CRUISE REPORT
JAMME GAIA 2022

28 September 2022-18 October 2022

Summary

List of figures

1 Scope of the cruise

The cruise aimed to map with the multibeam the Gulf of Naples testing the new instruments installed on board Gaia Blue and to produce a high resolution and updated morphobathymetric map of the area to be compared with the existing data.

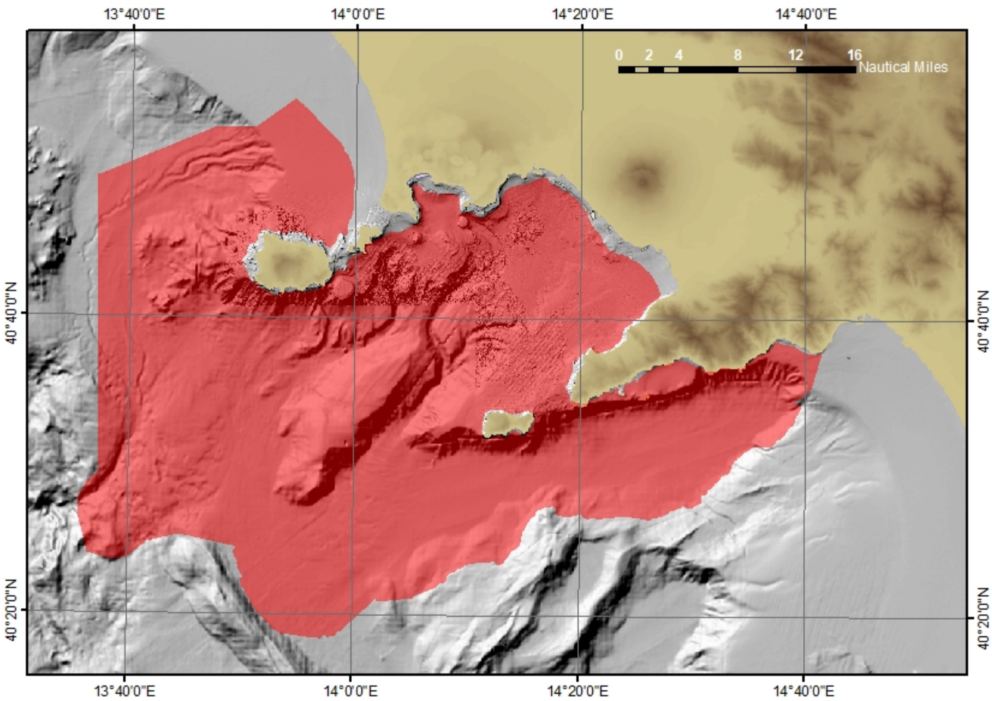

Figure 1- Map of the working area

2 Introduction

Jamme Gaia 2022 survey focuses on the central-eastern margin of the Tyrrhenian Sea, along the so-called peri-Tyrrhenian basins of Southern Italy, which joints the bathyal plain, some 3000 m deep, to the western margin of the Southern Apennines thrust belt.

The Tyrrhenian Sea, a major back-arc basin of the central Mediterranean area, formed since the late Miocene (Kastens et al., 1988) or early (Lymer et al., 2018; Loreto et al., 2021) due to the est- and south-eastward Ionian slab retreat guided by the Africa- Europe convergence (Moussat et al., 1986; Malinverno and Ryan, 1986; Kastens et al., 1988). Rifting allowed the thinning of continental crust since Langhinan-Serravaglian along the Sardinia Margin (Sartori et al., 2001; Loreto et al., 2021) and evolved into spreading since lower Pliocene (Kastens et al., 1988; Faccenna et al., 2001). Slab subduction allowed the melting and upwelling of mantle and the formation of the volcanic arc along the thinned continental crust surroundings the Marsili basin. Since Pleistocene the peri-Tyrrhenian basins start to experience compressive tectonics controlled to the slow Eurasia – Africa convergence (Zitellini et al., 2020; Loreto et al 2021; Camafort et al., 2020). The Campania segment of the eastern Tyrrhenian margin shows the typical features of a back-arc extensional domain, with a large number of extensional faults, thin crust, high values of heat flow (Ferrucci et al., 1989, Sartori et al., 2000), large-scale ignimbrite deposits preserved in the stratigraphic record and shoshonitic products in the subsurface on mainland (Di Girolamo1984; Milia and Torrente, 2003). It is characterized by a series of NW-SW trending half-graben bounded by structural highs that have developed since the early Pleistocene and accommodate the tectonic-controlled subsidence of the Piana Volturno – Garigliano, Piana Campana and Piana del Sele alluvial plains along with their submerged counterparts namely represented by the Gaeta Gulf, Gulf of Napoli and Gulf of Salerno, (Figure 1) (Romano et al., 1984; Ruberti et al., 2022, Amato et al., 2011; Bellucci et al., 2006)

High rates of subsidence driven by major NE–SW striking faults affected this segment of the continental margin with max vertical rates exceeding 4.3 mm/year (Torrente et al., 2010). Differential vertical ground movements within the half-graben basins, throughout the Middle Pleistocene, enabled a prolonged phase of aggradation and subsequently progradation of sedimentary sequences [Milia, 1999; Milia et al., 2003], almost 3 km thick in the main depocenters, onto a tectonically-displaced Mesozoic carbonate substrate and associated Cenozoic siliciclastic covers. Late-stage local tectonic inversions and regional left-lateral transtensive faults were also active in this area [Cinque et al., 1993; Bruno et al., 2000; Caiazzo et al., 2006;] and have contributed to delineate the complex structural setting of the Campania margin.

The extensional lineaments have been preferential pathways to the onset of volcanic activity, ascribed to different districts and provinces, particularly in the last 2 My. However, an oldest volcanic cycle is recorded in the western group of the Pontine islands with products emplaced from 4.2 Ma to 1 Ma ago [De Rita et al., 1986]. Volcanism then followed an eastward migration with records of activity constrained at 0.8–0.13 Ma ago on the Ventotene Island (De Rita et al., 1986), at 0.63 Ma to 0.13 Ma on land at Mt Roccamonfina (Di Brozolo et al., 1988) and beneath the Campania Plain, and more recently at Campi Flegrei, Ischia Island, and Somma-Vesuvius [Acocella et al., 1986; Torrente and Milia, 2013; De Girolamo et al., 1984, De Vivo et al., 2001, Rosi and Sbrana, 1987].

The Campi Flegrei volcanic field, ascribed to the most recent tectonic and magmatic activity, now represents the most relevant site in the area of natural hazard, and together with the Somma-Vesuvius strato-volcano, is being strictly monitored. Its structure is likely the result of two distinct caldera collapses originating, respectively, from major eruptions and pyroclastic currents: the Campanian Grey Tuff (CGT) at about 39 ka [De Girolamo et al., 1984; De Vivo et al., 2001] and the Neapolitan Yellow Tuff (NYT), dating to ca. 15 ka [Rosi et al., 1987; Deino et al., 2004]. The caldera collapse structure and late-stage resurgence have been identified in the Pozzuoli Gulf by seismic tomography and integrated stratigraphy investigations. Recent marine surveys revealed that the occurrence of underwater volcanic and hydrothermal activity is much diffused than previously suggested. Indeed, buried volcanic banks lie beneath the Gaeta Gulf (Bartole et al., 1982; de Alteriis et al., 2006; Aiello et al., 2000; Torrente and Milia., 2013; Cuffaro et al., 2016; Milia et al., 2017) whereas a vast submerged volcanic complex, has been recently surveyed, West of Ischia Island, almost twice in size with respect to the Island itself, (Bruno et al.; Chiocci and de Alteriis, 2006, Chiocci Magic Project, 2021). In the Gulf of Napoli several volcanic features, such as lateral conduits, ephemeral cones, pyroclastic and lava dome, lahars, tuff rings and relict rims have been recently surveyed and described (Milia and Torrente, 2007; Passaro et al., 2014, 2016, 2018., 2016) thus providing new information on this surprisingly complex volcanic and mixed siliciclastic-volcaniclastic environment. Moreover, the discovery of a variety of hydrothermal vents and fluid escape pathways, as well as a series of extrusive components of the active magmatic system, also suggests a significant interaction between magma and the shallow hydrothermal system.

Because of the intense volcanic activity, coupled with the sea-level change associated with the Marine Isotopic Stage 5 to 1, the late Quaternary depositional sequence (LQDS) is made up by marine clastic, volcaniclastic and epicontinental sediments (Chiocci, 2000; Aiello et al, 2017; Aucelli et al. 2012; Misuraca et al., 2018). Prograding clinoforms truncated by the MIS 2-related unconformity, and overlain by a thin cover of backstepping wedges, characterize the LQDS and record the subaerial exposure of the shelf from the lowstand phase until the successive sea level rise, which occurred from 18 ka BP to 5 ka. The present-day highstand conditions resulted in the onset of a post-5 ka prograding wedge, characterized by an overall decrease in thickness from the main riverine entry points (Garigliano, Volturno, Sarno, Sele Rivers) towards the shelf edge [Budillon et al., 2012, Sacchi et al., 2019]. Several laterally-continuous, well-defined seismic reflections, mainly coeval to fallout and settlement of volcanic ash and lapilli, represent stratigraphic markers in the sediment record of the margin and are meaningful for correlating marine sequences across adjacent basins (Insinga, Sacchi et al., 2005, Iorio et al., 2014).

Volcanic activity, differential, long-term vertical ground movements, glacio-eustasy and rapid dismantling of the emerging landscapes have driven a rapid morpho-evolution of the margin, resulting in steep slopes, canyoning, deep fans accretion and gravitational instability. Huge lateral collapses of the volcanic edifices has been documented offshore south of Ischia Island (Chiocci et al., 1998; Chiocci and de Alteriis, 2006; de Alteriis et al., 2010), possibly occurred also in historical time, and two others of minor extensions to the west and north of Ischia (Budillon et al., 2003; Violante et al., xx), and in the Gulf of Napoli (Milia …. Passaro), Holocene in age. The rapid aggradation of volcaniclastic deposits in the shallow marine environment and the entrance of pyroclastic flows into the seawater, also led to seafloor instability and creep in the prodelta of main rivers (Sacchi et al., 2005).

Three main turbiditic systems, namely Cuma, Magnaghi and Dohrn Canyons and a deep structural-controlled valley, (the Salerno Valley), have developed along with the rising of intraslope reliefs and volcanic activity and acted as main pathways for the delivery of sediments towards the deep domain. The canyon heads are lobe-shaped and encroach the outer shelf North of Ischia Island, south of Procida island

and off the Campi Flegrei. A lateral branch of the Dohrn Canyon diverges towards the East, possibly as a result of the drainage system associated with the Sarno river mouth during the last low stand of sea level. Actually, these features characterize the current seafloor morphology and even tough partly inactive, are of paramount interest for the analysis of the biodiversity of marine habitats.

3. Acquisition and processing

Multi beam data was collected using EM2040 from 50 m to 150 m, EM712 from 150 m to 1000 m and EM304 from 1000 m to 1200 m. Water column and backscatter data was collected simultaneously. Seapath 380 was used for positing and MRU corrections. DGPS correction was sent over the EMSAT and IOSAT L band beams with a FURGO subscription of 1 month. EMSAT is 1545.9275 Mhz (1200 bits per second bitrate) and the IOSAT is 1545.8075 Mhz (1200 bps bitrate) Sound velocity profiles were acquired twice a day with a Valeport swift SVP with a maximum depth of 500m and extended up to 1200 using the SIS sound velocity editor. SIS 5 was used to collect multi beam data for all MBs with the same installation parameters. For 2040 we changed the roll correction to 0.105° Multi beam data was processed as soon after the acquisition on board the vessel with the software Quimera. The processed Dynamic surface was exported as .xyz, .arcascii and .Geotiff format at the following resolution: 5m from 0 to 150, 10 m from 150 to 600 and 20 m from 600 to 1200. The .kmall processed were exported to GSF and imported into FMGT software to run the backscatter mosaic at the same resolution of the DTM. The mosaic was exported as .xyz, .arcascii and .Geotiff. Navigation was exported for each MB line from Qimera as .txt file and converted to .shp file using global mapper. All data products were uploaded on the GISMAR Cloud every day to be imported in the Jamme Gaia Geoportal implemented for the survey remotely.

The following image describes the Jamme Gaia workflow from data collection to publication aiming at following the FAIR principles Fig.2

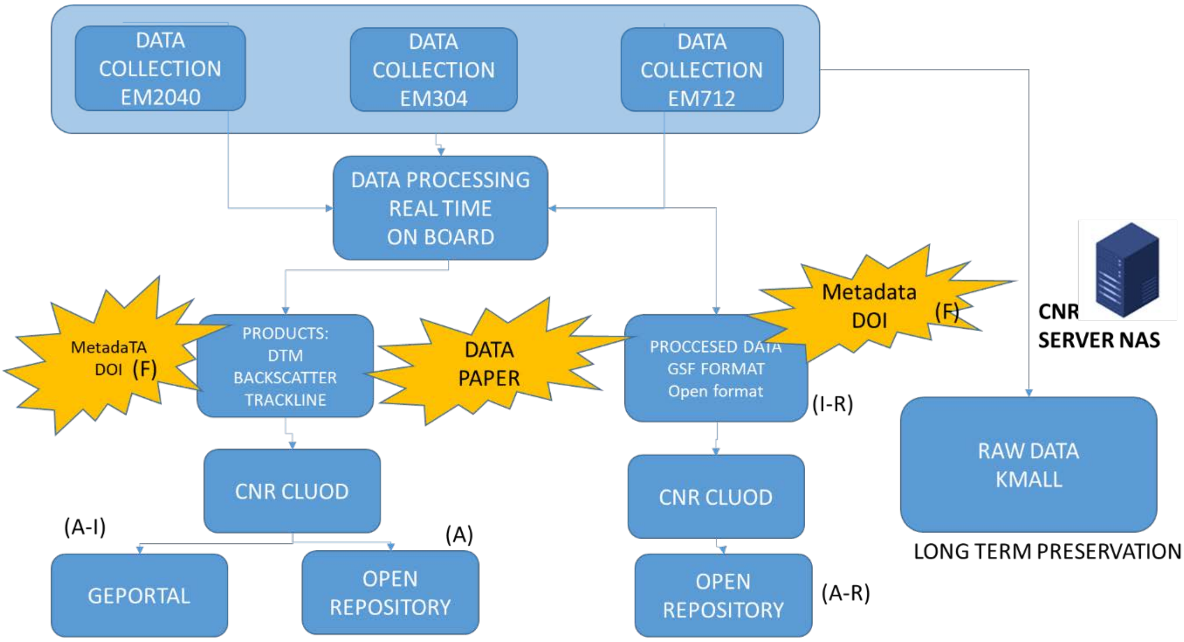

Figure 2 - Jamme Gaia Workflow towards the FAIR principle. (F) Findabilty, (A) Accessibilty, (I) Interoparabilty, (R) Reusabilty.

4. LEG 1 - 28 Sept 2022-06 Oct 2022 Naples-Naples

4. 1 Participant list

1. Federica Foglini CNR ISMAR Parti Chief
2. Alessandro Remia CNR ISMAR Multi Beam data acquisition and processing
3. Nora Tassetti CNR IRBIM Multi Beam data acquisition and processing
4. Claudio Pellegrini CNR ISMAR Multi Beam data acquisition and processing
5. Camilla Palmiotto CNR ISMAR Multi Beam data acquisition and processing
6. Giorgio Castellan CNR ISMAR Multi Beam data acquisition and processing
7. Daphnie Sanchez Galvez CNR ISMAR Multi Beam data acquisition and processing
8. Giovanni De Vita ARGO Marine technician

Remote support

1. Valentina Grande: CNR ISMAR cloud management, Geoportal implementation
2. Mariacristina Prampolini: CNR ISMAR Data products management and data loading

4.2 LEG 1 - RESULTS

We surveyed **1428 km2** of the Gulf of Naples from 50 m to 1200 m testing the performance of the instruments (Figure 3- Map of the bathymetry collected during LEG 1).

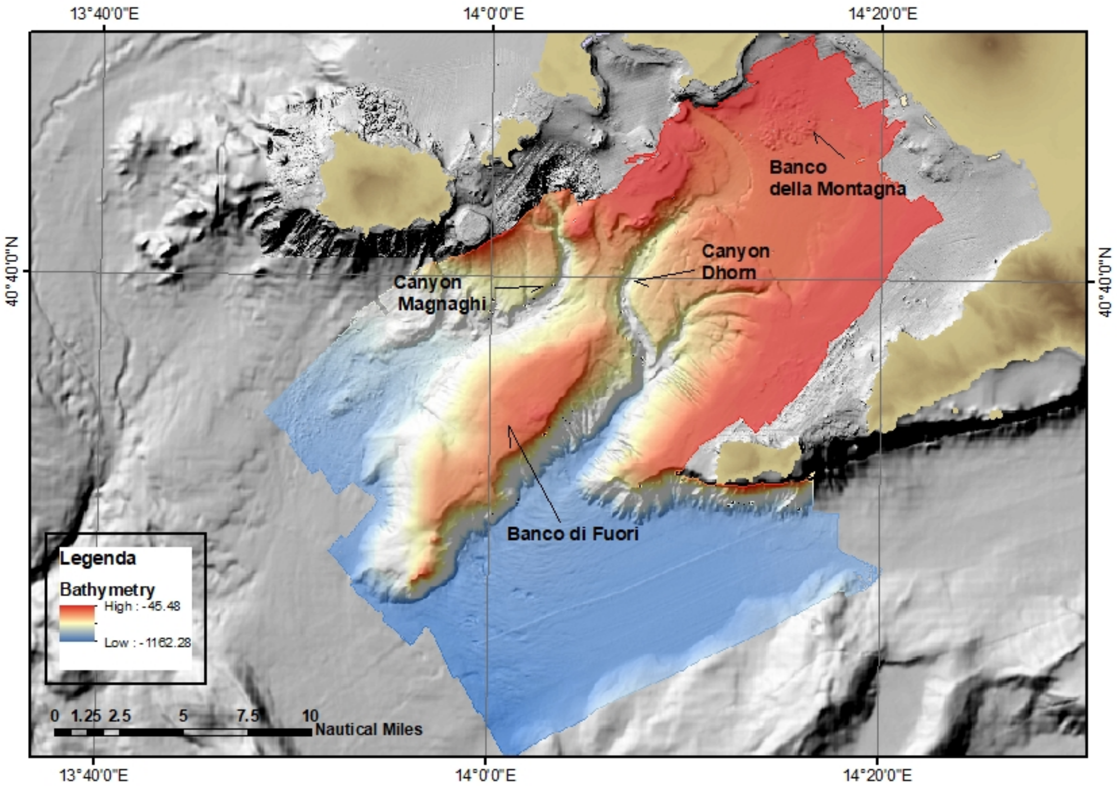

Figure 3- Map of the bathymetry collected during LEG 1

In the shallower area we characterised the **Banco della Montagna** off shore Naples that shows an elliptical external geometry with a hummocky morphology. From literature the Banco del Monte is a volcanic feature younger that 2ky before present and constitute by pyroclastic and marine sediments that crop out from the post last glacial maximum deposit (Passaro et al. 2016). This structural high is probably related to over pressure of fluids (Ventura et al. 2016). It extends for 4 km between 100 and 180 m.

From backscatter data it is possible to see several trawls tracks probably due to intense fishing and shipping traffic (Figure 4- Backscatter image of the Banco della Montagna).

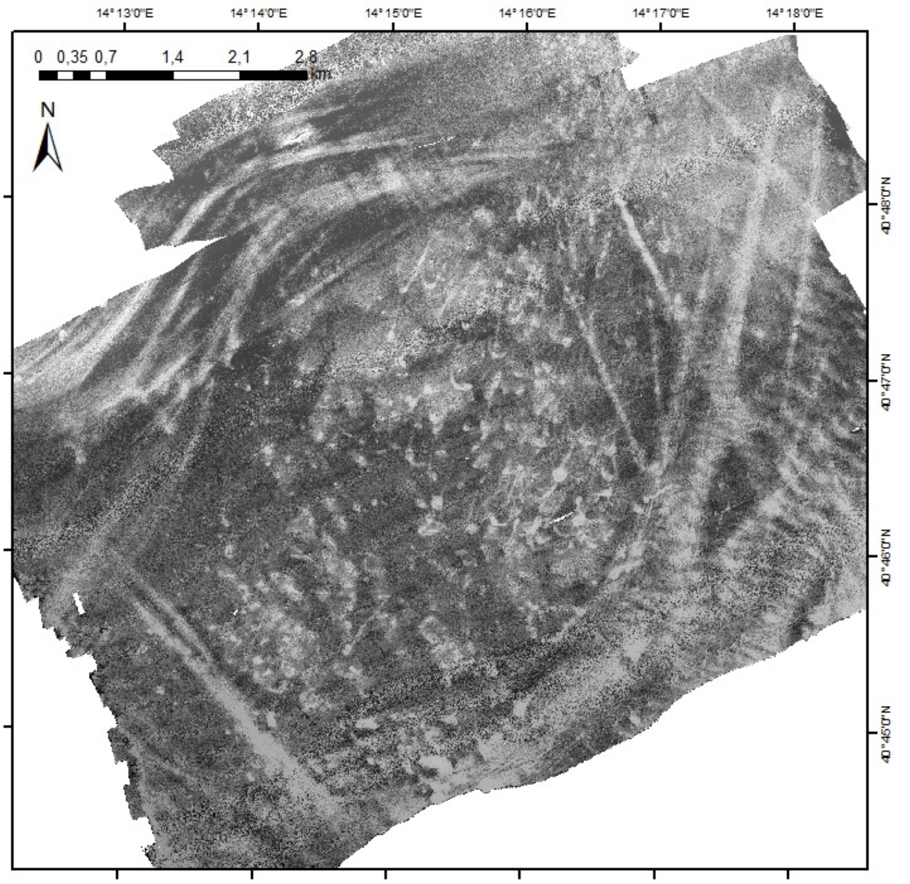

Figure 4- Backscatter image of the Banco della Montagna

We moved to the V shaped **Canyon Dohrn** extending for about 10 km toward the deeper sea from 180m where two branches indent the shelf edge. The canyon is characterised by steep flanks that show pervasive head scarps with slide deposit at their foot. The two canyon branches are about 500 m width and converge into a single canyon of up to 1500 km width. The canyon formed in response of the relative sea level fall during the last glaciation enhanced by local uplift cutting through Pleistocene sediment and the Campana Ignimbrite dated back to about 35 ky before present. (Milia 2000). The canyon is an hot spot of biodiversity hosting cold water coral in its steep slopes (Taviani et al, 2019) but recently it experienced a strong human pressure as proved by ROV images collected in the last years (Taviani et al., 2019).

North of the Dohrn canyon there is the **Magnaghi Canyon** that carves the shelf break to the peripheral rise of the eastern Tyrrhenian plate between 250 and 1100m. The canyon is about 500m in width in the shallower area and reach more than 2000 m in the distal reaches where it is characterised by debris flow deposits. Small gullies indent the northern wall of the Magnaghi Canyon likely concurring in the delivery of sediments toward the basin. Along slope bathymetric section shows the presence of asymmetrical convex up bed forms. A few shows asymmetrical geometry (Figure 5- Bathymetric profile along the northern flank of the Magnaghi canyon (see location in Figure 6- Slope map of the Magnaghi canyon with the bathymetric profile (black line))) and are reminiscent of up slope bedform such as antidunes cyclic steps meaning formation under supercritical and transcritical flows as documented by Cartigny et al, 2014. The Magnaghi canyon, as the Dhorn canyon, cut the middle to late Pleistocene succession (Aiello et al., 2001).

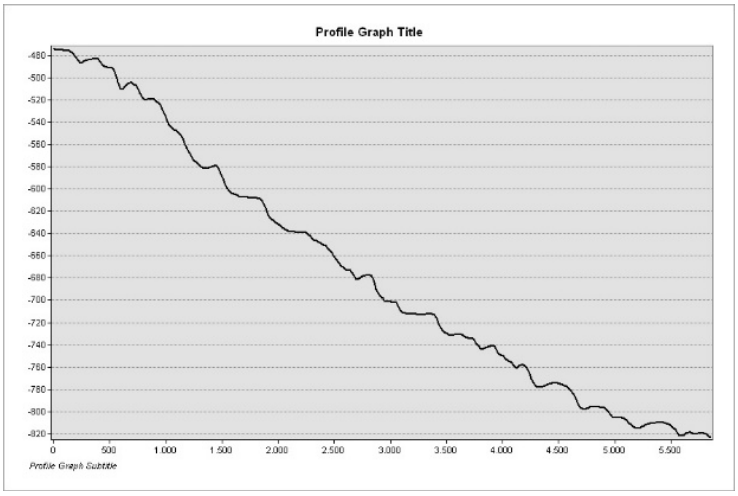

Figure 5- Bathymetric profile along the northern flank of the Magnaghi canyon (see location in Figure 6- Slope map of the Magnaghi canyon with the bathymetric profile (black line))

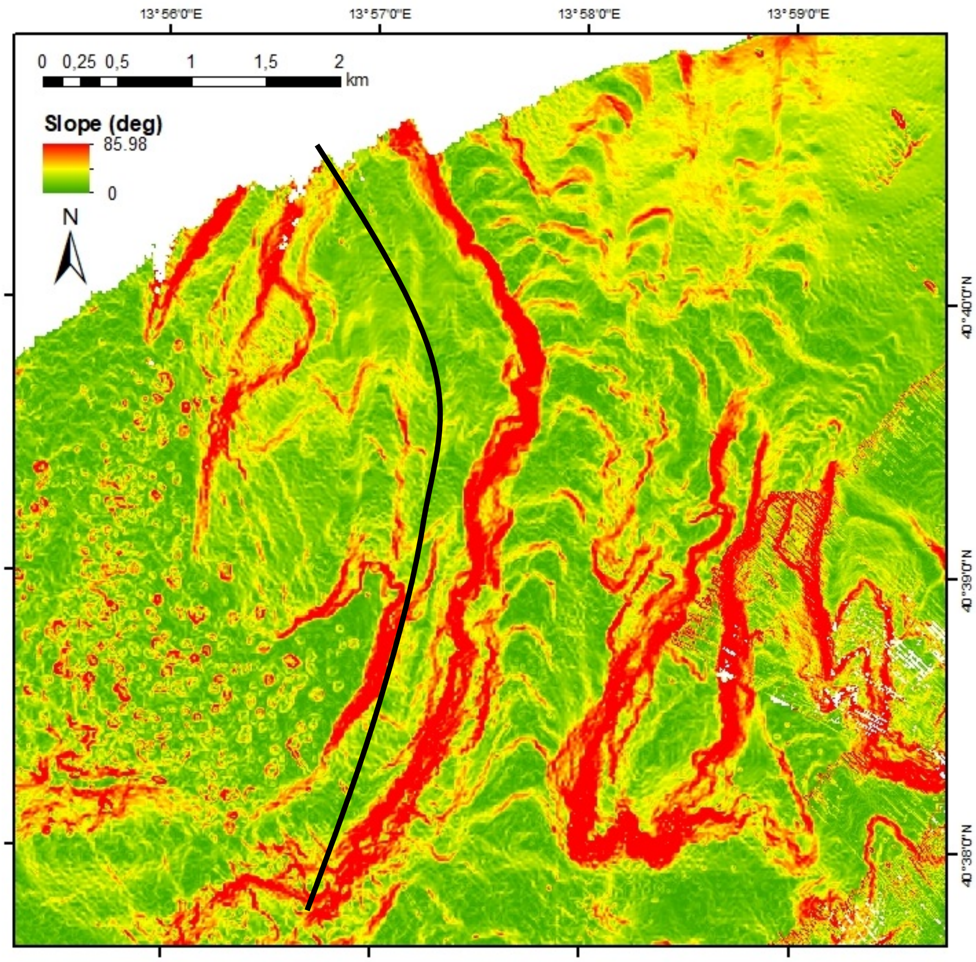

Figure 6- Slope map of the Magnaghi canyon with the bathymetric profile (black line)

The Magnaghi canyon is separated by the Dohrn canyon by the "**Banco di Fuori**", a structural high elongated north east for more than 20km and reaches 10 km in width. The southern flank of the "Banco di Fuori" shows several gullies with head scarps and small fans along the slope. Fans are well visible on the backscatter data.

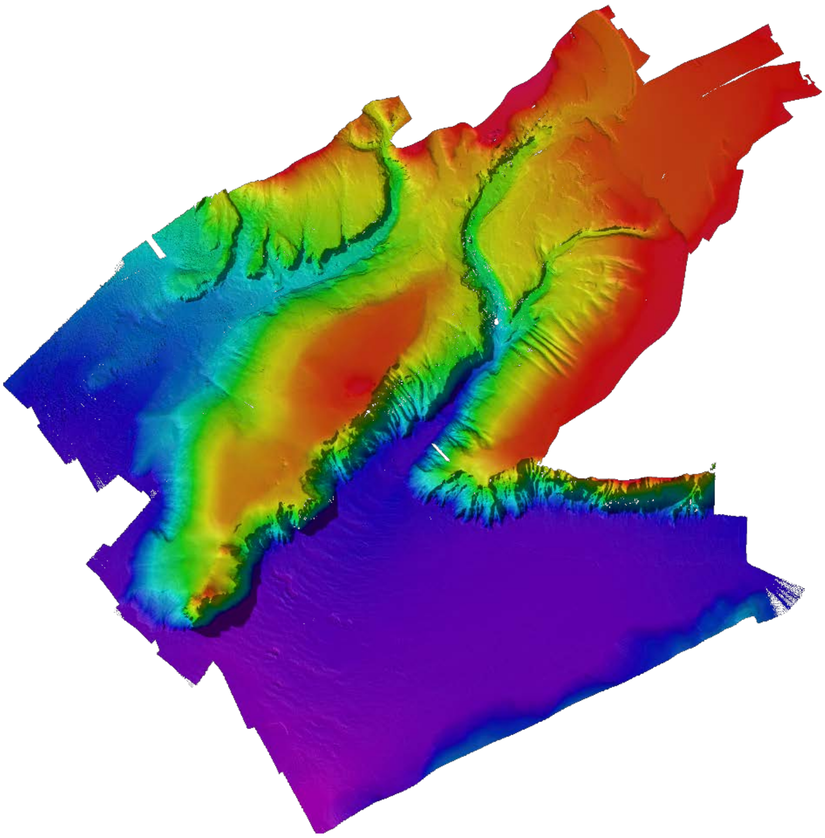

Figure 7- 3D view of the data collected in leg 1

Offshore the Sorrento between 80 and 130 meters the seafloor shows irregular morphology due to the presence of scattered small reliefs associated to coralligenous habitat likely formed on coarse grain sediments.

5. LEG 2 - 06 Oct-13 Oct 2022 Naples-Naples

5.1 Participant list

1. Renato Tonielli CNR ISMAR Parti Chief
2. Marco Sacchi CNR ISMAR Multi Beam data acquisition and processing
3. Francesca Budillon CNR ISMAR Multi Beam data acquisition and processing
4. Sara Innangi CNR ISMAR Multi Beam data acquisition and processing
5. Filomena Loreto CNR ISMAR Multi Beam data acquisition and processing
6. Gabriella Di Martino CNR ISMAR Multi Beam data acquisition and processing
7. Giorgio Castellan CNR ISMAR Multi Beam data acquisition and processing
8. Daphnie Sanchez Galvez CNR ISMAR Multi Beam data acquisition and processing
9. Fantina Madricardo CNR ISMAR Multi Beam data acquisition and processing

Remote support

3. Valentina Grande: CNR ISMAR cloud management, Geoportal implementation
4. Mariacristina Prampolini: CNR ISMAR Data products management and data loading

5.2 LEG 2- RESULTS

We surveyed about **1500 km2** of the Gulf of Naples from 50 m to 1200 m testing the performance of the instruments. Figure below shows some of the data collected.

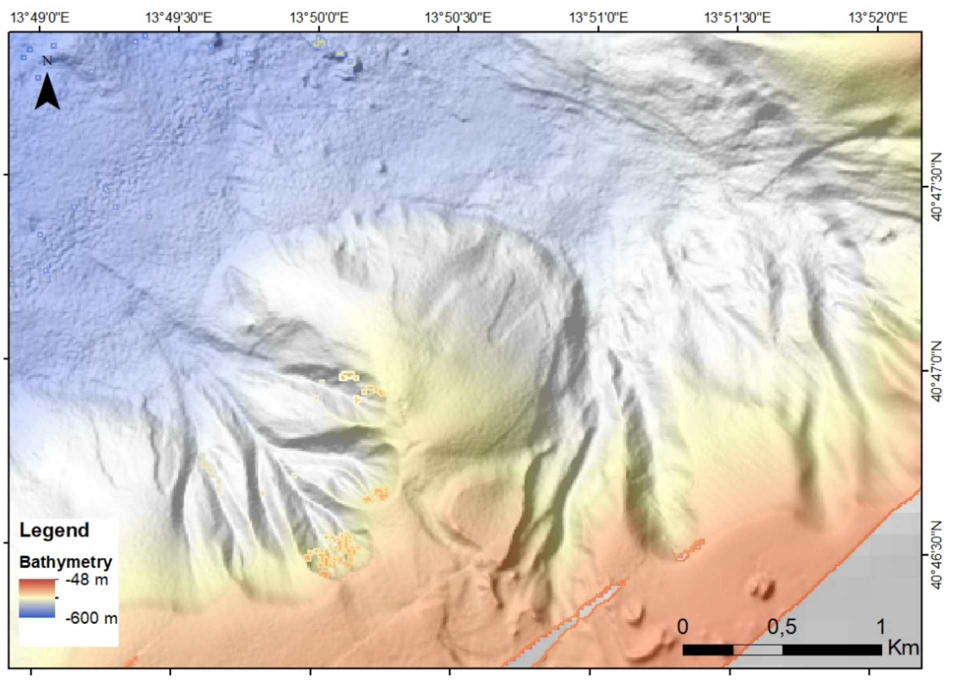

Figure 8-Bathymetry of Magnaghi Canyon

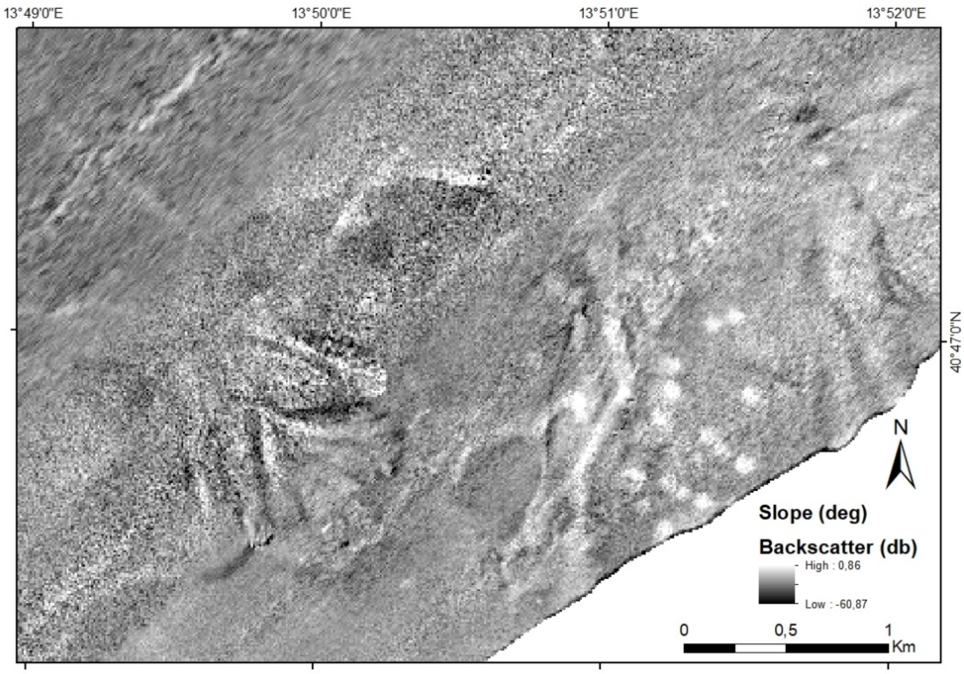

Figure 9- Detail of the backscatter of the head of the Magnaghi Canyon

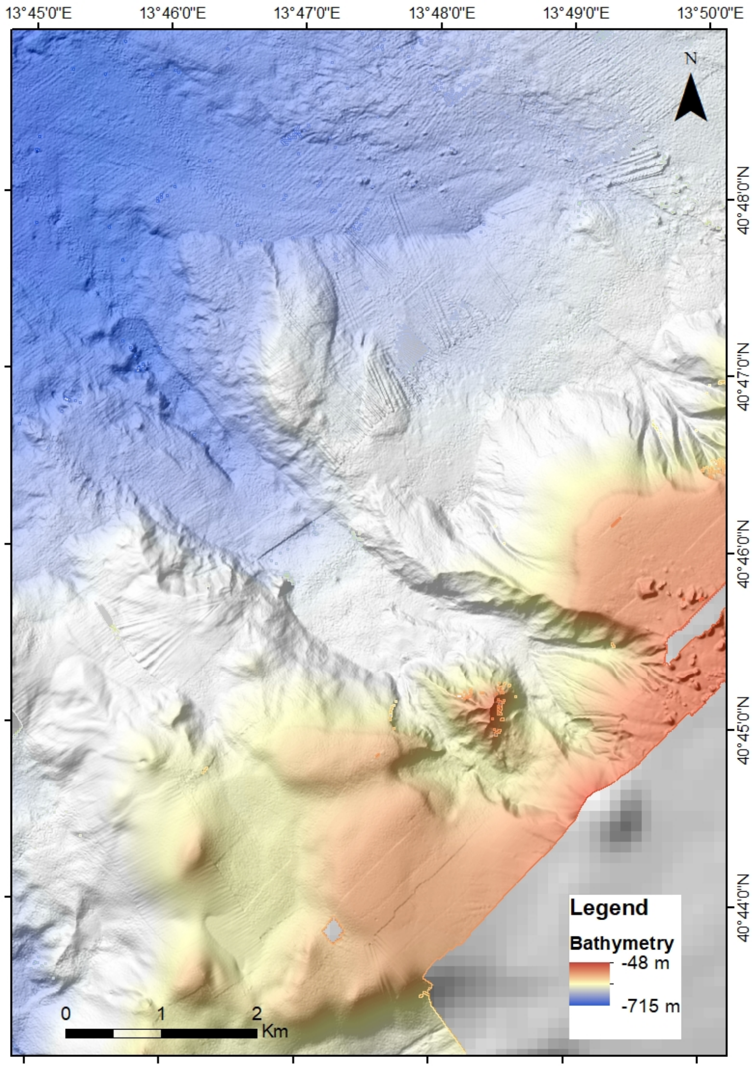

Figure 10- Bathymetry of the Forìo Canyon

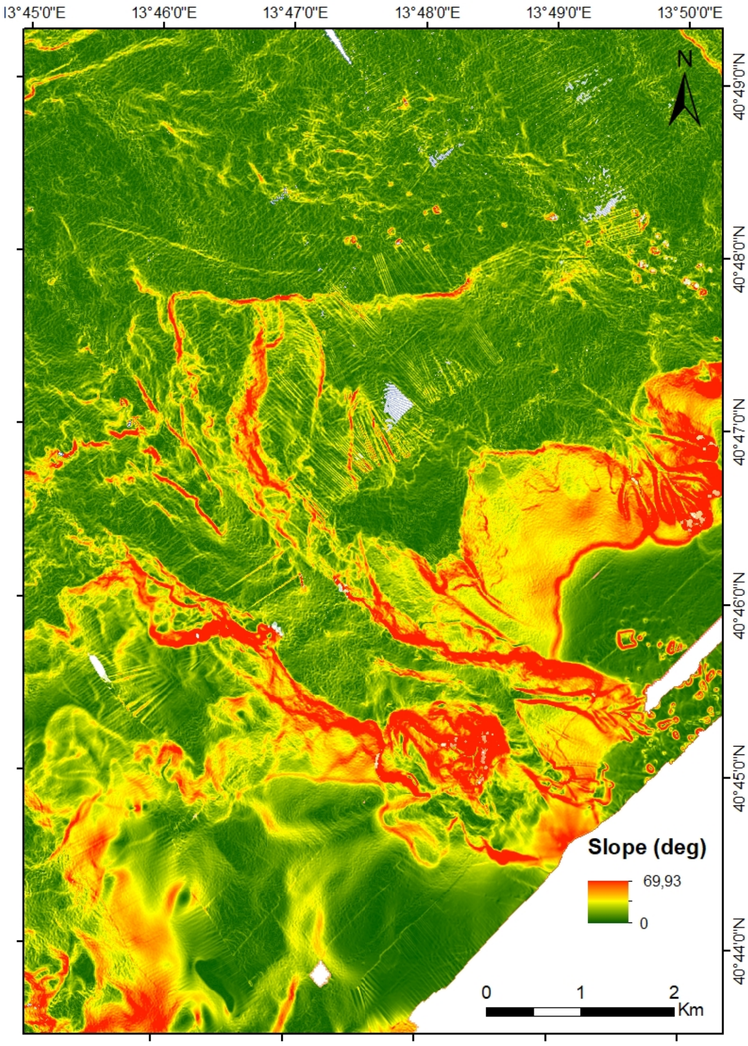

Figure 11- Slope of the Forìo Canyon

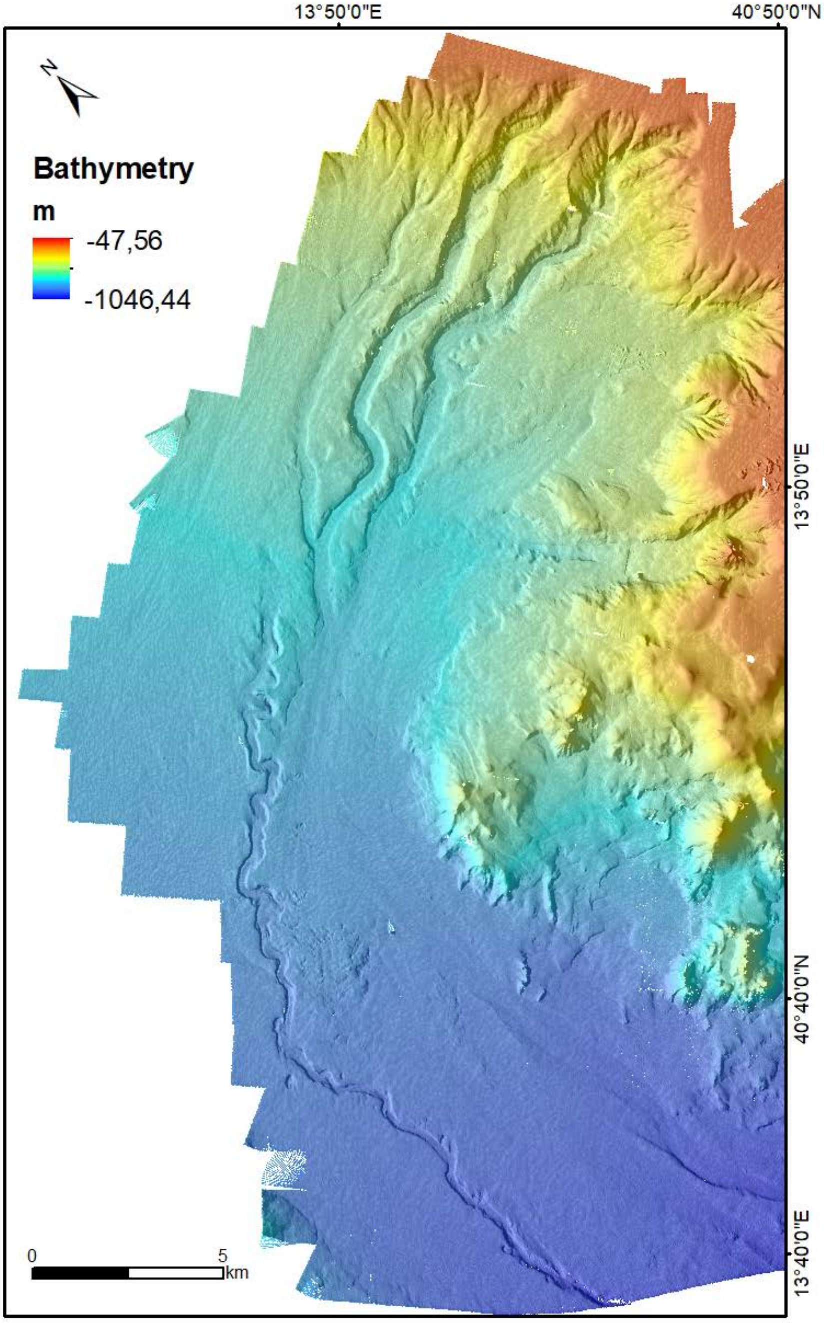

Figure 12_Bathymetry of the Cuma canyon (vertical exaggeration 5 x, 15 m horizontal resolution)

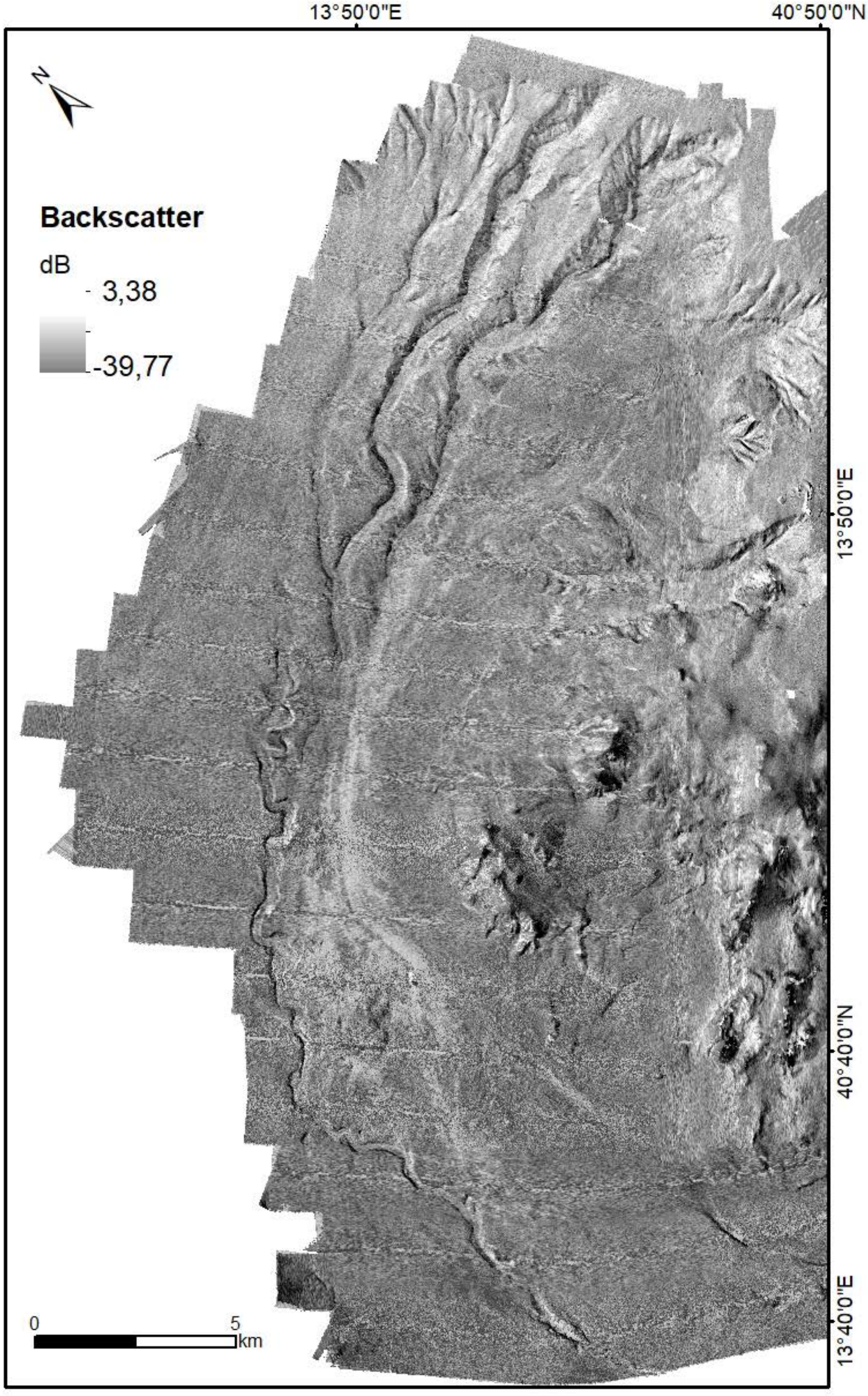

Figure 13-Backscatter of the Cuma Canyon draped on bathymetry (20 m horizontal resolution)

The Sirene Seamount

Between 40°25’N and 40°10’N, and 13°45’E and 14°05’E we investigated the Sirene Sm., which is a tectonically-controlled high, NW-SE oriented (Réhault et al., 1987) bounded by two Middle-Late Pleistocene basins (Milia et al., 2016). This structure is bounded by two main inverse faults on top of which sediments deforms in fault-anticline-folds, these are buried below Pleistocene sediments on the Campania side and cropping out on the open sea side, thus, suggesting that this structure could be currently active (Zitellini et al., 2020). The origin of stress field controlling the formation of the Sirene transpressive structure still not at all understood, some authors suggest a local compression controlled by lateral offset along normal faults (Conti et al., 2017) and related to the eastward migration of the Apennines front (Doglioni et al., 1999), some others suggest a regional control due to a diffuse compression guided by the slow Africa Eurasia convergence (Zitellini et al., 2020).

The Sirene Sm. is ca. 40 km-long and 8.1 km-large, raising of about 650 m with respect to the deeper lateral basins (Figure 14- 3D view of the Sirene Seamount bathymetry). The new acquired full-depth ocean multibeam (EM304) shows a more detailed morphology of the seamount. Indeed, high-resolution multibeam data revealed a series of slides and slumps affecting both sides of the structure and the morphology of the top, represented by gently highs and lows with sigmoidal shape likely related with the tectonics. The sigmoidal trend could be controlled by small fault segments belonging to the wide fault planes at depth merging and forming a positive flower structure (Woodcock & Rickards, 2003).

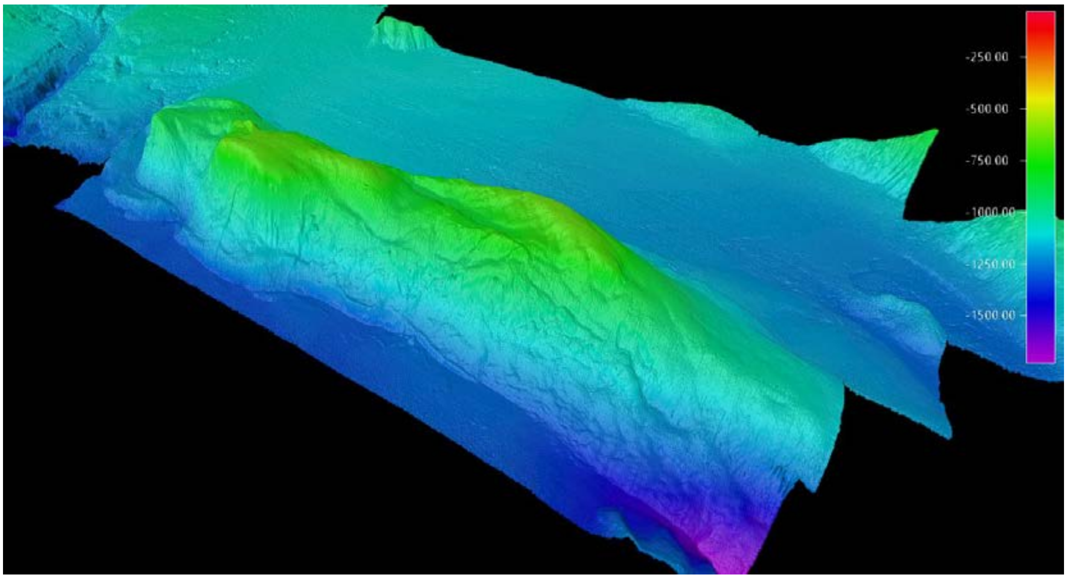

Figure 14- 3D view of the Sirene Seamount bathymetry

During the second leg a total area of 2005 km2 was covered (*Figure 15- 3D view of the Leg 2 bathymetry.*) .

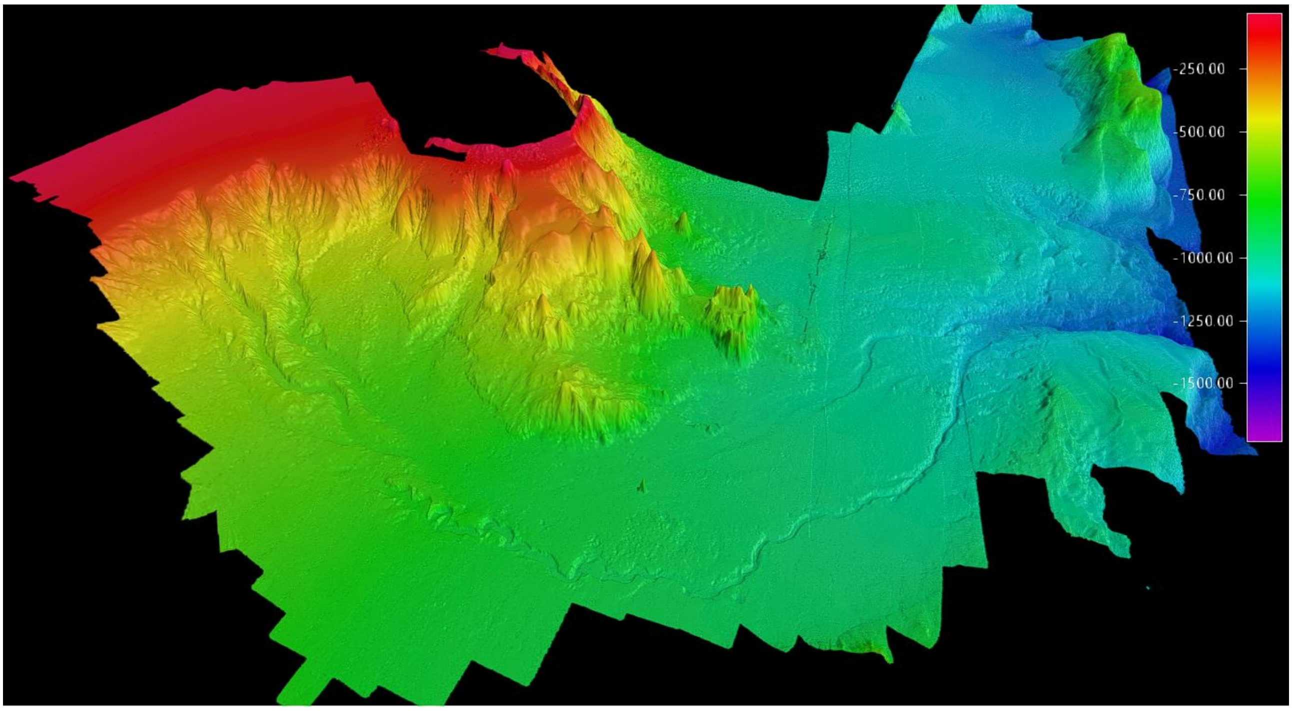

Figure 15- 3D view of the Leg 2 bathymetry.

6. LEG 3 - 13 Oct-20 Oct 2022 Naples-Naples

6.1 Participant list

1. Marzia Rovere CNR ISMAR Parti Chief
2. Renato Tonielli CNR ISMAR Multi Beam data acquisition and processing
3. Sara Innangi CNR ISMAR Multi Beam data acquisition and processing
4. Gabriella Di Martino CNR ISMAR Multi Beam data acquisition and processing
5. Giorgio Castellan CNR ISMAR Multi Beam data acquisition and processing
6. Alessandra Mercorella CNR ISMAR Multi Beam data acquisition and processing
7. Paolo Montagna CNR ISP Multi Beam data acquisition and processing
8. Lorenzo Petracchini CNR IGAG Multi Beam data acquisition and processing

Remote support

1. Valentina Grande: CNR ISMAR cloud management, Geoportal implementation
2. Mariacristina Prampolini: CNR ISMAR Data products management and data loading

6.2 LEG 3- RESULTS

During the 3rd leg of the cruise, on October 13th and 14th we completed the survey along the slope and outer shelf located just north of the Cuma canyon system. Here gullies and straight slope channels incise the steep slope, which is characterized by gradients ranging 5-7° along the open slope, unaffected by channelized erosion.

The steepest part of the slope is intersected by the 25-km-long headwall of a submarine landslide associated with pockmarks up to 50 m in diameter. The lower slope probably hosts the distal portion of the Volturno river system with sediment waves forming on the levees and overbank areas. The outer shelf is characterized by the presence of pockmarks aligning along the shelf edge and contour-parallel bedforms with relief < 2 m.

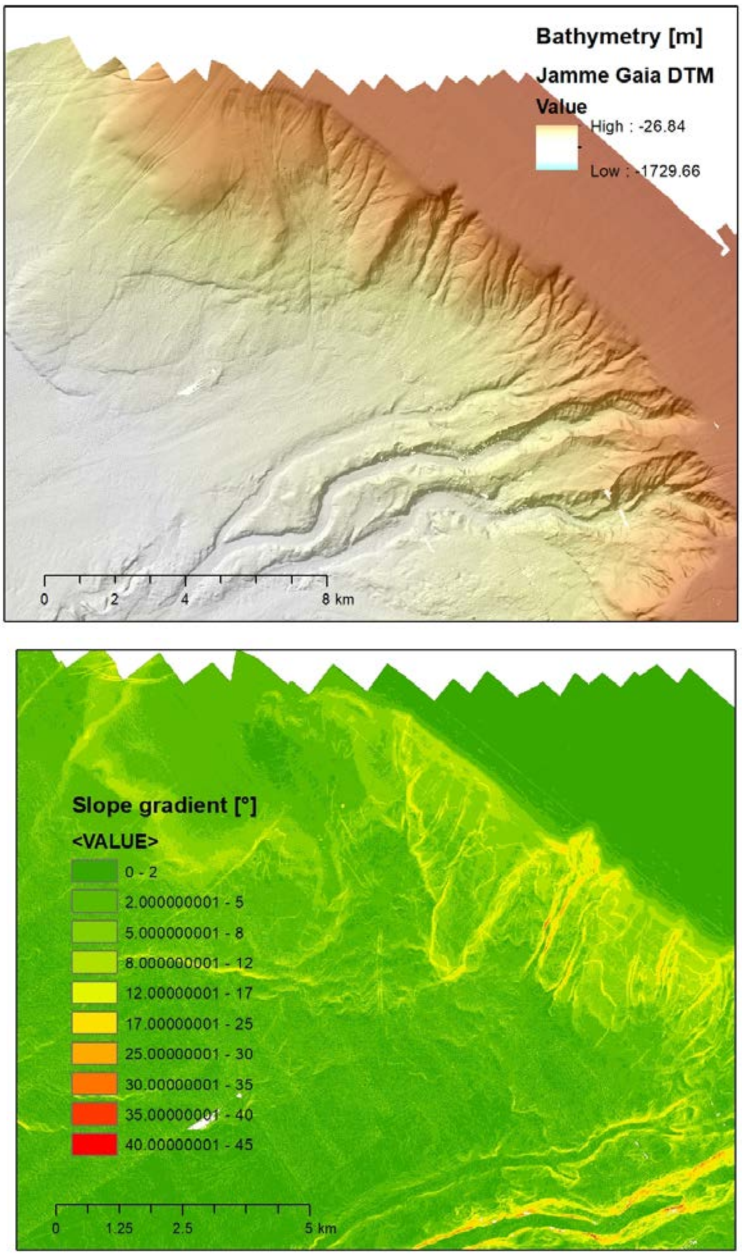

Figure 16 –Shaded relief and slope gradient of the northern part of the survey area during Leg 3.

We also completed the survey north of Ischia Island where the navigation is sometimes hampered by the intense traffic and fishery activities. Off Casamicciola Terme, rocky debris from the northern flank of the island is present and form a fan shape.

During the early hours of Oct. 15th we transferred to the area south of the Gulf of Pozzuoli to complete the seafloor mapping of the head of the Magnaghi canyon which is 150 km wide only accounting for its main branch. The canyon head was only completed during the night of October 15th and some gaps remain due to the difficulty of navigation around small fishing vessels. Similarly, the Ischia Bank was not accessible for surveying due to the presence of buoys in the adjoining area that prevent the manoeuvre of the ship. The Miseno Bank was partially surveyed due to the presence of fishing gears and boats that prevented the access to the area during both daylight and night. The Miseno Bank shows a widespread presence of debris at the seafloor. Comparisons with previous imaging of the area to attempt an assessment of the nature of these meter-high boulders is hampered by the lack of high-resolution data in this location. Bioconstructions are likely present at its summit although most of the area is missing in the current map.

The Penta Palumbo Shoal was entirely mapped using EM712 on the flat areas and EM2040 over the summit areas that are extensively formed or recolonized by bioconstructions; the northern flank is completely buried and reshaped by a thick sediment drift whereas the southern flank is steeper and more irregular compared to the northern one. Here small cones and bioconstructions are also visible. Overall, the shape of the seamount is rounded revealing the relict volcanic origin of the structure, which is very similar to the Nisida Bank which is characterized by a rounded shape with a diameter of 1200 m typical of a volcanic caldera. Indeed, the Gulf of Pozzuoli hosts the offshore area of the Phlegrean caldera. High-resolution seismic stratigraphy of the Gulf of Pozzuoli highlighted marine sedimentation in the eastern part of the bay offshore Baia), while volcanic units prevail in the western bay, offshore Pozzuoli (Aiello et al., 2012). In the central and western part of the Gulf of Pozzuoli, the seafloor is characterized by a smooth topography punctuated by four main depressions, corresponding to pockmarks 40-m-wide and 1 m deep with a very well preserved central cone. The backscatter of the water column shows columnar flares in the water column emanating from the seabed up to the sea surface. The pockmarks are located in the proximity of the main eruptive centers as indicated in Passaro et al. (2015). Five distinct submarine fumarolic fields were sampled in the bay: Mar Morto, Mercato Ittico, Erculanea, Nisida and Fumose, the latter having the highest temperature (93 °C) among the submarine gas discharges (Vaselli et al, 2011). The submarine gas samples have concentrations of ethane, propane and propene of about one order of magnitude higher than those collected on land. The Fumose gas discharges have the highest concentrations of benzene (Vaselli et al, 2011).

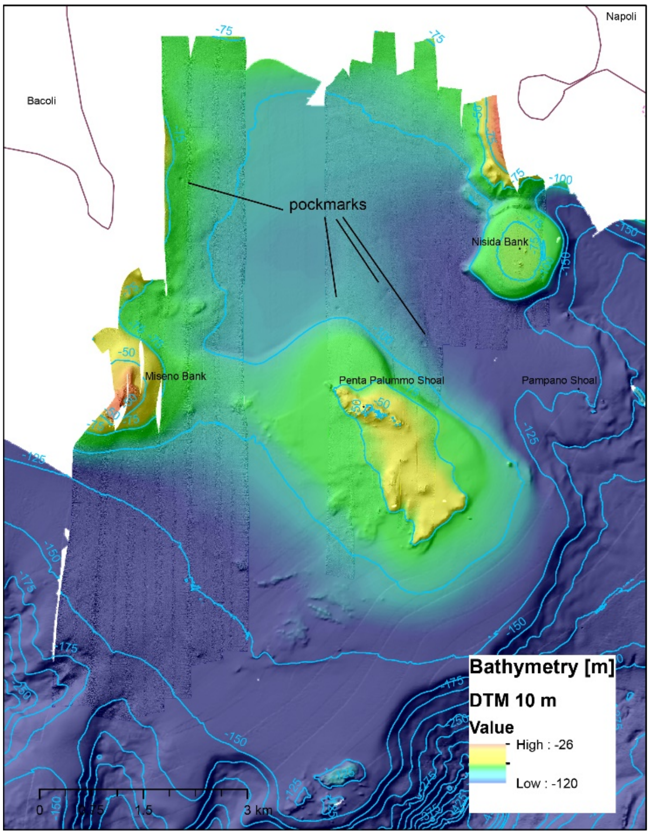

Figure 17 –Shaded relief of the survey area in the Gulf of Pozzuoli during Leg 3.

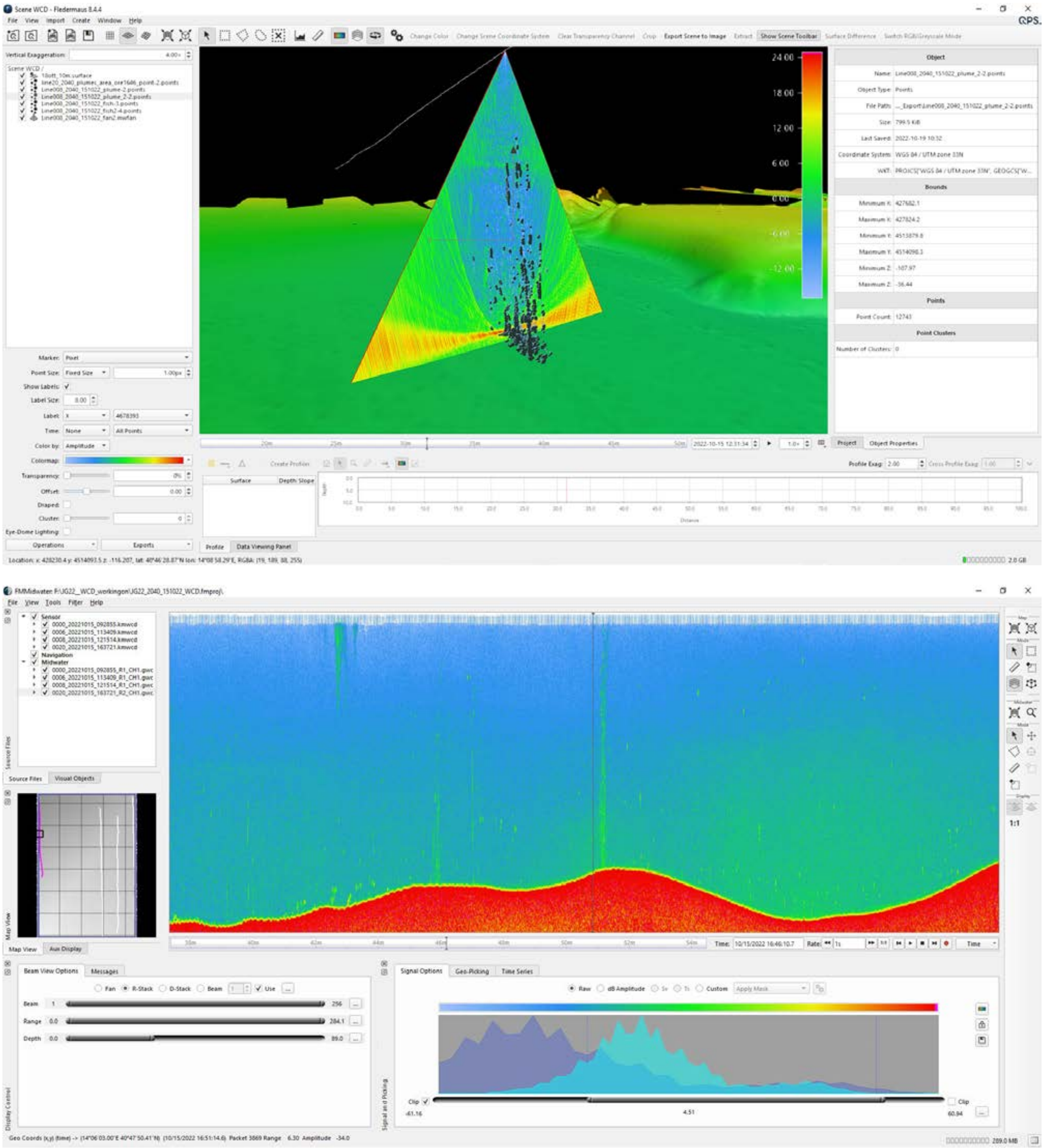

Figure 18 – Plumes in the Gulf of Pozzuoli collected during Leg 3. (Above) 3D view of the swath and the plume of CO_2 venting from the 100 m deep seafloor just north of the Penta Palummo Bank, where a paucity of pockmarks is present; (below) stack view of a N-S oriented track line intercepting several gas plumes in the Gulf pf Pozzuoli, the tallest of which reaches the sea surface.

The seafloor offshore Bagnoli is characterized by gentle WNW-ESE oriented undulations that do not show significant relief. Several possible wrecks are visible on the seafloor as elongated regular features less than 20 m long. The western side of the Gulf of Pozzuoli hosts large areas dedicated to mussels farming off Baia, Bacoli and Capo Miseno, which inhibit the navigation. In addition to this, the intense traffic of ferryboats in and out the port of Pozzuoli and in transit to the Islands of Procida and Ischia across the distal area of the gulf make the survey with a large vessel such as Gaia blu really hard in terms of safety of navigation. The navigation inside the channel between Procida and Monte di Procida is prohibited for motor boats as exclusive rights are granted to commercial vessel for public transport.

During the late hours of October 15th we left the area off Pozzuoli and transferred to the area located offshore the Salerno Valley and we surveyed waters deeper than 1000 m with EM304. The area is dominated by the NNE-SSW oriented Sele Seamount whose northeastern slope tips with a sort of plunge pool between 600 and 750m. The northern slope of the seamount is affected by several headwall and scars, probably corresponding to shallow seated landslides. The Sele Seamount was highlighted by the first seismic explorations using sparker sources started in the early 60's (Savelli and Wezel, 1980). It is located 15 km south of the Capri Island and culminates at 300 m water depth. No specific studies are reported to date about the geology of the seamount and on the benthic communities. The presence of sperm whale close to the Sele Seamount has been annotated in the past (see Würtz and Rovere, 2015).

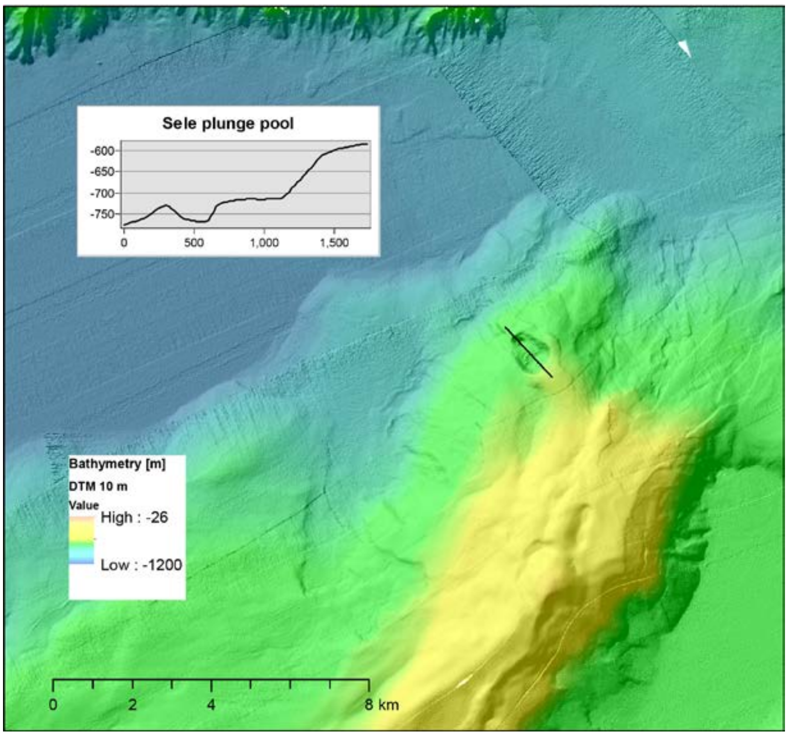

Figure 19 – Bathymetry of the northern termination of the Sele Seamount, acquired with EM710.

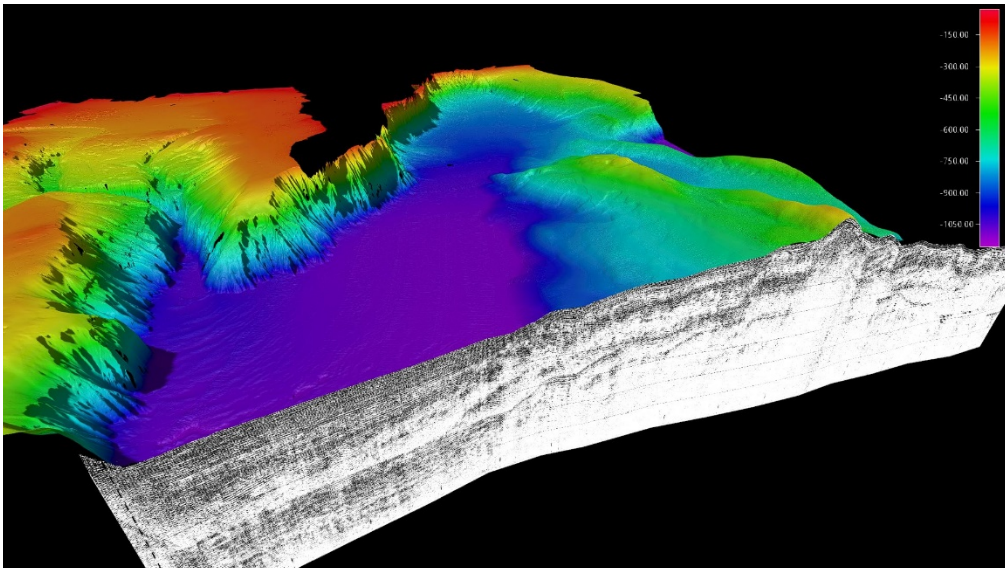

Figure 20 – Bathymetry and vintage seismic sparker profile collected in 1980 by researchers of the Institute of Marine Sciences of Bologna across the Salerno valley and the Sele Seamount.

During the morning and afternoon of October 16th, and after having performed the deepest (1000 m) sound velocity profile, we surveyed the steep continental slope off Capri and the Amalfi coast from Punta Campanella to the Amalfi village. Here the continental shelf is narrow reaching minimum width offshore the village of Praiano and Amalfi where the width of the shelf is less than 200 m. Off the Positano Bay, the Galli Islands and shallow shoals around the islands prevent the navigation along optimal tracks. During the night between October 16th and 17th we surveyed the Salerno Valley with EM710 along the northern lower slope and EM304 over the rather flat and featureless seafloor.

On October 17th, we continued the survey along the Amalfi coast to cover the shelf edge, the steep slope incised by linear gullies reaching gradients exceeding 70° that sometimes make it difficult to image correctly the seafloor. In particular, offshore Positano, a large steep canyon is the prolongation of the same feature located west of Montepertuso on land.

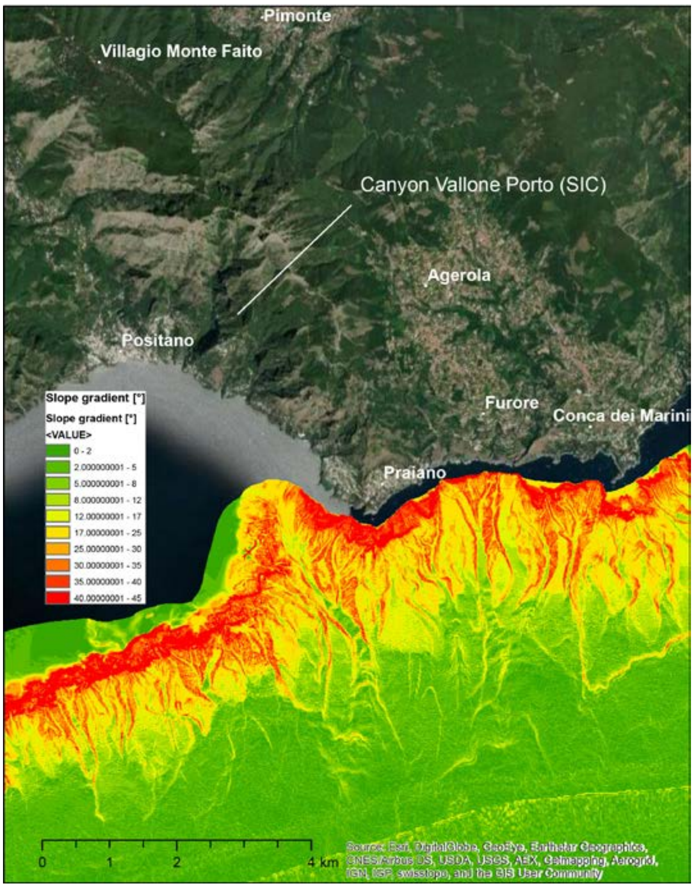

Figure 21 – Continental slope offshore Positano along the Amalfi Coast, see the continuity between Vallone Porto and the offshore canyon.

From the slope several shallow seated slides and debris flows, some times reaching up to 7 km in run out are emplaced. In 1954 a flooding devasted Salerno, Vietri sul Mare, Cava de' Tirreni, Salerno, Maiori, Minori, Tramonti, when the two rivers Bonea and Cavaiola carried along the way so much debris and sediment to generate the beach in Vietri (Violante, 2009).

On October 18th, we completed the survey over the Sele Seamount that revealed a peculiar slightly arcuate shape and a saddle in the middle. A smaller ridge runs parallel to the main seamount and is offset across a small basin. Sound velocity anomalies were detected during the transit on top of the Sele Seamount, we therefore decided to perform an additional sound velocity cast to highlight deviations in the surface waters compared to the profiles collected in the deeper part of the Salerno Valley. Indeed, slightly higher velocities were detected in the first 100 m of the profile.

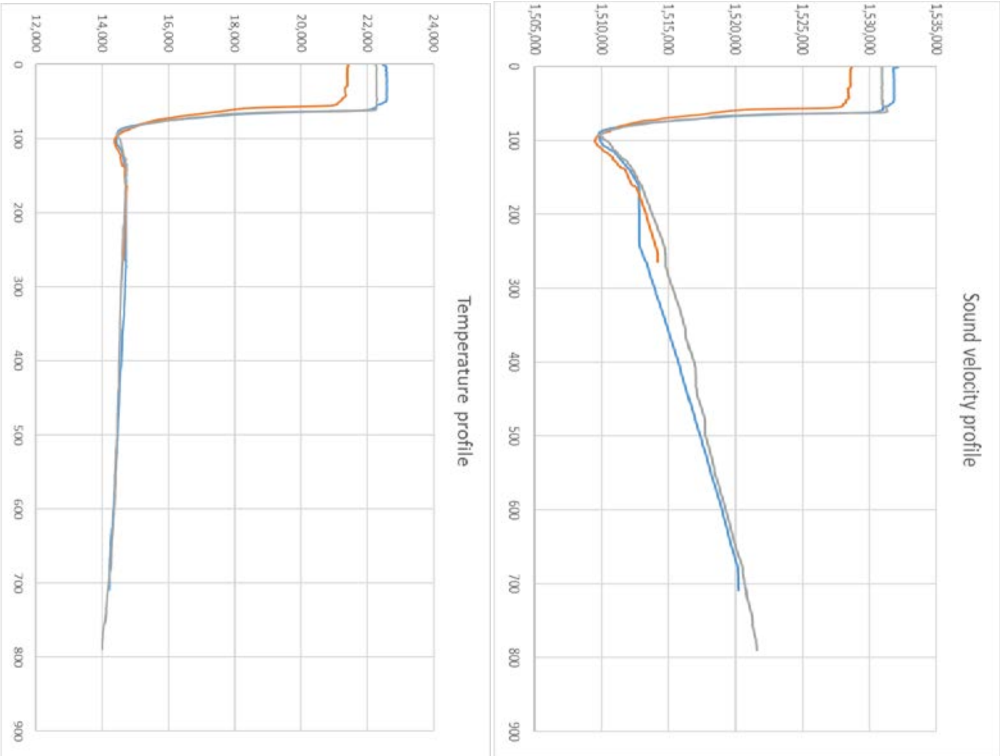

Figure 22 – Comparison of downcast of temperature and sound velocity profiles recorded in the area of the Sele Seamount. Red profiles recorded on top of the Sele Seamount show lower temperature (1°) and lower velocities compared to profiles collected in the Salerno Valley.

On October 19th, we continued the survey along the southern slope of the Salerno Valley until 14:30 local time when we left the area to reach the port of Naples. TV operators joined the cruise to making interviews and reportage on the first ever CNR cruise of the R/V Gaia blu.

During the night between October 19th and 20th, we transferred in the area beyond the Sirene Seamount to complete the survey over the distal termination of the Cuma canyon using EM304, a sound velocity profile was casted at 700 m water depth. On October 20th, morning we returned to the area off Capri and after having performed a sound velocity cast we started again surveying the shelf edge around Capri using EM710.

7. Acknowledgements

We thank the Argo crew for the excellent job done and for the full support to the operation. A special thanks to the Capitan Pasquale Guida for his great help and for guiding us day and night through the marvellous Gulf of Naples.

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