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Short Cruise Report

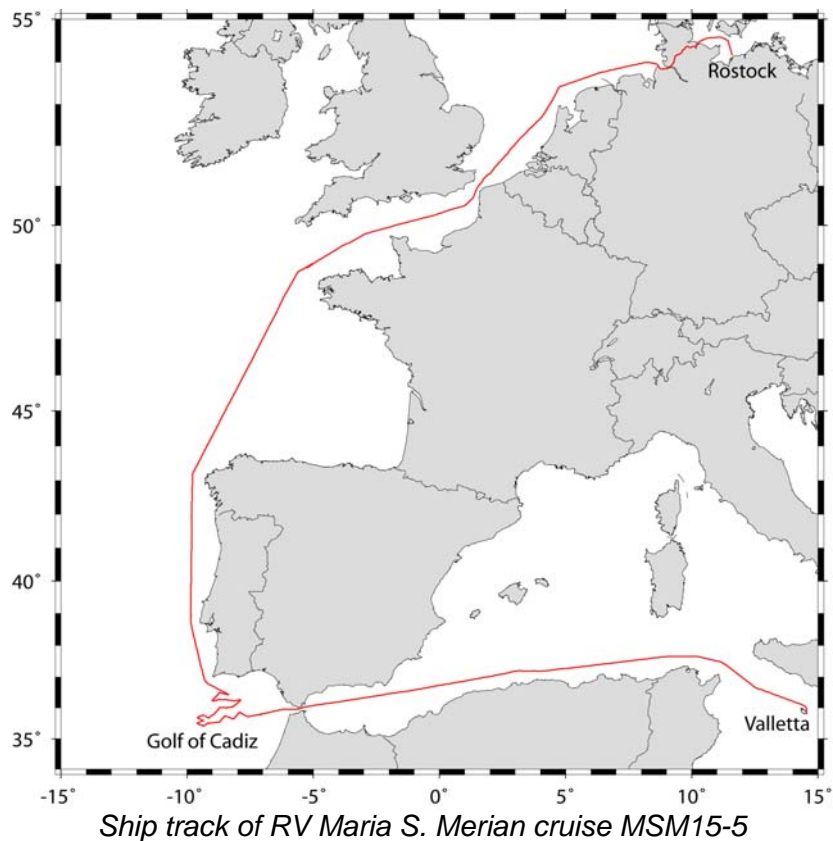
RV MARIA S. MERIAN Cruise MSM15/5

Valletta, Malta - Rostock, Germany

17. July – 29. July 2010

Chief Scientist: Ingo Grevemeyer

Captain: Karl Friedhelm von Staa



Objectives

The evolution of the Western Mediterranean Sea and the Gulf of Cadiz is inherently governed by (i) plate convergence between Nubia (Africa) / Eurasia and (ii) subduction related slab-roll back. Both processes are responsible for the surface features / topography of the Alboran Sea / Rif / Betic domain and deep-seated features related to the consumption of African lithosphere. The cruise is part of the ESF-EUROCORES programme TOPO-EUROPE (Project TOPO-MED) and is aiming to study the interrelation between convergence and major tectonic fault zones in the Alboran Sea (Trans-Alboran-Shear-Zone – the Alboran Ridge) and in the Gulf of Cadiz and Miocene subduction, causing deep-seated seismicity (40-150 km depth) under the western Alboran basin. Furthermore, active tectonic features and fault zones will mimic the plate boundary configuration between Europe/Iberia and Nubia/Morocco. Monitoring networks with ocean bottom seismometers (OBS) were installed in the Alboran Sea and in the Gulf of Cadiz, recording local and regional earthquakes. Two deployment periods of approx. 6 month (in total one year) were conducted. In August of 2009 30 OBS were deployed during the RV *Poseidon* cruise P389. Instruments were recovered in January of 2010 during the *Poseidon* cruise P393 and have been re-deployed in the Gulf of Cadiz (Fig. 1). The recovery of OBS deployed in the Gulf of Cadiz stations was the main aim of the RV *Maria S. Merian* cruise MSMS15/5. During the deployments the ocean bottom seismic instruments recorded a wealth of local earthquakes. The distribution of seismicity is going to outline tectonically active features and faults. In addition, data will be used for tomographic inversion, providing seismic constraints on the structure of crust and mantle in the Gibraltar arc / Gulf of Cadiz area and the Alboran domain. Furthermore, land based monitoring networks operated during the time of the marine deployments provide a regional coverage of the entire area between Morocco and Spain, including the northern Moroccan continent and southern Spain.

In a piggy-back programme scientist from the University of Tübingen joined the cruise, sampling planktonic foraminifera for genetic analyses.

Narrative of the Cruise

Maria S. Merian left the harbour of Valletta, Malta, on July 17, 2010 at 10 p.m. Ten hours after leaving Valletta, a multi-net was deployed to the south of Sicily for sampling planktonic foraminifera in the uppermost 700 m of the water column. A second multi-net was taken a day later after entering the territorial waters of Algeria. Due to the tight time constraints of the cruise, sampling of foraminifera during the remaining time of the cruise was conducted just in the surface water using pumps. However, using pumps samples could be taken continuously during the transits. On July 21, 2010, at 8 a.m. the *Maria S. Merian* reached the Strait of Gibraltar, entering the Atlantic Ocean before midday. A few hours later, at 17:21 local time the first ocean-bottom-seismometer was released, being recovered

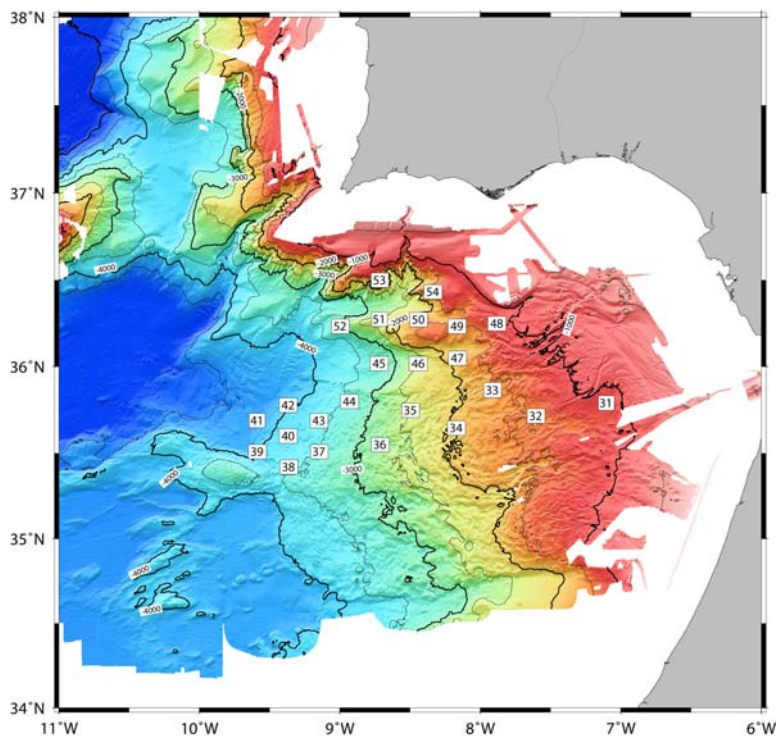


Fig. 1. Network of ocean bottom seismometers (OBS) recovered after recording local and regional earthquakes in the Gulf of Cadiz since January 2010.

at 17:51. Within the next 46 hours all 24 OBS were recovered in record time. The last OBS was on deck at 15:30 local time and we headed north. Within the next days the *Maria S. Merian* sailed past Portugal, through the Bay of Biscay, reaching the English Channel on midday of July 26, 2010. At 9.00 a.m. on July 28 German waters were entered. At 17:30 h the Pilot was met in the German Bight off Cuxhaven. At 20:45 h the *Maria S. Merian* sailed past the “Alte Liebe” and entered at 22:10 h the “Nord-Ostseekanal”. The passage through “Schleswig Holstein” ended in Kiel-Holtenau on July 29, 2010 at 6 a.m. and the *Maria S. Merian* headed toward Rostock. We reached the pilot station offshore of Rostock-Warnemünde on July 29, 2010 at noon and a successful cruise ended.

Acknowledgments

We are grateful to Master Friedhelm von Staa, his officers, and crew of the RV *Maria S. Merian* for excellent sea-going support and a great working environment.

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Cruise participants

Name	Discipline	Institution
Grevemeyer, Ingo, chief scientist	Seismics, OBS/OBH	IFM-GEOMAR
Labahn, Erik, technician	OBS	KUM
Brunn, Wiebke, scientist	OBS	IFM-GEOMAR
Kraft, Helene, student	OBS	CAU
Tahayt, Abdelilah, scientist & observer		Morocco
Manzoni, Sonia, scientist & observer		Portugal
Aurahs, Ralf, scientist	Foraminifera	IFGTÜ
Schmidt, Christiane, student	Foraminifera	IFGTÜ
Steinhardt, Juliane, student	Foraminifera	IFGTÜ
Weiner, Agnes, scientist	Foraminifera	IFGTÜ

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Station List

Multi-net stations for sampling of foraminifera

Date	Time [UTC]	Latitude	Longitude	Water depth [m]
2010/07/18	05:50	36° 39.97 N	12° 29.99 E	1330
2010/07/19	06:20	37° 27.29 N	6° 58.78 E	2832

Ocean-Bottom-Seismometers (OBS) recovered

Station name	Date	Time [UTC]	Latitude	Longitude
OBS 31	2010/07/21	15:51	35° 47.6'N	7° 06.5'W
OBS 32	2010/07/21	18:10	35° 43.0'N	7° 36.5'W
OBS 33	2010/07/21	19:17	35° 52.0'N	7° 55.0'W
OBS 34	2010/07/21	20:13	35° 38.8'N	8° 10.4'W
OBS 35	2010/07/21	21:58	35° 45.0'N	8° 30.0'W
OBS 36	2010/07/22	01:55	35° 33.0'N	8° 43.0'W
OBS 37	2010/07/22	04:49	35° 30.6'N	9° 09.0'W
OBS 38	2010/07/22	06:33	35° 25.2'N	9° 22.0'W
OBS 39	2010/07/22	08:20	35° 30.6'N	9° 35.4'W
OBS 40	2010/07/22	10:04	35° 36.0'N	9° 22.2'W
OBS 41	2010/07/22	12:04	35° 41.4'N	9° 35.4'W
OBS 42	2010/07/22	13:53	35° 46.8'N	9° 22.2'W
OBS 43	2010/07/22	15:38	35° 41.4'N	9° 09.0'W
OBS 44	2010/07/22	17:22	35° 48.0'N	8° 56.0'W
OBS 45	2010/07/22	20:12	36° 01.0'N	8° 43.3'W
OBS 46	2010/07/22	22:05	36° 01.0'N	8° 26.5'W
OBS 47	2010/07/22	23:59	36° 02.9'N	8° 09.9'W
OBS 48	2010/07/23	01:45	36° 15.0'N	7° 53.0'W
OBS 49	2010/07/23	03:50	36° 14.0'N	8° 10.0'W
OBS 50	2010/07/23	05:24	36° 16.4'N	8° 26.5'W
OBS 51	2010/07/23	07:20	36° 16.5'N	8° 43.3'W
OBS 52	2010/07/23	09:22	36° 14.0'N	9° 00.0'W
OBS 53	2010/07/23	11:35	36° 30.0'N	8° 43.2'W
OBS 54	2010/07/23	13:30	36° 25.9'N	8° 20.4'W