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Short Cruise Report METEOR M195

Piräus – Piräus
10.11.2023 – 02.12.2023
Chief Scientist: Jörg Pross
Captain: Rainer Hammacher



FS METEOR
M195
Piräus – Piräus
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Objectives

From the Paleolithic onwards, Mediterranean cultures have closely interacted with their environment, but it is still unclear to what extent climatic and environmental change has influenced their evolution. At the same time, the onset, early extent and consequences of anthropogenic change in terrestrial and notably in marine ecosystems are yet poorly constrained.

In light of these uncertainties, the main scientific objective of R/V METEOR cruise M195 (“CYRTACI” – Climate Dynamics and Ecosystem Change during the Rise of Mediterranean Civilizations) was to recover core material that will allow to investigate changes in terrestrial and marine ecosystems in the Mediterranean during the rise of human civilizations in that region. Cruise M195 is a follow-up cruise to cruise M144 (“EMPIRE”; Heraklion – Catania, 12/2017–01/2018), and it is complementary to cruise M144 with regard to the selected work areas. While cruise M144 has focused on the Aegean Sea proper, cruise M195 mainly targeted areas with high deposition rates off the coast of the Peloponnese, thereby also exploring the Ionian Sea. From all visited areas, high-deposition-rate records were still lacking. Such records are, however, essential for tackling the overarching research goal of deciphering the relationships between early cultures and short-term environmental change in the eastern Mediterranean region during the Late Glacial and Holocene.

Based on the recovered material from high-deposition-rate, coastal settings, both terrestrial and marine proxy data will be generated; this will yield terrestrial data within a high-quality marine-based age frame. We will assess how climate and human resource demands interacted over the Holocene, both to unravel how environmental change affected socioeconomic evolution during the Holocene and to assess the growing impact of settled society and industrialized economies on Mediterranean ecosystem structure and biodiversity.

The overarching research goal can be divided into two major research topics:

- (i) The role of Lateglacial and Holocene short-term climate and ecosystem change on early cultures;
- (ii) Assessment and quantification of terrestrial and notably marine human-induced environmental change during the Holocene, including the rise of industrial economies.

For both research topics, the recovery of new core material is mandatory; they cannot be adequately addressed via material of previous expeditions. Research Topic (i) requires exceptionally high sedimentation rates and coring locations strategically selected with respect to archeological sites, predominantly from near-coastal settings around the Peloponnese. Research Topic (ii) inevitably requires large amounts of sediment as they are not available through the gravity cores of previous expeditions. Our ‘master records’ of Lateglacial and Holocene ecosystem change in the E Mediterranean region will yield critical new insight into the sensitivity vs. resilience of Mediterranean civilizations to environmental change and the vulnerability of marine ecosystems to early anthropogenic impact.

Narrative

In the evening of November 11, 2023, R/V METEOR left the port of Piraeus. The departure, which had originally been scheduled for November 10, had to be postponed by one day due to repair work on one of the METEOR's life boats. As during most of the cruise, the weather conditions were fair to very good, with only sporadically increased winds; the swell that the METEOR was exposed to never exceeded 3 m, and short windows of bad weather and high-wave conditions as they occurred in the second half of the cruise could be navigated by rearranging the sequence of work areas.

The first work area, i.e., the Bay of Epidavros off the northeastern Peloponnese, was reached after four hours of transit. With the exception of a short core from the southern part of the basin that had been recovered by Greek colleagues earlier, the sedimentary filling of the basin has yet largely remained unexplored. We started our scientific operations in the Bay of Epidavros with a Multibeam/Parasound (MBPS) survey followed by deployment of the gravity-, box- and multicorers. As at all sites explored during the cruise, CTD profiling completed the scientific program in the Bay of Epidavros. We retrieved multiple, up to 6 m long cores from the Bay of Epidavros comprising extensive finely laminated intervals. These intervals may represent varves and formed when the area was part of a freshwater lake that formed as a result of lowered sea level during the last glacial.

After successful completion of our operations in the Bay of Epidavros we steamed south in order to spend the next two days in Argolikos Bay, where we carried out an extensive MBPS survey and then retrieved excellent cores that based on first estimates date back to the Lateglacial and – of particular importance with regard to the research objectives of our cruise – contain an apparently complete, high-quality Holocene sequence. The direct hinterland of Argolikos Bay harbors not only important centers from the Bronze Age (such as Mycenae and Tiryntha), but also prominent archeological sites from the Paleo- to Neolithic (e.g., Franchthi and Lerna).

The following work area, i.e., the Myrtoon Basin, was reached early on November 16. Upon arrival, we carried out a brief MBPS survey in the western part of the working area, followed by deployment of the gravity- and multicorer. Later in the same day, this procedure was repeated at a site in the eastern part of the working area. The Myrtoon Basin yielded cores with much lower sedimentation rates than previously encountered in the proximal settings of the Peloponnese. However, at the same time they provided us with cores that date back into the last glacial and thus cover the full range of climatic boundary conditions that the region has witnessed during the last glacial cycle until today.

After station work in the Myrtoon Basin had been completed, the METEOR steamed back to the Peloponnese where we spent the next two days exploring the proximal parts of the Lakonikos Basin and the Gulf of Messiniakos. Our efforts focused on four sites where we retrieved three box cores, twelve gravity cores, and six multicores. In the evening of Monday, November 20, we finished our operations in the Gulf of Messiniakos and commenced our transit to Kali Limenes (Crete), where we were expected to start refueling on Tuesday, November 21, at 14:00. As Kali Limenes is conveniently located within our anticipated work area off southern Crete, these bunker operations could be carried out with minimal impact on our research activities. The rest of Tuesday until early Wednesday morning was dedicated to a MBPS survey that helped identify two promising sites in Messara Bay off the mouth of the Geropotamos River, one of the few rivers flowing on Crete.

On the evening of Wednesday, November 22, we started a 24-hours-long transit to our next work area, situated off the west coast of the Peloponnese. Again, an extensive MBPS survey was carried out first in order to identify promising coring sites. These efforts resulted in the successful deployment of the gravity- and multicorers at one station. Because the weather forecast predicted harsh weather conditions for the next days, we terminated our research activity in the area and steamed north in order to wait out the storm in Amvrakikos Bay, which is sheltered from the open sea by a land bridge and also represents one of the most promising locations within our northernmost work area. Our research operations in Amvrakikos Bay, which comprised an extensive MBPS survey followed by deployment of 15 gravity- and eight multicorers, yielded laminated (possibly varved) sediment cores of excellent quality. The oxygen fluorescence sensors employed in our multicorer tubes revealed nearly anoxic bottom waters and fully anoxic conditions already two centimeters below the sediment-water interface.

Upon completion of our coring operations we left Amvrakikos Bay in the morning of Monday, November 27, and steamed further north in order to explore high-deposition-rate archives between the island of Kerkyra (Corfu) and the Greek mainland. After a MBPS survey we retrieved extended mid- to late Holocene archives via gravity- and kasten coring in relatively shallow waters (c. 60–70 m water depth), potentially also comprising the early Holocene or even Lateglacial. From there, we steamed south in order to obtain high-deposition-rate archives at stations off Kefalonia and Ithaka via kasten- and gravity coring at four sites on the upper continental slope between c. 290 and 300 m water depth.

After completing our last station including collection of a box core on the outer shelf off the historical site of Olympia, we started the transit to Piraeus on November 30. We arrived at Piraeus in the morning of December 2, where we started to unload our samples and equipment.

Acknowledgments

We would like to express our gratitude to Captain Rainer Hammacher and the entire crew of RV METEOR. Their support and expertise made this cruise a successful voyage. We thank Martin Frank and Dirk Nürnberg for their immense help during the preparation of the cruise. The Reederei Briese, LPL (Markus Gehrken and Marlies Nikitin), and Elke Lucas (First Reisebüro) have provided great logistic and organizational support. We would like to thank the Greek authorities for their temporary permission to work in Greek waters. The German Research Fleet Coordination Centre (Universität Hamburg) and the German Federal Foreign Office are thanked for administrative support.

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Station list R.V. METEOR cruise M195

Station No.	Date	Gear	at Depth				Remarks/Recovery
			Time (UTC)	Coordinates (ddm)		Water Depth (m)	
				Lat. (N)	Long. (E)		
M195-							
RA IIa - Epidavros							
1-1	11.11.2023	SVP	20:28:00	N37° 35.682	E23° 17.667	385,0	
2-1	11.11.2023	MB/PS	05:39:00	N37° 38.620	E23° 17.169	277,3	scanning finished at 12.11.2023; includes stations 2-2 and 2-3
3-1	12.11.2023	GC	06:51:00	N37° 34.094	E23° 19.922	143,0	hose-bag (Schlauchfolie), ca 5.60 m; laminations in lowermost ca. 2 m, above transition to marine sediments
4-1	12.11.2023	GC	08:45:00	N37° 38.576	E23° 14.083	417,0	only ca. 50 cm sediment recovery; 15 kN
4-2	12.11.2023	GC	09:59:00	N37° 38.572	E23° 14.083	423,7	24 kN
5-1	12.11.2023	GC	10:57:00	N37° 39.614	E23° 13.006	381,9	6 m sediment recovery
4-3	12.11.2023	MUC	12:06:00	N37° 38.586	E23° 14.087	425,1	12 tubes
4-4	12.11.2023	CTD	13:26:00	N37° 38.535	E23° 14.079	412,0	ca. 100 m next to last position
4-5	12.11.2023	KC	14:27:00	N37° 38.540	E23° 14.079	421,4	5.75 m sediment recovery; 46 kN max. rope force
3-3	12.11.2023	MUC	17:23:00	N37° 34.074	E23° 19.929	147,1	8 tubes, 15 kN
3-4	12.11.2023	GC	18:10:00	N37° 34.076	E23° 19.929	147,2	10 m tube
7-1	12.11.2023	MB/PS	19:39:00	N37° 38.954	E23° 18.755	313,0	scanning finished at 13.11.2023; includes stations 7-2 and 7-3
8-1	13.11.2023	GC	06:23:00	N37° 42.337	E23° 12.212	322,0	hose-bag (Schlauchfolie), ca 6 m
9-1	13.11.2023	GC	07:44:00	N37° 42.411	E23° 11.924	307,6	hose-bag (Schlauchfolie), ca 6 m; lake sediments, higher sedimentation rate than in 7-1
10-1	13.11.2023	GC	08:53:00	N37° 45.861	E23° 13.954	162,5	hose-bag (Schlauchfolie), ca 5 m; lake sediments with dark layer
11-1	13.11.2023	GC	09:36:00	N37° 45.872	E23° 14.208	151,5	hose-bag (Schlauchfolie), ca 2 m
12-1	13.11.2023	CTD	11:17:00	N37° 42.412	E23° 11.907	303,0	
12-2	13.11.2023	MUC	11:41:00	N37° 42.412	E23° 11.907	306,4	
12-3	13.11.2023	GC	14:54:38	N37° 42.412	E23° 11.907	309,8	extra long core (1/2)
12-4	13.11.2023	GC	15:49:00	N37° 42.411	E23° 11.907	309,6	extra long core (2/2)
13-1	13.11.2023	GC	15:49:00	N37° 45.870	E23° 13.958	168,8	extra long core
RA IIb - Argolis							
14-1	14.11.2023	SVP	02:30:00	N37° 11.260	E23° 00.500	750,0	
15-1	14.11.2023	MB/PS	09:01:00	N37° 25.914	E22° 49.870	392,0	includes stations 15-2 and 15-3
16-1	14.11.2023	GC	09:35:00	N37° 26.366	E22° 53.651	399,0	hose-bag (Schlauchfolie), ca 6 m; more than 80 cm of sapropel
16-2	14.11.2023	MUC	10:35:41	N37° 26.374	E22° 53.659	393,6	12 tubes
16-3	14.11.2023	KC	11:32:00	N37° 26.369	E22° 53.659	396,4	comparable to 16-1
16-4	14.11.2023	CTD	12:56:00	N37° 26.354	E22° 53.661	397,5	

17-1	14.11.2023	MB/PS	16:27:00	N37° 26.250	E22° 53.270	403,2	scanning finished at 15.11.2023; includes stations 17-2 and 17-3
18-1	15.11.2023	MUC	09:21:08	N37° 18.221	E22° 56.452	723,1	
18-2	15.11.2023	CTD	10:29:00	N37° 18.221	E22° 56.452	728,4	depth(m) at Depth and at End are based on EM122
18-3	15.11.2023	GC	11:17:00	N37° 18.220	E22° 56.451	727,3	10 m long piston; only 4.96 m sediment recovery
19-1	15.11.2023	GC	13:33:00	N37° 10.592	E23° 00.774	775,1	10 m long piston; only 5.66 m sediment recovery
19-2	15.11.2023	MUC	14:30:20	N37° 10.596	E23° 00.771	772,2	8 tubes
RA IIC - Myrtoon							
20-1	16.11.2023	SVP	01:38:00	N36° 56.867	E23° 51.382	1018,0	
21-1	16.11.2023	MB/PS	05:25:00	N36° 56.025	E23° 56.499	1045,0	includes stations 21-2 and 21-3
22-1	16.11.2023	MUC	06:38:31	N36° 55.125	E24° 02.674	910,5	8 tubes
22-2	16.11.2023	GC	07:47:10	N36° 55.122	E24° 02.688	910,2	10 m long piston; 7.68 m sediment recovery
23-1	16.11.2023	SVP	11:28:00	N36° 53.890	E24° 34.216	636,0	
24-1	16.11.2023	MB/PS	13:44:00	N37° 03.518	E24° 30.432	484,0	includes stations 24-2 and 24-3
25-1	16.11.2023	CTD	14:36:41	N37° 00.510	E24° 31.639	468,8	no flasks, just sensors
25-2	16.11.2023	GC	15:08:43	N37° 00.511	E24° 31.638	468,9	10 m long piston; 9.16 m sediment recovery; 35kN max. rope force
25-3	16.11.2023	MUC	16:03:29	N37° 00.510	E24° 31.638	469,3	8 tubes
RA IId - Laconian Gulf							
26-1	17.11.2023	SVP	02:53:00	N36° 27.418	E22° 41.554	1490,0	
27-1	17.11.2023	MB/PS	08:26:00	N36° 32.424	E22° 51.674	990,0	includes stations 27-2 and 27-3
28-1	17.11.2023	GC	10:21:00	N36° 30.555	E22° 42.839	1425,0	10 m long piston; <5 m sediment recovery; 37.5kN max. rope force
28-2	17.11.2023	CTD	11:37:55	N36° 30.544	E22° 42.839	1422,8	
28-3	17.11.2023	MUC	12:40:29	N36° 30.544	E22° 42.839	1418,8	8 tubes
29-1	17.11.2023	GC	14:26:00	N36° 27.758	E22° 39.826	1492,1	extra long core; <4 m sediment recovery; 45 kN max. rope force
29-2	17.11.2023	CTD	15:08:00	N36° 27.758	E22° 39.827	1492,3	
30-1	17.11.2023	MB/PS	18:29:00	N36° 46.782	E22° 45.055	46,0	scanning finished at 18.11.2023
31-1	18.11.2023	GC	06:55:11	N36° 45.052	E22° 35.932	95,1	hose-bag (Schlauchfolie), ca 6 m
31-2	18.11.2023	MUC	07:52:09	N36° 45.052	E22° 35.933	100,5	12 tubes
31-3	18.11.2023	CTD	08:13:20	N36° 45.053	E22° 35.932	100,2	
31-4	18.11.2023	KC	08:46:37	N36° 45.052	E22° 35.933	101,0	44.4kN
32-1	18.11.2023	MUC	10:07:18	N36° 44.432	E22° 36.162	111,8	8 tubes
32-2	18.11.2023	CTD	10:28:35	N36° 44.357	E22° 36.168	111,5	
32-3	18.11.2023	GC	10:55:52	N36° 44.362	E22° 36.187	112,7	3.89 m sediment recovery; 30 kN max. rope force
33-1	18.11.2023	KC	12:06:54	N36° 45.067	E22° 35.957	101,0	2.27 m sediment recovery
33-2	18.11.2023	GC	13:14:40	N36° 45.066	E22° 35.956	100,8	3.97 m sediment recovery (5 m piston)
33-3	18.11.2023	GC	13:40:23	N36° 45.066	E22° 35.956	101,0	4.23 m sediment recovery (5 m piston)
33-4	18.11.2023	GC	14:15:00	N36° 45.066	E22° 35.957	102,0	3.66 m sediment recovery (5 m piston)

RA IId - Messenian Gulf							
34-1	18.11.2023	SVP	21:36:00	N36° 52.647	E22° 06.555	783,0	
35-1	18.11.2023	MB/PS	22:46:00	N36° 52.650	E22° 06.547	781,0	scanning finished at 19.11.2023; includes stations 35-2 and 35-3
36-1	19.11.2023	GC	07:05:54	N36° 59.129	E22° 00.338	75,5	hose-bag (Schlauchfolie), ca 4.80 m sediment recovery; packed in liners(!); 26.3 kN max. rope force
36-2	19.11.2023	KC	08:45:00	N36° 59.130	E22° 00.334	74,1	ca. 2.0 m sediment recovery; 51 kN max. rope force
36-3	19.11.2023	CTD	09:43:00	N36° 59.130	E22° 00.332	74,0	
36-4	19.11.2023	MUC	10:01:03	N36° 59.130	E22° 00.331	74,0	12 tubes
36-5	19.11.2023	GC	10:45:55	N36° 59.130	E22° 00.333	74,1	X m sediment recovery (5 m piston); 23.5 kN max. rope force
36-6	19.11.2023	GC	11:15:39	N36° 59.131	E22° 00.331	73,9	X m sediment recovery (5 m piston); 27.5 kN max. rope force
37-1	19.11.2023	MUC	12:42:20	N36° 55.937	E22° 01.262	402,5	8 tubes
37-2	19.11.2023	CTD	13:16:31	N36° 55.931	E22° 01.269	404,0	
37-3	19.11.2023	GC	14:03:25	N36° 55.950	E22° 01.259	402,5	10 m long piston; <3 m sediment recovery; 43 kN max. rope force
38-1	19.11.2023	MB/PS	15:15:00	N36° 56.712	E21° 58.142	78,0	scanning finished at 20.11.2023; includes stations 38-2 and 38-3
39-1	20.11.2023	GC	06:54:29	N36° 52.029	E22° 02.641	485,1	10 m long piston; 5.10 m sediment recovery; 39.9kN max. rope force
39-2	20.11.2023	CTD	07:48:06	N36° 52.032	E22° 02.630	484,1	
39-3	20.11.2023	MUC	08:25:27	N36° 52.032	E22° 02.630	483,9	8 tubes
RA Ic - South Crete							
40-1	21.11.2023	SVP	14:10:00	N34° 54.761	E24° 42.521	912,0	
41-1	21.11.2023	MB/PS	15:22:00	N34° 58.557	E24° 43.367	87,0	scanning finished at 22.11.2023; includes stations 41-2 and 41-3
42-1	22.11.2023	GC	06:41:01	N35° 03.976	E24° 36.141	247,3	hose-bag (Schlauchfolie), ca 2.90 m sediment recovery; 32.5 kN max. rope force
43-1	22.11.2023	GC	07:58:58	N35° 02.900	E24° 41.013	118,5	hose-bag (Schlauchfolie)
44-1	22.11.2023	CTD	09:30:13	N35° 02.972	E24° 36.137	247,0	
44-2	22.11.2023	GC	10:07:48	N35° 02.973	E24° 36.137	247,0	hose-bag (Schlauchfolie), only 1m sediment recovery; 32.4 kN max. rope force
44-3	22.11.2023	GC	10:36:31	N35° 02.973	E24° 36.136	247,1	hose-bag (Schlauchfolie), ca. 2.64 m sediment recovery; 30 kN max. rope force
44-4	22.11.2023	GC	11:02:00	N35° 02.973	E24° 36.137	247,2	hose-bag (Schlauchfolie), ca. 2.43 m sediment recovery; 32 kN max. rope force
44-5	22.11.2023	MUC	11:40:00	N35° 02.972	E24° 36.138	247,1	12 tubes
RA III - Ionian Sea South							
45-1	23.11.2023	SVP	12:27:00	N37° 29.914	E21° 20.896	600,0	
46-1	23.11.2023	MB/PS	13:39:00	N37° 31.046	E21° 17.046	506,0	includes stations 46-2 and 46-3

47-1	23.11.2023	GC	16:03:00	N37° 35.448	E21° 18.432	138,0	10 m long piston; 4.29 m sediment recovery; 34.9 kN max. rope force
47-2	23.11.2023	CTD	16:36:00	N37° 35.449	E21° 18.433	139,8	
47-3	23.11.2023	MUC	16:53:55	N37° 35.449	E21° 18.434	138,8	8 tubes
48-1	23.11.2023	MB/PS	17:38:00	N37° 38.647	E21° 21.291	15,0	scanning finished at 24.11.2023; includes stations 48-2 and 48-3
RA IV - Amvrakikos							
49-1	24.11.2023	SVP	14:37:00	N38° 57.203	E21° 04.301	57,0	
50-1	24.11.2023	MB/PS	15:06:00	N38° 57.528	E21° 08.181	46,0	includes station 50-2
51-1	24.11.2023	GC	17:11:10	N38° 57.973	E21° 04.289	54,3	10 m long piston; 6.60 m sediment recovery; 38 kN max. rope force; depth sensor readjusted at depth, 8m off
51-2	24.11.2023	CTD	17:57:07	N38° 57.973	E21° 04.289	54,9	
51-3	24.11.2023	MUC	18:08:57	N38° 57.974	E21° 04.289	54,8	tubes too full, second MUC attempt
51-4	24.11.2023	MUC	18:34:55	N38° 57.973	E21° 04.289	54,8	12 tubes, all too full, material flows out of MUC corers; loss of sediment
52-1	24.11.2023	MB/PS	19:40:00	N38° 56.918	E21° 01.055	48,0	scanning finished at 25.11.2023; includes stations 52-2 and 52-3
53-1	25.11.2023	GC	09:14:06	N38° 55.986	E21° 03.273	67,0	hose-bag (Schlauchfolie), almost full; 24.2 kN max. rope force; depth sensor Y3 shows 10m less
53-2	25.11.2023	CTD	09:57:00	N38° 55.991	E21° 03.271	58,0	hose-bag (Schlauchfolie), almost full; 24.2 kN max. rope force; depth sensor Y3 shows 10m less
53-3	25.11.2023	MUC	10:25:46	N38° 55.986	E21° 03.272	57,9	12 tubes
53-4	25.11.2023	GC	11:04:00	N38° 55.986	E21° 03.272	57,9	10 m long piston; >5 m sediment recovery; 36.5 kN max. rope force
53-5	25.11.2023	GC	11:41:00	N38° 55.986	E21° 03.264	57,8	10 m long piston; 30.5 kN max. rope force
53-6	25.11.2023	GC	12:14:00	N38° 55.959	E21° 03.264	57,8	10 m long piston; 50m south of 53-5
53-7	25.11.2023	GC	12:54:00	N38° 55.932	E21° 03.264	57,6	15 m long piston; 50m south of 53-6; 37.7 kN max. rope force
54-1	25.11.2023	GC	14:02:14	N38° 57.346	E21° 03.507	57,7	hose-bag (Schlauchfolie), completely full; 25.2 kN max. rope force; problems with thin hose-bag
54-2	25.11.2023	CTD	14:27:14	N38° 57.347	E21° 03.525	58,0	
54-3	25.11.2023	GC	15:19:20	N38° 57.346	E21° 03.524	57,8	10 m long core; 34 kN max. rope force; 30cm core loss on top
54-4	25.11.2023	GC	16:14:00	N38° 57.353	E21° 03.521	57,9	10 m long core; 31 kN max. rope force
54-5	25.11.2023	MUC	16:46:33	N38° 57.357	E21° 03.524	57,9	12 tubes
55-1	25.11.2023	MB/PS	17:12:00	N38° 56.492	E21° 03.294	59,0	scanning finished at 26.11.2023; includes stations 55-2 and 55-3
56-1	26.11.2023	GC	06:46:10	N38° 59.483	E20° 49.842	34,7	10 m long piston; 5.21 m sediment recovery; 33 kN

							max. rope force
56-2	26.11.2023	CTD	07:12:00	N38° 59.484	E20° 49.841	34,7	
56-3	26.11.2023	MUC	07:41:26	N38° 59.484	E20° 49.841	34,6	12 tubes
57-1	26.11.2023	MUC	08:34:40	N38° 58.118	E20° 51.367	35,5	12 tubes
57-2	26.11.2023	CTD	08:56:59	N38° 58.116	E20° 51.366	35,3	
57-3	26.11.2023	GC	09:24:23	N38° 58.115	E20° 51.365	35,3	10 m long piston; 5.71 m sediment recovery; 37 kN max. rope force
58-1	26.11.2023	GC	10:30:22	N38° 57.241	E20° 54.341	42,7	10 m long piston; X m sediment recovery; 35.1 kN max. rope force
58-2	26.11.2023	CTD	10:51:23	N38° 57.240	E20° 54.341	42,7	
58-3	26.11.2023	MUC	11:10:00	N38° 57.240	E20° 54.342	42,7	12 tubes
59-1	26.11.2023	CTD	12:31:26	N38° 54.957	E21° 04.226	53,0	
59-2	26.11.2023	MUC	12:45:07	N38° 54.957	E21° 04.227	52,9	12 tubes (8 sampled)
59-3	26.11.2023	GC	13:16:00	N38° 54.958	E21° 04.230	52,9	10 m long piston; X m sediment recovery; 33 kN max. rope force
59-4	26.11.2023	GC	13:57:50	N38° 54.957	E21° 04.230	53,0	10 m long piston; X m sediment recovery; 34 kN max. rope force
59-5	26.11.2023	GC	14:28:22	N38° 54.957	E21° 04.230	53,0	10 m long piston; X m sediment recovery; 33 kN max. rope force
60-1	26.11.2023	MB/PS	15:07:00	N38° 55.867	E21° 02.680	57,0	scanning finished at 27.11.2023; includes stations 60-2 and 60-3
RA IV - Ionian Sea North							
61-1	27.11.2023	SVP	11:44:00	N39° 32.305	E20° 03.956	67,0	
62-1	27.11.2023	MB/PS	12:34:00	N39° 33.811	E20° 05.798	58,0	includes stations 62-2 and 62-3
63-1	27.11.2023	GC	14:20:00	N39° 33.641	E20° 01.683	68,7	hose-bag (Schlauchfolie), completely full; 26 kN max. rope force;
63-2	27.11.2023	CTD	14:51:00	N39° 33.645	E20° 01.660	80,0	
63-3	27.11.2023	MUC	15:12:12	N39° 33.645	E20° 01.659	69,1	11 tubes (not all sampled)
63-4	27.11.2023	MUC	15:32:00	N39° 33.645	E20° 01.659	69,1	12 tubes (repetition of 63-3)
63-5	27.11.2023	KC	16:07:00	N39° 33.645	E20° 01.659	69,0	6m sediment recovery
63-6	27.11.2023	GC	17:21:55	N39° 33.645	E20° 01.660	76,9	15 m long piston; X m sediment recovery; 33 kN max. rope force; strange depth value
RA III - Ionian Sea South							
64-1	28.11.2023	SVP	03:06:00	N38° 16.757	E20° 48.309	357,0	
65-1	28.11.2023	MB/PS	03:40:00	N38° 16.182	E20° 48.043	310,0	includes stations 65-2 and 65-3
66-1	28.11.2023	GC	07:10:00	N38° 15.495	E20° 49.284	292,0	hose-bag (Schlauchfolie), completely full; 34 kN max. rope force; packed into flower boxes
66-2	28.11.2023	CTD	07:49:05	N38° 15.494	E20° 49.282	294,7	
66-3	28.11.2023	MUC	08:28:02	N38° 15.494	E20° 49.285	292,5	12 tubes
66-4	28.11.2023	KC	09:23:00	N38° 15.494	E20° 49.286	292,6	2.93m sediment recovery; 59 kN max. rope force
67-1	28.11.2023	MUC	10:43:16	N38° 15.387	E20° 48.213	289,1	12 tubes
67-2	28.11.2023	CTD	11:12:30	N38° 15.385	E20° 48.216	288,9	

68-1	28.11.2023	MB/PS	15:12:00	N38° 32.873	E20° 48.401	233,0	scanning finished at 29.11.2023; includes stations 68-2 and 68-3
69-1	29.11.2023	GC	08:18:03	N38° 22.787	E20° 47.944	347,8	hose-bag (Schlauchfolie), completely full; 33 kN max. rope force;
69-2	29.11.2023	CTD	09:11:40	N38° 22.787	E20° 47.942	358,7	depth sensor shows 10m differences
69-3	29.11.2023	KC	10:10:00	N38° 22.786	E20° 47.941	347,7	3.80 m sediment recovery; 59 kN max. rope force
69-4	29.11.2023	MUC	11:11:31	N38° 22.793	E20° 47.933	348,3	12 tubes
69-5	29.11.2023	GC	11:55:10	N38° 22.792	E20° 47.933	348,5	10 m long piston; X m sediment recovery; X kN max. rope force
70-1	29.11.2023	GC	13:33:00	N38° 29.527	E20° 43.883	309,3	10 m long piston; 5.30 m sediment recovery; 37 kN max. rope force
70-2	29.11.2023	CTD	14:24:12	N38° 29.526	E20° 43.884	309,5	
70-3	29.11.2023	MUC	15:08:34	N38° 29.536	E20° 43.880	309,5	
71-1	29.11.2023	MB/PS	17:28:00	N38° 11.199	E20° 53.327	258,0	scanning finished at 30.11.2023; includes stations 71-2 and 71-3
72-1	30.11.2023	GC	10:12:35	N37° 32.535	E21° 18.237	341,6	hose-bag (Schlauchfolie), completely full; 4.94 m sediment recovery; many turbidites
73-1	30.11.2023	KC	11:25:14	N37° 35.451	E21° 18.434	133,7	4.10 m sediment recovery; 58 kN max. rope force