



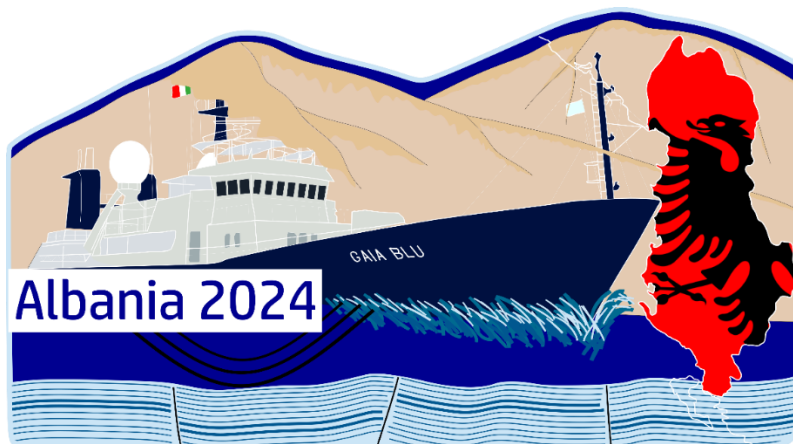
# ALBANIA-2024

Technical Report

Adriatic Sea

(Nov. 7 – 26, 2024)

**R/V Gaia Blu**



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## HOW TO READ THIS REPORT

**Section 1** gives the introductory and background information. **Section 2** describes cruise operations and the technical aspects involved in data acquisition. **Section 3** discusses the preliminary results of the Albania-2024 scientific cruise. The **Appendix** contains the cruise logbook and some additional pictures.

## ACKNOWLEDGEMENTS

We would like to express our gratitude to all those who contributed to the organization and realization of the research cruise, including those who were not on board. Furthermore, we sincerely thank Captain Pasquale Guida, the officers and crew members of R/V Gaia Blu for their professionalism and dedication in assuring the success of the cruise.

## RIASSUNTO

Questa relazione tecnica descrive la campagna di Geologia Marina “Albania-2024”, svoltasi tra il 07 e il 26 novembre 2024 nel Mar Adriatico Meridionale. L’originale progetto che intendeva indagare le strutture tettoniche a largo delle coste albanesi è stato riadattato a causa del mancato arrivo dei permessi da parte delle autorità albanesi. Pertanto, la campagna è stata interamente dedicata alla raccolta di dati geofisici quali carte morfo-batimetriche e profili sismici a riflessione del margine Apulo.

I nuovi dati geofisici sono stati acquisiti in modo da attraversare due importanti zone di deformazione tettonica che attraversano da est ad ovest il margine Apulo in prossimità del Gargano e di Brindisi. In particolare, i nuovi profili sismici multicanale colmano un vuoto di dati per la regione, altrimenti studiata prevalentemente attraverso dati di sottofondo chirp a bassissima penetrazione oppure con i profili sismici ministeriali acquisiti per l’esplorazione petrolifera.

## SUMMARY

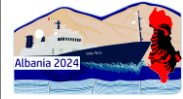
This technical report describes the Albania-2024 Marine Geology campaign, carried out between November 7 and 26, 2014, in the Southern Adriatic Sea. The original project, aimed at investigating tectonic structures offshore the Albanian coast, was revised due to delays in obtaining permits from Albanian authorities. Indeed, the campaign focused on the acquisition of geophysical data, including morpho-bathymetric maps and seismic reflection profiles of the Apulian Margin.

The newly acquired data were specifically designed to cross two major tectonic deformation zones extending from east to west across the Apulian margin, near the Gargano and Brindisi areas. In particular, the multichannel seismic profiles fill a significant data gap in a region previously investigated mainly through very shallow penetration CHIRP sub-bottom data or vintage seismic profiles for oil exploration.



## Contents

<b>1. The Albania-2024 scientific cruise</b> .....	7
<b>1.1. Introduction and aim of the work</b> .....	7
<b>1.2. Working area geological setting</b> .....	7
<b>1.3. Cruise team</b> .....	10
<b>1.4. References</b> .....	11
<b>2. Activities and instruments</b> .....	13
<b>2.1. The research vessel Gaia Blu</b> .....	13
<b>2.2. Multichannel seismic reflection profiles acquisition</b> .....	15
<b>2.3. Navigation System and vessel attitude parameters</b> .....	16
<b>2.4. MBES and sub-bottom data acquisition</b> .....	17
<b>2.5. Other geophysical data acquisition</b> .....	17
<b>2.6. Outreach activities</b> .....	18
<b>3. Summary of scientific findings</b> .....	19
<b>APPENDICES</b> .....	20
<b>Appendix I: Logbook</b> .....	21
<b>Appendix II: Photo gallery</b> .....	24



## List of figures

<b>Figure 1</b> - Geological setting of the study area mod. from Festa et al., 2019. Above:Tectonic sketch showing the major tectonics domain and the position of the fault system investigated in during the cruise. Black dots represent the epicentral distribution of earthquakes from the ISIDE dataset (ISIDE Working Group, 2007) Below: Schematic cross section crossing the Adriatic Sea. ....	8
<b>Figure 2</b> - Scientific party and the ship's Captain. ....	10
<b>Figure 3</b> - R/V Gaia Blu.....	13
<b>Figure 4</b> - A: source/streamer geometry. B: Streamer ready to be deployed. C: The HMS-630LF AquaPulse.	15
<b>Figure 5</b> - Map of the study area showing the acquisition lines of the geophysical data. Red: Acquisition lines of the Multichannel seismic profiles .....	16

## List of tables

<b>Table 1</b> - List of participants.....	10
<b>Table 2</b> - R/V Gaia Blu specification and instrumentation.....	14
<b>Table 3</b> - Source/streamer geometry.....	15
<b>Table 4</b> - Streamer and source technical specifications.....	16
<b>Table 5</b> - Technical specification of the multibeam echo sounder (MBES) systems.....	18
<b>Table 6</b> - Technical specification of the Knudsen 3260 CHIRP sub-bottom profiler.....	18
<b>Table 7</b> . Logbook.....	21



## 1. The Albania-2024 scientific cruise

### 1.1. Introduction and aim of the work

The scientific cruise *Albania-2024* has been carried out from November 7<sup>th</sup> to 26<sup>th</sup> in the Adriatic Sea. During the cruise, multichannel and single-channel seismic reflection profiles, along with bathymetric data, were acquired offshore of the Apulian coast, specifically in the area between the Gulf of Manfredonia and Brindisi. The cruise aimed to study the recent tectonic deformation of the Apulian Foreland.

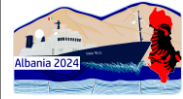
The original project aimed to image the tectonic deformation affecting the Apulian foreland caused by the advance of Albanides and to investigate the tectonic activity of the external portion of the belt. Unfortunately, the lack of permits for data acquisition in Albanian territorial waters forced us to revise the objectives of the cruise and select the new target area described before.

Despite this change, the main goal remained studying the active tectonic deformation shaping the Apulian foreland, describing the kinematics and activity of the offshore prolongation of major fault-systems (Mattinata Gondola Fault System and Monopoli Fault System) and linking the mapped tectonic deformation with recent seismicity.

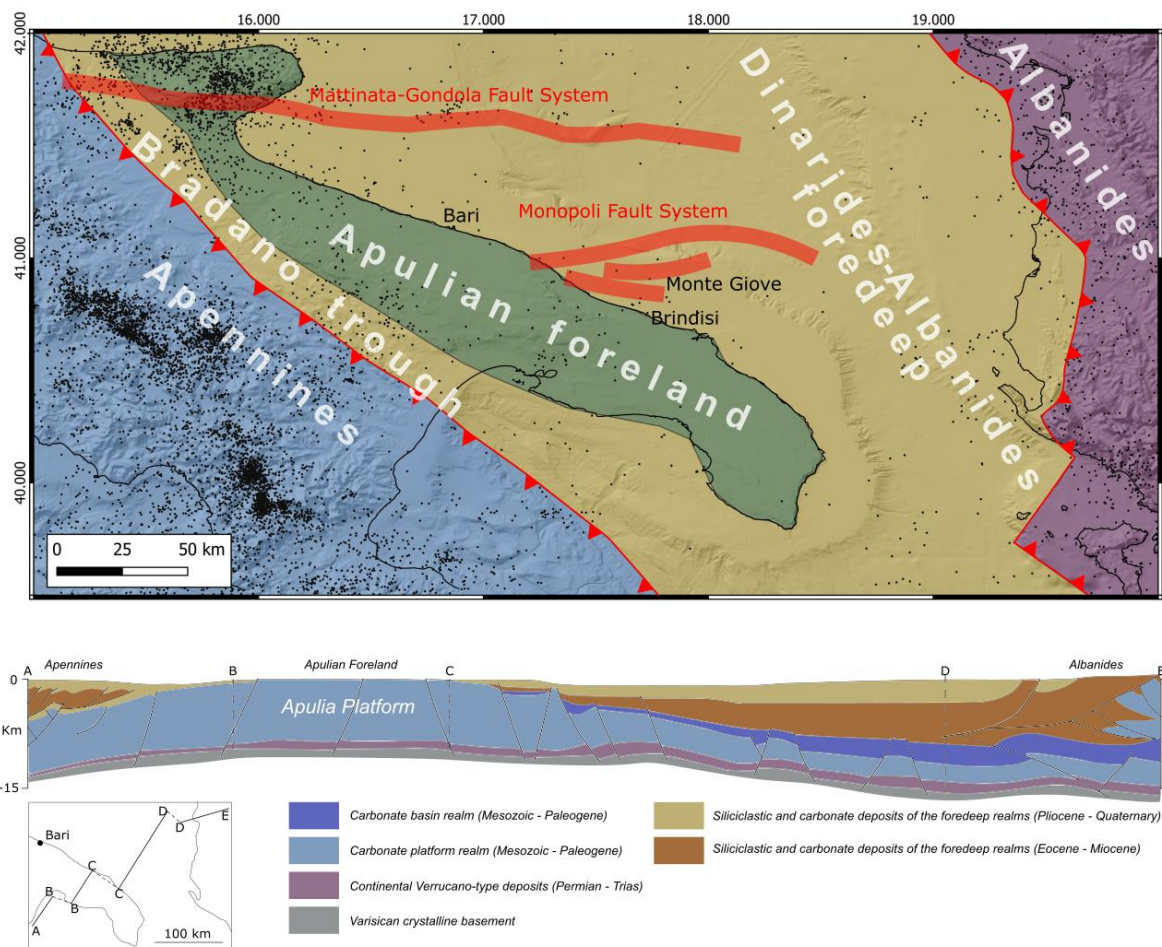
The newly acquired multichannel seismic profiles will help fill the gap in seismic data coverage for the region, which has so far been studied using a dense grid of single-channel seismic profiles with very high resolution but limited penetration, as well as a high-penetrating multichannel seismic profile dataset from the VIDEPI database. The extensive dataset resulting from the combination of older data with the new cruise dataset will enable the development of a geodynamic model of crustal deformation in the Apulian foreland, the localization of the most active faults and the reassessment of seismic risk in the region.

### 1.2. Working area geological setting

The study areas focus on two recently reactivated tectonic zones deforming the boundary between the Apulian foreland and the foredeep of the Dinarides-Albanides fold-and-thrust-belt (e.g., Ricchetti et al., 1988; Fig.1). This portion of the Adria plate, representing the outermost portion of the oppositely verging fold-and-thrust-belt of the Apennines to the west and Albanides to the East



(e.g., Ricchetti et al., 1988), is characterized by an average crustal thickness of 25-30 km (e.g., De Lorenzo et al., 2014). The shallow crust comprises a 7 km thick pile of Mesozoic-Paleogene sediments deposited in carbonate platform and carbonate basin environments, overlying the Variscan Basement (Fig.1B; e.g., Fantoni and Franciosi, 2010). These Mesozoic-Paleogene sediments pertaining to the Apulian Platform are unconformably overlain by more recent carbonate and terrigenous deposits, which thicken eastward approaching the Dinarides-Albanides chain front (Fig.1B; e.g., Ciaranfi et al., 1988).



**Figure 1** - Geological setting of the study area mod. from Festa et al., 2019. Above: Tectonic sketch showing the major tectonic domain and the position of the fault system investigated during the cruise. Black dots represent the epicentral distribution of earthquakes from the ISIDE dataset (ISIDE Working Group, 2007) Below: Schematic cross section crossing the Adriatic Sea.

The Apulia region, including its offshore, exhibits relatively low seismicity, compared to other Italian regions (Fig. 1A), but several strong earthquakes, especially in the Gargano region, struck the area. These events have been linked to the presence of E-W trending shear zones, such as those



targeted during our cruise, that were inherited from earlier Adria microplate deformation stages (Colantoni et al., 1990; Festa, 2003).

The Monopoli Fault System (MFS) is located at the southernmost portion of our study area, north of the city of Brindisi (Fig 1). It is considered the offshore prolongation of the fault zone affecting the Murge area, where extensional faults, active since the Cretaceous (Festa, 2003), were considered the cause of the area's low seismicity (Del Gaudio et al., 2005). The MFS shapes the shelf-offshore transition and controls the formation of a narrow E-W submarine ridge called Monte Giove (e.g., Cicala et al., 2023). The MFS is a seismogenic structure and it has been identified as the source of the recent earthquake ( $M_w:3.7$ ) that struck the Brindisi offshore in 2018 (Festa et al., 2019).

To the north of our study area lies the second target of our survey, namely the offshore extension of the Mattinata-Gondola Fault System (MGFS). The MGFS is a major tectonic feature, running E-W for a total length of at least 180 km from the Apennines to the Adriatic Sea (Fig.1A; e.g., Di Bucci & al., 2006).

The Mattinata fault, which cuts the Gargano Promontory, is one of the major fault segments of the MGFS. It is generally considered an active, mainly right lateral seismogenic fault, responsible for several strong ( $5 < M_w < 6$ ) historical earthquakes (DISS working group, 2021).

The offshore counterpart, specifically, the Gondola Fault or “Gondola Ridge” (e.g. Colantoni et al., 1990); has been considered inactive for a long time. However, its activity and seismogenic potential have been recently reappraised (Fracassi et al., 2012; Ridente and Trincardi, 2006; Ridente et al., 2008).



### 1.3. Cruise team

Table 1 reports the name, role and affiliation of the cruise team (Fig.2).

*Table 1 - List of participants*

Name	Duty	Affiliation	Role
Luca Gasperini	Party Chief	ISMAR-CNR	Researcher
Francesco De Giosa	Surveyor	UNIBA-ENSU	Researcher
Andrea Fresco	Surveyor	UNIBA-ENSU	Tecnichian
Christina Lombardo	Surveyor	UNIBA	PhD Student
Fabio Savelli	Surveyor	ISMAR-CNR	Tecnichian
Gabriel Tagliaro	Surveyor	USP/ISMAR_CNR	Postdoc Associate/Visiting Researcher
Giuseppe Lo Mauro	Surveyor	ISMAR-CNR/UNIBA	PhD Student
Nicolò Chizzini	Surveyor	UNIPR	Postdoc Researcher
Pietro De Monte	Surveyor	UNIBA-ENSU	Tecnichian

**ISMAR-CNR:** Istituto di Scienze Marine-Consiglio Nazionale delle Ricerche - **UNIBA:** Università di Bari  
**ENSU:** Environmental Surveys – **UNIPR:** Università di Parma – **USP:** Universidade de São Paulo



*Figure 2 - Scientific party and the ship's Captain.*



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## 2. Activities and instruments

The cruise started and concluded at the harbor of Bari, lasting a total of 20 days. During this cruise, multichannel and single-channel seismic profiles were acquired, along with bathymetric data, in the two study areas mentioned earlier, both located offshore of Apulian coasts. See Figure 4 for the acquisition lines of the geophysical data acquired during the cruise.

Unstable weather conditions forced us to stop multichannel seismic profiles acquisition and to head to calmer water in the Manfredonia Gulf. The deteriorating weather conditions further necessitated an almost 48-hour stand-by period, during which the vessel docked at the harbor of Bari.

The following sections describe the activities carried out during the cruise, including acquisition parameters and the specifications of the used systems.

### 2.1. The research vessel Gaia Blu

The research cruise was conducted using the 83-meter-long R/V Gaia Blu (Fig. 3; Tab. 2), donated to the CNR (National Research Council) by the Schmidt Institute in 2022.



*Figure 3 - R/V Gaia Blu.*



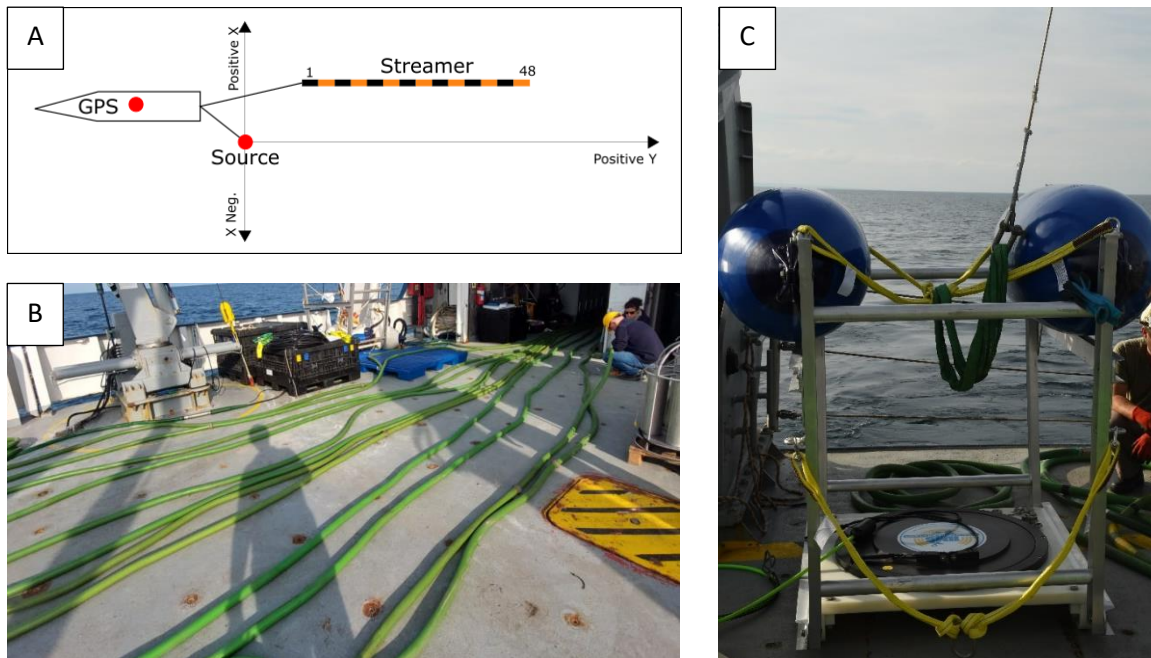
**Table 2 - R/V Gaia Blu specification and instrumentation.**

<b>Builder</b>	Orenstein & Koppel AG
<b>Built/Modernisation</b>	1981/2009-2012
<b>Flag</b>	Italy
<b>Length overall</b>	82.9
<b>Beam overall</b>	13
<b>Draft</b>	4.8
<b>Gross tonnage</b>	2024 t
<b>Net tonnage</b>	608 t
<b>Maximum speed</b>	17 kn
<b>Cruising speed</b>	11 kn
<b>Survey speed</b>	8 kn
<b>Endurance with 44 personnel aboard</b>	36 days
<b>Accommodation</b>	26 scientific personnel and 18 crew
<b>Hull-mounted instruments</b>	
<b>Multi-beam echo sounders</b>	Kongsber EM 2040, 712 (0.5°x1°), EM 304 (1°x1°); Seapath 380
<b>Fishery research systems</b>	Simrad EK60, 18/38/70/120/200/710 kHz; Simrad SH90 114 kHz
<b>Acoustic Doppler Current Profiler</b>	Teledyne Ocean Surveyor, 45 kHz; Teledyne Workhorse Mariner, 300 kHz
Knudsen 3260 CHIRP sub-bottom profiler	
<b>Deck facilities and other instrumentation</b>	
CTD IBERCISA ocean winch equipped with a Launch and Recovery system (LARS)	
Multipurpose IBERCISA winch	
A-frame (~ 9000 kg), 2 J-frame (~ 9000 kg and ~ 3200 kg) and 2 HIAB cranes (1310-5200 kg)	
Piston coring system (650-1850 kg modular head) with modular rotating cradle swing from 5 to 25 m	
Ecosearch Automatic Weather Station	
HiPAP 352P & cNODE MiniS for ROV positioning	
C-band Maritime VSAT Antenna System (v240 C model)	
Starlink Flat High-Performance Kit (Maritime/Energy)	
<b>Other facilities and instrumentation</b>	
Laboratories: wet (32 m <sup>2</sup> ), dry/offices (26 m <sup>2</sup> ), control room (28 m <sup>2</sup> )	
Dynamic positioning system: EMRI Joystick/DP system	

## 2.2. Multichannel seismic reflection profiles acquisition

We used 6 section (each 50 m long) of the *digital solid state Geoeel streamer* (Fig. 4B), designed by Geometrics, as seismic receiver, and the *HMS-620LF AquaPulse* (Fig. 4C) as the seismic source to acquire multichannel seismic reflection profiles in the two study areas (See table 3 and 4 for the system specification of the source and receiver).

The shot interval was 6.25 m, considering a hydrophone group interval of 6.25 m and the record length was 2,5 s. Both the Streamer and the source were towed approximately 40 m behind the stern of the ship. The source/streamer geometry is illustrated in Figure 4A.



**Figure 4** - A: source/streamer geometry. B: Streamer ready to be deployed. C: The HMS-620LF AquaPulse.

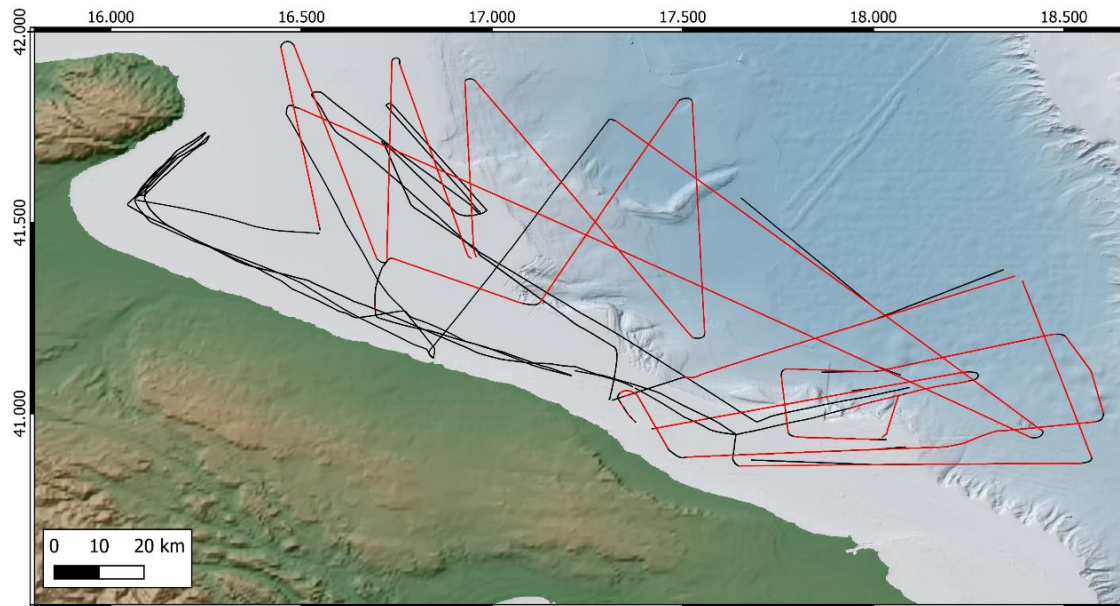
**Table 3** - Source/streamer geometry.

Receiver geometry		Source geometry	
First receiver dx (m)	10	Source dx (m)	-9.6
First receiver dy (m)	40	Source dy (m)	83
Number of receivers	48	<b>CDP Binning</b>	
Distance between receivers (m)	6.25	Bin size (m)	6.25



**Table 4 - Streamer and source technical specifications.**

<b>Geoel Digital solid state streamer (Geometrics) specifications</b>	
<b>Cable total length:</b>	6 X 50 m active cable length (300 m total length)
<b>Cable type:</b>	Solid state hydrphone cable w/ 44.5 mm diameter
<b>Number of channels:</b>	8 channels per sections (total 48 channels) at 6.25 m group interval
<b>Hydrophone group:</b>	6 hydrophones per group
<b>Operational Frequency</b>	3.5 kHz to 210 KHz
<b>Transducers:</b>	3x3 transducers array hull mounted TR-1075, Chirp bands 2 to 7 kHz.
<b>Output power:</b>	up to 10 kW Channel 1, up to 2 kW cahnnels 2 3, and 4
<b>A/D modules</b>	16 channels A/D modules ethernet connection
<b>Sensitivity</b>	-194 + 1.5 dB re 1 V/ $\mu$ Pa.
<b>HMS-620LF AquaPulse specifications</b>	
<b>Frequency</b>	20 – 1700 kHz
<b>Source generation</b>	Electromechanical acoustic
<b>Filters</b>	Hi/Low passband filters
<b>Trigger</b>	Internal or external



**Figure 5 - Map of the study area showing the acquisition lines of the geophysical data. Red: Acquisition lines of the Multichannel seismic profiles**

### 2.3. Navigation System and vessel attitude parameters

The vessel's navigation and bridge communication system is managed by the QPS Qinsy 9.5.6 software. The software is integrated with the Seapath 380, which provides a common reference point for all onboard systems, including the sub-bottom profiler and multibeam echosounders. The



system manages all the offsets of the installed systems and applies positioning corrections in real time.

The Seapath 380 system continuously supplies positioning data via dual GNSS antennas and attitude information through an MRU5 motion sensor, also computing heading with high accuracy supported by Fugro HP DGNSS services. Integrated sensors correct vessel motion components (roll, pitch, heave and yaw) with accuracies up to  $0.02^\circ$  for roll and pitch and  $0.075^\circ$  for heading. Vessel draft is determined through stability calculations using the Intershalt Maritime System Stability software SEACOS MACS3, accounting for load distribution and navigation parameters.

#### **2.4. MBES and sub-bottom data acquisition**

Multibeam bathymetry data and sub-bottom profiles were collected throughout the campaign, including during periods when rough sea conditions necessitated the suspension of multichannel seismic reflection profile acquisition. Bathymetric data were acquired using the *EM2040* and *EM712* multibeam echo sounder (MBES) systems (Tab. 5), both designed by *Kongsberg* and installed on the ship's keel. All data were logged, displayed, and monitored in real time using *Kongsberg's* Seafloor Information System (SIS 5) software.

Simultaneously, high-resolution single-channel seismic profiles were recorded using the hull-mounted *Knudsen 3260 CHIRP* sub-bottom profiler (see Table 6 for technical specifications). The transmitted pulse (Tx) duration was approximately 8 ms, with a trigger rate of around 0.25 seconds, adjusted for water depth. Interference between the MBES and CHIRP transducers was mitigated using *Kongsberg's* K-Sync synchronization software.

To correct sound propagation in the multibeam data, sound velocity profiles were obtained using a *Seabird SBE-911+* CTD system mounted on a 24-bottle Rosette sampler.

#### **2.5. Other geophysical data acquisition**

On the third day of the cruise, we began acquiring of magnetometric data using the *Sea-Spy* magnetometer designed by Marine Magnetics. The instrument, towed 250 m behind the stern, recorded data with an accuracy of 0.1 nT, operating at 1Hz frequency. The acquisition software used was *Sealink*, also developed by Marine Magnetics. It permits the integration of GPS data for precise geolocation tagging.



Unfortunately, the magnetometer stopped functioning and so, it was pulled in, opened and repaired. Although we verified that the instrument was working again after the repair, we preferred to not redeploy to avoid potential further damage for water ingress, which could have occurred as a result of the prior opening.

## 2.6. Outreach activities

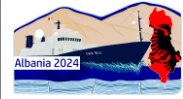
On November 12<sup>th</sup>, we held a live-streamed connection with the conference room at CNR in Rome, where students attended the event *“Il Futuro è nell’oceano: la faccia nascosta del Pianeta”* (The Future is in the Ocean: The Hidden Face of the Planet). During the meeting we showed the ship’s infrastructures and answered student’s questions about the role of a marine geologist job and life aboard the ship.

**Table 5** - Technical specification of the multibeam echo sounder (MBES) systems.

	<b>EM 2040</b>	<b>EM 712</b>
<b>Operational Frequency</b>	Selectable from 200 to 400 KHz	Selectable from 40 to 100 KHz
<b>Swath Coverage</b>	Up to 170°	Up to 140°
<b>Number of Beams</b>	400 (High density mode)	800
<b>Along-Track Beamwidth</b>	0.7°	0.5°
<b>Across-Track Beamwidth</b>	0.4°	1°
<b>Depth Range</b>	0.5 - 300 m	3 - 3300 m
<b>Impulse</b>	FM Chirp or CW slectable	FM Chirp or CW slectable
<b>Max. Ping Rate</b>	50 Hz	30 Hz
<b>Mammal Protection</b>	Yes	Yes

**Table 6** - Technical specification of the Knudsen 3260 CHIRP sub-bottom profiler.

<b>Data Storage:</b>	Stores raw data in SEG-Y and XTF format
<b>Operator Software:</b>	SounderSuite in Windows™ environment.
<b>Channels:</b>	up to 4 channels.
<b>Pulse Length:</b>	up to 64 msec
<b>Operational Frequency</b>	3.5 kHz to 12 KHz
<b>Transducers:</b>	3x3 transducer array hull-mounted TR-1075, Chirp bands 2 to 7 kHz.
<b>Output power:</b>	up to 10 kW Channel 1, up to 2 kW channels 2, 3, and 4
<b>Depth: range</b>	5, 10, 20, 50, 100, 200, 500, 100, 200, 5000 m
<b>Hard Copy Recorder:</b>	Grey scale graphic recorder, Centronix interface.
<b>Position:</b>	Hull-mounted



### 3. Summary of scientific findings

During the Albania-2024 scientific cruise, we acquired more than 3500 km of sub-bottom single-channel seismic profiles and more than 1500 km of multi-channel seismic profiles (Fig. 5).

The new data image two deformation zones related to the Mattinata Gondola Fault system to the north and to the Monopoli Fault system to the south. Both are characterized by the co-occurrence of brittle and ductile deformation until very recent times. The acquisition of single-channel profiles simultaneously with the multichannel seismic profiles on the same trace has been helping us in studying the tectonic deformation with a multiscale approach.

Moreover, the new data image the sedimentary succession deep to the Messinian erosional surface with very high resolution, allowing us to describe the interaction between tectonic deformation and sedimentary processes such as slumping and contourites.

The description of the tectonic activity of these structures and the link with the slope dynamics is crucial to defining the geologic hazard of a highly densely populated area such as the Apulia region.



## APPENDICES



## Appendix I: Logbook

*Table 7. Logbook*

Date	Time (UTC)	Latitude	Longitude	Event
08/11/2024	07:00 - 16:00	-	-	Configuration of seismic reflection acquisition system
08/11/2024	16:00	-	-	Seismic source and streamer deployed - Starting CHIRP acquisition
08/11/2024	19:36	-	-	End of MCS Line 1 and start of Line 2
08/11/2024	22:50	-	-	End of MCS of Line 2
08/11/2024	23:43	-	-	Start of line 4
09/11/2024	00:34	-	-	Channel 29 noisy
09/11/2024	03:02	-	-	Velocity=3.5 Kn / Heading=260°
09/11/2024	04:36	-	-	Warning on the MCS acquisition software: Missing section
09/11/2024	08:43	-	-	Constant noise
09/11/2024	08:48	-	-	End Line2_4 / Source and stremer moved 20 m away
09/11/2024	09:09	-	-	Start of Line8
09/11/2024	10:56	-	-	End of Line8
09/11/2024	15:00	40°58.36	17°25.46	Magnetometer deploys and start recording
09/11/2024	15:17	-	-	Acquiring CHIRP and MBES(2040) data
09/11/2024	16:13	40°54.52	17°27.68	End of Line5
09/11/2024	16:22	40°54.06	17°28.11	Start recording MBES(712) data
09/11/2024	16:55	40°53.13	17°30.52	Start of Line7
09/11/2024	17:42	40°53.33	17°34.64	Noise MBES - MBES (712) stop pinging
09/11/2024	18:54	-	-	MBES(712) start recording
09/11/2024	20:15	-	-	Magnetometer stop working
10/11/2024	00:19	40°54.88	18°11.98	Start of Line_12 due to change route
10/11/2024	01:48	40°57.29	18°19.80	Start of Line_13
10/11/2024	04:38	40°58.78	18°35.24	End of Line9a_13 - Problems with the change of line on the MCS acquisition software
10/11/2024	05:06	-	-	The MCS system previously disarmed is now armed but we are recordin on the same file of the last line
10/11/2024	06:30	-	-	Warning on the MCS acquisition software: Trigger Time Exceeded
10/11/2024	06:39	41°06.51	18°34.29	Ships's turning
10/11/2024	06:44	41°06.86	18°34.13	Start of Line9c_14 - Heading=330°
10/11/2024	08:24	-	-	End of Line9c_14
10/11/2024	08:40	41°12.48	18°28.67	Start of Line9d_15 - Heading=255° - Velocity=4Kn
10/11/2024	14:15	41°06.69	18°00.74	End of Line9d_16
10/11/2024	14:23	41°06.65	18°00.11	Start of Line9_17
10/11/2024	17:06	-	-	End of Line9_17



10/11/2024	17:19	41°06.01	17°45.52	Start of Line9_18 - Heading 170° - Velocity=4.1 Kn
10/11/2024	17:40	-	-	MBES(712) recording
10/11/2024	18:39	41°00.66	17°46.14	MBES(2040) start recording
10/11/2024	19:34	40°56.95	17°46.65	End of Line9_18
10/11/2024	19:34	40°56.40	17°47.70	Start of Line10_19
10/11/2024	22:17	40°55.93	18°00.82	End of Line10_19
10/11/2024	22:28	40°56.35	18°01.46	Start of Line11_20
11/11/2024	01:00	-	-	Source and streamer pulled in due to deteriorating weather - Acquisition of CHIRP and MBES data
11/11/2024	03:43	-	-	Heading=254° - Velocity=3Kn
11/11/2024	07:46	-	-	New route Heading=316°
11/11/2024	16:17	-	-	Recording MBES(2040/712) data
11/11/2024	16:20	41°30.57	16°51.94	Stop recording and positioning in preparation of the CTD
11/11/2024	16:40	41°30.55	16°51.94	CTD
12/11/2024	-	-	-	Acquisition of CHIRP and MBES data in the Manfredonia Gulf
13/11/2024	03:39	-	-	Acquisition of CHIRP and MBES data - Heading=130°
13/11/2024	08:41	-	-	CTD
13/11/2024	10:10	-	-	Start of Line_25
13/11/2024	11:16	41°05.42	17°29.27	MCS acquisition software doesn't work - PC restarted
13/11/2024	11:24	41°05.57	17°29.74	End of Linea_26
13/11/2024	11:29	41°05.68	17°30.22	Start of Linea_28
13/11/2024	11:34	41°05.67	17°30.71	Change of route due to presence of a fishing vessel
13/11/2024	11:43	-	-	Heading=64° - Velocity=4.2Kn
13/11/2024	22:05	-	-	Start of Lineab_29 - Heading=162°
14/11/2024	05:17	40°53.01	18°34.36	End of Lineab_29
14/11/2024	05:41	40°52.20	18°32.64	Start of Lineab_30 - Heading=270° - Velocity=4Kn
14/11/2024	10:14	-	-	MBES(2040) start recording
14/11/2024	15:44	40°51.77	17°38.87	End of Lineb_30 - Source and streamer pulled in due to deteriorating weather
14/11/2024	16:58	40°56.72	17°38.43	CTD
15/11/2024	05:30	-	-	Acquisition CHIRP and MBES data - Heading=300° - Moving to Manfredonia Gulf
15/11/2024	21:28	41°35.81	16°05.28	Acquisition CHIRP and MBES data - Heading=213° - Manfredonia Gulf
15/11/2024	22:22	-	-	New heading=91°
15/11/2024	23:35	41°34.52	16°05.47	New heading=39°
16/11/2024	03:30	-	-	Acquisition CHIRP and MBES data - Manfredonia Gulf
16/11/2024	14:40	41°28.43	16°32.73	CTD
16/11/2024	15:20	-	-	Source and streamer deployed - Start of LineGondola01_31
16/11/2024	22:16	41°57.78	16°26.80	End of LineGondola01_31
16/11/2024	22:48	41°57.70	16°28.88	Start of LineGondola02_32 - Heading=164° - Velocity=4,20Kn
17/11/2024	07:30	41°24.30	16°41.90	End of LineGondola02_32



17/11/2024	07:51	41°23.96	16°43.54	Start of LineGondola03_33 - Heading=108°
17/11/2024	15:40	41°55.34	16°44.22	End of LineGongola03_33
17/11/2024	16:13	41°54.77	16°45.51	Start of LineGondola04_34 - Heading=165° - Velocity=4,20Kn
17/11/2024	23:55	41°24.4	16°56.7	End of LineGondola04_34
18/11/2024	00:14	41°24.70	16°57.49	Start of LineGondola05_35
18/11/2024	07:24	41°52.21	16°57.45	End of Line Gondola05_35 - Start of Line Gondola06_36 - Heading=147°
18/11/2024	19:40	41°13.04	17°33.43	Start of LineGondola07_37 - Heading=356°
19/11/2024	04:34	41°49.07	17°31.48	End of LineGondola07_37
19/11/2024	05:03	41°49.13	17°29.36	Start of LineGondola08_38 - Heading=207° - Velocity=4.10Kn
19/11/2024	13:57	-	-	Start of LineGondola09_39
19/11/2024	18:41	41°24.41	16°44.26	End of LineGondola09_39
19/11/2024	19:10	-	-	Source and streamer pulled in due to deteriorating weather - Acquisition of CHIRP and MBES data
20/11/2024	03:02	41°10.46	16°58.74	Acquisition of CHIRP and MBES data - Heading=125° - Velocity=2.30Kn
21/11/2024	05:00	-	-	Acquisition of CHIRP and MBES data in the Manfredonia Gulf
21/11/2024	15:00	-	-	Stand-by due to deteriorating weather - Docked at the harbor of Bari
23/11/2024	14:00	-	-	Departure from the harbor of Bari
23/11/2024	19:30	41°47.79	16°30.05	Source and streamer deployed - Start of LineGondola12_41
24/11/2024	00:03	41°40.43	16°46.87	Start of LineGondola12_42
24/11/2024	20:28	40°57.42	18°26.38	Start of LineGondola13_43
25/11/2024	13:39	-	-	Source and streamer pulled in due to deteriorating weather - Acquisition of CHIRP and MBES data
25/11/2024	18:10	-	-	Docked at the harbor of Bari



## Appendix II: Photo gallery

