

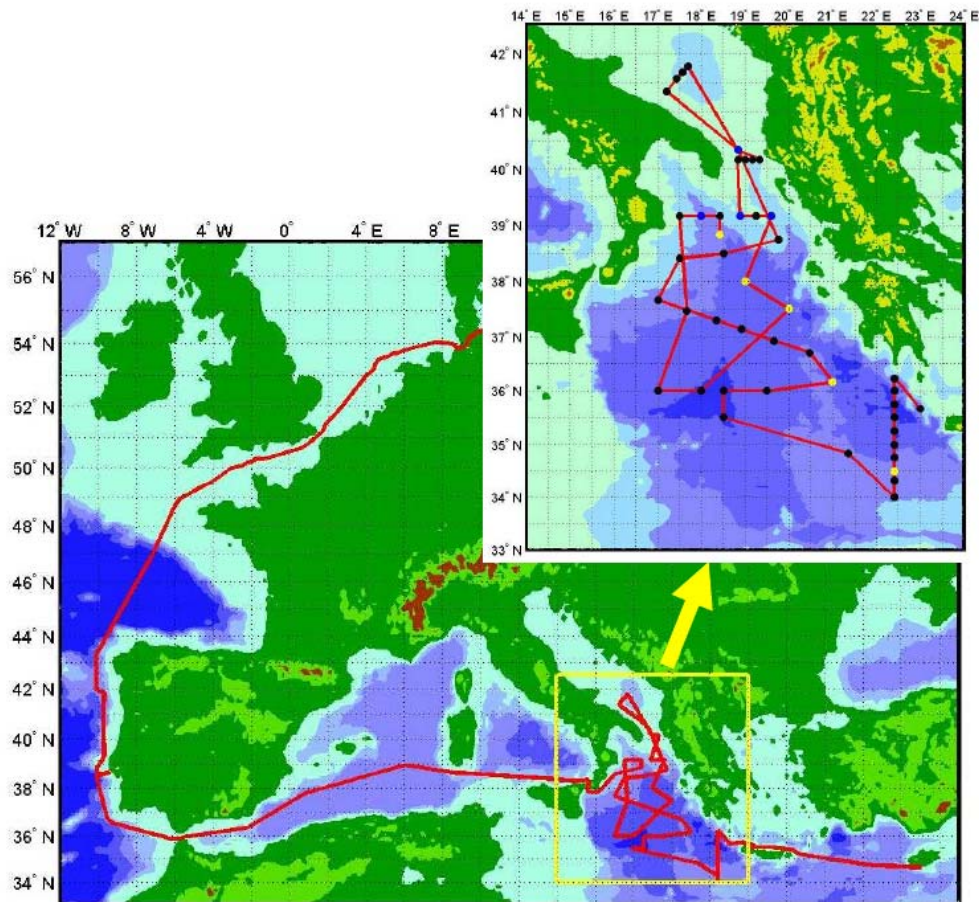
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Summary Cruise Report RV MARIA S. MERIAN Cruise MSM13/1-2

Rostock-Warnemünde – Limassol
28. September – 22. October 2009
Chief Scientist: Dagmar Hainbucher
Captain: Karl-Friedhelm von Staa



Ship track of RV MARIA S. MERIAN cruise MSM 13/1-2 from Rostock, Germany to Limassol, Cyprus. The displayed image section shows the research area. Black dots are CTD stations, blue dots indicate the positions of moorings and yellow dots show the positions where Argo floats were launched.

Objectives

Up to the end of the eighties the main source of deep water masses in the Ionian Basin was the southern Adriatic Sea. However, during the nineties a dramatic climatic change took place in the eastern Mediterranean Sea: the Eastern Mediterranean Transient (EMT). Since then, deep water has been formed by waters originating in the Aegean Sea. Expeditions carried out in this region in recent years indicate that the process of deep water formation might reverse again. To what extent this assumption applies and what characteristics the deep water in the Ionian Sea exhibit nowadays, should be determined on the cruise. The process of a re-reversal of abyssal water production in the Ionian Sea is a long-term process and must therefore be monitored for several years. Hence, this cruise is part of a series of cruises investigating this question (POSEIDON 298, METEOR 71-3, MSM13/1-2, MSM15-4). The investigations were carried out by means of CTD/IADCP measurements.

Observations and model simulations have shown that Adriatic Deep Water (ADW) reaches the Ionian Basin along different routes with different mixing rates. The mixing rate can be a determining criterion for the characteristics of Ionian Deep Water (EMDW); the resulting density from the ADW influences also the role which the Aegean Deep Water might play in the Ionian Basin. Therefore, it is essential to identify the routes and to quantify the mixing rates of the ADW. For this purpose, moorings were deployed during the cruise and will be recovered in summer 2010. Additionally, the dispersion of Levantine Intermediate Water is investigated by means of CTD profiles made with Argo floats that reach a maximum depth of 2000 m. The drift of the floats, which move on a parking depth of 350 m, allows for additional investigation of the near-surface circulation.

Microorganisms play a fundamental role in biogeochemical cycling. They can be successfully correlated to water masses characterized by distinct temperature and salinity. The purpose of the study is to investigate the microbiota composition and activity of the different water masses involved in the structure of the thermohaline cell of the eastern part of the Mediterranean basin, in order to confirm the origin of the Ionian abyssal water layers.

The biogeochemical work complemented a prior campaign in January/February 2007 (Meteor 71-3). Again water for nutrient analyses was sampled, and will be determined for the $^{15}\text{N}/^{14}\text{N}$ ratios in nitrate, dissolved organic nitrogen (DON), and suspended matter at several stations in the central and northern Ionian Sea, and the southern Adriatic Sea. We also experimentally sought for evidence of N_2 -fixation.

Another objective of the cruise was to train Bachelor students on oceanographic instrumentation and to familiarize them with the analysis of scientific problems.

RV MARIA S. MERIAN cruise MSM13/1-2 was carried out by the Institut für Meereskunde at the ZMAW of the University of Hamburg. Scientists and technicians from the Institut für Biogeochemie und Meereschemie, ZMAW, University of Hamburg, from the Istituto Nazionale di Oceanografia e di Geofisica Sperimentale, from the Department of Environmental Sciences, University of Venice and of the Department of Food Science and Microbiology, University of Milano also participated in the cruise. Six students from the University of Hamburg and one from the University of Rome got their first training on board.

Narrative

RV Maria S. Merian left Warnemünde, Rostock as scheduled on 28th October at 12:00, setting course to the eastern Mediterranean Sea. On the same day we reached the passage through the North-Baltic-Sea-Channel at around 19:00. The next day we sailed through the North Sea. The weather was cloudy with rainfall and the sea was rough. Part of the scientific crew suffered from sea sickness. But, while passing through the English Channel we got sunny and calm weather.

The transit time was used for several duties. The scientists set up and tested their instruments. The students started their training program with meteorological and oceanographic measurements. The results of their measurements were discussed in daily seminars. In these seminars student projects were also defined, such as “temperature and salinity in the North Sea” or “meteorological measurements compared to ship sensor measurements”. From the ship’s side a lot of engine and stroke-compensation tests were carried out during transit. On Saturday, 3rd October, early in the morning, RV Maria S. Merian stopped at the mouth of the river Tejo to disembark via boat the technicians responsible for the stroke-compensation tests. Also, a technician for testing the PARASOUND system was taken on board.

On Sunday, 4th October we sailed through the Strait of Gibraltar at sunrise, entering finally the Mediterranean Sea. The weather was fantastic and the view spectacular. On Tuesday, 6th October, in the morning a CTD test station was carried out between Sardinia and Sicily on 38° 38.76’ N and 8° 31.30’ E. The station was completed without any complications.

On Wednesday, 7th October, in the late afternoon RV Maria S. Merian arrived at the Strait of Messina where the last technician responsible for the PARASOUND system disembarked via boat at Reggio Calabria. At last, the transit to the eastern Mediterranean Sea was ended.

RV Maria S. Merian anchored at Reggio Calabria until the next morning, Thursday, 8th October. 5 Italian colleagues embarked, also via boat. Soon afterwards RV Maria S. Merian set course to the first CTD station at 38° 50’ N and 18° 25’ W in the north western Ionian Sea. We arrived on station at 21:10. In addition to the CTD measurements, we launched our first Argo float. The deployment was carried out without any problems. We continued with our CTD work through the night until the next morning on Friday, 9th October.

Between 8:00 and 9:00 on 9th October we deployed our first mooring at 39° 10.02’ N and 18° 00.01’ E. The work was done very fast as the sea and the weather were absolutely calm. Afterwards, we were heading southward and continuing with CTD stations. Everything worked well without any severe problems and also the weather remained still fantastic and the sea calm. Some of the stations were very deep (around 4000m).

On Sunday, 11th October, at 10:05 we launched our second Argo float at 37° 29.96’ N and 19° 59.98’ E and in the late afternoon we launched the third float at 37° 59.93’ N and 18° 59.90’ E. During lunch time we celebrated half time of the cruise with a surprise meal and wine served with the food.

On Monday, 12th October, we deployed two moorings, one in the morning at 39° 10.01’ N and 19° 35.99’ E and the second in the afternoon at 39° 07.88’ N and 18° 50.88’ E. During the second deployment a tanker with an engine failure drifted towards us, so that we had to move the planned position at 39° 10’ N slightly to 39° 7.88’ N. In between the moorings we continued with our CTD work and one of our Italian colleagues held a talk during the seminar

about the Adriatic Sea. During the night, the weather got bad with high swell and wind speeds up to 10 Beaufort. So we decided not to deploy our last mooring in the Strait of Otranto but instead to sail to our most northern section in the southern Adriatic Sea in order to continue our CTD work. We reached the section covering the Adriatic Pit on the evening of Tuesday, 13th October. Meanwhile, the weather calmed down a bit and the work could be carried out without any difficulties.

On Wednesday, 14th October, at noon we were able to deploy our last mooring in the Strait of Otranto at 40° 20.29' N and 18° 50.13' E. In the afternoon of the same day we got a lecture by another Italian colleague about recent measurements and results in the Ionian Sea. The next days were completed with CTD measurements. The weather was now more cloudy and rainy with sometimes some swell but it did not constrain our work. Another seminar lecture on Friday, 16th October informed us about the work of the microbiologists on board. Also, this day we launched our 4th Argo float in the evening at 36° 10.00' N and 21° 00.03' E. CTD work continued in the central Ionian Sea until the evening of Saturday, 17th of October. Then, we set course eastward, still doing CTD measurements on route to our last section (south - north) at 22° 25' E on which a fine scale survey of Aegean inflow to the Ionian Sea should be carried out.

We reached the final section on the afternoon of Sunday, 18th October. On this section we also launched our last Argo float in the night of 18th October at 34° 30.49' N and 22° 25.12' E. During the section we observed some problems with our CTD which now showed spiky profiles below 2500m for one of the two salinity sensors and additionally for the oxygen sensor. Luckily, this did not happen before and, luckily, the CTD was equipped with two sensor systems so that we did not lose any important data. On Tuesday, 20th October around 10:00 we finished our work and the ship set course to our final destination, Limassol in Cyprus which we reached in the morning of Thursday, 22nd October on schedule.

The cruise ended with a reception held on board the ship in the late afternoon of 22nd October. Guests from science, politics and the administration of Cyprus were invited. Even the German ambassador showed up for a short visit.

Acknowledgements

We would like to thank Captain Friedhelm von Staa, his officers and the crew of RV MARIA S. MERIAN for their always competent support of our measurement programme and for their friendliness and patience. Special thanks to Björn Maaß, Chief Officer for giving a lecture of navigation to our students, to Frank Schrage, sailor, for teaching them to make knots and to Achim Schüler, Chief Engineer for showing and explaining the engines of the vessel. We all enjoyed our stay on board.

The ship time of RV Maria S. Merian and the financial support for the journey of scientists and transport of equipment was provided by the Deutsche Forschungsgemeinschaft within the core program METEOR/MERIAN. We also benefited from financial contributions by the research institutes involved. We gratefully acknowledge this support.

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Marchetto, Davide	Biological sampling	UVE
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Welsch, Andreas	Moorings, floats, technical support	IfM-ZMAW

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List of Stations

CTD Conductivity-Temperature-Depth sonde including IADCP
MOR Mooring
ARGOFL Argo Float
BE Begin of station
BO Near bottom reached on station
EN End of station

MSM13/2	892	1	61	CTD	20.10.09	6:20:43	BE	35°39.998	N	22°59.99	1	E	2637.20			
MSM13/2	892	1	61	CTD	20.10.09	7:10:40	BO	35°39.989	N	22°59.98	6	E	2562.1	2618.7		~30
MSM13/2	892	1	61	CTD	20.10.09	8:04:16	EN	35°39.986	N	22°59.98	6	E	2676			