

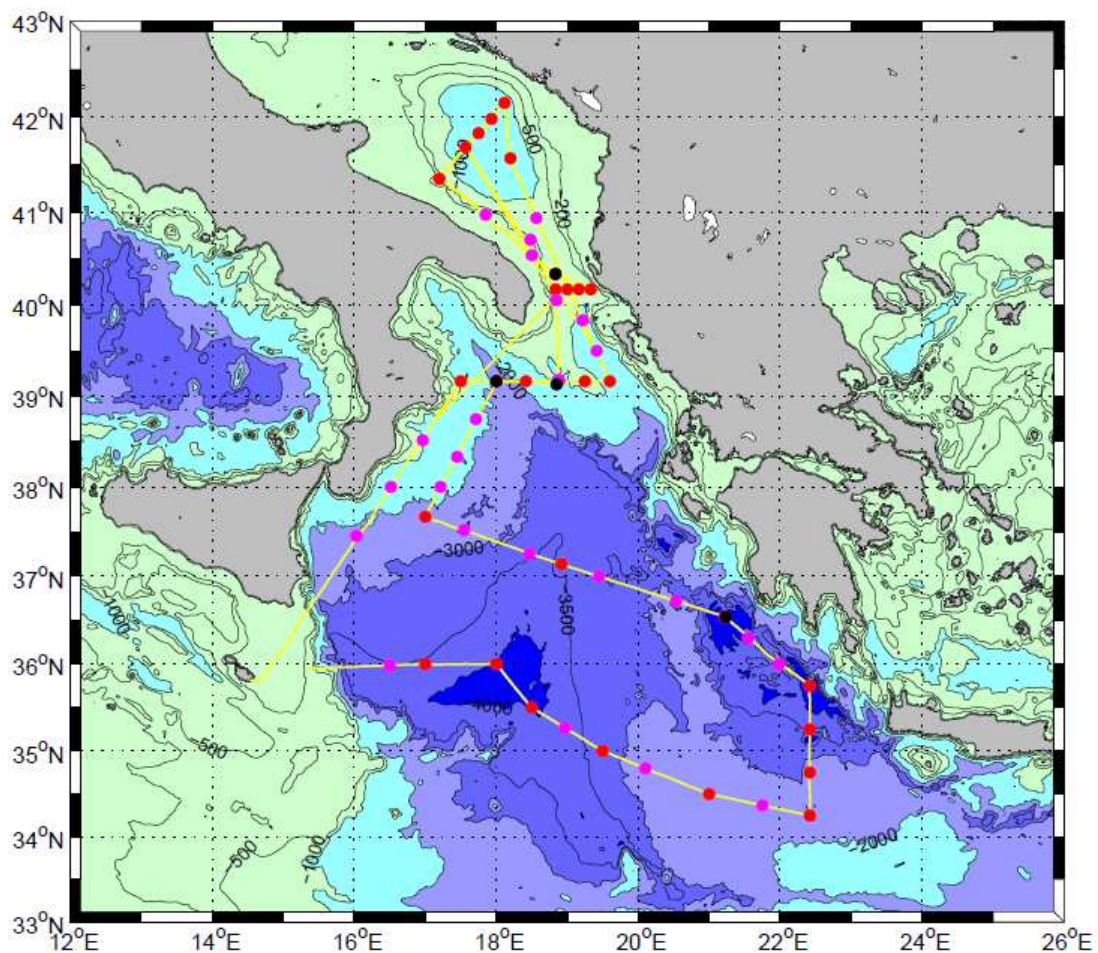
Dagmar Hainbucher  
Institut für Meereskunde  
ZMAW  
Universität Hamburg  
Bundesstr. 53  
D-20146 Hamburg

Tel.: +49 40 42838 5745  
Fax: +49 40 42838 4644  
..



## Summary Cruise Report RV MARIA S. MERIAN Cruise MSM15/4

Malta – Malta  
07. July – 17. July 2010  
Chief Scientist: Dagmar Hainbucher  
Captain: Karl Friedhelm von Staa



*Ship track of RV MARIA S. MERIAN cruise MSM 15/4 from Malta to Malta. Red dots are CTD stations, black dots indicate mooring locations and magenta dots show XBT stations.*

## Objectives

After the Eastern Mediterranean Transient (EMT), which occurred in the late 1980s, the abyssal water masses of the eastern Mediterranean were dominated by water masses of Aegean origin. Data from cruises carried out in recent years now indicate that the process of deep water formation has again been reversed, with Adriatic deep water being the main source for the deep water formation. The reversal of deep water production in the Ionian Sea is a long-term process and therefore it needs to be monitored over a period of years. The characteristics which are crucial for the deep water today, how it differs from the deep water before the EMT and in which state of the reversal it resides, these are the questions which have to be investigated continuously during the coming years. The cruises which have been accomplished (such as Poseidon 298, Meteor M71-3, Merian MSM13/2) and the current one shall fulfill this purpose.

Furthermore, observations and model simulations have shown that the Adriatic Deep Water (ADW) reaches the Ionian Basin along different routes with different mixing rates. In the process, the mixing rate could be a determining factor for the characteristics of the Ionian Deep Water and the density resulting from the ADW also determines the importance of Aegean Deep Water on the deep water in the Ionian basin. Therefore, it is crucial to identify the transport routes of the ADW and to quantify its mixing rates. Additionally, the composition and the activity of microorganisms of different water masses will be analysed, in order to ascertain the origin of the Ionian Deep Water.

3 moorings which were deployed during MERIAN cruise 13/2 in October 2009 will be recovered on the cruise. One mooring is located in the Strait of Otranto for measuring the outflow of Adriatic deep water during winter. Three other moorings are located slightly south of the Strait. They should cover the possible transport routes of ADW in order to identify the different mixing rates. Additionally, CTD and XBT sections will be carried out in the southern Adriatic Sea and in the northern and central Ionian Basin. Here, stations will be repeated which were already occupied on other cruises for investigating the modification of the water mass characteristics. The microbiological works focus on DNA analyses and on diversity studies.

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.

## Narrative

FS MARIA S. MERIAN left the harbour of Marsaxlokk, Malta, as scheduled, on 7<sup>th</sup> July at 8:00 in the morning. The sky was blue and it became a very hot day. After the usual preparations to get everything running, we started with our first XBT station on 37° 27' N 16° 2' E at 18:30 on 7<sup>th</sup> July. We reached our first CTD station on 39° 10' N 17° 30' E early the following morning at 5:00. We had no major problems with our instruments and so all work was carried out as scheduled. Meanwhile, there was enough time for our soccer fans to watch the match between the German and the Spanish teams at the World Cup. Luckily, the outcome of the match did not trouble the good mood on board. At 8:00 in the morning of 8<sup>th</sup> July we reached the first mooring position on 39° 10' N 18° E. Unfortunately, we were unable

to make contact with the mooring. Therefore, we released blind but the mooring did not come up. We decided to dredge for the mooring on our way back. With great fear that also the other moorings would not come up, we sailed to the second mooring position on 39° 10' N 18° 53' E which we reached at around 17:45. This mooring was released without any problems and there was great relief after the first Benthos spheres were seen at around 18:00. Meanwhile, the wind had increased to gusts of up to 8 Bft and some of the scientists became seasick and were unable to attend the evening birthday party of the chief scientist. Overnight and early the next morning, Friday the 9<sup>th</sup> July, we carried out CTD stations in the Strait of Otranto and reached our third mooring station on 40° 20' N 18° 50' E in the middle of the day. This mooring was also recovered without any problems, and around 13:30 all instruments from the mooring were safely stored on deck. During the following longer steaming distance we launched some XBTs. In the night to 10<sup>th</sup> July we reached our western most station of the section covering the Adriatic Pit. The CTD work on this section ended on Saturday, 10<sup>th</sup> July at around 15:00. Then began a long transit of around 13 hours. On this transit an extraordinary social event proceeded. The electronics engineer of the vessel Frank Riedel and his longtime companion Dr. Marina Meixner were married by the ship's captain, Captain Karl Friedhelm von Staa. They made their wedding vows on the helicopter deck at around 16:00, on Saturday, 10<sup>th</sup> July. After the ceremony, everybody was invited to a champagne reception, and in the evening a barbecue party with all traditional wedding practices, like kidnapping of the bride, cutting of the fancy cake, etc. were celebrated. At around 4:00 in the night of the 11<sup>th</sup> July work continued and we reached the eastern most station of our section on 39° 10' N. At around noon, we were again on the position of our first mooring and we began dredging. In the evening of this day, it got just once more thrilling when a yellow object was seen in the far distance and everybody was hoping that these were our yellow Benthos spheres. As it was already dark, the rescue boat was exposed in order to flag the position of the object. Unfortunately, the object was definitely nothing belonging to our mooring and we were a bit sad that all the exhausting work of the crew on deck was to no purpose. On Monday, 12<sup>th</sup> July, we continued with CTD and XBT stations in the north central Ionian basin. We had to interrupt this work in order to be on time at sunrise at the position of 36° 32' N 21° 15' E. There, a mooring lay in about 4500 m depth which was deployed by our colleagues from FTZ Kiel and GKSS around 2 years ago. This mooring was always answering but however, did not come up. Three other vessels had previously attempted to recover the mooring. Also, we released but the mooring did not move. We started dredging early in the morning and in the afternoon we got the upper part of the mooring. We dredged once again but the remaining part of the mooring was not recovered. The procedure took the whole day until around 19:30. The rest of the week was covered with CTD and XBT stations. One section was carried out on 22° 25' E from north to south in order to quantify the inflow from Aegean and Levantine water into the Ionian basin. Further stations followed in the deep central Ionian basin. These stations are essential to quantify the amount of Adriatic and Aegean deep water in the Ionian Sea. In the afternoon of Friday, 16<sup>th</sup> July the CTD and XBT work was abandoned and we set course to our final destination of La Valletta, Malta. We had still some time to make a sightseeing tour with the rescue boat for those scientists who had never been on the MERIAN before. Then, the container was packed and the laboratories and cabins cleaned. During our last evening on board we celebrated the birthday of a member of the scientific crew on the quarter deck of the vessel including some unexpected baths in the pool on deck. In the morning of Saturday, the 17<sup>th</sup> July RV MARIA S. MERIAN reached the port of La Valletta on Malta as scheduled.

## Acknowledgements

We would like to thank Captain Karl Friedhelm von Staa, his officers and the crew of RV MARIA S. MERIAN for the support of our scientific programme, for their unending competent and friendly help, and for the excellent food. Especially, the engagement during the dredging gains our recognition and deserves our gratitude. This sudatory work enabled in the first place the recovery of parts of a mooring, which three ships before had been unable to recover.

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.

## Cruise participants

Dagmar Hainbucher	Chief Scientist	IfM-ZMAW
Bensi, Manuel	CTD	OGS
Berta, Maristella	CTD	OGS
Büns, Ilse	O <sub>2</sub> -Titration	IFBM-ZMAW
Cardin, Vanessa	CTD	OGS
Hübner, Udo	Moorings, data managment	IfM-ZMAW
Kiehn, Rüdiger	Mooring, Kiel	GKSS
Mapelli, Francesca	Biological sampling	DiSTAM
O'Driscoll, Kieran	CTD	IfM-ZMAW
Pigozzo, Andrea	Biological sampling	UVE
Tittebrand, Antje	CTD	IfM-ZMAW
Voigt, Wolfgang	Mooring, Kiel	FTZ-Kiel
Welsch, Andreas	Moorings, technical support	IfM-ZMAW
Yu, Huaming	CTD	IfM-ZMAW

### **Institut für Meereskunde (IfM-ZMAW)**

#### **Zentrum für Marine und Atmosphärische Wissenschaften**

Universität Hamburg

Bundesstr. 53

20146 Hamburg / Germany

e-mail: domke-sommer@zmaw.de

www: //www.ifm.zmaw.de

### **Institut für Biogeochemie und Meereschemie (IFBM)**

#### **Zentrum für Marine und Atmosphärische Wissenschaften**

Universität Hamburg

Bundesstr. 55

20146 Hamburg / Germany

e-mail: sekretariat-ifbm@zmaw.de

www: //www.geowiss.uni-hamburg.de/i-bioge/start.html

**Cà Foscari University of Venice (UVE)**  
**Department of Environmental Sciences**  
Microbiology Laboratory  
Calle Larga S. Marta 2137  
30123 Venice / Italy  
e-mail: baldi@unive.it  
www: //www.unive.it/nqcontent.cfm?a\_id=50266

**Department of Food Science and Microbiology (DiSTAM)**  
**Faculty of Agriculture**  
University of Milano  
Via Celoria 2  
20133 Milano / Italy  
e-mail: distam@unimi.it  
www: //www.distam.unimi.it

**Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS)**  
**Dipartimento Oceanografia**  
Borgo Grotta Gigante 42/C  
34010 Sgonico (TS) /Italy  
e-mail: sedoga@inogs.it  
www: // www.ogs.trieste.it

**Forschungs- und Technologiezentrum Westküste der Universität Kiel (FTZ Kiel)**  
**Arbeitsbereich CORELAB / Meeresmesstechnik**  
Hafentörn 1  
25761 Büsum / Germany

### **List of Stations**

CTD Conductivity-Temperature-Depth sonde  
MOR Mooring  
BE Begin of station  
BO Near bottom reached on station  
EN End of station  
DB Deep Blue XBT  
FD Fast Deep XBT



EXPO-CODE	Stat. No.	Cast. No.	CTD Cast No.	Type	Date	Time	Code	POSITION		Bottle depth	Max. press.	Bottom dist.	Comments	Biological Samples
						UTC		Latitude	Longitude					
MSM_15_4			1	XBT	07.07.10	16:31:00		37° 26.470'	N 16° 02.160'	E		DB		
MSM_15_4			2	XBT	07.07.10	19:40:00		37° 59.730'	N 16° 30.55'	E	1557	FD		
MSM_15_4			3	XBT	07.07.10	22:51:00		38° 31.182'	N 16° 57.530'	E	1108	DB		
MSM_15_4	637	1	1	CDT	08.07.10	3:12:00	BE	39° 9.988'	N 17° 29.973'	E	1105			
MSM_15_4	637	1	1	CDT	08.07.10	3:38:00	BO	39° 9.992'	N 17° 29.975'	E	1105	10.62	bottles closed in wrong order	
MSM_15_4	637	1	1	CDT	08.07.10	4:20:00	EN	39° 9.992'	N 17° 29.976'	E	1104			
MSM_15_4	638	1	2	CDT	08.07.10	6:48:00	BE	39° 9.990'	N 18° 00.0'	E	2425			X
MSM_15_4	638	1	2	CDT	08.07.10	7:36:00	BO	39° 9.996'	N 17° 59.993'	E	2508	10.6		
MSM_15_4	638	1	2	CDT	08.07.10	8:34:00	EN	39° 9.677'	N 17° 59.992'	E	-			
MSM_15_4	639			Mooring	08.07.10	8:50:00		39° 9.67'	N 17° 59.910'	E			no contact to releaser	
MSM_15_4	640	1	3	CDT	08.07.10	12:13:00	BE	39° 9.997'	N 18° 24.993'	E	1564			
MSM_15_4	640	1	3	CDT	08.07.10	12:43:00	BO	39° 9.996'	N 18° 24.993'	E	1564	14		
MSM_15_4	640	1	3	CDT	08.07.10	13:42:00	EN	39° 10.00'	N 18° 24.992'	E	1562			
MSM_15_4	641			Mooring	08.07.10	15:54:00		39° 7.58'	N 18° 50.930'	E			mooring released	
MSM_15_4	642	1	4	CDT	08.07.10	17:36:00	BE	39° 9.979'	N 18° 52.990'	E	1166			
MSM_15_4	642	1	4	CDT	08.07.10	17:59:00	BO	39° 9.977'	N 18° 52.987'	E	1149	13.9		X
MSM_15_4	642	1	4	CDT	08.07.10	18:40:00	EN	39° 9.972'	N 18° 52.990'	E	1163			
MSM_15_4			4	XBT	08.07.10	22:12:00		39° 10.719'	N 18° 52.850'	E	725	DB		
MSM_15_4			5	XBT	08.07.10	23:55:00		40° 3.384'	N 18° 50.635'	E	762	DB		
MSM_15_4	643	1	5	CDT	09.07.10	0:33:00	BE	40° 10.005'	N 18° 49.985'	E	785			
MSM_15_4	643	1	5	CDT	09.07.10	0:56:00	BO	40° 9.998'	N 18° 49.993'	E	784.5	13.5		
MSM_15_4	643	1	5	CDT	09.07.10	1:33:00	EN	40° 9.999'	N 18° 49.991'	E	784.5			
MSM_15_4	644	1	6	CDT	09.07.10	2:35:00	BE	40° 9.981'	N 18° 59.996'	E	918			
MSM_15_4	644	1	6	CDT	09.07.10	2:54:00	BO	40° 9.985'	N 18° 59.992'	E	905	12		
MSM_15_4	644	1	6	CDT	09.07.10	3:25:00	EN	40° 9.984'	N 18° 59.993'	E	918			
MSM_15_4	645	1	7	CDT	09.07.10	4:30:00	BE	40° 9.980'	N 19° 9.999'	E	973			
MSM_15_4	645	1	7	CDT	09.07.10	4:51:00	BO	40° 9.981'	N 19° 9.998'	E	958	10		X
MSM_15_4	645	1	7	CDT	09.07.10	5:21:00	EN	40° 9.979'	N 19° 10.003'	E	974			
MSM_15_4	646	1	8	CDT	09.07.10	6:15:00	BE	40° 9.993'	N 19° 20.026'	E	933			
MSM_15_4	646	1	8	CDT	09.07.10	6:36:00	BO	40° 9.993'	N 19° 20.025'	E	931	11		X
MSM_15_4	646	1	8	CDT	09.07.10	7:09:00	EN	40° 9.993'	N 19° 20.023'	E	932			
MSM_15_4	647	1	9	CDT	09.07.10	9:29:00	BE	40° 19.918'	N 18° 49.784'	E	834			
MSM_15_4	647	1	9	CDT	09.07.10	9:49:00	BO	40° 19.918'	N 18° 49.786'	E	817	9.2		
MSM_15_4	647	1	9	CDT	09.07.10	10:29:00	EN	40° 19.919'	N 18° 49.784'	E	828			
MSM_15_4	648			Mooring	09.07.10	10:43:00		40° 19.370'	N 18° 49.96'	E			mooring released	
MSM_15_4			6	XBT	09.07.10	13:06:00		40° 31.873'	N 18° 29.585'	E	119	DB		
MSM_15_4			7	XBT	09.07.10	14:25:00		40° 41.565'	N 18° 29.281'	E	129	DB		
MSM_15_4			8	XBT	09.07.10	16:33:00		40° 57.963'	N 17° 51.255'	E	133	DB		
MSM_15_4	649	1	10	CDT	09.07.10	19:46:00	BE	41° 21.069'	N 17° 12.145'	E	580			
MSM_15_4	649	1	10	CDT	09.07.10	20:01:00	BO	41° 21.070'	N 17° 12.146'	E	579	9.3		X
MSM_15_4	649	1	10	CDT	09.07.10	20:22:00	EN	41° 21.069'	N 17° 12.145'	E	581			
MSM_15_4	650	1	11	CDT	09.07.10	22:43:00	BE	41° 41.002'	N 17° 34.022'	E	1129.9			
MSM_15_4	650	1	11	CDT	09.07.10	23:17:00	BO	41° 41.000'	N 17° 34.001'	E	1115	15	some bottles didn't close	X
MSM_15_4	650	1	11	CDT	09.07.10	23:50:00	EN	41° 40.996'	N 17° 34.000'	E	1114.2			
MSM_15_4	651	1	12	CDT	10.07.10	1:03:00	BE	41° 49.994'	N 17° 44.997'	E	1202			
MSM_15_4	651	1	12	CDT	10.07.10	1:29:00	BO	41° 49.993'	N 17° 44.990'	E	1202	15		X



MSM_15_4	651	1	12	CDT	10.07.10	2:12:00	EN	41° 49.993'	N	17° 44.991'	E	1202				
MSM_15_4	652b	1	13	CDT	10.07.10	5:48:00	BE	41° 59.002'	N	17° 56.000'	E	1219				
MSM_15_4	652b	1	13	CDT	10.07.10	-	BO	41° 59.002'	N	17° 56.000'	E	-	11.2	cast because 1. cast failed		
MSM_15_4	652b	1	13	CDT	10.07.10	6:49:00	EN	41° 59.003'	N	17° 56.001'	E	1219.5				
MSM_15_4	653	1	14	CDT	10.07.10	8:02:00	BE	42° 08.998'	N	18° 6.909'	E	1148				
MSM_15_4	653	1	14	CDT	10.07.10	8:27:00	BO	42° 08.998'	N	18° 6.909'	E	1135.7	9.4			
MSM_15_4	653	1	14	CDT	10.07.10	8:57:00	EN	42° 08.998'	N	18° 6.910'	E	1147				
MSM_15_4	654	1	15	CDT	10.07.10	12:10:00	BE	41°33.753'	N	18° 11.816'	E	1177				
MSM_15_4	654	1	15	CDT	10.07.10	12:40:00	BO	41°33.752'	N	18° 11.813'	E	1178	15			
MSM_15_4	654	1	15	CDT	10.07.10	13:19:00	EN	41°33.752'	N	18° 11.814'	E	1181				
MSM_15_4			9	XBT	10.07.10	16:46:00		40° 55.861'	N	18° 34.273'	E	880	FD			
MSM_15_4			10	XBT	10.07.10	22:20:00		39° 50.000'	N	19° 12.884'	E	1062	FD			
MSM_15_4			11	XBT	11.07.10	0:04:00		39° 30.000'	N	19° 24.478'	E	1216	FD			
MSM_15_4	655	1	16	CDT	11.07.10	2:04:00	BE	39° 9.993'	N	19° 36.004'	E	1399				
MSM_15_4	655	1	16	CDT	11.07.10	2:35:00	BO	39° 9.993'	N	19° 36.004'	E	1398	11			X
MSM_15_4	655	1	16	CDT	11.07.10	3:14:00	EN	39° 9.993'	N	19° 36.004'	E	1398				
MSM_15_4	656	1	17	CDT	11.07.10	5:04:00	BE	39° 9.974'	N	19° 14.964'	E	864.2				
MSM_15_4	656	1	17	CDT	11.07.10	5:20:00	BO	39° 9.973'	N	19° 14.964'	E	864.2	9.7			X
MSM_15_4	656	1	17	CDT	11.07.10	5:50:00	EN	39° 9.973'	N	19° 14.964'	E	-				
MSM_15_4	657			Mooring	11.07.10	11:30:00		39° 9.929'	N	17° 59.638'	E			dredging for nonreleased mooring		
MSM_15_4			12	XBT	11.07.10	23:07:00		38° 45.000'	N	17° 43.175'	E	FD				
MSM_15_4			13	XBT	12.07.10	1:21:00		38° 20.000'	N	17° 26.570'	E	FD				
MSM_15_4			14	XBT	12.07.10	3:15:00		38° 0.000'	N	17° 13.300'	E	1669	FD			
MSM_15_4	658	1	18	CDT	12.07.10	5:11:00	BE	37° 39.990'	N	17° 0.005'	E	2253.3				
MSM_15_4	658	1	18	CDT	12.07.10	5:54:00	BO	37° 39.990'	N	17° 0.001'	E	2269	9.5			X
MSM_15_4	658	1	18	CDT	12.07.10	6:46:00	EN	37° 39.990'	N	17° 0.005'	E	2252				
MSM_15_4			15	XBT	12.07.10	9:00:00		37° 30.650'	N	17° 33.203'	E	3012	DB			
MSM_15_4			16	XBT	12.07.10	12:46:00		37° 14.970'	N	18° 28.430'	E	3914	FD			
MSM_15_4	659	1	19	CDT	12.07.10	14:44:00	BE	37° 7.997'	N	18° 55.026'	E	3336				
MSM_15_4	659	1	19	CDT	12.07.10	15:47:00	BO	37° 7.995'	N	18° 55.032'	E	3373	9			X
MSM_15_4	659	1	19	CDT	12.07.10	16:59:00	EN	37° 7.995'	N	18° 55.032'	E	3336				
MSM_15_4			17	XBT	12.07.10	19:21:00		36° 59.752'	N	19° 26.889'	E	3359	DB			
MSM_15_4			18	XBT	12.07.10	23:20:00		36° 43.069'	N	20° 32.334'	E	2912	FD			
MSM_15_4	660			Mooring	12.07.10	6:00:00			N		E			dredging for nonreleased mooring		
MSM_15_4	661	1	20	CDT	13.07.10	19:48:00	BE	36° 32.150'	N	21° 13.150'	E	4715				
MSM_15_4	661	1	20	CDT	13.07.10	21:12:00	BO	36° 32.150'	N	21° 13.267'	E	4500	15			X
MSM_15_4	661	1	20	CDT	13.07.10	22:52:00	EN	36° 32.149'	N	21° 13.267'	E	4590				
MSM_15_4			19	XBT	14.07.10	0:50:00		36° 17.500'	N	21° 32.500'	E	4760	FD			
MSM_15_4			20	XBT	14.07.10	2:55:00		36° 01.014'	N	21° 58.821'	E	4922	FD			
MSM_15_4	662	1	21	CDT	14.07.10	5:14:00	BE	35° 44.995'	N	22° 25.003'	E	4550				
MSM_15_4	662	1	21	CDT	14.07.10	6:37:00	BO	35° 44.995'	N	22° 25.003'	E	4611.7	10.3			X
MSM_15_4	662	1	21	CDT	14.07.10	8:08:00	EN	35° 44.995'	N	22° 25.003'	E	4431				
MSM_15_4	663	1	22	CDT	14.07.10	10:50:00	BE	35° 14.992'	N	22° 25.002'	E	3876				
MSM_15_4	663	1	22	CDT	14.07.10	12:05:00	BO	35° 14.992'	N	22° 25.001'	E	3874	13			X
MSM_15_4	663	1	22	CDT	14.07.10	13:43:00	EN	35° 14.990'	N	22° 25.003'	E	3876				
MSM_15_4	664	1	23	CDT	14.07.10	16:25:00	BE	34° 44.983'	N	22° 24.987'	E	3138				
MSM_15_4	664	1	23	CDT	14.07.10	17:18:00	BO	34° 44.983'	N	22° 24.986'	E		9.3			X
MSM_15_4	664	1	23	CDT	14.07.10	18:25:00	EN	34° 44.984'	N	22° 24.985'	E	2968				





