

PELASEam2 expediton (RV GAIA BLU)

The PELASEam2 is an expedition designed to explore the pelagic ecosystem of 2 seamounts in the Tyrrhenian Sea with different topographic and environmental characteristics.

The main goal will be to investigate and assess the pelagic productivity, biodiversity, and ecological roles of these important ecosystems by exploring different trophic levels, the underlying mechanisms of productivity using various and innovative methods including net sampling, eDNA, visual, and acoustic observations.

The results of this survey will help to better understand the unique features and potential ecological significance of the seamounts, providing valuable insights into their role in supporting marine life and contributing to the overall health of the marine ecosystem in the Tyrrhenian Sea

Objectives

- Investigate the overall pelagic productivity of the Vavilov and Vercelli seamounts in the Tyrrhenian Sea exploring different trophic levels
- Investigate the spatial distribution, abundance and composition of fish early life stages over the 2 seamounts to understand if these habitats can act as spawning and/or nursery areas for the fish species distributed in these areas.
- Investigate the underlying mechanisms of the enhanced productivity detected over seamounts with different morphological characteristics, in particular testing whether pelagic productivity is supported by an increased primary production originated from local sources (e.g. through the formation of Taylor column) or from the influx of energy through the advection of zooplankton and micronekton from the surrounding areas.
- Evaluate the attractiveness of seamounts for the pelagic megafauna and top predators (large pelagics, marine mammals and sea birds). During the cruise we want to estimate the relative abundance and composition of megafauna assemblages at the seamounts in relationship with the overall pelagic productivity and environmental conditions detected in the study area using visual, camera, eDNA metabarcoding and acoustic observations.
- Investigate biodiversity of the pelagic communities on and around seamounts using net samples and eDNA metabarcoding: We want to answer to the following questions: 1) is eDNA a valuable tool to describe the pelagic biodiversity around seamounts and what is the difference with the traditional net sampling? (2) Is the pelagic biodiversity significantly different at the seamounts as opposed to the open ocean? 3) Is the species community at the seamounts generalist or more specialised to the seamounts ecosystems?

Sampling activities

Two seamounts with different morphological characteristics will be targeted during the survey: the Vercelli and the Vavilov. The 2 seamounts were chosen because of their different habitat characteristics which can lead to different hydrodynamics and environmental features and consequently a different level of pelagic productivity. The details of each sampling activity are described here below:

Fisheries acoustics: The acoustic sampling will be used to characterise the overall pelagic fish and zooplankton biomass (used as proxy) and will be conducted using the Simrad EK60 system running transects over the seamounts. The transect design will align to that of PELAseam to maximize reproducibility and allow results comparison. Transects at the Vercelli seamount will follow a star-shaped design with transects starting from the summit and running away from the seamounts in different directions. The Vavilov will be surveyed running parallel transects perpendicular to the longitudinal axis of the seamount and one transect along its length. The transects will extend up to 30 nautical miles away from the summits to capture any possible gradient. The surveys will be run in daylight and repeated during nighttime to detect any diel variability and investigated DVMs.

Physical/Chemical Oceanography: The CTD/Rosette will be deployed at predefined stations along the acoustic transects to characterise the environmental conditions at the seamounts. Water sampling will be taken to perform the analysis on the main nutrients and chlorophyll. The hydrology of the area will be investigated using the hull-mounted ADCP that will be run continuously unless any interference is noticeable and affecting the fisheries acoustic data. L-ADCP will also be deployed with the CTD/Rosette at each fixed station. Drifters and a set of drifters could also be deployed, depending on logistics and availability.

Net sampling: A mid-water tucker trawl with multiple cod-ends (or a BONGO90 if tucker trawl not available) will be deployed to assess the macro-zooplankton and ichthyoplankton community and ground truth the acoustic data over different areas and depths around the seamounts (e.g. summit, flanks, open ocean). The location of deployments is not fixed and it will be chosen opportunistically based on the characteristics of the aggregations and scattering layers detected on the echosounder. WP2 nets will also be deployed at fixed stations along the acoustic transects to sample meso-zooplankton. All the net operations will be performed at night to minimise potential net avoidance and to potentially capture species that carry out vertical migration at the surface.

Video sampling: Pelagic BRUVs (Baited Remote Underwater Video system) will be deployed near the surface to capture the presence and estimate relative abundance of large pelagics at the seamounts and its surroundings. BRUVs will consist in an array of cameras (numbers will vary based on availability) spaced 500 m apart, which will be deployed for 60- 240 minutes.

eDNA: Water samples for eDNA metabarcoding analysis will be taken from the rosette at the fixed stations and/or before the deployment of the midwater net and of the BRUVs to make a direct comparison between the different results. Sampled water will be collected into sterilized carboys and filtered for eDNA collection using sterile 47 mm-diameter, 0.45 µm-pore size PES disk filters. Downstream eDNA extraction, sequencing and processing will not take place at sea.

Marine mammals and seabird observation: Observers will be monitoring continuously the presence and density of large pelagics at the surface and air-breathing animals (marine mammals, seabirds and sea turtles) following established observation protocols during daytime acoustic transects.

Stazione	Lon_GG.dec E	Lat_GG.dec N
Vavilov		
1	12.618	39.922
2	12.563	39.859
3	12.608	39.855
4	12.654	39.851
5	12.598	39.792
Vercelli		
6	10.907	41.107
7	10.848	41.056
8	10.989	41.053
9	10.989	41.179
10	10.806	41.172

Coordinate dei punti di rilascio dei drifter