Eurofleets+

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# CRUISE REPORT

## "Climate Dynamics and Environmental Change in the Aegean Sea during the Holocene"

R/V AEGAEO, Cruise 'MYRTOON'

30.09 (Piraeus, Greece) – 09.10.2021 (Piraeus, Greece)


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**Table of Content**

# 1 Summary

EUROFLEETS+ cruise 'MYRTOON' (Climate Dynamics and Environmental Change in the Aegean Sea during the Holocene) focused on investigating the potential influence of climatically and neotectonically driven environmental change on critical sociocultural transitions in the SW Aegean Sea region over the Holocene. Surrounded by the landmasses of the Peloponnese, Attica, and the Cyclades Islands, the study area comprises one of the few regions in Europe that has been continuously inhabited since Neolithic times, and it holds a central position within the ancient core locations of the Cycladic, Mycenean, and Classical Greek civilizations (Figure 1). In this cruise, we combined geophysical surveys (multibeam, Airgun, and Sparker profiling) with sediment coring (gravity and box corers) in the Argolikos and Myrtoon Basins of the SW Aegean Sea on-board R/V AEGAEO. Specifically, mapping of the seafloor and the sub-surface with multibeam (total surface of c. 1200 km$^2$), Airgun and Sparker echosounders (total line length of c. 584 and 164 km, respectively) allowed to investigate tectonic structures and sub-marine landslides in the study region. In addition, sedimentological, micropaleontological and geochemical analyses on core sediments (from seven gravity and three box cores) will allow to reconstruct the natural terrestrial ecosystems on these landmasses, ultimately resolving the environmental conditions during the rise and fall of early cultures in the southern Aegean Sea region.

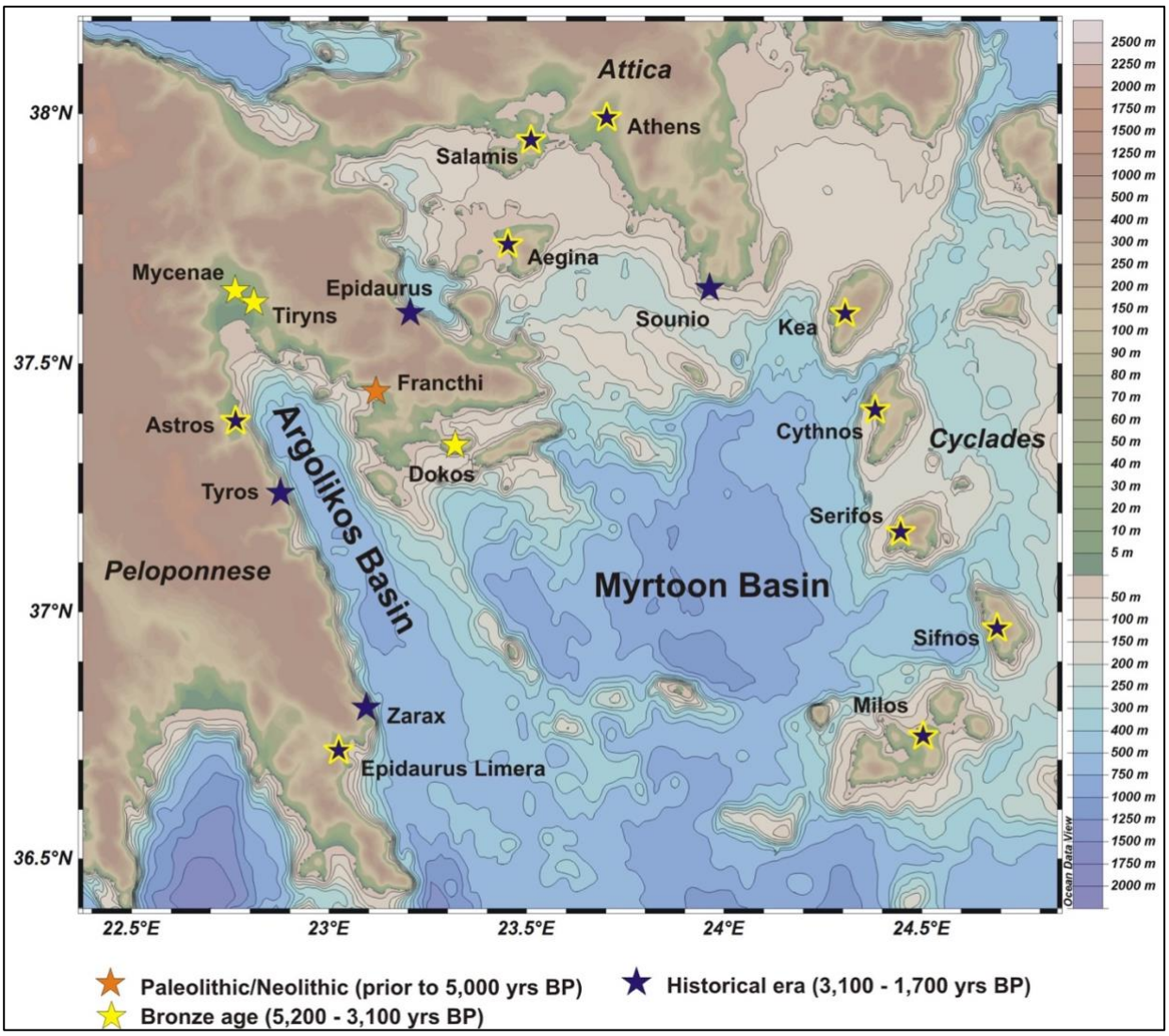


**Figure 1.** Map of the study area indicating important archaeological sites in the surrounding landmasses.

# 2 Research Programme/Objectives

The study goal is to assess the influence of climatically and neotectonically driven environmental change on critical sociocultural transitions in the Aegean region during the Holocene. To successfully tackle these scientific objectives, the project was divided into two work packages (WP):

**WP1 – Tectonic structure and sedimentary evolution of the Argolikos and Myrtoon Basins:**

The primary tasks of WP1 were to locate, map and study the kinematic characteristics of the main active faults that are responsible for the formation, evolution and present morphological configuration of the Argolikos and Myrtoon Basins, including: (i) shaping of the steep slopes that confine the basin's flat seafloor; (ii) identification of active faults; and (iii) identification of submarine slope failures and mass transport deposits on the seafloor and in the basin sedimentary record to estimate the frequency of landslide occurrences (and thus landslide hazards) in the study area. The deliverables of WP1 include: (i) identification of the fault network, and geometrical and kinematic characteristics of individual faults and deformation patterns; (ii) identification of the active faults; (iii) identification of the mass-transport deposits in the basin's sedimentary infill and deformational processes; (iv) assessment of submarine landslide hazard.

**WP2 – Climate and ecosystem evolution in the Argolikos and Myrtoon Basins during the Holocene:**

Sediment coring in the Argolikos and Myrtoon Basins will yield multi-proxy records of terrestrial climate and marine productivity during the Holocene. Specifically, coring was carried out with a 5-m-long gravity corer and a 60-cm-long box corer. Preliminary data suggest that the sedimentation records from both basins are marked by high sedimentation rates and span the entire Holocene. Ongoing post-cruise analyses focus on both terrestrial climate proxies (pollen and spores, organic biomarkers, grain size, and sediment geochemistry derived from XRF core scanning) and marine ecosystem and productivity proxies (micropaleontology, oxygen- and carbon-isotope geochemistry). In addition, high-resolution age control will be achieved by $^{14}C$ dating and tephrostratigraphy.

# 3 Narrative of the Cruise

**28th – 29th September: Pre-embarkation activities**

On Tuesday, 28th of September, all cruise participants were tested against Covid-19 at the Institut Pasteur in Athens. The PCR test results were sent confidentially to the cruise 'Operator', i.e., the Hellenic Center for Marine Research (HCMR). Subsequently, they were passed along to the captain of R/V AEGAEO who approved the embarkation of the scientists on the vessel.

On Wednesday, September 29th, testing of the equipment was carried out on-board R/V AEGAEO, and the HCMR IT specialists installed and tested the most recent version of EARS software on the vessel's computers. In addition, because of the forecasted stormy weather conditions in the Myrtoon Basin, which was the originally proposed study area, alternative research areas fulfilling the objectives of the project were meticulously explored. Argolikos Basin was selected as an alternative research area because of its proximity to the Myrtoon Basin (Figure 1), warranting: (i) similar climate and environmental conditions during the Holocene recording terrestrial signals from the same landmasses; (ii) active neotectonic history (e.g., Sakellariou et al., 2021); (iii) rich cultural history since the paleolithic times and potential human-climate interactions as also suggested by studies from coastal settings in the Argolikos Basin (e.g., Surdez et al., 2018; Beck et al., 2021); (iv) quick transit to the Myrtoon Basin upon improvement of the weather conditions.

**30th September – 5th October: Research activities in Argolikos Basin**

At 9:00 (local time) of September 30th, the R/V AEGAEO left the port of Piraeus. Shortly after sailing, a safety drill took place, and subsequently, the scientists were informed about the special measures against Covid-19 during the cruise. During the c. 6 hours transit to Argolikos Basin, a meeting of the science party discussed the objectives of the project and the responsibilities on-board for each participant, and the work shifts were organised. The research activities started around mid-day of September 30th and continued uninterrupted until October 5th, including CTD profiling, hydroacoustic surveys with a multibeam echosounder, Airgun and Sparker seismic profilers as well as sediment coring with gravity and box corers (see Section 8, Table 3). A short visit (3.5 h) at Nafplio port, which is located within the study area in Argolikos Basin, took place on October 4th to get replacement parts for the Airgun compressor (as a precaution measure based on signs of malfunction on October 2nd) and vessel supplies. The weather conditions remained calm throughout the survey period in Argolikos Basin allowing for high-quality data acquisition.

**5th – 9th October: Research activities in Myrtoon Basin**

Transit to Myrtoon Basin started early morning of October 6th and research activities commenced before noon. Although the weather conditions in the area were wavy and windy (5 Bf, and locally 6 Bf) until October 8th, the hydroacoustic survey (multibeam and Airgun) was carried out successfully. Considerably improved weather conditions on October 9th allowed for successful sediment coring with both gravity and box corers. The cruise ended in the evening of the same day (at 19:00 local time) after a c. 4.5 h transit to Piraeus port.

# 4 Preliminary Results

## 4.1 Underway Hydroacoustics

The main tools for the accomplishment of WP1 tasks were: (i) a hull-mounted multibeam system (Wärtsilä ELAC SeaBeam 3030) to precisely map the traces of the faults on the seafloor; (ii) Airgun and (iii) Sparker echosounders for high-resolution sub-bottom profiling along pre-defined track lines to study the fault surfaces in depth and the deformation pattern of sedimentary infill in the study basins.

### 4.1.1 Multibeam profiling

A Wärtsilä ELAC SeaBeam 3030 (30 kHz) multibeam system was used to acquire swath bathymetry data. Prior to mapping, calibration of the acquired data has been carried out using conductivity, temperature and depth (CTD) sound profiling (see section 4.2). The total mapped area in the Argolikos Basin was c. 320 km$^2$ (Figure 2). However, detailed mapping of the Myrtoon Basin as planned in the project proposal was not possible due to stormy weather conditions that reduced the total working time in the area (see Section 3). Therefore, the multibeam system in Myrtoon Basin was only applied along the Airgun track lines covering a total area of c. 915 km$^2$ (Figure 2).

### 4.1.2 Airgun profiling

A 40 cubic inches Airgun sound source and a SIG seismic streamer (65 m active length, 48 hydrophones at 1 m spacing) were used for the acquisition of single-channel seismic reflection profiles on CodaOctopus DA4G™ 2000 acquisition software and hardware (Figures 2, 3, and 4). The shooting rate was set to 3 s in the Argolikos Basin, and 4 s in the Myrtoon Basin. The total length of the recorded track lines was 161 km (87 nm) in Argolikos Basin, and 523 km (282 nm) in Myrtoon Basin.

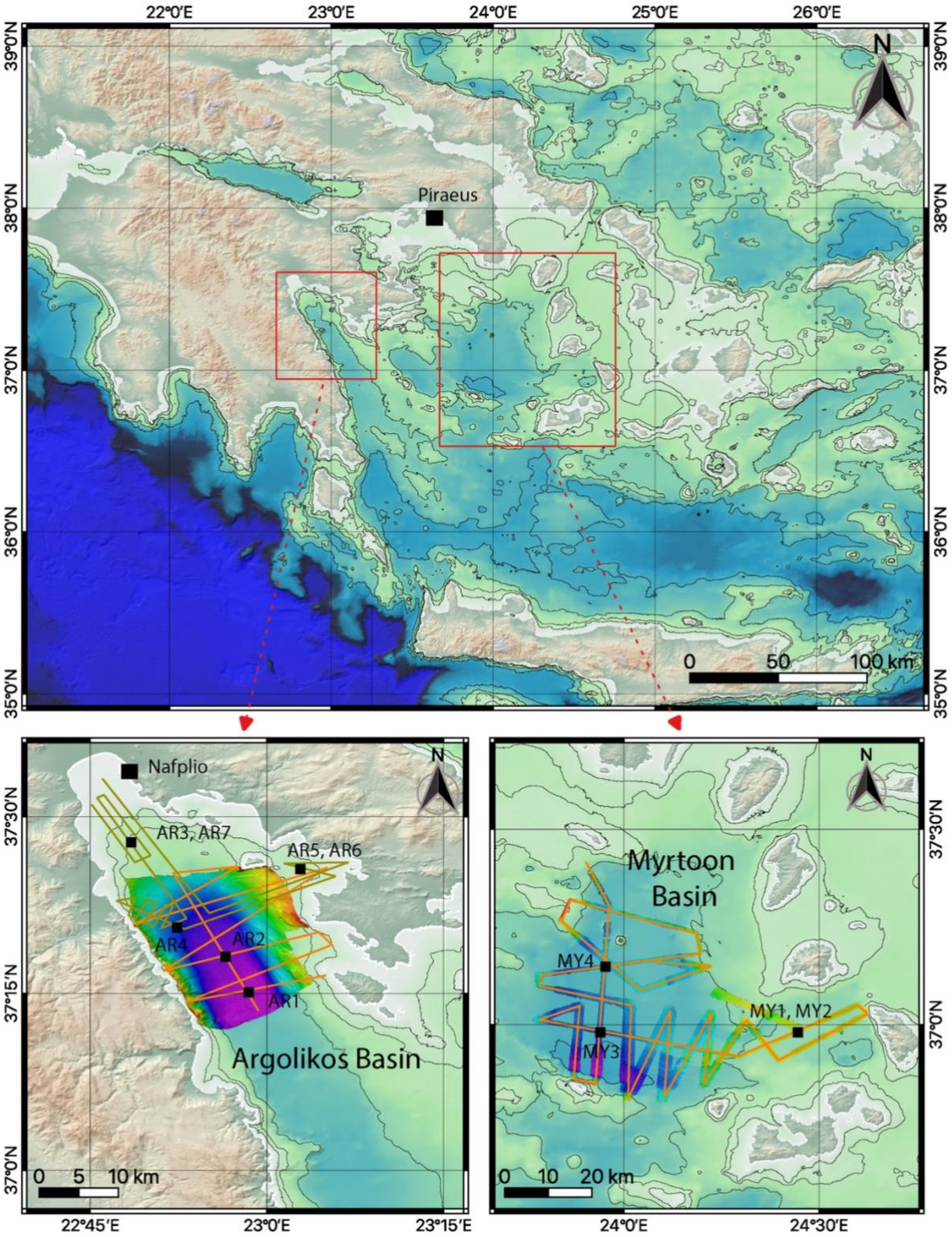


**Figure 2.** Overview of the study region indicating the areas mapped with a multibeam echosounder, the Airgun (orange colour) and Sparker (green colour) track lines and the coring sites. Bathymetry from the EMODnet database.

### 4.1.3 Sparker profiling

An Applied Acoustics 2000 J Sparker sub-bottom profiler was used for the acquisition of high-resolution geophysical data in the Argolikos Basin at a shooting rate of 1.5 s, using the CodaOctopus DA4G™ 2000 acquisition software and hardware. The total length of the recorded track line in the Argolikos Basin was 164 km (88.5 nm) (Figures 2 and 5).

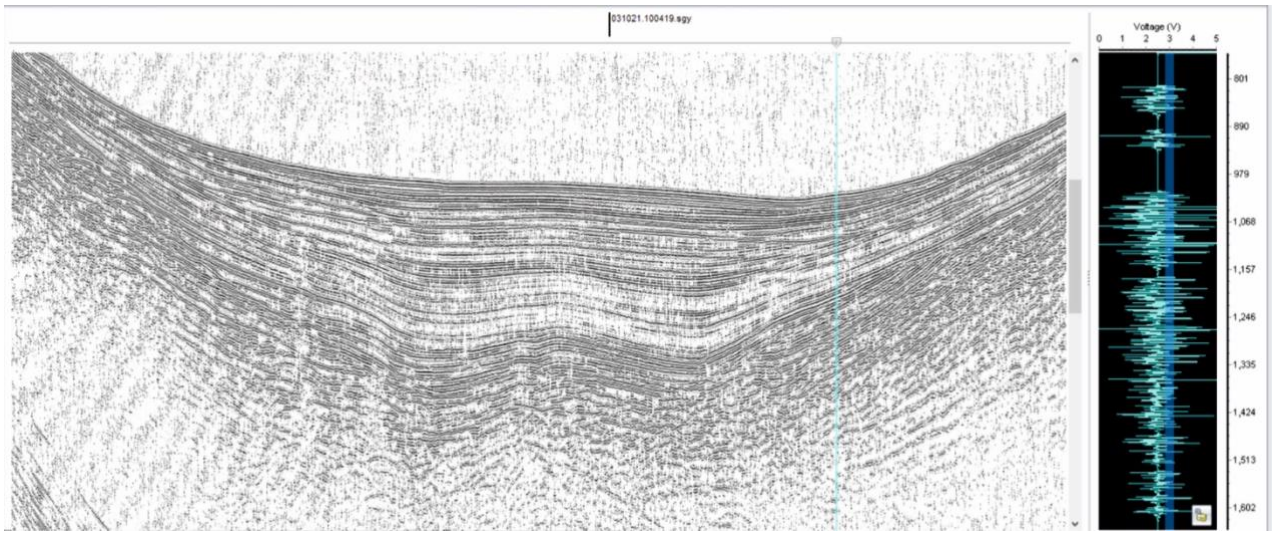


**Figure 3.** Representative Airgun seismic profile from Argolikos Basin.

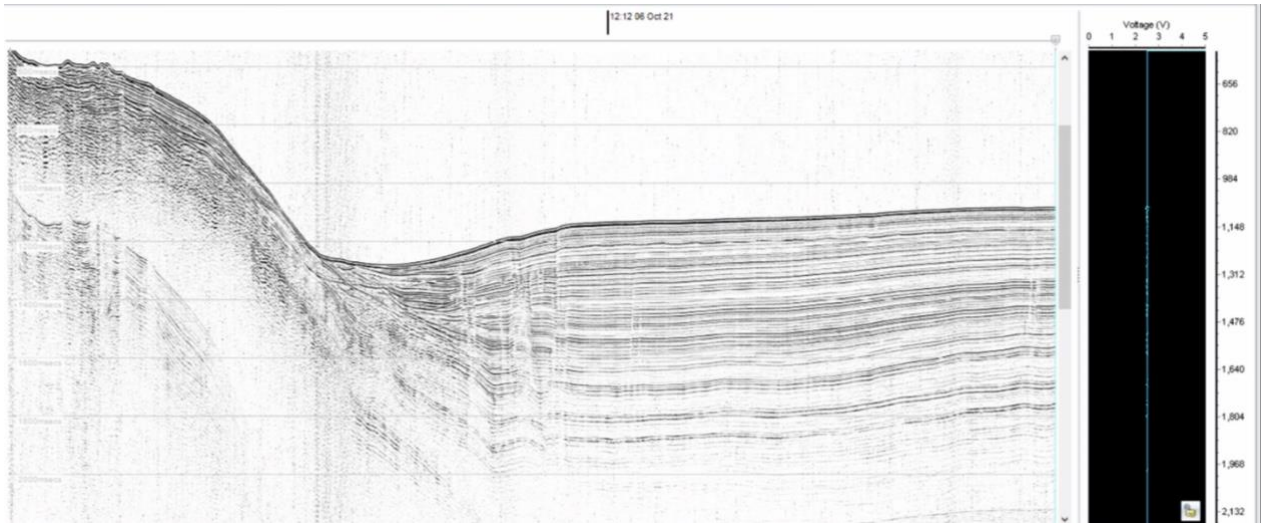


**Figure 4.** Representative Airgun seismic profile from Myrtoon Basin.

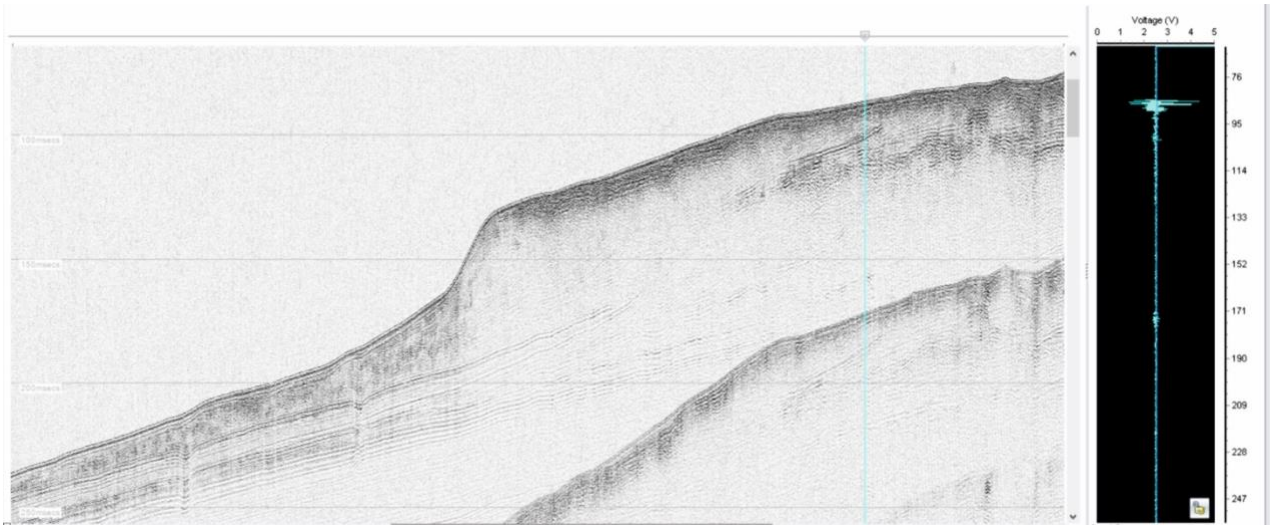


**Figure 5.** Representative Sparker seismic profile from Argolikos Basin.

### 4.2 Sediment Coring

A total of eight gravity and three box cores where retrieved from the Argolikos and Myrtoon Basins (Figure 2). Specifically, cores EF-AR1 and EF-AR2 were taken from the central and deepest part of the basin at water depths of 760 and 725 m, respectively. Moreover, core EF-AR3 was retrieved from the northemost shallow part of the basin (176 m), core EF-AR4 (595 m) at the base of an extensive landslide discovered during the geophysical survey at the western part of the basin, and core EF-AR5 at the shallow Kiladha Bay (168 m) at the eastern part of the basin. In addition, box cores EF-AR6 and EF-AR7 were retrieved in close proximity to the coring sites of EF-AR5 and EF-AR3 gravity cores, respectively. The box cores were sub-sampled with three plastic liners and three 5-cm wide U-channels. Core recovery ranged between 189 and 264 cm for the gravity cores, and was 58-60 cm for the box cores.

In the Myrtoon Basin, gravity cores EF-MY3 and EF-MY4 were taken from the central and deepest part of the basin at water depths of 906 and 845 m, respectively. Moreover, core EF-MY1 was retrieved from the southeastern part of the basin at a water depth of 418 m; box core EF-MY1 was also recovered in close proximity. The box core was sub-sampled with three plastic liners and three 5-cm wide U-channels. Core recovery was 34 cm for the box core, and ranged between 188 and 280 cm for the gravity cores.

### 4.3 CTD Measurements

CTD measurements were carried out in two stations, one in Argolikos and one in Myrtoon Basins (Table 3; Figure 6). The temperature, salinity, and pressure data were used to calculate the expected sound interval for a given water depth, and hence, calibrate the multibeam echosounder allowing for accurate distance measurements from the vessel to the sea floor.

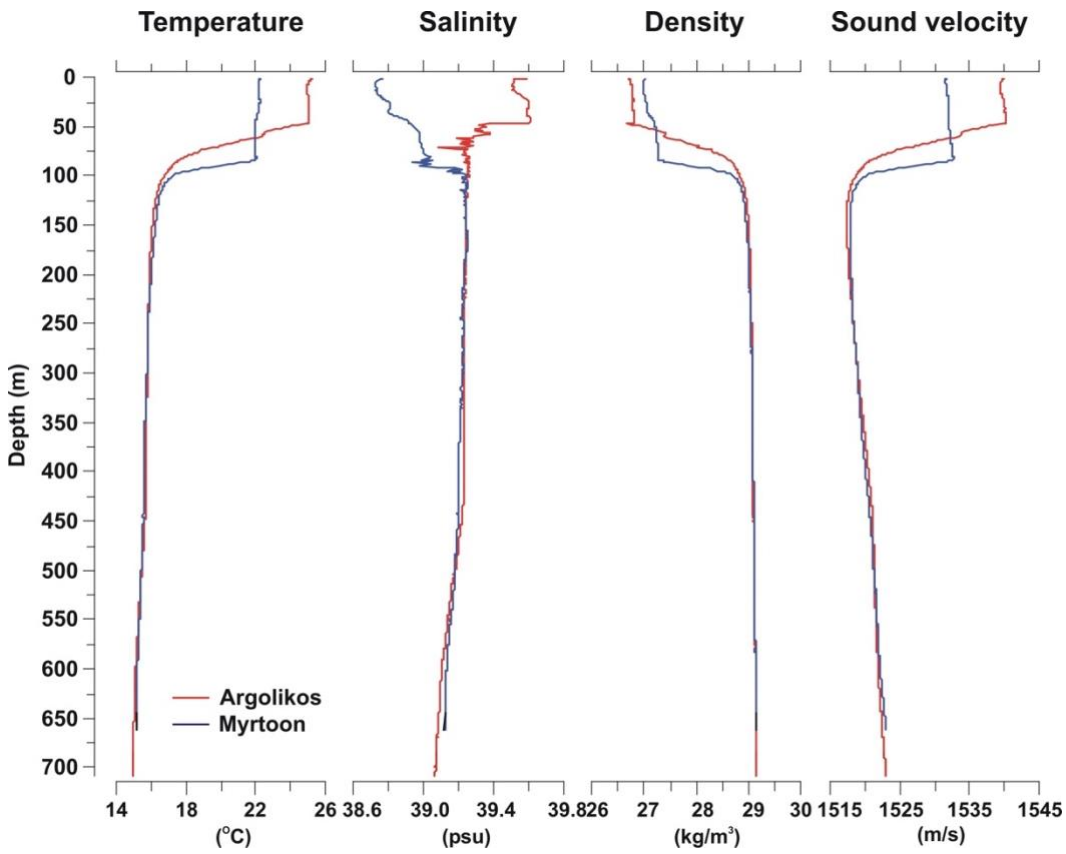


**Figure 6.** CTD sound profiles from Argolikos and Myrtoon Basins.

### 4.4 Post-cruise Analyses

The geophysical profiles are currently under analysis at HCMR using CODA Survey Engine Processing and Interpretation software for the airgun and sparker profiles and HYPACK, PDS, and ArcGIS for the swath bathymetry data.

The gravity core EF-AR4 is stored at HCMR. It will be used for geotechnical analyses with the aim to shed light on the sedimentological and geotechnical characteristics of the landslide and the dating of the deposits. All other cores were transported to Heidelberg University, where ongoing multiproxy analyses aim to a better understanding of the palaeoclimatic and palaeoenvironmental conditions in the Argolikos and Myrtoon Basins. Specifically, these cores have been scanned with an Avaatech X-Ray fluorescence (XRF) scanner at the Institute of Earth Sciences to analyse the sediment elemental composition; moreover, grain size and micropaleontological (foraminifera) analyses are ongoing. Planned work during the port-cruise moratorium period (i.e., 2 years) also includes $^{14}C$ dating, tephrostratigraphic, palynological, and organic geochemical analyses.

## 5 Science communication

Several web announcements and posts on social media were made before, during, and after the cruise. In detail, a press release (in German and English) was posted on the website of the Insitute of Earth Sciences, Heidelberg Univeristy a few days before the cruise, and a second one (in Greek) was posted on the website of the Insitute of Oceanography, HCMR, which was reproduced by numerous newspapers and news websites in Greece (Table 1). In addition, announcements on the cruise were posted on the official social media accounts of both institutes on Twitter, Facebook, and Instagram. Moreover, the participants posted photographs and short videos from the activities on-board on private social media accounts during the cruise.

**Table 1.** List of press releases and news articles on the EUROFLEETS+ 'MYRTOON' cruise.

| Type | Date | Medium | Link |
|---|---|---|---|
| Press release | 21.09.2021 | Website Institute of Earth Sciences, Heidelberg University | [1] |
| Press release | 12.10.2021 | Website Institute of Oceanography, HCMR | [2] |
| News article | 19.10.2021 | Newspaper 'Dimokratiki' | [3] |
| News article | 19.10.2021 | News site 'reporter.gr' | [4] |
| News article | 19.10.2021 | Newspaper 'Anagnostis' | [5] |
| News article | 19.10.2021 | News site 'energeia.gr' | [6] |
| News article | 20.10.2021 | Newspaper 'Kathimerini' | [7] |
| News article | 20.10.2021 | Newspaper 'Avgi' – print version | - |
| News article | 20.10.2021 | Blog 'krititraveller.gr' | [8] |
| News article | 23.10.2021 | News site 'fevgato.gr' | [9] |
| News article | 23.10.2021 | News site 'logiastarata.gr' | [10] |

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|---|---|---|---|
| News article | 23.10.2021 | News site 'taxidromos.gr' | [11] |
| News article | 23.10.2021 | News site 'amna.gr' | [12] |
| News article | 29.10.2021 | Newspaper 'Makedonia' | [13] |
| News article | 29.10.2021 | News site 'CNN.gr' | [14] |
| News article | 29.10.2021 | News site 'el.gr' | [15] |
| News article | 29.10.2021 | News site 'mynews.gr' | [16] |
| News article | 29.10.2021 | News site 'zougla.gr' | [17] |
| News article | 29.10.2021 | News site 'powergame.gr' | [18] |
| News article | 29.10.2021 | News site 'envinow.gr' | [19] |
| News article | 30.10.2021 | Newspaper 'Athens News' | [20] |
| News article | 30.10.2021 | News site 'newsbomb.gr' | [21] |
| News article | 01.11.2021 | Journal 'Archaiologia' | [22] |

# 6 Data and Sample Storage / Availability

The cruise schedule has been postponed twice due to the Covid-19 pandemic, a fact that did not allow all project proponents to sail because of travel-related restrictions and overlapping work commitments. The project proponents that did not sail have been informed about the outcome of the cruise and are invited to contribute to post-cruise science. Following the EUROFLEETS+ guidelines and the project's granting agreement (SEA02_04_MYRTOON), all shipboard data will be submitted to the HCMR National Oceanographic Data Management Centre via the EMODnet Data Ingestion Portal. All sediments cores are stored at 4 °C in the cooling facilities of the Institute of Earth Sciences, Heidelberg University, except from core EF-AR4 from Argolikos Basin that is stored at the cooling facilities of the HCMR. Researchers that were not part of the shipboard science party may request access to sediment and geophysical data from Andreas Koutsodendris (andreas.koutsodendris@geow.uni-heidelberg.de).

# 7 Participants

**Table 2.** List of participants of the EUROFLEETS+ 'MYRTOON' cruise. CEREGE: Centre Européen de Recherche et d' Enseignement des Géosciences de l' Environnement; HCMR: Hellenic Centre for Marine Research. Asterisks indicate participants funded by EUROFLEETS+.

| No. | Name | Early career | Gender | Affiliation | On-board tasks |
|---|---|---|---|---|---|
| **1*** | Koutsodendris, Andreas | N | M | Heidelberg Univ. (D) | Sedimentology (Chief Scientist) |
| **2*** | Auer, Gerald | Y | M | Graz Univ. (AT) | Micropaleontology |
| **3*** | Beny, François | Y | M | CEREGE (F) | Inorganic geochemistry |

| | | | | | |
|---|---|---|---|---|---|
| **4** | Iatrou, Margarita | Y | F | HCMR (GR) | Marine geology, geophysics |
| **5*** | Kern, Oliver | Y | M | Heidelberg Univ. (D) | Inorganic geochemistry |
| **6*** | Kolb, Laurin | Y | M | Heidelberg Univ. (D) | Sedimentology |
| **7** | Livanos, Isidoros | Y | M | HCMR (GR) | Marine geology, geophysics |
| **8** | Mantopoulos, Prokopis | N | M | HCMR (GR) | Engineer, geophysics |
| **9*** | Martinot, Claire | Y | F | CEREGE (F) | Micropaleontology |
| **10*** | Meier, Karl | Y | M | Heidelberg Univ. (D) | Marine geology, geophysics |
| **11** | Morfis, Ioannis | N | M | HCMR (GR) | Engineer, geophysics |
| **12** | Panagiotopoulos, Ioannis | N | M | HCMR (GR) | Marine geology, geophysics |
| **13** | Paraschos, Frantzesca | Y | F | HCMR (GR) | Inorganic geochemistry |
| **14** | Sakellariou, Dimitris | N | M | HCMR (GR) | Marine geology, geophysics |
| **15** | Tsampouraki-Kraounaki, Konstantina | Y | F | HCMR (GR) | Marine geology, geophysics |

# 8 Cruise log and Station List

All events during the cruise have been documented with the 'EARS' software (version 3). Moreover, a detailed log of events, including a list of stations, research activities, and weather conditions, is presented in Table 3.

**Table 3.** EUROFLEETS+ 'MYRTOON' cruise log and station list. CC: core catcher.

| **Date** | **Station** | **Time** | **Latitude** | **Longitude** | **Water depth** | **Gear** | **Description** | **Study area** | **Remarks** |
|---|---|---|---|---|---|---|---|---|---|
| **dd/mm** | | **[UTC]** | **[°N]** | **[°E]** | **[m]** | | | | |
| 30.09 | Piraeus Port | 06:10 | 37°56,670' | 23°35,740' | - | - | Start of cruise - Transit to Argolikos Basin because of strong winds in the Myrtoon Basin | - | *Wind in Myrtoon Basin: 6-7 Bf (North direction)* ---------- *Deviation to Argolikos Basin* |
| | Station 1 | 13:20 | 37°16,412' | 22°57,663' | 740 | CTD sound profile | MY-CTD-1 | Argolikos Basin | |
| | - | 14:15 | - | - | - | Multibeam | Start of multibeam calibration | | |
| | - | 16:45 | - | - | - | Multibeam | End of multibeam | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | calibration | | |
| | Track 1 | 18:10 | - | - | - | Multibeam | Start of multibeam survey | | |
| 01.10 | Track 1 | All day | - | - | - | Multibeam | Continue multibeam survey | Argolikos Basin | *Wind in Myrtoon Basin: 6-7 Bf (North direction)* |
| 02.10 | Track 1 | 07:40 | - | - | - | Multibeam | Pause of multibeam survey | Argolikos Basin | *Wind in Myrtoon Basin: 6-7 Bf (North direction)* |
| | Track 1 / Line 1-2 | 08:11 | 37°16,121' | 23°02,607' | - | Multibeam & Airgun | Start combined multibeam and Airgun (40 ci, shooting-rate 3,000 msec, Recording: 3,000 msec) seismic profiling | | |
| | Line 1-2 | 08:44 | 37°16,014' | 23°02,099' | - | Airgun | Pause Airgun profiling because of air leakage | | |
| | Line 1-2 | 09:36 | 37°14,561' | 22°54,528' | - | Airgun | Continue Airgun profiling | | |
| | Line 1-2 | 11:12 | 37°14,561' | 22°54,528' | - | Airgun | Pause Airgun profiling because of air compressor malfunction | | |
| | Line 8-7 | 19:09 | 37°25,692' | 22°57,546' | - | Airgun | Continue Airgun profiling after repairing the air compressor. Start of new line. | | |
| | Line 8-7 | 21:02 | 37°20,975' | 22°48,931' | - | Airgun | End of line | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Line 7-6 | 21:02 | 37°20,975' | 22°48,931' | - | Airgun | Start of line | | |
| 3.10 | Line 7-6 | 00:16 | 37°25,606' | 23°05,499' | - | Airgun | End of line | Argolikos Basin | *Wind in Myrtoon Basin: up to 6 Bf (North direction)*<br>---<br>EF-AR1: CC sand<br>---<br>EF-AR2: CC mud |
| | Line 6-5 | 00:16 | 37°25,606' | 23°05,499' | - | Airgun | Start of line | | |
| | Line 6-5 | 03:34 | 37°17,112' | 22°51,281' | - | Airgun | End of line | | |
| | Line 5-4 | 03:34 | 37°17,112' | 22°51,281' | - | Airgun | Start of line | | |
| | Line 5-4 | 06:20 | 37°19,035' | 23°05,504' | - | Airgun | End of line | | |
| | Line 3-2 | 06:20 | 37°19,035' | 23°05,504' | - | Airgun | Start of line | | |
| | Line 3-2 | 08:54 | 37°14,234' | 22°53,454' | - | Airgun | End of line | | |
| | Line 2-9 | 08:54 | 37°14,234' | 22°53,454' | - | Airgun | Start of line | | |
| | Line 2-9 | 10:00 | 37°13,751' | 22°59,148' | - | Airgun | End of line | | |
| | Line 9-10 | 10:00 | 37°13,751' | 22°59,148' | - | Airgun | Start of line | | |
| | Line 9-10 | 13:04 | 37°25,376' | 22°52,011' | - | Airgun | End of line | | |
| | Track 1 | 13:04 | 37°25,376' | 22°52,011' | - | Multibeam | End of multibeam survey | | |
| | Station 2 | 14:34 | 37°17,785' | 22°56,734' | 725 | Gravity Corer | Core EF-AR2 (198 cm) | | |
| | Station 3 | 14:48 | 37°15,317' | 22°58,256' | 760 | Gravity Corer | Core EF-AR1 (243 cm) | | |
| | Track 2 | 16:35 | 37°19,745' | 23°01,365' | - | Multibeam | Start of multibeam survey | | |
| | Track 2 | 03:38 | 37°21,430' | 23°02,896' | - | Multibeam | End of multibeam survey | | |
| | - | 03:55 | - | - | - | - | Transit to Nafplio port to get replacement parts for the Airgun compressor and vessel supplies | | |
| | Nafplio port | 06:55 | - | - | - | - | - | | |
| | - | 10.30 | - | - | - | - | Transit to Sparker Line 1 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 04.10 | Line 11-12 | 11:31 | 37°31,058' | 22°47,743' | - | Sparker | Start of Sparker survey (2000 J, shooting-rate 1,500 msec, Recording: 1,500 msec) | Argolikos Basin | *Wind in Myrtoon Basin: up to 6 Bf (North direction)* |
| | Track 3 | 11:44 | 37°28,146' | 22°50,060' | - | Multibeam | Start of multibeam survey | | |
| | Line 12-13 | 13:03 | 37°21,767' | 22°55,123' | - | Sparker | Continue Sparker survey | | |
| | Line 13-14 | 15:16 | 37°26,107' | 23°06,728' | - | Sparker | Continue Sparker survey | | |
| | Line 14-15 | 16:24 | 37°25,984' | 23°01,484' | - | Sparker | Continue Sparker survey | | |
| | Line 15-16 | 17:28 | 37°24,923' | 23°05,744' | - | Sparker | Continue Sparker survey | | |
| | Line 16-17 | 19:48 | 37°20,408' | 22°52,850' | - | Sparker | Continue Sparker survey | | |
| | Line 17-18 | 21:08 | 37°22,805' | 22°47,340' | - | Sparker | Continue Sparker survey | | |
| | Line 18-19 | 22:23 | 37°23,127' | 22°48,672' | - | Sparker | Continue Sparker survey | | |
| | Line 19-20 | 22:41 | 37°21,678' | 22°48,250' | - | Sparker | Continue Sparker survey | | |
| | Line 20-21 | 23:06 | 37°21,298' | 22°48,830' | - | Sparker | Continue Sparker survey | | |
| | Line 21-22 | 23:15 | 37°22,977' | 22°49,786' | - | Sparker | Continue Sparker survey | | |
| | Line 22-23 | 23:43 | 37°22,742' | 22°50,513' | - | Sparker | Continue | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Sparker survey | | |
| | Line 23-24 | 23:55 | 37°21,033' | 22°49,598' | - | Sparker | Continue Sparker survey | | |
| 05.10 | Line 24-25 | 00:24 | 37°20,657' | 22°50,279' | - | Sparker | Continue Sparker survey | Argolikos Basin | *Wind in Myrtoon Basin: up to 6 Bf (North direction)*<br>----------<br>EF-AR3: CC sand<br>----------<br>GC bend and was replaced<br>----------<br>EF-AR4: CC mud<br>----------<br>EF-AR5: CC sand<br>----------<br>EF-AR6 Box corer:<br>Round cores 1-3 58 cm<br>U-channels 4-6 39 cm<br>----------<br>EF-AR7 Box corer:<br>Round cores 1-3 -> 60 cm<br>U-channels |
| | Line 25-26 | 00:35 | 37°22,566' | 22°51,390' | - | Sparker | Continue Sparker survey | | |
| | Line 26-27 | 01:08 | 37°22,453' | 22°52,032' | - | Sparker | Continue Sparker survey | | |
| | Line 27-28 | 01:16 | 37°20,538' | 22°51,555' | - | Sparker | Continue Sparker survey | | |
| | Line 28-29 | 01:48 | 37°21,384' | 22°53,239' | - | Sparker | Continue Sparker survey | | |
| | Line 29-30 | 02:19 | 37°31,607' | 22°45,607' | - | Sparker | Continue Sparker survey | | |
| | Line 30-31 | 03:53 | 37°31,777' | 22°46,218' | - | Sparker | Continue Sparker survey | | |
| | Line 31-32 | 07:13 | 37°25,125' | 22°48,124' | - | Sparker | Continue Sparker survey | | |
| | Line 31-32 | 08:31 | 37°30,446' | 22°45,535' | - | Sparker | End of Sparker survey | | |
| | Track 3 | 08:31 | 37°30,446' | 22°45,535' | - | Multibeam | End of multibeam survey | | |
| | Station 4 | 09:35 | 37°28,419' | 22°47,963' | 176 | Gravity Corer | Core EF-AR3 (212 cm) | | |
| | Station 5 | 10:49 | 37°21,029' | 22°51,331' | 595 | Gravity Corer | Core EF-AR4 (189 cm) | | |
| | Station 6 | 12:21 | 37°25,936' | 23°01,867' | 168 | Gravity Corer | Core EF-AR5 (264 cm) | | |

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|---|---|---|---|---|---|---|---|---|---|
| | Station 6 | 12:41 | 37°25,947' | 23°01,855' | 168 | Box Corer | Core EF-AR6 (58 cm) | | 4-7 30-40 cm |
| | Station 7 | 14:03 | 37°28,459' | 22°49,011' | 176 | Box Corer | Core EF-AR7 (60 cm) | | |
| | - | 14:45 | - | - | - | - | Transit to Myrtoon Basin | | |
| 06.10 | Station 8 | 10:44 | 37°19,961' | 22°57,387' | 810 | CTD sound profile | MY-CTD-2 | Myrtoon Basin | *Wind in Myrtoon Basin 5 and locally 6 Bf until c. 16.00. Improved wind and wave conditions later on (North direction).* |
| | Track 1 / Line 1-2 | 12:08 | 37°25.043' | 23°54.060' | - | Multibeam & Airgun | Start combined multibeam survey and Airgun seismic profiling (40 ci, shooting-rate 4,000 msec, Recording: 4,000 msec) | | |
| | Line 1-2 | 12:08 | 37°25.043' | 23°54.060' | - | Airgun | Start of line | | |
| | Track 1 | 12:35 | 37°23.156' | 23°55.101' | - | Multibeam | Start of multibeam survey | | |
| | Line 1-2 | 13:52 | 37°18.333' | `23°57.761' | - | Airgun | End of line | | |
| | Line 2-3 | 13:52 | 37°18.333' | `23°57.761' | - | Airgun | Start of line | | |
| | Line 2-3 | 19:56 | 36°50.931' | 23°55.602' | - | Airgun | End of line | | |
| | Line 3-4 | 19:56 | 36°50.931' | 23°55.602' | - | Airgun | Start of line | | |
| | Line 3-4 | 20:36 | 36°51.641' | 23°52.383' | - | Airgun | End of line | | |
| | Line 4-5 | 20:36 | 36°51.641' | 23°52.383' | - | Airgun | Start of line | | |
| | Line 4-5 | 23:10 | 37°02.909' | 23°53.151' | - | Airgun | End of line | | |
| | Line 5-6 | 23:10 | 37°02.909' | 23°53.151' | - | Airgun | Start of line | | |
| | Line 5-6 | 00:26 | 37°00,746' | 23°46.638' | - | Airgun | End of line | | |
| | Line 6-7 | 00:26 | 37°00,746' | 23°46.638' | - | Airgun | Start of line | | |
| | Line 6-7 | 06:20 | 36°55,019' | 24°17.801' | - | Airgun | End of line | | |
| | Line 7-8 | 06:20 | 36°55,019' | 24°17.801' | - | Airgun | Start of line | | |
| | Line 7-8 | 10:05 | 37°03.0136' | 24°35.905' | - | Airgun | End of line | | |

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| 07.10 | Line 8-9 | 10:05 | 37°03.0136' | 24°35.905' | - | Airgun | Start of line | Myrtoon Basin | *Wind in Myrtoon Basin: 4 and locally 5 Bf (North direction)* |
| | Line 8-9 | 10:28 | 37°01.624' | 24°37.256' | - | Airgun | End of line | | |
| | Line 9-10 | 10:28 | 37°01.624' | 24°37.256' | - | Airgun | Start of line | | |
| | Line 9-10 | 13:24 | 36°54.503' | 24°23.733' | - | Airgun | End of line | | |
| | Line 10-11 | 13:24 | 36°54.503' | 24°23.733' | - | Airgun | Start of line | | |
| | Line 10-11 | 15:05 | 37°00.790' | 24°18.610' | - | Airgun | End of line | | |
| | Line 11-12 | 15:05 | 37°00.790' | 24°18.610' | - | Airgun | Start of line | | |
| | Line 11-12 | 17:33 | 36°50.844' | 24°12.260' | - | Airgun | End of line | | |
| | Line 12-13 | 17:33 | 36°50.844' | 24°12.260' | - | Airgun | Start of line | | |
| | Line 12-13 | 20:03 | 37°01.782' | 24°13.341' | - | Airgun | End of line | | |
| | Line 13-14 | 20:03 | 37°01.782' | 24°13.341' | - | Airgun | Start of line | | |
| | Line 13-14 | 23:23 | 36°48.572' | 24°05.911' | - | Airgun | End of line | | |
| | Line 14-15 | 23:23 | 36°48.572' | 24°05.911' | - | Airgun | Start of line | | |
| 08.10 | Line 14-15 | 02:30 | 37°02.349' | 24°07.029' | - | Airgun | End of line | Myrtoon Basin | *Wind in Myrtoon Basin: up to 6 Bf (South direction)* |
| | Line 15-16 | 02:30 | 37°02.349' | 24°07.029' | - | Airgun | Start of line | | |
| | Line 15-16 | 05:47 | 36°48.648' | 24°00.429' | - | Airgun | End of line | | |
| | Line 16-17 | 05:47 | 36°48.648' | 24°00.429' | - | Airgun | Start of line | | |
| | Line 16-17 | 08:59 | 37°03.172' | 24°00.924' | - | Airgun | End of line | | |
| | Line 17-18 | 08:59 | 37°03.172' | 24°00.924' | - | Airgun | Start of line | | |
| | Line 17-18 | 11:39 | 37°05.003' | 23°46.828' | - | Airgun | End of line | | |
| | Line 18-19 | 11:39 | 37°05.003' | 23°46.828' | - | Airgun | Start of line | | |
| | Line 18-19 | 12:01 | 37°07.657' | 23°47.041' | - | Airgun | End of line | | |
| | Line 19-20 | 12:01 | 37°07.657' | 23°47.041' | - | Airgun | Start of line | | |
| | Line 19-20 | 16:24 | 37°10.957' | 24°11.822' | - | Airgun | End of line | | |
| | Line 20-21 | 16:24 | 37°10.957' | 24°11.822' | - | Airgun | Start of line | | |
| | Line 20-21 | 17:07 | 37°14.098' | 24°11.170' | - | Airgun | End of line | | |
| | Line 21-22 | 17:07 | 37°14.098' | 24°11.170' | - | Airgun | Start of line | | |
| | Line 21-22 | 20:40 | 37°19.132' | 23°51.723' | - | Airgun | End of line | | |
| | Line 22-23 | 20:40 | 37°19.132' | 23°51.723' | - | Airgun | Start of line | | |

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|---|---|---|---|---|---|---|---|---|---|
| | Line 22-23 | 21:26 | 37°15.935' | 23°50.244' | - | Airgun | End of line | | |
| | Line 23-24 | 21:26 | 37°15.935' | 23°50.244' | - | Airgun | Start of line | | |
| 09.10 | Line 23-24 | 00:39 | 37°05.266' | 24°02.622' | - | Airgun | End of line | Myrtoon Basin | *Wind in Myrtoon Basin: 3-4 Bf (South direction)*<br>---<br>EF-MY1 Box corer:<br>Round cores 1-3 <34 cm<br>U-channels 4-6 <34 cm<br>---<br>EF-MY2: CC sandy silt (with forams, pteropods)<br>Cores on the crossing of Line 7-8 and old HMCR Line Kimolos 36-37<br>---<br>EF-MY3: CC sandy silt<br>Cores on the crossing of Lines 2-3 and 17-18<br>---<br>EF-MY4: CC (sandy) silt<br>Cores on the crossing of Lines 2-3 and 19-20 |
| | Line 24-25 | 00:39 | 37°05.266' | 24°02.622' | - | Airgun | Start of line | | |
| | Line 24-25 | 02:41 | 37°08.992' | 24°13.128' | - | Airgun | End of line | | |
| | Line 25-26 | 02:41 | 37°08.992' | 24°13.128' | - | Airgun | Start of line | | |
| | Line 25-26 | 04:03 | 37°09.654' | 24°05.408' | - | Airgun | End of line | | |
| | Track 1 | 12:35 | 37°09.654' | 24°05.408' | - | Multibeam | End of multibeam survey | | |
| | Station 9 | 06:27 | 36°59.191' | 24°27.181' | 418 | Box Corer | Core EF-MY1 (34 cm) | | |
| | Station 9 | 07:23 | 36°59.191' | 24°27.085' | 418 | Gravity Corer | Core EF-MY2 (280 cm) | | |
| | Station 10 | 09:49 | 37°04.172' | 23°56.582' | 906 | Gravity Corer | Core EF-MY3 (188 cm) | | |
| | Station 11 | 10:56 | 37°08.980' | 23°57.003' | 845 | Gravity Corer | Core EF-MY4 (220 cm) | | |
| | - | 11:28 | - | - | - | - | Transit to Piraeus port | | |
| | - | 16:07 | - | - | - | - | At Piraeus port | | |
| | End of cruise | | | | | | | | |

# 9 Acknowledgements

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