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WOMBlue

CRUISE REPORT

Civitavecchia 01 August 2025 – Napoli 07 August 2025
on board the R/V Gaia Blu of CNR

Original logo design by Marina Vingiani

1. INTRODUCTION

In July 2024, the International Seabed Authority (ISA) Partnership Fund (PF) approved, under the umbrella of the Women in Deep-Sea Research Project (WIDSR), the project “Women in Blue: training opportunities in ocean science", proposed for funding by CNR-ISMAR (Institute of Marine Science) to provide advanced training in deep-sea research for women scientists from developing countries.

The WOMBlue cruise is ultimately the last step of the “Women in Blue: training opportunities in ocean science” initiative. It is designed to offer advanced training to build professional skills in deep-sea research to a group of trainees represented by women scientists from developing states, Least Developed Countries (LDCs), Land-Locked Developing Countries (LLDCs) and Small Island Developing States (SIDSs).

After attending the first edition of the Marine Geology Advanced School (in January 2024), seven female scientists from developing states (Argentina, India, Nigeria, Ghana), LLDC (Nepal, Bangladesh) and SIDS (Mauritius, Tonga, Kiribati - the latter also LLDC) have had the opportunity

for practical advanced training at sea aboard the R/V Gaia Blu. Participants are engaged in seafloor and sub-seafloor mapping, resource identification, biogeochemistry, seafloor and ocean circulation interactions, water column properties, biological sampling, and work with available onboard technologies and equipment related to deep-sea research.
In addition, this oceanographic expedition contributed to a further understanding of the interplay between morphology, tectonics, and magmatism during the initial phases of the opening of the Tyrrhenian back-arc basin, as a follow up of a previous cruise (IFIGENIA 2024, Palmiotto et al., 2024), in an area completely unmapped from the point of view of marine data.
The WOMBlue training expedition has several objectives:

- Foster a new generation of young women scientists, capable of addressing deep-sea challenges.
- Actively promote and encourage measures to strengthen the role of women in marine scientific research especially in deep-sea related activities.
- Provide qualified women scientists from developing States with opportunities to take part in international marine scientific research programs, including through training, technical assistance and scientific cooperation programs.
- Strength institutional capacities through technology transfer and technical assistance by facilitating access to physical infrastructures managed by CNR.

2. LIST OF PARTECIPANTS

The WOMBlue cruise involves the participation of a total of 20 people, including 7 women scientists from developing countries, who will be engaged in theoretical and practical training activities. The CNR-ISMAR staff, in collaboration with the Atlantic Technological University of Galway, will contribute with on-board work activities and theoretical-practical training on the equipment that will be used during the expedition.

Table 1: WOMBlue Cruise Team

1	Alessandra Mercorella	Party Chief	CNR ISMAR
2	Valentina Ferrante	Researcher/Geophysical Operator/Surveyor	CNR ISMAR
3	Marzia Rovere	Researcher/Geophysical Operator/Surveyor	CNR ISMAR
4	Camilla Palmiotto	Researcher/Geophysical Operator/Surveyor	CNR ISMAR
5	Giacomo Dalla Valle	Researcher/Geophysical Operator/Surveyor	CNR ISMAR
6	Fabio Savelli	Technician/Box-corer operator and sediment sampling	CNR ISMAR
7	Malek Belgacem	Post-Doc Researcher/CTD and Rosette operator, water sampling for physical properties analyses	CNR ISMAR
8	Angelica Pesce	PhD Student/Water and sediment sampling for biological and environmental analyses	CNR ISMAR
9	Marina Vingiani	PhD Student/Water and sediment sampling for biological and environmental analyses	ATU (Atlantic Technological University)/ CNR ISMAR
10	Fabiano Gamberi	Researcher/Observer	CNR ISMAR
11	Gaetano Massimo Macrì	Reporter/Observer	CNR Uff. Stampa
12	Vittorio Tulli	Video maker/Observer	CNR ASR Unità Reti
13	Rabiatu Abubakar	Geological Engineer/Observer	ISA (International Seabed Authority)
14	Faustina Asante	Geochemical/Observer	ISA (International Seabed

			Authority)
15	Lucia Cattana	Marine Geologist/Observer	ISA (International Seabed Authority)
16	Mele Siale Manu	Geologist/Observer	ISA (International Seabed Authority)
17	Shruti Rana	Geologist geochemical/Observer	ISA (International Seabed Authority)
18	Bibi Shamimtaz Sadally Roomaldawo	Marine Molecular Biologist and Ecologist/Observer	ISA (International Seabed Authority)
19	Anameere Tennaba	Marine biologist/Observer	ISA (International Seabed Authority)

3. ACTIVITIES

The WOMBlue oceanographic cruise left the harbor of Civitavecchia on Friday, August 1st and reached a conclusion on Thursday August 7th in the port of Naples (Italy)

Seafloor and Sub-seafloor mapping

New geophysical data have been collected. Bathymetry and backscatter data was acquired with EM712 and EM304 multibeam systems, hull-mounted on the ship. Additional information along the water column was acquired with the same instrumentation.
High-resolution seismic profiles were collected with the hull-mounted Knudsen 3260 CHIRP sonar profiler to investigate the first 10-40 meters of the sub-seafloor depending on the physical characteristics of the substrate and sediments.
Participants were involved both in acquisition and processing, taught the basics of elaboration of geophysical data.

Seabed Sampling

Sediment sampling was carried out using an oceanic box corer to characterize, at the water-seabed interface, the physical-chemical sediment properties and benthic communities by environmental DNA (eDNA), molecular and taxonomic (for meiobenthos) analysis.
Participants were shown the sampling procedures and the different techniques and protocols for the correct collection, preparation and conservation of samples based on the type of analysis (geological, geochemical and biological) to be carried out.

Water sampling

The CTD-Rosette system was used to measure key environmental parameters (temperature, salinity, dissolved oxygen, fluorescence) along the vertical profile of the water column, and to collect seawater samples for investigating the chemical and physical properties of the water column, enabling an assessment of its stratification and for laboratory analysis of alkalinity, pH, inorganic carbon and dissolved organic matter. Additionally, environmental DNA analyses with eDNA metabarcoding will be carried out to assess biodiversity.
Participants were shown the sampling procedure and the protocols for the correct collection and preparation of samples.

Onboard outreach activities

Various activities were carried out on media and social media to promote the results of the "Women in Blue: Training Opportunities in Ocean Sciences" initiative, to tell the stories of the women in blue project girls ad to show the work of the marine geologist and biologist aboard of oceanographic vessels.

The journalist and the video maker from the Cnr press office, Gaetano Massimo Macrì and Vittorio Tulli, were on board to cover the cruise with video footage and photographs and created the storytelling of the content posted on social media during the week-long expedition. They have also recorded interviews for future podcasts to spread to the larger audience the passion for marine scientific research in the deep sea.

STUDY AREA

Map of survey and activities carried out during the cruise.

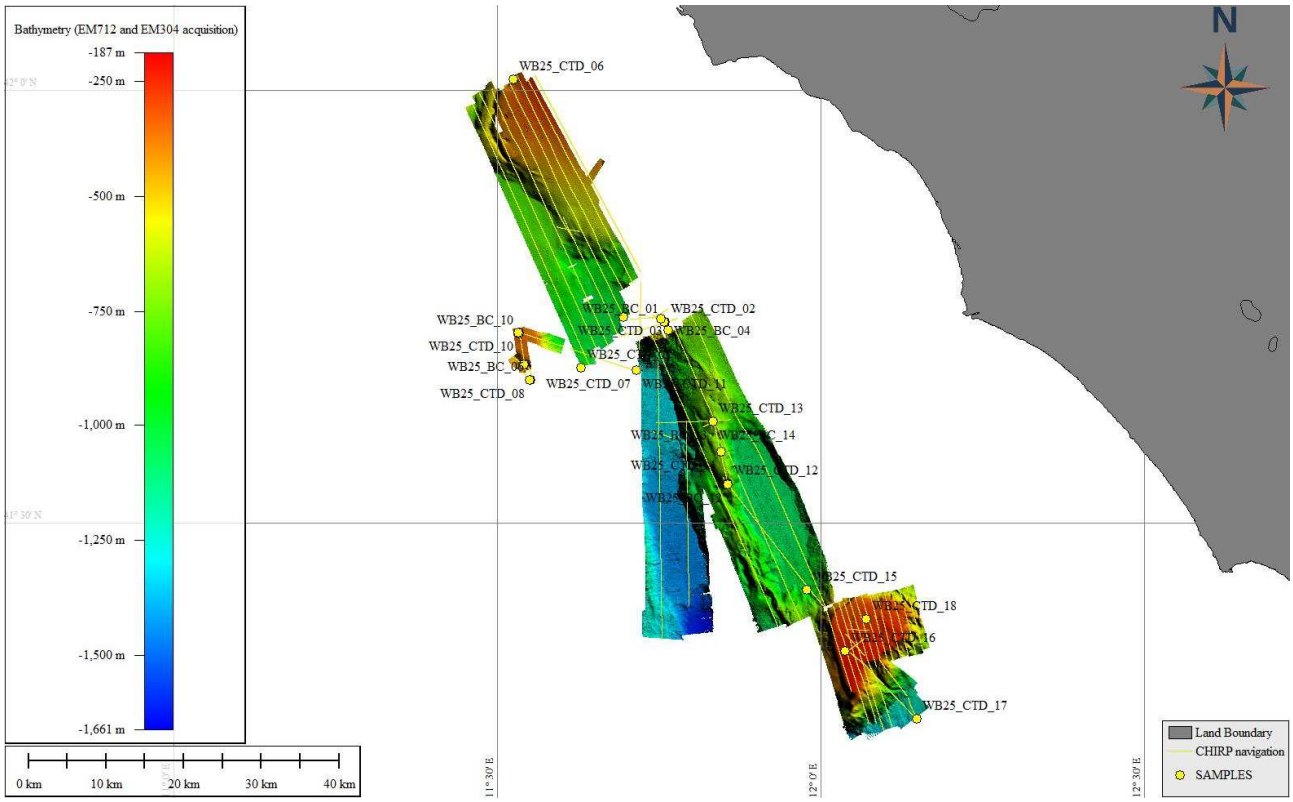

Figure 1

NAVIGATION

Total multibeam acquisition length: 682.49 km (368.51 nautical miles)

Total chirp acquisition length: 736.41 km (397.63 nautical miles)

Total number of box corer: 15

Total number of CTD: 18

GEOPHYSICAL DATA ACQUISITION

Multibeam

Multibeam data were acquired using two different multibeam echosounder systems: the Kongsberg EM712 for water depths ranging from 0 to 1200 m, and the Kongsberg EM304 for deeper waters (>

1200 m). Both systems are hull-mounted on the R/V Gaia Blu's gondola with a T-configuration of linear transducer arrays.
Ship positioning was provided by the Seapath 380 system, utilizing a Fugro HP Differential Global Positioning System (DGPS) with Marinestar Global Navigation Satellite System (GNSS) signal accuracy of better than 5 cm. Data were collected using a WGS84-UTM32 reference system. Corrections for pitch, roll, heave, and yaw movements were applied using the Kongsberg MRU (Motion Reference Unit) 5 and a dual antenna GPS integrated into the Seapath system. A Valeport-mini Sound Velocity Sensor (SVS), mounted near the transducers, continuously measured sound velocity to optimize beamforming. Additional sound velocity profiles were collected with the CTD/rosette SBE 911plus to account for variations in sound velocity within the water column and ensure accurate seafloor depth calculations.
A basic workflow with the Qimera - QPS software was applied on board to check the data quality. A preliminary DTM with 10 m grid cells has been produced to better analyse the most relevant morphological and sedimentary structures on the seafloor (see Figure 1).
A quick preliminary look at the water column data revealed some emissions (Figure 2).

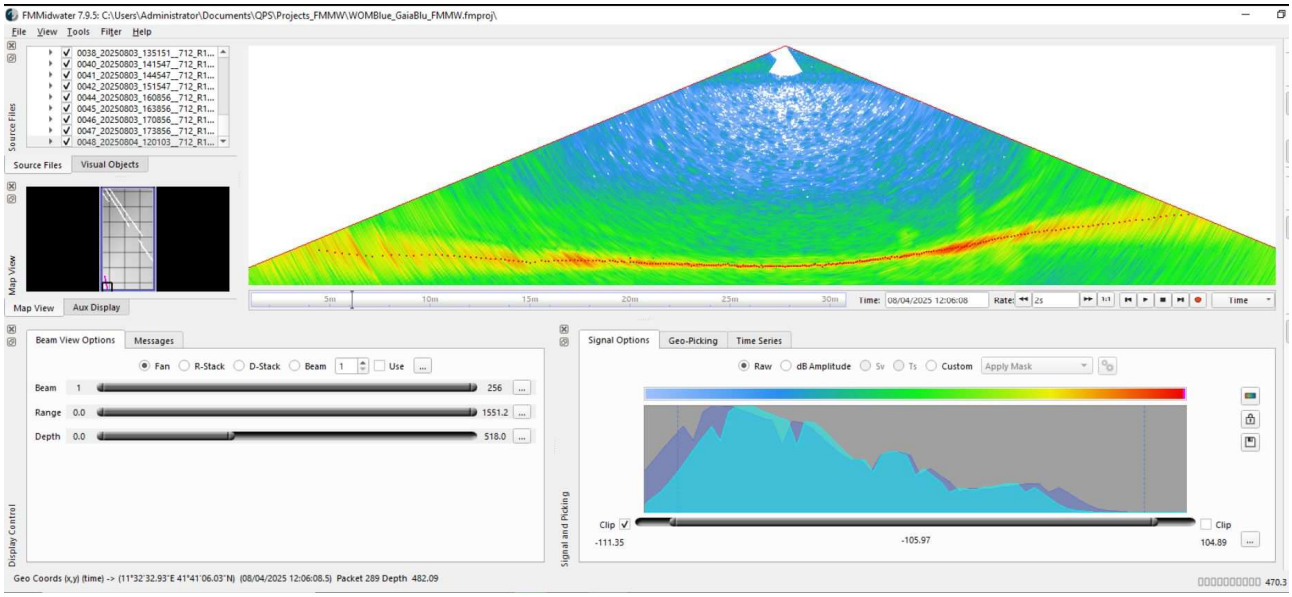

Figure 2

Chirp Sub-Bottom Profiler (SBP)

High-resolution seismic profiles were acquired mainly along navigation routes to investigate the presence of tectonic activity, mass transport dynamics, and sediment deposition in deep water environments. In addition, prior to each sampling activity, reconnaissance lines were carried out to characterize the sedimentary cover from a seismic point of view (seismic facies analysis) and establish the sampling strategy.
The data were collected using a 3.5-12 kHz Knudsen Chirp 3260 sub-bottom profiler mounted on the hull. Since seismic acquisition was conducted simultaneously with multibeam surveying, the K-sync system was used throughout the operation to avoid acoustic interference between the two instruments.
The data were recorded in SEG-Y format, FILTERED carrier type: the raw data pass through a digital correlation filter before undergoing envelope detection. Unlike raw data, this type of data will benefit from the pulse compression characteristics of the chirp correlation filter.

Data visualization and preliminary processing were performed on board using MOGA Seaview SBP software. The figures below show that in an area characterized by thick sediment layers, the seismic signal penetrates to 50 m below the seabed.
Some examples of Chirp acquisition:

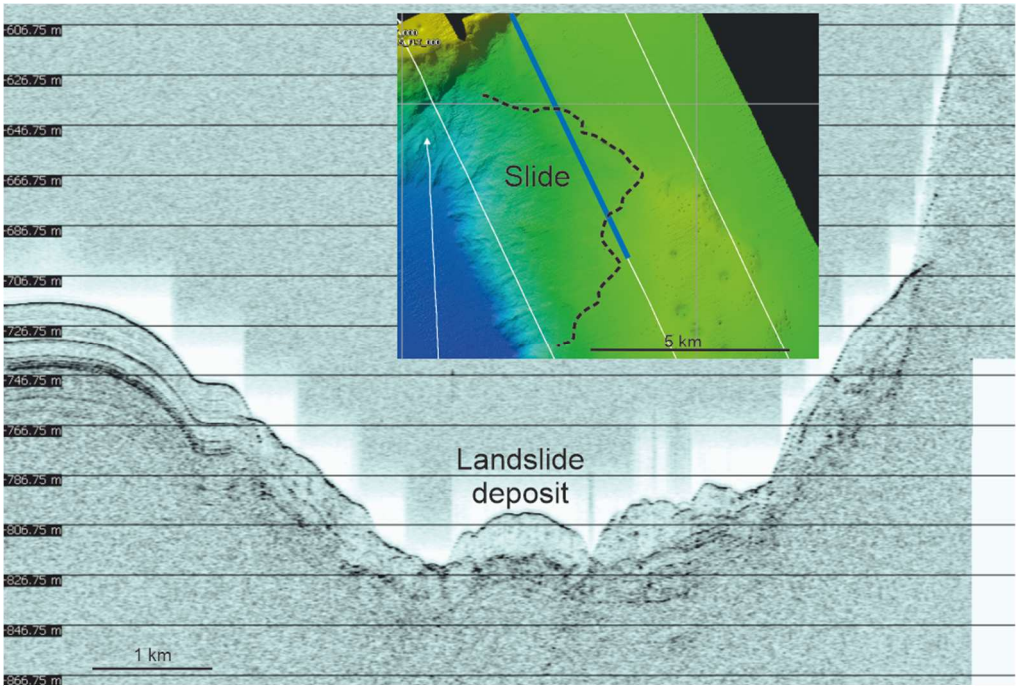

Figure 3: Landslide exposed on the seafloor

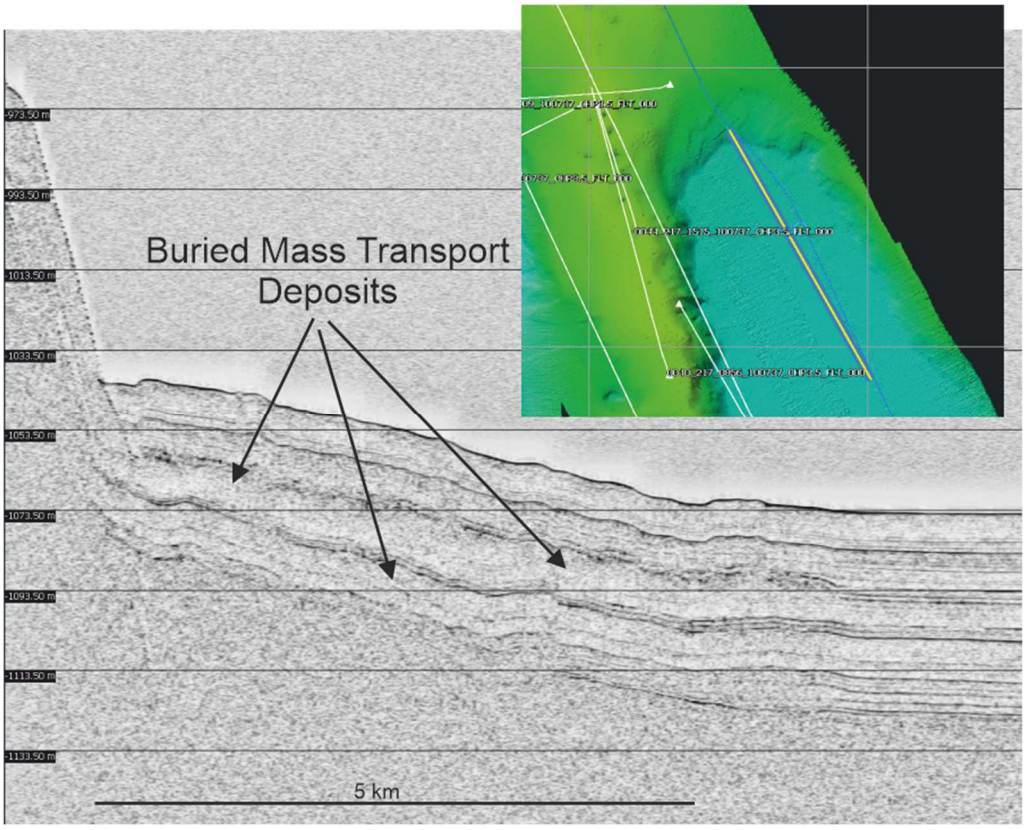

Figure 4: buried landslides

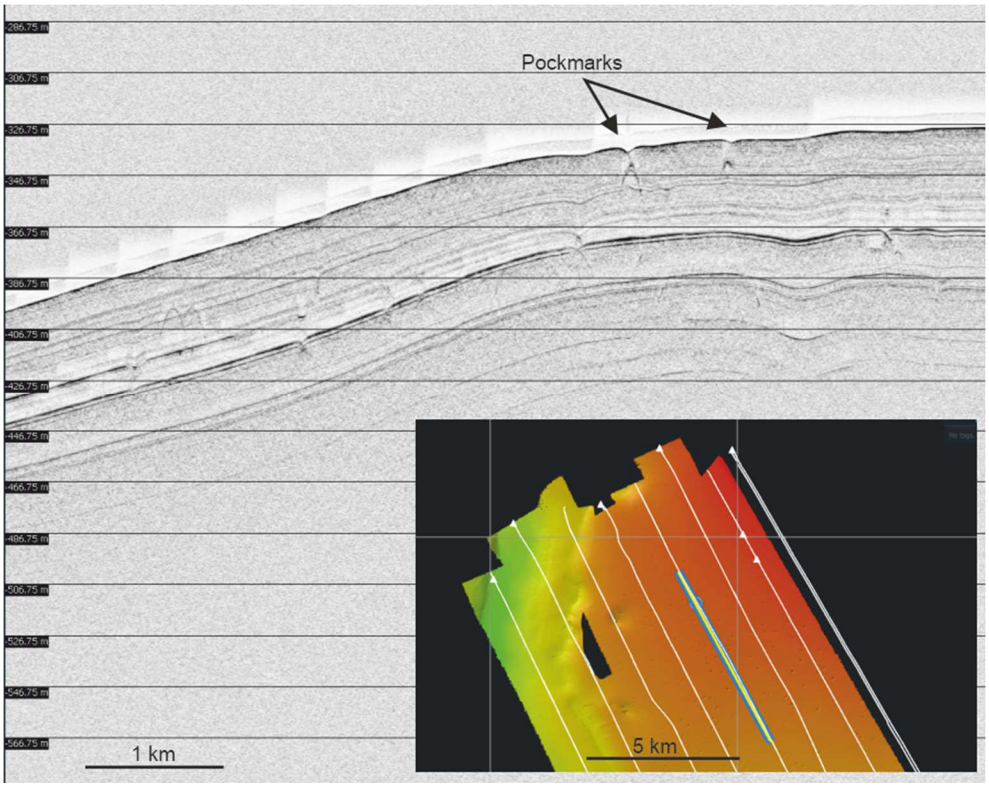

Figure 5: Pockmarks and gas-rich sediments

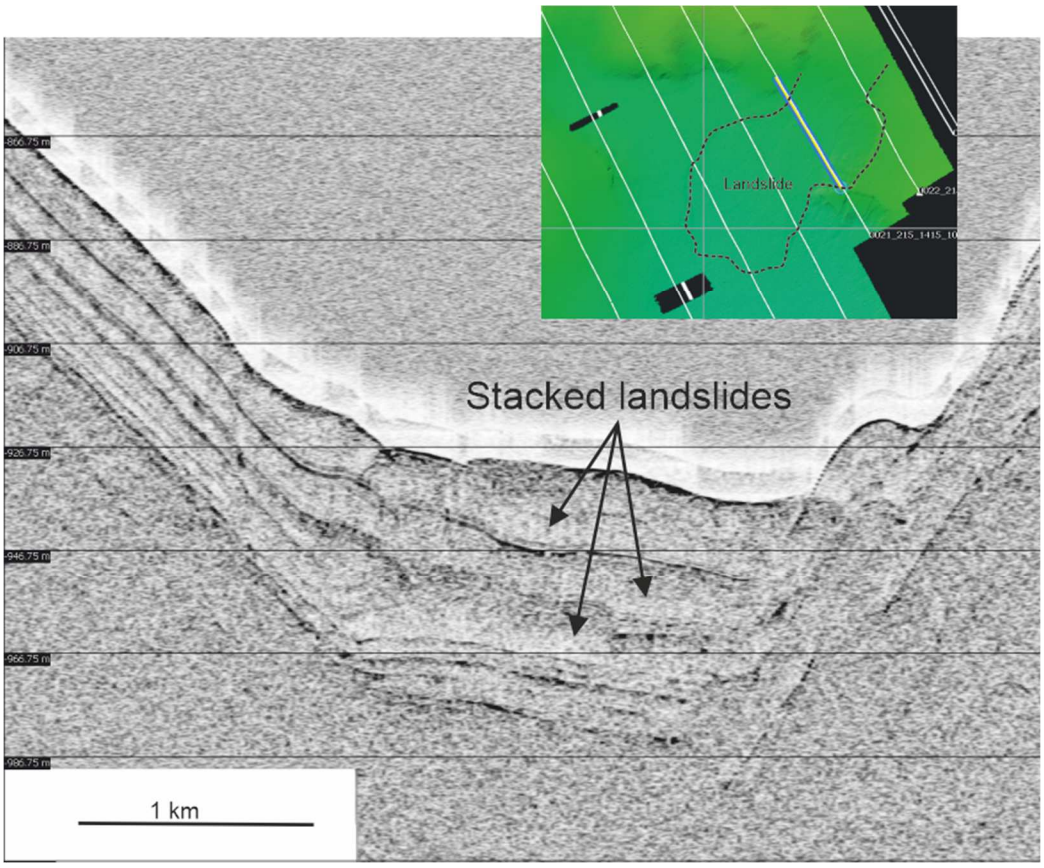

Figure 6: Stacked mass transport deposits

PHYSICAL PROPERTIES OF SEAWATER (CTD)

During WOMBlu cruise, a total of 18 CTD station were collected for hydrographic and biogeochemical investigations.

Vertical profiles of temperature, conductivity and dissolved oxygen were collected using CTD/rosette SBE 911plus, equipped with 24 Niskin bottles of 12 liters each for water sampling.

Data was processed with SBE Data Processing software (Version 7.26.7 from Sea-Bird Scientific). The following steps were applied: data conversion, alignment CTD, cell Thermal Mass correction, derive of additional variables, low pass filter, bin average and split of downcast and upcast profiles.

Below present the preliminary results from the processing of the CTD profiles. The T-S diagram highlights the typical water mass structure of the northern Tyrrhenian Sea.

In the following figures, an overview of CTD measurements from the WOMBLU25 cruise.

Figure 8: map od CTD station and

Figure 9: vertical profiles of temperature (°C), salinity, and dissolved oxygen (µmol/kg) plotted for all stations.

Figure 10: temperature-salinity (T-S) diagram, color-coded by sampling date, with overlaid σ_0 density contours (kg/m^3).

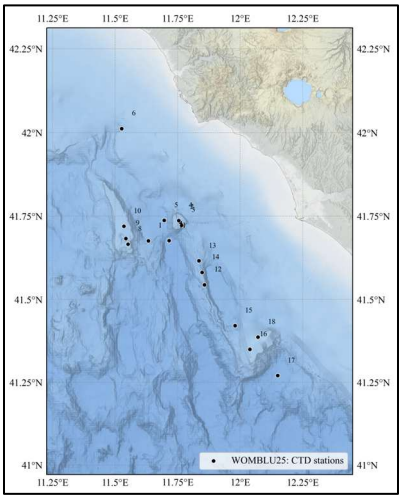

Figure 7

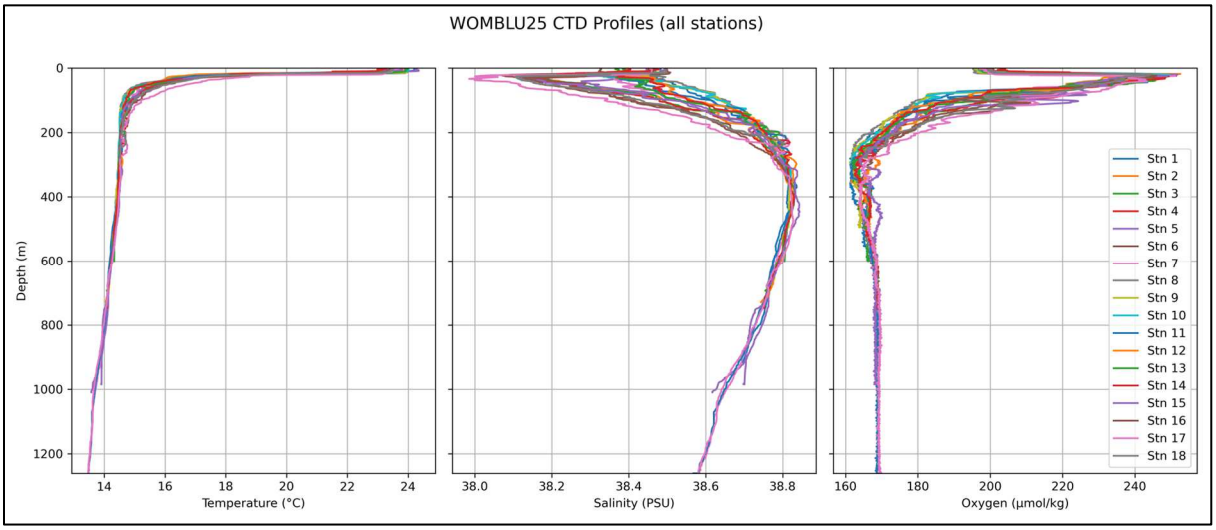

Figure 8

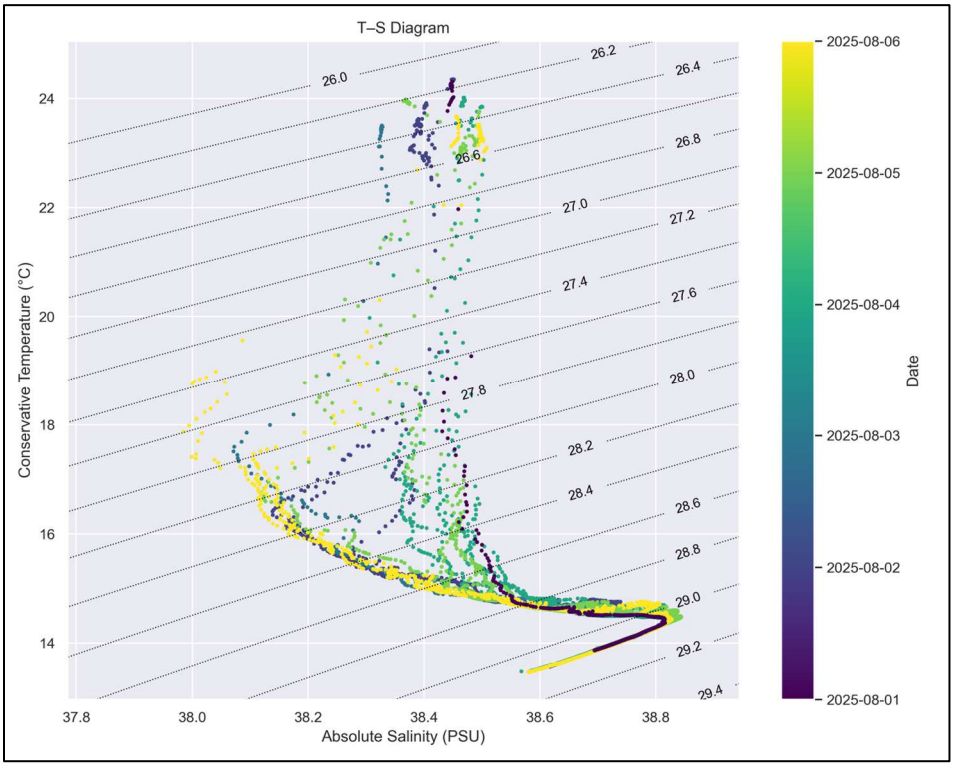

Figure 9

SEDIMENT AND WATER SAMPLING

I. Sediment sampling

Sediments were collected at 9 stations using an oceanic box corer deployed from the stern of the vessel. This instrument enables recovery of unaltered surface material from the seafloor. From each deployment, the 0-3 cm of surface sediment layer was subsampled under sterile procedures for two purposes:

- eDNA analysis, for which five replicates of surface sediments were transferred directly into 50 ml Falcon tubes and immediately fresh-frozen at -80°C.
- Meiofauna analyses, for which five additional subsamples from the seabed were also collected. Five plastic liners with a diameter of 3.6 cm were randomly inserted into every sediment block collected at each station. Sediment core replicates for meiobenthos were gently extruded from PVC liners (*Figure 10*), and the upper layer (0-3 cm) was stored in 50 ml Falcon tubes, then preserved at -80°C.

In total, 90 sediment subsamples (45 for eDNA and 45 for meiofauna) were collected (*Table 1*).

To assess potential contamination during the collection procedure, a tool negative control was collected at each station by swabbing sampling tools (i.e., an Inox spoon bleached before each sampling station and new empty Falcon tubes) with sterile floaked swabs, then stored into 1.5 mL Eppendorf tubes and frozen together with sediments.

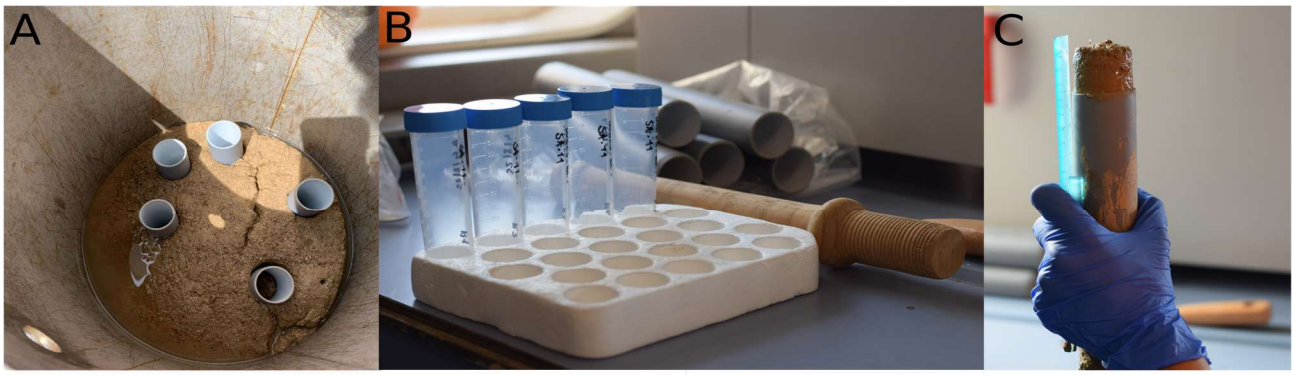

Figure 10: Sediment sampling: A) The liner of the box corer retrieved on board with subsampling cores for meiobenthos analysis; B) Detail of Falcon tubes for sediment sampling; C) Extrusion procedure of 0-3 cm layer surface subsamples from cores in the wetlab

Table 1. Sediment samples collected at seafloor using the Box Corer

LAT	LONG	Date	Time (UTC)	Bottom depth (m)	Bottom Pressure (db)	Essential variables	Sediment subsample types	Sample name	Station
41°43'58.684" N	11°45'34.831" E	02/08/2025	10:10 AM	553	543.1482	Biodiversity, TEMP, SAL, OXY	Meiobenthos, eDNA	WB25_BC_03	St4
41°43'23.688" N	11°45'57.309" E	02/08/2025	12:37:00 AM	600	604.1237	Biodiversity, TEMP, SAL, OXY	Meiobenthos, eDNA	WB25_BC_04	St5
41°44'11,858" N	11°45'14,925"E	02/08/2025	15:09:00 PM	515	514.8601	Biodiversity, TEMP, SAL, OXY	Meiobenthos, eDNA	WB25_BC_05	St3
41°40'59.176" N	11°32'34.209" E	04/08/2025	8:58:00 AM	288	279.0573	Biodiversity, TEMP, SAL, OXY	Meiobenthos, eDNA	WB25_BC_08	St11
41°40'59.176" N	11°32'34.209" E	04/08/2025	11:20:00 AM	500	498.7708	Biodiversity, TEMP, SAL, OXY	Meiobenthos, eDNA	WB25_BC_09	St9
41°43'11.480" N	11°32'05.732" E	04/08/2025	2:30:00 PM	347	346.0627	Biodiversity, TEMP, SAL, OXY	Meiobenthos, eDNA	WB25_BC_11	St6
41°32'37,81" N	11°51'25,50" E	05/08/2025	8:13:00 AM	743	736.241	Biodiversity, TEMP, SAL, OXY	Meiobenthos, eDNA	WB25_BC_12	St15_new
41°36'58,10" N	11°50'03,37" E	05/08/2025	2:51:00 PM	700	700.4918	Biodiversity, TEMP, SAL, OXY	Meiobenthos, eDNA	WB25_BC_14	St13_new
41°34'53,733" N	11°50'51,01" E	05/08/2025	4:42:00 PM	740	754.8642	Biodiversity, TEMP, SAL, OXY	Meiobenthos, eDNA	WB25_BC_15	St14

II. Water sampling and processing

A 24-Niskin bottle carousel equipped with a CTD was used to collect water samples (*Figure 11-A*). Seawater was collected at 11 CTD stations (*Table 2*), sampling three different depth levels corresponding to surface, deep chlorophyll maximum (DCM), and deepest bottom layer (5 m above the seafloor). At each station and each depth, 10 liters were collected from Niskin bottles, closing at least two bottles per depth to ensure pouring 5 liters from different bottles located at various distances on the carousel. This is to get water samples as representative as possible. Seawater was poured into plastic tanks, previously bleached and rinsed with milliQ water (i.e., sterile procedures to avoid cross-contamination), and filtered in the wet laboratory shortly afterwards for eDNA retainment (*Figure 11-B*). A multichannel peristaltic pump was used to filter water samples on Sterivex filters (plastic capsules containing a filtering membrane with 0.45 µm pore size).
Negative controls (sampling NTCs) were collected contextually, filtering 2 liters of ultra-pure water to check on both milliQ water and on the Niskins' eDNA carryover between sampling stations (three each). The 6 NTCs underwent the same workflow used for seawater collection and filtering. Thus, a total of 33 filtered water samples and 6 NTCs were then dried with silica beads and stored at -80°C in ziplock plastic bags for further eDNA molecular analysis.

The combination of water and sediment sampling, together with contamination controls, provides a robust framework to characterize marine biodiversity in sampled sites.
Indeed, water samples might reveal pelagic community composition and vertical variability across depth layers, while sediment samples could integrate benthic and sessile organisms, supporting both eDNA-based biodiversity surveys and morphological analysis of meiofauna.
Negative controls add reliable metadata by monitoring contamination risks during collection and processing.

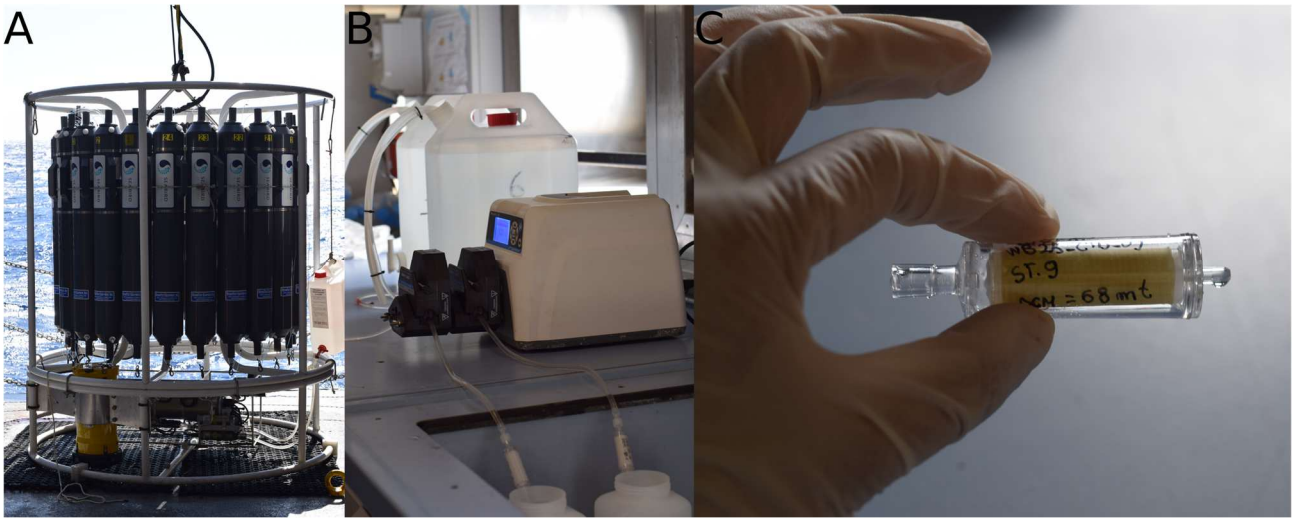

Figure 11: Water sampling and filtering: A) Niskin bottle carousel onboard; B) Peristaltic pump filtering water from tanks in the wetlab; C) Detail of Sterivex filter retaining eDNA.

Table 2. CTD stations and water samples

File	Latitude	Longitude	Date	Time (UTC)	Bottom Pressure (db)	Essential variables	Water samples	Sampling depths (m)	Sample name	Station
dWB25_CTD_01	41.6762	11.632	01/08/2025	5:10 PM	925.7084	TEMP, SAL, OXY	na	na	na	na
dWB25_CTD_02	41.7327	11.759	02/08/2025	7:10 AM	543.1482	eDNA, TEMP, SAL, OXY	Bottom, DCM, Surface	550, 72, 5	WB25_CTD_02	St4
dWB25_CTD_03	41.7230	11.765	02/08/2025	11:17 AM	604.1237	eDNA, TEMP, SAL, OXY	Bottom, DCM, Surface	600, 70, 5	WB25_CTD_03	St5
dWB25_CTD_04	41.7368	11.754	02/08/2025	1:55 PM	514.8601	eDNA, TEMP, SAL, OXY	Bottom, DCM, Surface	512, 77, 5	WB25_CTD_04	St3
dWB25_CTD_05	41.7378	11.696	02/08/2025	4:37 PM	1017.0452	TEMP, SAL, OXY	na	na	na	na
dWB25_CTD_06	42.0120	11.526	03/08/2025	6:27 PM	384.1324	TEMP, SAL, OXY	na	na	na	na
dWB25_CTD_07	41.6762	11.715	04/08/2025	10:16 PM	1264.2266	TEMP, SAL, OXY	na	na	na	na
dWB25_CTD_08	41.6662	11.551	04/08/2025	7:01 AM	279.0573	eDNA, TEMP, SAL, OXY	Bottom, DCM, Surface	288, 68, 5	WB25_CTD_08	St11
dWB25_CTD_09	41.6832	11.542	04/08/2025	10:33 AM	498.7708	eDNA, TEMP, SAL, OXY	Bottom, DCM, Surface	500, 68, 5	WB25_CTD_09	St9
dWB25_CTD_10	41.7198	11.534	04/08/2025	12:58 PM	346.0627	eDNA, TEMP, SAL, OXY	Bottom, DCM, Surface	345, 68, 5	WB25_CTD_10	St6
dWB25_CTD_11	41.6768	11.715	04/08/2025	4:08 PM	1271.0045	TEMP, SAL, OXY	na	na	na	na
dWB25_CTD_12	41.5443	11.857	05/08/2025	6:18 AM	736.241	eDNA, TEMP, SAL, OXY	Bottom, DCM, Surface	742, 68, 5	WB25_CTD_12	St15_new
dWB25_CTD_13	41.6162	11.835	05/08/2025	1:06 PM	700.4918	TEMP, SAL, OXY	na	na	na	na
dWB25_CTD_14	41.5815	11.847	05/08/2025	3:42 PM	754.8642	eDNA, TEMP, SAL, OXY	Bottom, DCM, Surface	750, 67, 5	dWB25_CTD_14	St14
dWB25_CTD_15	41.4212	11.979	05/08/2025	6:32 PM	994.3484	TEMP, SAL, OXY	na	na	na	na
dWB25_CTD_16	41.3502	12.038	06/08/2025	7:08 AM	212.9645	eDNA, TEMP, SAL, OXY	Bottom, DCM, Surface	221, 80, 5	WB25_CTD_16	St20
dWB25_CTD_17	41.2710	12.149	06/08/2025	9:12 AM	1273.0104	eDNA, TEMP, SAL, OXY	Bottom, DCM, Surface	1269, 99, 5	WB25_CTD_17	St17_ctd
dWB25_CTD_18	41.3868	12.071	06/08/2025	12:43 PM	281.0363	eDNA, TEMP, SAL, OXY	Bottom, DCM, Surface	248, 74, 5	WB25_CTD_18	St18_ctd

TRAINING ON BOARD

Lucía, Faustina, Rabiatu, Shruti, Anameere, Shamimtaz and Mele are the names of the seven women scientists from Argentina, Ghana, India, Kiribati, Mauritius and Tonga who joined the cruise and had a life-changing experience on board. They not only had the opportunity to gain key knowledge on deep-sea exploration but also Italian culture, kitchen and language. They have also experienced a bit of rough sea conditions to test their resilience to unfavourable working conditions. The Trainees attended frontal lectures on the main geological processes that occur at the seabed and the sub-seabed and how they influence habitat and biodiversity distribution, they had access to laboratories on board, and hands-on training on the real-time acquisition and processing of marine geophysical data, physical properties of the water column and eDNA sampling. The aim of these activities is to explore the geological processes at the seabed and how they influence the biodiversity distribution over specific underwater structures, such as seamounts, in the northern Tyrrhenian Sea.

Lectures on board

<u>01/08</u>

- Umberto Napolitano, Lazzaro Festivo (naval and chief officers, Argo): Safety induction on board and guided tour of the Gaia Blu vessel
- Camilla Palmiotto (CNR-ISMAR): Introduction to the study area in the northern Tyrrhenian Sea and WOMBlue cruise objectivities

<u>02/08</u>

- Fabiano Gamberi (CNR-ISMAR): Introduction to the geodynamics of the Mediterranean Sea with a focus on the Tyrrhenian Sea
- Malek Belgacem (CNR-ISMAR): Introduction to Operational Oceanography
  - Principles of operational oceanography
  - Importance for climate and marine ecosystem
  - Ocean observing systems
  - Case study of the Tyrrhenian Sea hydrology

  Hands-on exercise: CTD Data Processing and interpretation using SBE software data processing
  - Convert raw CTD files
  - Apply basic quality check steps
  - Generate vertical profiles
  - Interpret physical features using Ocean data view

<u>03/08</u>

- Marina Vingiani (CNR-ISMAR): Biodiversity in water and sediments: methods, sources and integrated data for environmental assessment
- Angelica Pesce (CNR-ISMAR): Beyond detection: to understand decay and dispersion of eDNA for its correct interpretation
- Fabiano Gamberi (CNR-ISMAR): Generalities on deep-sea sedimentary processes. Landslides: characteristics, causes, hazards part I.
- Hands-on exercise: Seismic reflection data interpretation for the reconstruction of continental margin stratigraphic, tectonic and sedimentary evolution.

<u>04/08</u>

- Fabiano Gamberi (CNR-ISMAR): Generalities on deep-sea sedimentary processes. Landslides: characteristics, causes, hazards part II.

- Hands-on exercise: High resolution seismic data interpretation for sedimentary processes, seafloor environment and geomorphic elements reconstruction, and hazard evaluation

05/08

- Fabiano Gamberi (CNR-ISMAR): Fluid circulation at the seabed and in sub-seabed
- Camilla Palmiotto (CNR-ISMAR): Multibeam data acquisition with different systems and resolution
- Alessandra Mercorella (CNR-ISMAR): Data acquisition and navigation
- Valentina Ferrante (CNR-ISMAR): Microfossils in sediments
- Giacomo Dalla Valle (CNR-ISMAR): Sub-bottom data acquisition and interpretation
- Hands-on exercise: Morphological interpretation of contour maps in volcanic contexts: the case of the Marsili Seamount part I

06/08

- Angelica Pesce (CNR-ISMAR): Plastic debris in the deep sediment and contamination in the Mediterranean Sea: models of distribution on the sea surface, at the sea bottom and along coastlines
- Fabiano Gamberi (CNR-ISMAR)
  Hands-on exercise: Morphological interpretation of contour maps and side scan sonar images in volcanic contexts: the case of the Marsili Seamount part II
  Habitat mapping from bathymetric and side scan sonar data interpretation: the case of the Tavolara islet offshore

For the first time, the participants gained knowledge on various aspects of marine sciences.

- Participants learned about different geochemical and biostratigraphic proxies to reconstruct the marine environment through the geological past
- Participants learned how to use tools and techniques to acquire and interpret data that can be applied to their marine regions and case studies
- Participants learned how to integrate marine geology and biology to reconstruct habitats at the seabed

Participants shared diverse viewpoints, scientific background and working methods from around the world.

Participants will report back to their respective organizations who are eager to expand their interest in marine scientific research, marine geohazards and paleoceanography.

4. LOGBOOK

DATE	UTC TIME (local-2h)	SYNTETIC DESCRIPTION	LONG DDMMSS.xxx	LAT DDMMSS.xxx	SAMPLE NAME	GEOPHISYCAL ACQUISITION NOTES	DEPTH	ANNOTATIONS
01/08/2025	14:00	departure from Civitavecchia harbour						
01/08/2025	17:00	arrival at CTD point						
01/08/2025	17:13	CTD on bottom			WB25_CTD_01 WB_SVP_20250801_1713		885	Valeport (SVP) doesn't work properly. Sound velocity profile calculated from CTD data
01/08/2025	19:00	start geophisical survey				SOL MB EM712, CHIRP, QINSY		
02/08/2025	2:50	trouble						K-synk lost the connection with EM712. Required to activate EM712 again on k-synk
02/08/2025	5:04	end geophisical survey				EOL MB EM712, CHIRP, QINSY		
02/08/2025	5:05	transfer to sampling station 4				SOL QINSY		
02/08/2025	5:08	START CHIRP SCOUTING across sampling station 4				SOL CHIRP (006_214_0508)		
02/08/2025	5:47	END CHIRP SCOUTING, transfer to sampling station 1 and 2				EOL CHIRP		
02/08/2025	6:03	START CHIRP SCOUTING from station 2 to 1				SOL QINSY, SOL CHIRP (007_214_0603)		
02/08/2025	6:16	END CHIRP SCOUTING				EOL QINSY, EOL CHIRP (007_214_0603)		
02/08/2025	6:26	START CHIRP SCOUTING from sampling station 1 to 4 crossing station 3				SOL CHIRP (007_214_0603)		
02/08/2025	6:38	END CHIRP SCOUTING				EOL CHIRP (007_214_0603)		
02/08/2025	7:21	CTD on bottom	11°45'35.435" E	41°43'58.442" N	WB25_CTD_02		537	CTD measurements + Valeport (svp), Water sampling for e-DNA analysis at bottom, 72 m depth, 5 m depth (8 bottles for each depth)
02/08/2025	8:36	BOX CORER on bottom	11°45'34.87" E	41°43'58.73" N	WB25_BC_01		554	the box corer did not close at the bottom. The sampling is repeated at the same station
02/08/2025	9:08	BOX CORER on bottom	11°45'34.904" E	41°43'58.691" N	WB25_BC_02		553	Sediment out of the box useless for eDNA and sediment samples. We repeat the box in the same point
02/08/2025	10:10	BOX CORER on bottom	11°45'34.831" E	41°43'58.684" N	WB25_BC_03		553	sediments recovered
02/08/2025	10:47	START CHIRP SCOUTING from station 4 to 5				SOL QINSY; SOL CHIRP		
02/08/2025	11:04	EOL CHIRP				EOL CHIRP		
02/08/2025	11:30	CTD on bottom	11°45'56.564" E	41°43'23.497" N	WB25_CTD_03		600	CTD measurements, Water sampling for e-DNA analysisat bottom, 72 m depth, 5 m depth (8 bottles for each depth)
02/08/2025	12:37	BOX CORER on bottom	11°45'57.309" E	41°43'23.688" N	WB25_BC_04		600	box corer on bottom
02/08/2025	13:20	START CHIRP SCOUTING from station 5 to 3				SOL CHIRP		
02/08/2025	13:33	EOL CHIRP				EOL CHIRP		
02/08/2025	14:06	CTD on bottom	11°45'16,159"E	41°44'12,045" N	WB25_CTD_04 WB_SVP_20250802_1406		514	CTD measurements + Valeport (svp). Water sampling for e-DNA analysis at bottom, 77 m depth, 5 m depth (8 bottles for each depth)
02/08/2025	15:09	BOX CORER on bottom	11°45'14,925"E	41°44'11,858" N	WB25_BC_05		515	
02/08/2025	15:21	SOL CHIRP, QINSY				SOL CHIRP, no mb		chirp acquisition durint transit to next ctd point
02/08/2025	16:04	EOL CHIRP				EOL CHIRP		
02/08/2025	16:30	**TECHINICAL STAND-BY**						ctd winch cable out of axis
02/08/2025	16:55	CTD on bottom	11°41'46,268"E	41°44'16,490" N	WB25_CTD_05		1011	CTD + Valeport (svp)
02/08/2025	18:09	start geophisical survey				SOL CHIRP, MB EM712, Qinsy		
02/08/2025	19:07	end geophisical survey				EOL CHIRP, MB EM712		
02/08/2025	19:10	SOL CHIRP, no mb				SOL CHIRP		transfer on adiacent line
02/08/2025	19:22	EOL CHIRP				EOL CHIRP		
02/08/2025	19:48	trouble						mb and chirp data start to be very noisy due to the increasing of bad weather conditions
02/08/2025	19:40	**STAND-BY METEO**						
03/08/2025	6:32	SOL CHIRP				SOL CHIRP		trasfer to a new acquisition line
03/08/2025	6:40	SOL MB				SOL MB EM712		mb acquisition with no svp, the weather condition (causing ship rolling) doesn't permit to do the ctd
03/08/2025	12:13	start MB WC acquisition				MB EM712: start water column acquisition		pockmark area
03/08/2025	18:05	end geophisical survey						transit to ctd point
03/08/2025	18:34	CTD on bottom	11°31'35,13"E	42°00'44,5" N	WB25_CTD_06 WB_CTD_20250803_1834			

03/08/2025	19:17	SOL CHIRP, MB				SOL CHIRP, MB EM712		Valeport still works bad, no usefull file from it. We use profile inferred from cdt
03/08/2025	20:14	start MB WC acquisition				EOL CHIRP, MB		
03/08/2025	21:28	start geophisical survey				SOL CHIRP, MB EM712		MB stops to work due to ksync problem
03/08/2025	21:31	SOL CHIRP, MB						vessel speed 10 kn
03/08/2025	21:35	EM304 POWER ON				SOL CHIRP, MB EM304		New project creation
03/08/2025	22:10	end geophisical survey						
03/08/2025	22:42	CTD on bottom	11°42'58,07"E	41°40'36,5" N	WB25_CTD_07 WB_CTD_20250803_2242		1262	depth 1262 m
03/08/2025	23:37	start geophisical survey				SOL CHIRP, MB EM304		
04/08/2025	5:11	end geophisical survey				EOL MB EM304		
04/08/2025	5:14	transfer to Tiberino Seamount sampling stations						
04/08/2025	6:24	SOL CHIRP				SOL CHIRP		transfer to Tiberino seamount area. NO MB acquisition
04/08/2025	6:33	EOL CHIRP				EOL CHIRP		
04/08/2025	7:13	CTD on bottom	11°33'07.256" E	41°39'57.38" N	WB25_CTD_08		287 m	CTD + Valeport; Water sampling (bottom; 68 m; 5 m)
04/08/2025	7:55	BOX CORER on bottom	11°33'06.67" E	41°39'57.53" N	WB25_BC_06		288 m	
04/08/2025	8:13	BOX CORER at surface BOX CORE off deck						Box corer did not closed at the bottom. The sampling is repaeted
04/08/2025	8:21	BOX CORER on bottom	11°33'06.603" E	41°39'57.515" N	WB25_BC_07		288 m	Box corer grabs only few centimeters of bottom sand. The sampling is repeated
04/08/2025	8:58	BOX CORER on bottom	11°33'06.942" E	41°39'57.53" N	WB25_BC_08		288 m	sampling ok
04/08/2025	9:21	SOL CHIRP						
04/08/2025	9:27	EOL CHIRP; Start CHIRP SCOUTING between stations 7 and 9						Scouting from station 7 to 9
04/08/2025	9:40	EOL CHIRP						
04/08/2025	9:44	SOL MB + Water Column; SOL CHIRP				SOL MB EM304; SOL CHIRP		add CTD in post processing
04/08/2025	9:57	EOL MB, EOL CHIRP				EOL MB EM304; EOL CHIRP		
04/08/2025	10:32	CTD and SV (Valeport) probe off deck						
04/08/2025	10:42	CTD on bottom	11°32'34.209" E	41°40'59.267" N	WB25_CTD_09 WB_CTD_20250804_1045		500 m	CTD and SVP
04/08/2025	11:20	BOX CORER on bottom	11°32'34.975" E	41°40'59.176" N	WB25_BC_09		500 m	sampling ok
04/08/2025	12:00	start geophisical survey				SOL Quinsy, SOL CHIRP, SOL MB EM712 (bathymetry and water column)		A new project (WOMBLUE_II) was created in SIS to allow the grid display
04/08/2025	12:30	end geophisical survey						
04/08/2025	13:08	CTD on bottom	11°32'05.732" E	41°43'11.626" N	WB25_CTD_10		345 m	
04/08/2025	13:35	BOX CORER on bottom	11°32'05.997" E	41°43'11.227" N	WB25_BC_10		347 m	Box corer recovered only water. The sampling is repeated
04/08/2025	:	BOX CORER on bottom	11°32'03.689" E	41°43'11.480" N	WB25_BC_11		349 m	
04/08/2025	14:52	start geophisical survey				SOL Quinsy, SOL CHIRP, SOL MB EM712		transfer to a planned CTD. ONLY CTD measurements
04/08/2025	15:53	end geophisical survey						
04/08/2025	16:31	CTD on bottom	11°42'56.86" E	41°40'36.752 N	WB25_CTD_11 WB_CTD_20250804_1631			CTD and SVP
04/08/2025	17:27	start geophisical survey				SOL Quinsy, SOL CHIRP, SOL MB EM304		
04/08/2025	19:38	EOL CHIRP/SOL CHIRP						in chirp, change sound speed value from 1534 to 1519. This value is the mean of all sound values from the last svp. In this way we can try to correct the depth from chirp that differs so much from mb (more then 15 meters). It doesn't seem to have big improvement from this change
04/08/2025	20:24	start MB WC acquisition						
05/08/2025	2:07	end MB WC acquisition						
05/08/2025	4:33	end geophisical survey						
05/08/2025	4:35	SOL QINSY						start trasfer to station 15_NEW
05/08/2025	4:38	SOL CHIRP				0038_217_0438		speed: 10 kn
05/08/2025	5:35	EOL CHIRP						
05/08/2025	5:35	SOL CHIRP				0039_217_0535		scouting line before sampling (speed: 6,5 kn)
05/08/2025	5:39	chirp range change				chirp range from 500 to 200		
05/08/2025	5:51	EOL CHIRP						
05/08/2025	6:32	CTD on bottom	11°51'25,50" E	41°32'39,24" N	WB25_CTD_12		740	CTD measurements, Water sampling for e-DNA analysis at bottom, 68 m depth, 5 m depth (8 bottles for each depth)

05/08/2025	7:00	**STAND-BY for elettrical problems to CTD WINCH**						
05/08/2025	7:45	END OF STAND-BY						
05/08/2025	8:13	BOX CORER on bottom	11°51'26,55" E	41°32'37,81" N	WB25_BC_12		743	
05/08/2025	8:56	start geophisical survey				SOL Quinsy, SOL CHIRP, SOL MB EM304 (bathymetry and water column)		transfer fron Station 15_NEW to station 13_NEW
05/08/2025	9:41	end geophisical survey						
05/08/2025	10:15	**TECHINICAL STAND-BY**						trobles in comunication between software and rosette. The mechanism to close the bottles doesn't work. In the meanwhile, we acquired geophysical data
05/08/2025	11:00	possible wreck	11°50'41,08" E	41°37'17,9" N			737	
05/08/2025	11:09	start geophisical survey				SOL Quinsy, SOL CHIRP, SOL MB EM304 (bathymetry and water column)		EM304, CHIP lines transverseto the Civitavecchia Ridge
05/08/2025	12:56	end geophisical survey						
05/08/2025	13:23	CTD on bottom	11°50'03,37" E	41°36'58,84" N	WB25_CTD_13		703	troubles no fixed, so no water samples. Just ctd profile
05/08/2025	14:17	BOX CORER on bottom	11°50'04,82" E	41°36'58,02" N	WB25_BC_13		700	not closed
05/08/2025	14:51	BOX CORER on bottom	11°50'04,75" E	41°36'58,10" N	WB25_BC_14		700	
05/08/2025	15:15	start geophisical survey				SOL Quinsy, SOL CHIRP, SOL MB EM304 (bathymetry and water column)		trasfer to station 14
05/08/2025	15:34	end geophisical survey						
05/08/2025	16:00	CTD on bottom	11°50'51,01" E	41°34'53,78" N	WB25_CTD_14		750	CTD measurements, Water sampling for e-DNA analysis at bottom, 67 m depth, 5 m depth (8 bottles for each depth)
05/08/2025	16:42	BOX CORER on bottom	11°50'51.300" E	41°34'53,733" N	WB25_BC_15		740 m	
05/08/2025	17:16	start geophisical survey				SOL Quinsy, SOL CHIRP		Transfer to Albano S,
05/08/2025	18:14	end geophisical survey						STEERED NOTES changed from Gaia CoG to CTD
05/08/2025	18:53	CTD on bottom	11°58'47.879" E	41°25'16.121" N	WB25_CTD_15		990 m	
05/08/2025	19:26	start geophisical survey						
06/08/2025	5:30	end geophisical survey						
06/08/2025	5:44	SOL CHIRP						Start Chirp scouting from station 18 to station 17 and 16. Range changed in 100
06/08/2025	6:07	EOL CHIRP						
06/08/2025	6:09	SOL CHIRP						Start Chirp scouting to station 19
06/08/2025	6:23	EOL CHIRP						
06/08/2025	6:29	SOL CHIRP						Start Chirp scouting to station 20
06/08/2025	6:52	EOL CHIRP						
06/08/2025	06:53	STEERED NODE Gaia CoG CHANGED IN CTD						Start sampling operations at ALBANO SM.
06/08/2025	7:14	CTD on bottom	12°02'17.444" E	41°20'59.946" N	WB25_CTD_16		220 m	CTD and Water Sampling (bottom, 80 m, 5 m i.e. surface)
06/08/2025	7:52	start geophisical survey				SOL Quinsy, SOL CHIRP, SOL MB EM712		
06/08/2025	8:54	end geophisical survey						
06/08/2025	9:36	CTD on bottom	12°02'17.506" E	41°20'59.958" N	WB25_CTD_17			coordinates extracted from qinsy logile
06/08/2025	10:15	SOL CHIRP						
06/08/2025	10:27	EOL CHIRP						
06/08/2025	10:29	start geophisical survey				SOL Quinsy, SOL CHIRP, SOL MB EM304		
06/08/2025	10:56	SOL MB EM712				SOL Quinsy, SOL CHIRP, SOL MB EM712		EOL CHIRP. Change bearing, SOL CHIRP
06/08/2025	12:20	end geophisical survey						
06/08/2025	12:44	CTD and SV (Valeport) probe off deck					284 m	CTD measurements and sound velocity profile
06/08/2025	12:49	CTD on bottom	12°04'13.318" E	41°23'13.295" N	WB25_CTD_18	SBE_20250806_1249	284 m	
06/08/2025	13:15	start geophisical survey				SOL Quinsy, SOL CHIRP, SOL MB EM712		
06/08/2025	18:06	end geophisical survey. TRANSFER TO THE PORT OF NAPLES						
07/08/2025	**9:59**	**ARRIVE AT THE DOCK**						

5. PRELIMINARY RESULTS

Geophysical and geological data collected during the WOMBlue cruise will contribute to increase our knowledge on the Northern Tyrrhenian sea characterized by a complex morphology related to the interplay between tectonics, magmatism, sediment transport and deposition.
In addition, multibeam data will be part of the EMODnet Bathymetry data infrastructure under the CDI-record id 3680061 of the Pan-European Infrastructure for Ocean & Marine Data Management SeaDataNet and will be part of the 2026 release of the 1/16 *1/16 arc minutes (ca. 115 m grid) EMODnet DTM and concur to the high resolution DTMs.

6. DISSEMINATION

Dissemination and outreach activity was carried out during the cruise, thanks to the involvement of Gaetano Massimo Macrì and Vittorio Tulli, from the Cnr press office (see 3. ACTIVITY - Onboard outreach activities paragraph).

7. CONCLUSION

Thanks to the hard work of both the Master, the crew and the researchers and technicians involved in the WOMBlue cruise, all the objectives were successfully reached.

8. ACKNOLEDGEMENTS

We thank the Master Pasquale Guida, Gaia Blu crew and ARGO for the professional way and great work done onboard to make WOMBlue cruise successful.
We thank Rocco De Marco for his remote support in creating a virtual machine to work collaboratively during the cruise

9. REFERENCES

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