND THE SEAMOUNTS

Numerous information gathered on the pelagic fauna for the Ligurian and Tyrrhenian seamounts during the large-scale project PROMETEOS.



Biological surveys: Highlights

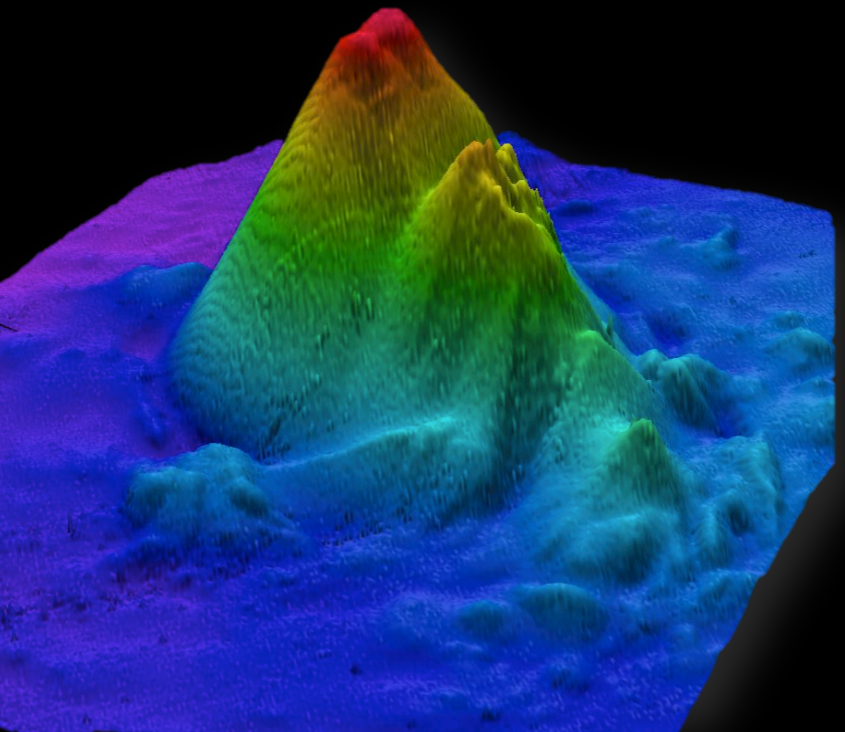
Fragmentary biological data are available for about 6 structures, whether only the Tyrrhenian Vercelli Seamount has been studied in details.





Fishing Exploitation of Mediterranean Seamounts

Large fishes inhabiting dark habitats are marginally considered by conservationists, nevertheless their presence appear to be very low if compared with the few information collected interviewing old fishermen
(Bava & Canese, 2009)





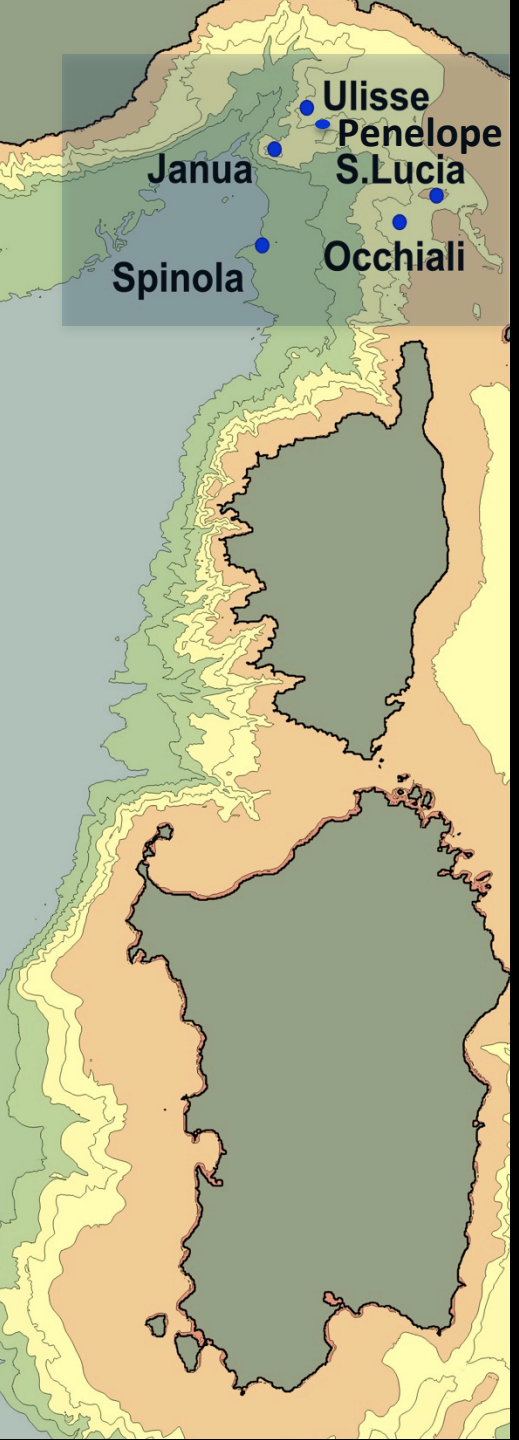
Ulisse Seamount, ‘70s, Andreino Croce
1 longline with 70 hooks, total catch of 450kg
20 *P. americanus*, 3 *H. griseus*

BIOMOUNT PROJECT

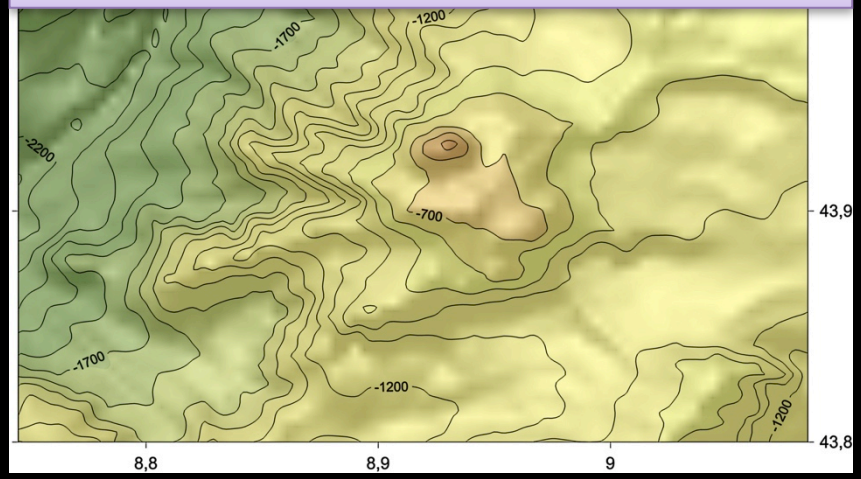
Biodiversity patterns of Tyrrhenian seamounts

Fulfill biodiversity gaps and link new insights from the deep sea biology and ecology with expertise from the emerging technologies to understand and manage Mediterranean seamount ecosystems

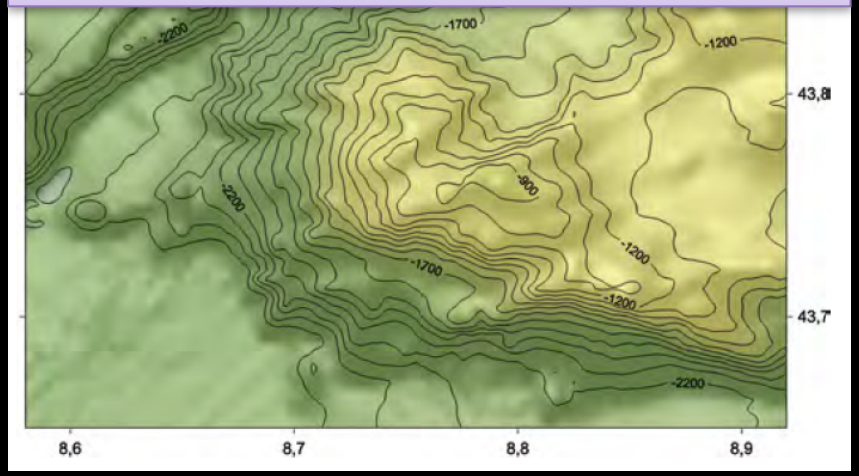
- Characterization of the benthic and fish communities of deep Tyrrhenian (and Ligurian) seamounts
- Biology and ecology of a target deep-sea corals
- Genetic connectivity of deep-sea populations
- Antropic impact assessment
- Vulnerability GIS charts
- Management framework for Mediterranean seamounts



Ulisse 400-730m and Penelope 450-730m

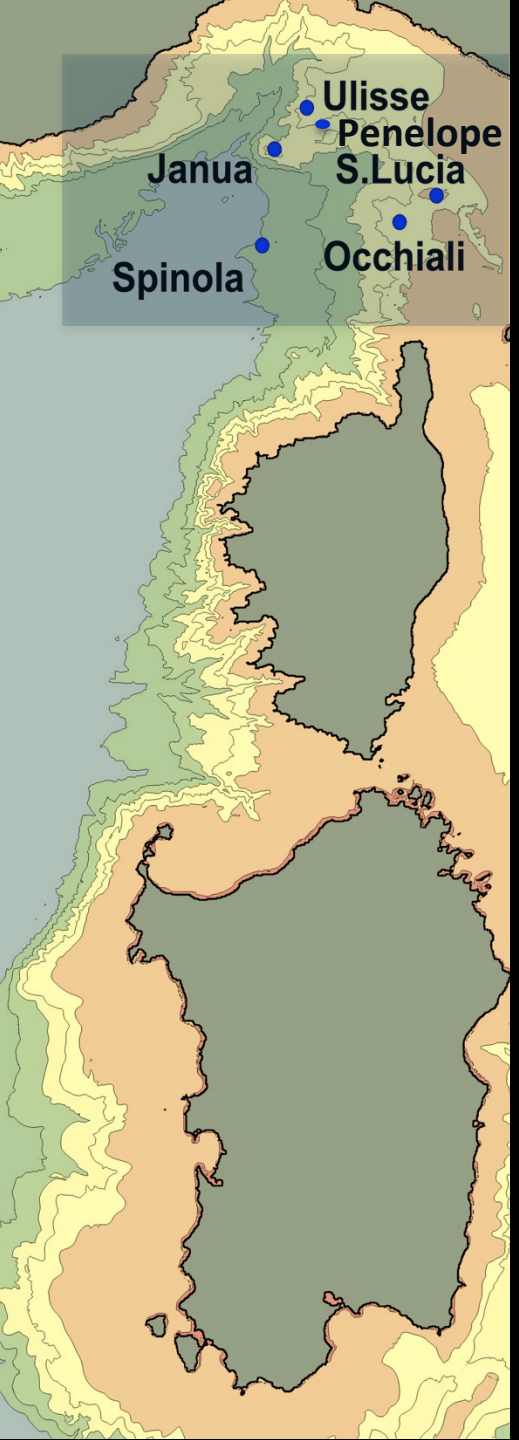


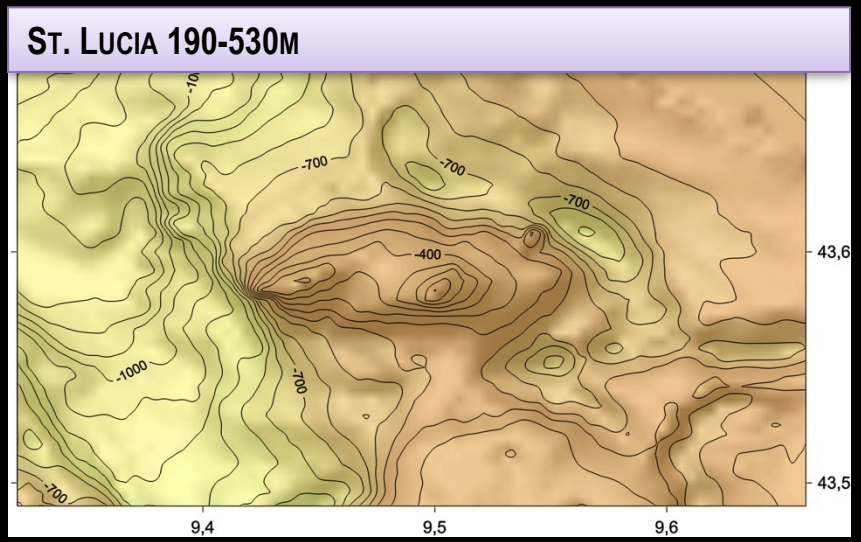
Janua 810-1280m

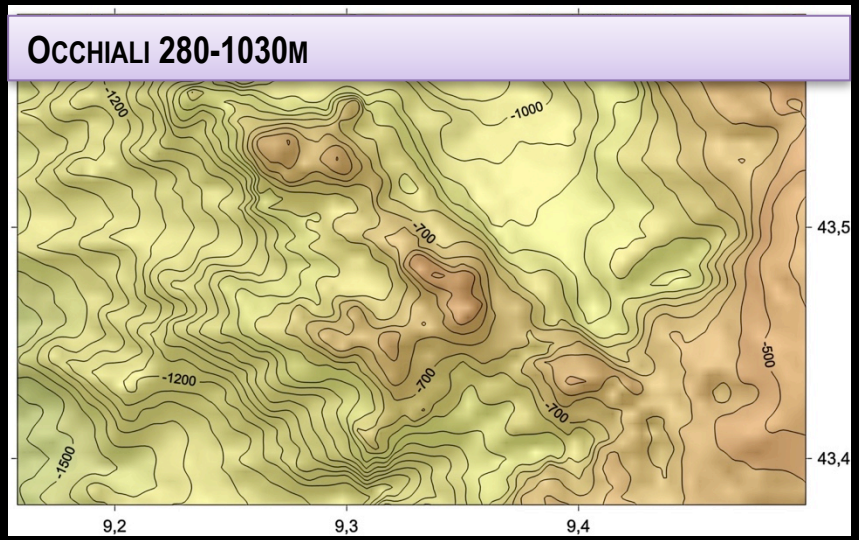


Seamounts of the Ligurian Sea

The Genovese seamounts





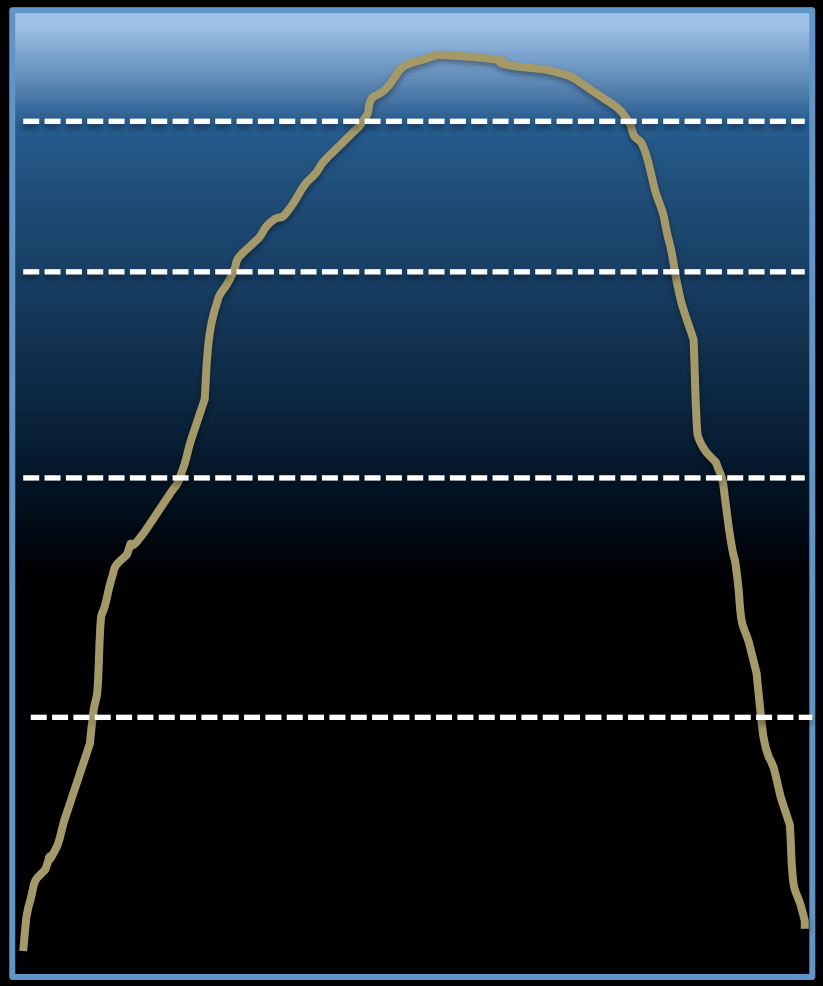


SEAMOUNTS OF THE LIGURIAN SEA

The Tuscan seamounts

SAMPLING STRATEGY

The aim of this study was to: 1. depict the benthic biodiversity of the top of mounts differing in depth





Euphotic, 20-60m
na

Mesophotic, 60-200m
S. Lucia

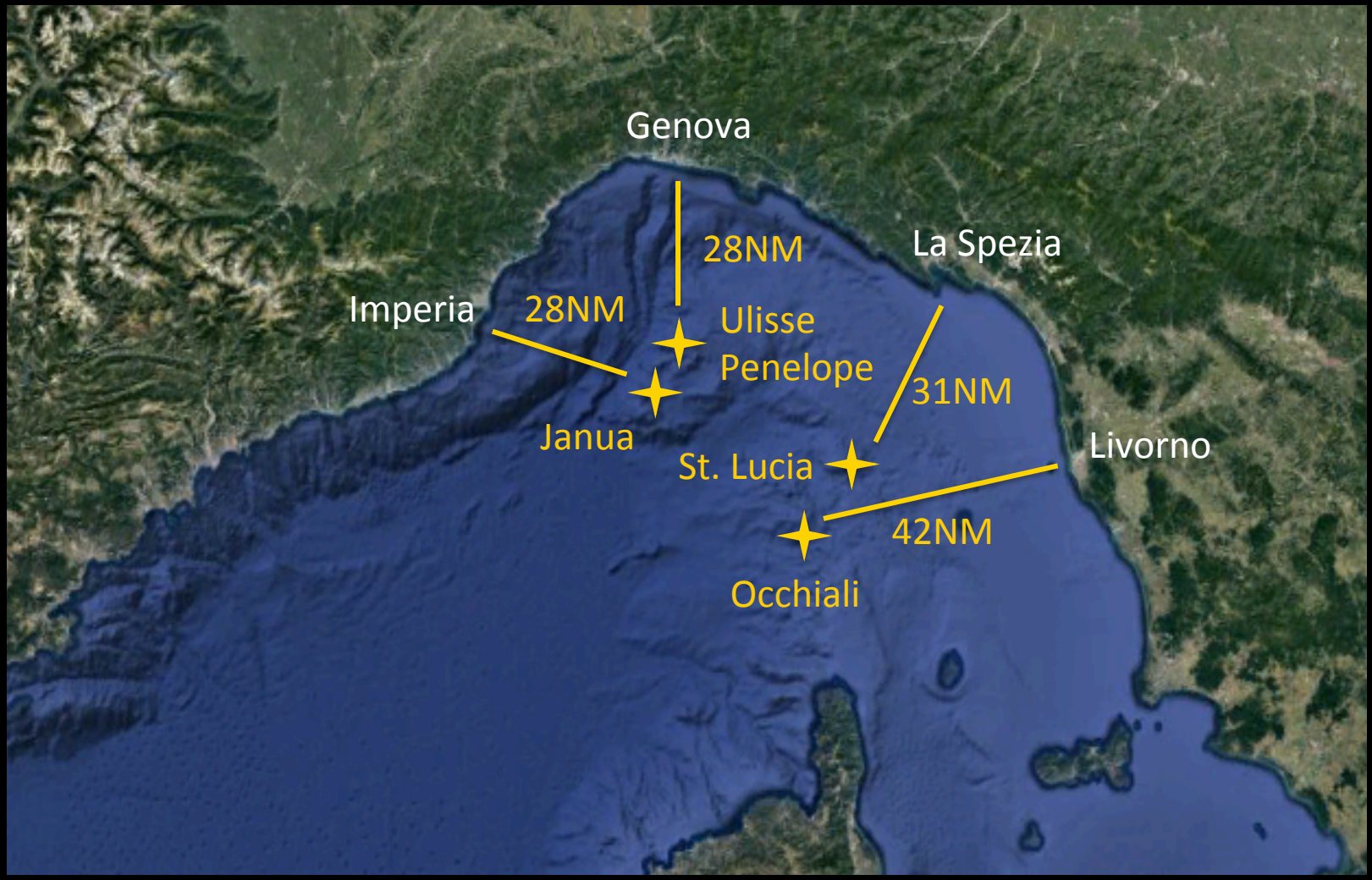
Upper bathyal, 200-500m,
Ulisse, Penelope, Occhiali

Lower bathyal, 500-1000m
Janua

PEAKS OF THE MOUNTS

SAMPLING STRATEGY

The aim of this study was to: 2. depict the fishing impact based on the distance from the nearest continental coast (large harbor)



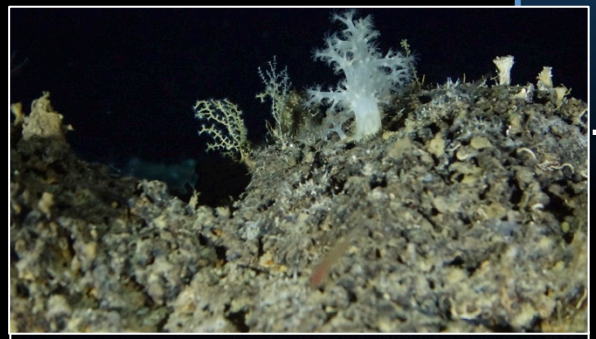
THE GENOVESE TRIAD

ULISSE SEAMOUNT



Callogorgia verticillata forest

Juvenile *C. verticillata*

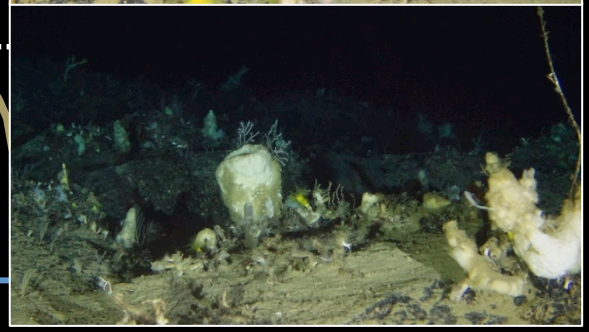




400m

Sponge ground





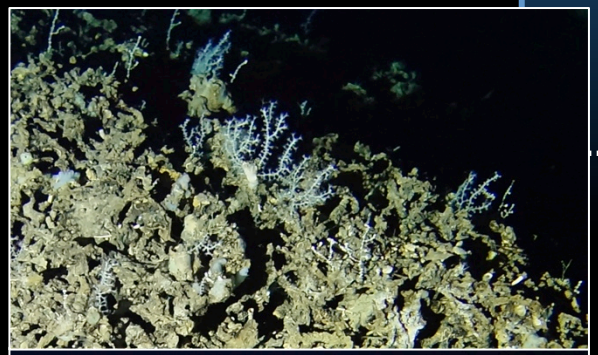
THE GENOVESE TRIAD

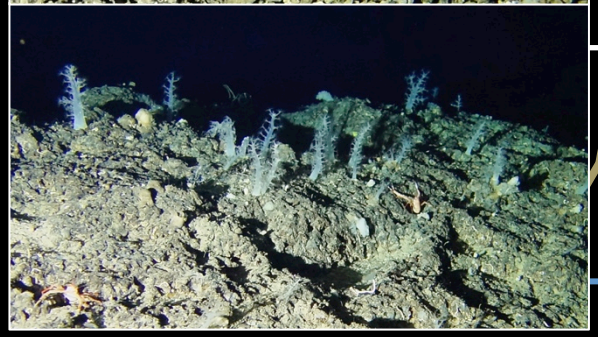
PENELOPE SEAMOUNT

Stylocordila pellita meadow



Soft coral and gorgonians

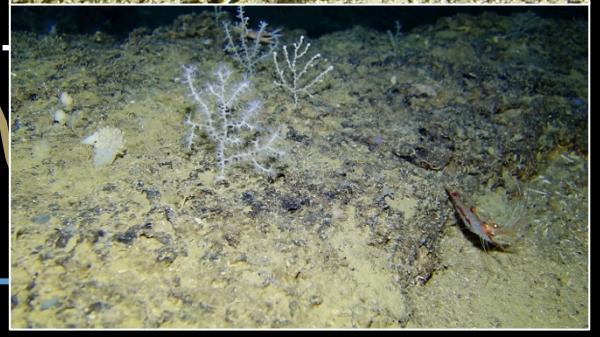




450m

Muriceides lepida and *Dendrobrachia bonsai*





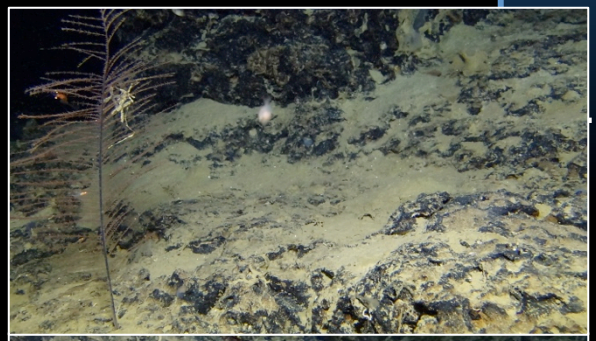
THE GENOVESE TRIAD

JANUA SEAMOUNT

Geodia sponge ground



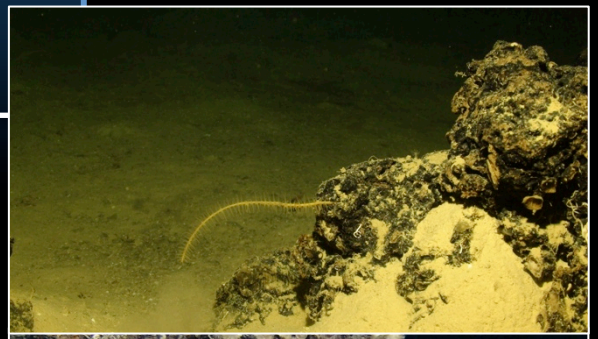
cf. *Acanella arbuscula* and *Bathypathes* sp.





810m

Farrea bowerbanki





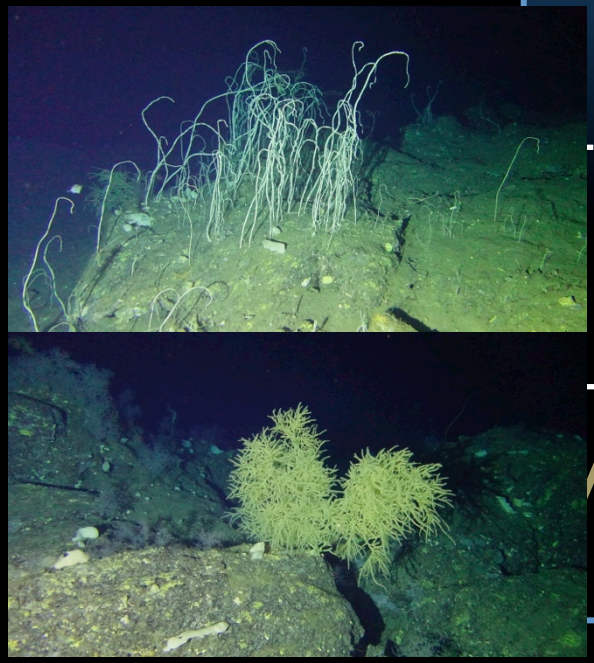
THE TUSCAN MOUNTS

S. LUCIA SEAMOUNT

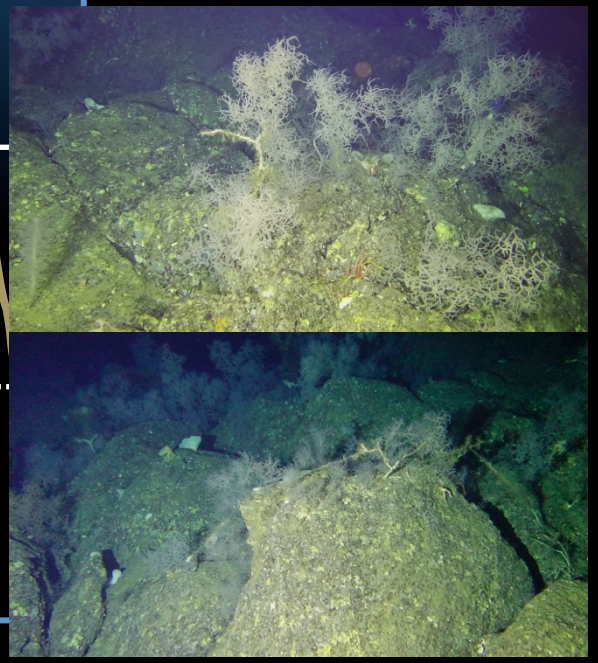


Eunicella cavolinii and
Antedon mediterranea

Viminella flagellum

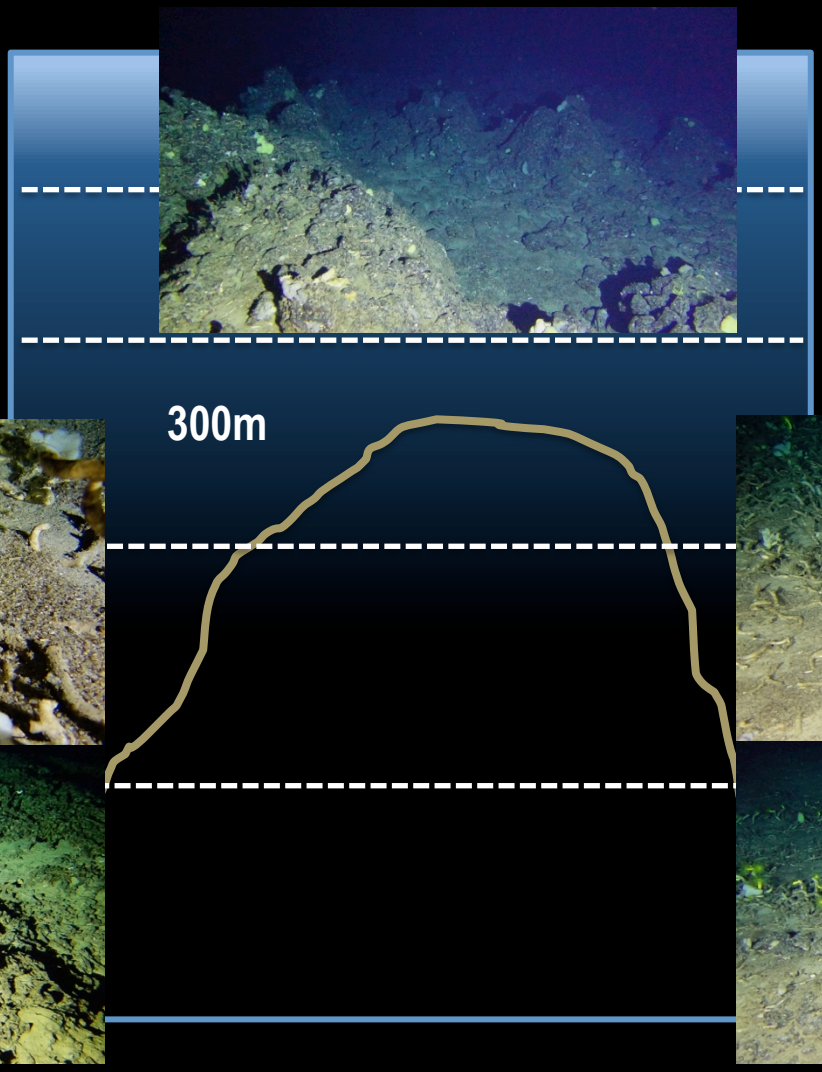


Black coral forest



THE TUSCAN MOUNTS

OCCHIALI SEAMOUNT

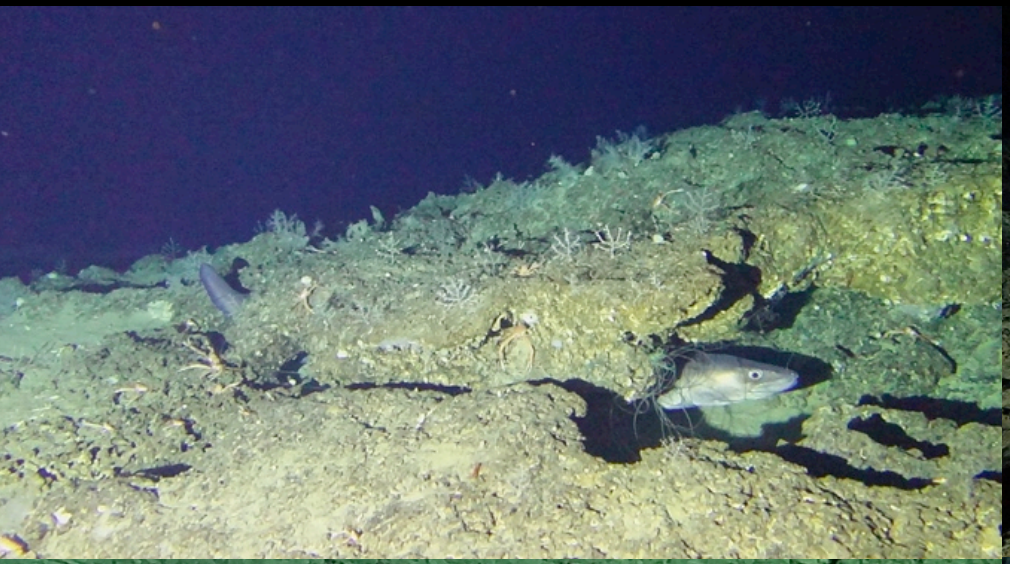


Coral tanatocoenosis

Dendrophyllia cornigera

Occurrence of Commercial Species

Palinurus mauritanicus and *Conger conger* as the main observed representatives.









Occurrence of Iconic species

About 20 species of fishes of which only **FEW TOP PREDATORS**.







Indirect indications of Zooplanktonic richness



Deep plankton blooms

Phronima sp.

Solmissus sp.

Ctenophores

Pteropods

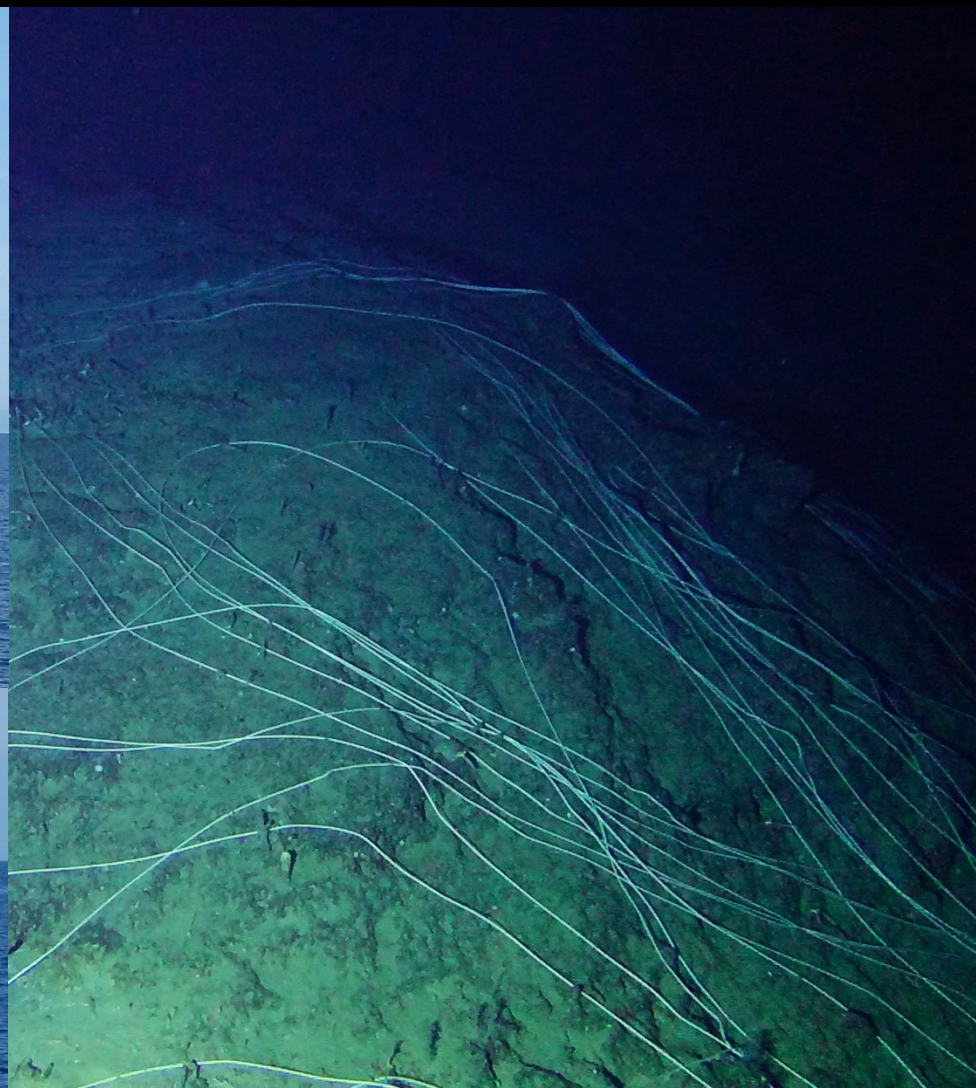
Pyrosomes

FISHING EFFORT

Fishing boats have been observed on **all seamounts except for Janua**.
2 artisanal fishing boats, 9 recreative boats (highest frequency on St. Lucia)

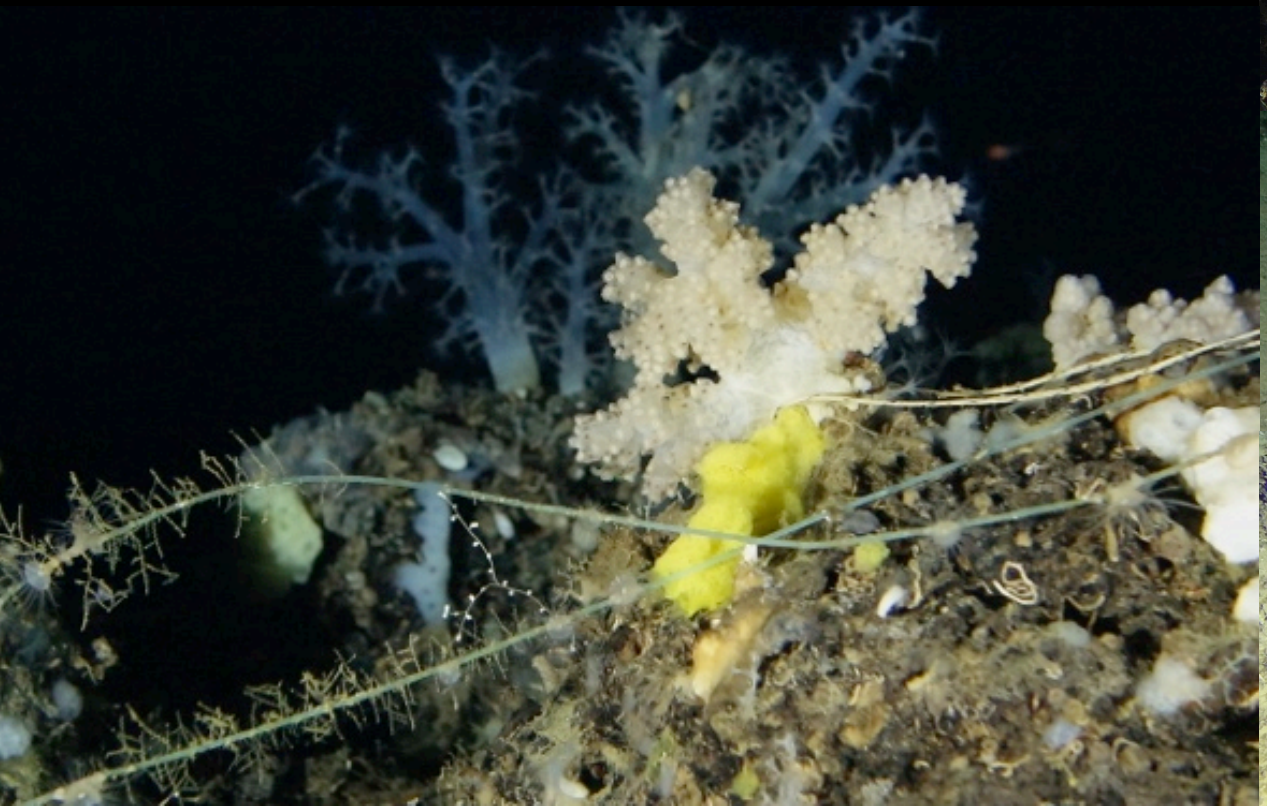




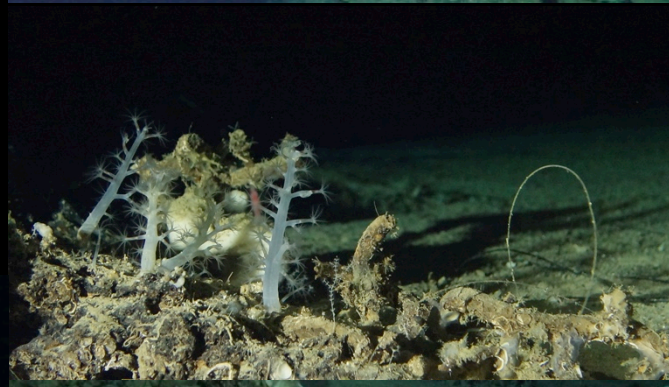


Where no one sees ...

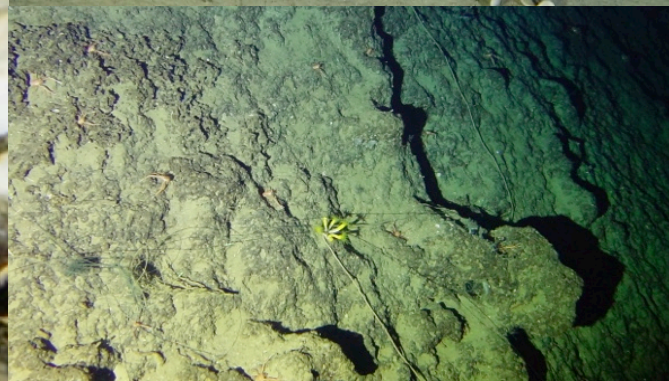
Direct and indirect traces of **damages** on all structuring components including the small-sized coral species.
Traces on all seamounts.











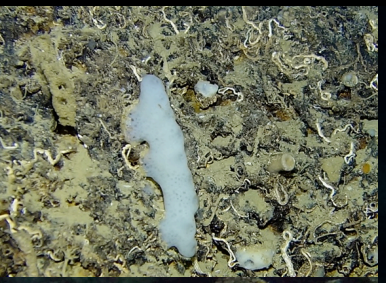
Biodiversity Hotspots

Ligurian bathyal seamounts once hosted major **CWCs frameworks**, still visible as dead bioconstructions dominated by *Lophelia pertusa*. No such living ecosystems has been identified at present.



Unexpected Richness

A high number of new Atlantic occurrences as well as biocoenoses and new species have been found, especially on the deepest mount highlighting the need for further investigations in the bathyal depth ranges.







New isidiid

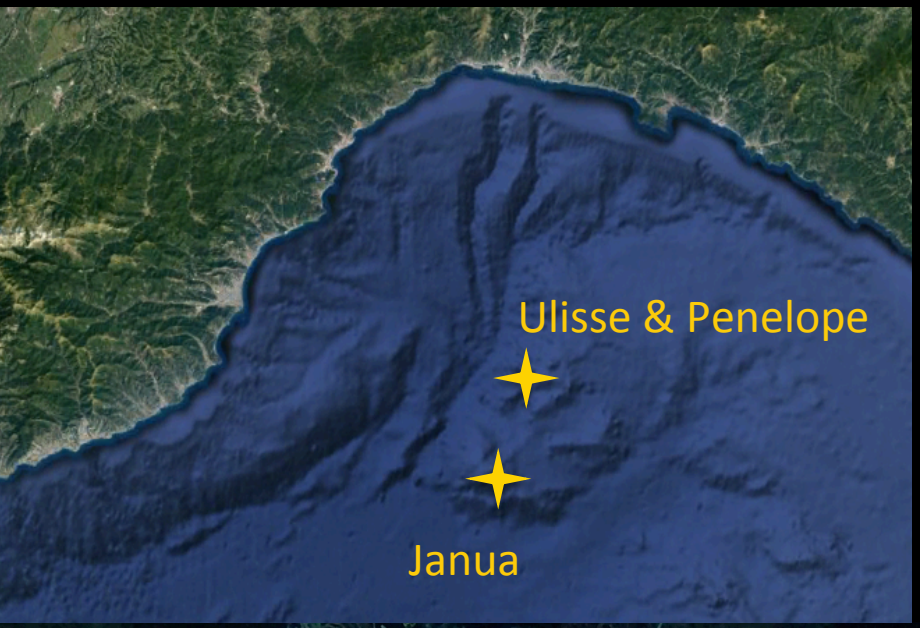
Bathypathes sp.

Aggregations of glass sponges, geodiid and stalked sponges.

Aggregations of *Chironephthya* sp.



The Canyon Effect



The Genovese triad hosts the most diversified deep assemblages.

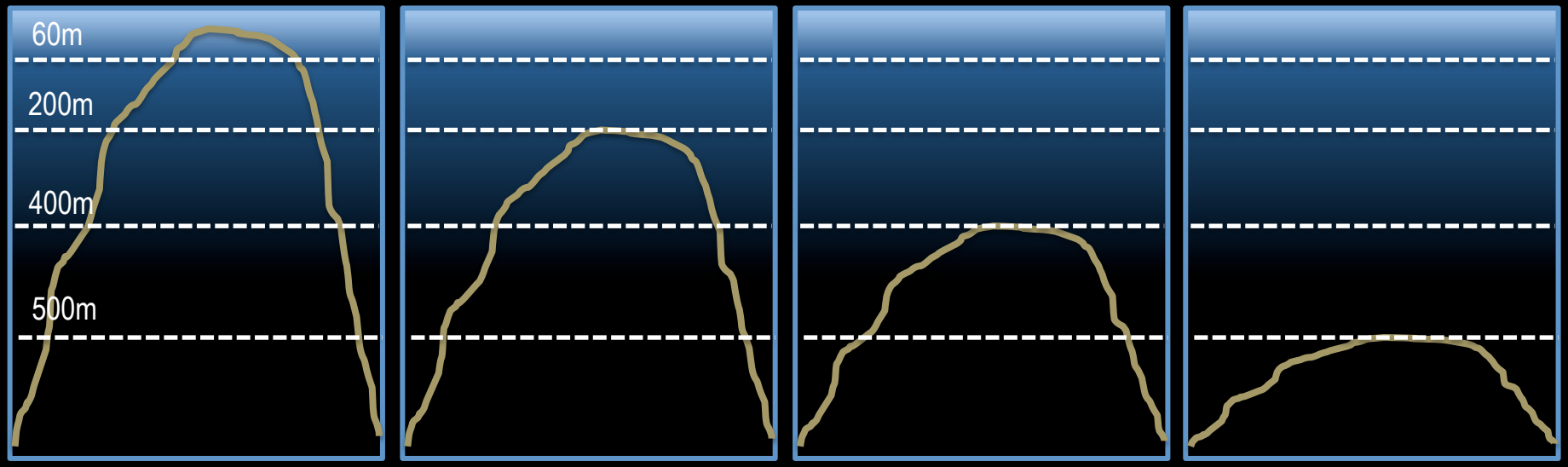
Is it plausible an influence, from the hydrodynamic and trophic point of view, of the nearby Genova canyons?



Seamount Benthic Zonation

From a more general point of view some considerations can be made on the characteristics of the peaks penetrating the water column at different depth ranges:

Euphotic	Mesophotic	Upper bathyal	Lower bathyal
Coralligenous assemblages, presence of Laminariales and *A. mediterranea*	Mesophotic assemblages dominated by black corals and gorgonians	Dark assemblages dominated by gorgonians and demosponges	Dark assemblages dominated by glass sponges and black corals



THREE-DIMENSIONALITY OF THE BIOTIC COVERAGE

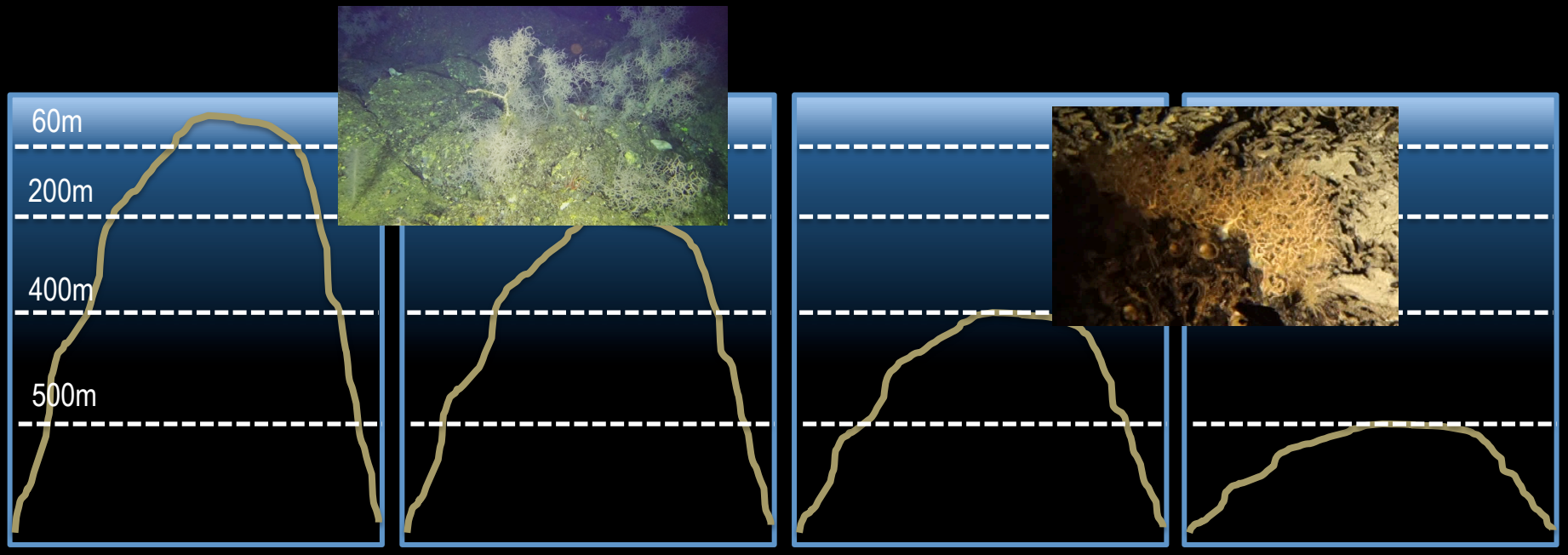
There is a progressive reduction of the **three-dimensionality** of the forest layer with depth.

Shallow-water seamounts

Dense forests of large, arborescent species, > 1m high

Deep-water seamounts

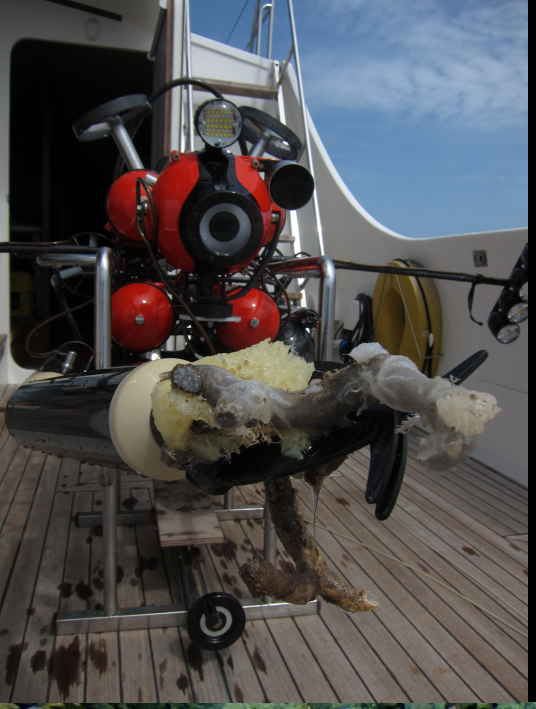
Patchy aggregations of small-sized species <10cm high



Fishing impact on seamounts' communities

Not related to distance from the coast, but rather to bathymetric **inaccessibility**, Janua Seamount shows the lowest abundance of lost gears.





UNRESOLVED ISSUES

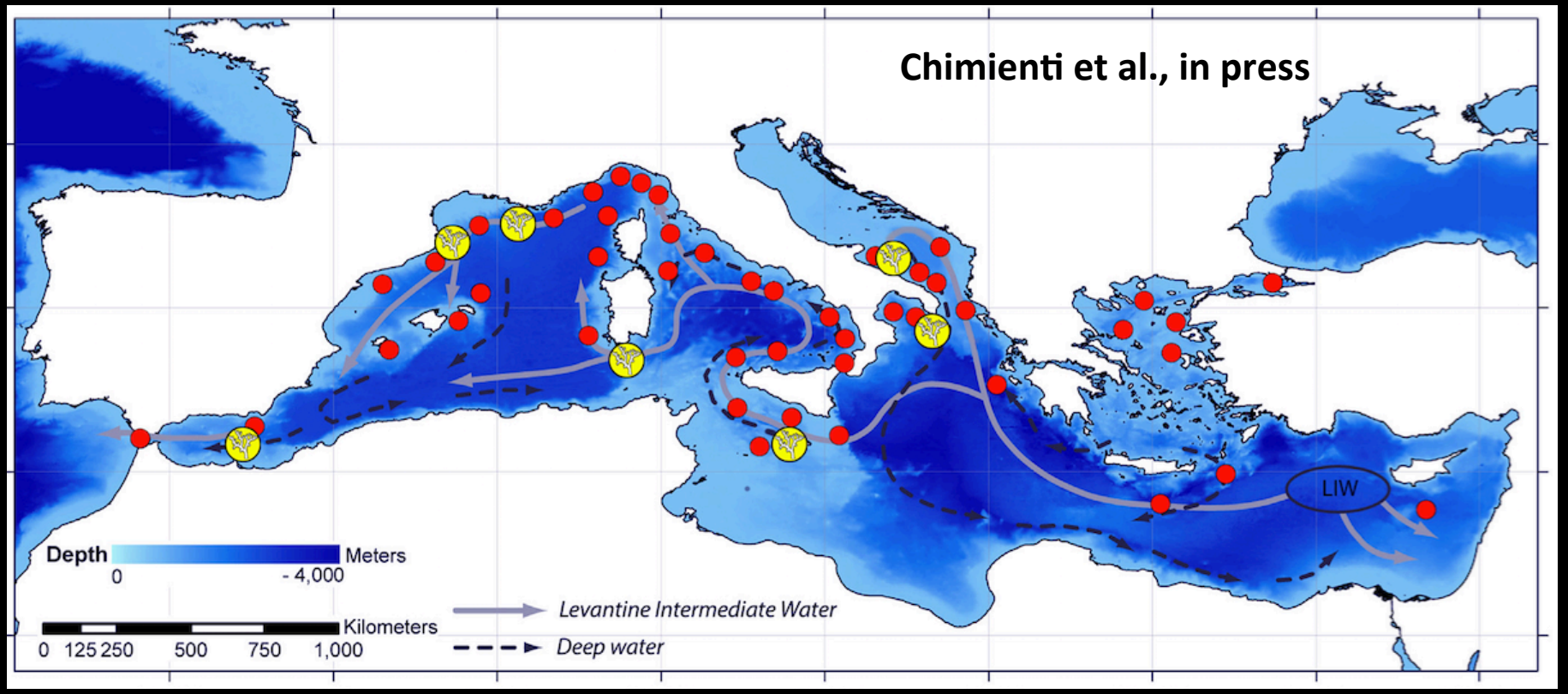
Further investigations will be focused on:

- Biodiversity research (Spinola Spur)
- Genetic connectivity among seamounts communities and continental ones
- Benthic zonation comparison among Ligurian and Tyrrhenian mounts: the circulation effect



CWCs Hotspots

The distribution of CWCs aggregations is well explained by the circulation pattern of the LIW flow.
Gaps could be fulfilled by further investigations on seamounts.



Distribution of CWCs hotspots in relation to the LIW circulation pattern

CONSERVATION ISSUES

The creation of **fishing restriction zones** is promoted also in consideration of the fact that the mounts are mainly frequented by recreational boats.



Vercelli Seamount and Palinuro Seamount have been recently proposed to be part of the Rete Natura 2000 for off-shore Vulnerable Marine sites.

NATURA 2000

Would the Sanctuary be an helpful management instrument to protect also submarine mountains?







BIOMOUNT

Biodiversity patterns of Tyrrhenian Seamounts