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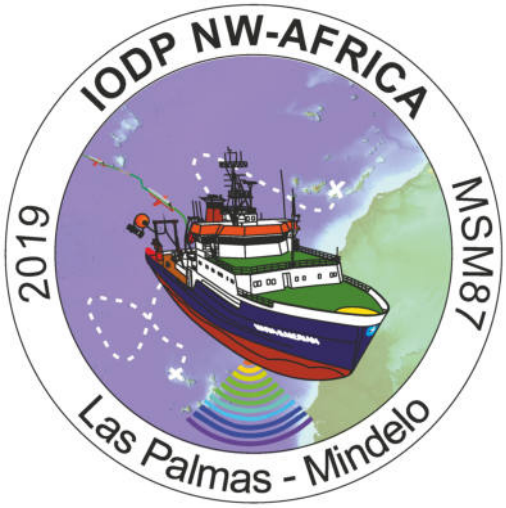
Short Cruise Report
RV Maria S. Merian-Cruise MSM87

Las Palmas – Mindelo
16.11.2019 – 25.11.2019
Chief Scientist: Prof. Dr. Sebastian Krastel
Captain: Björn Maaß



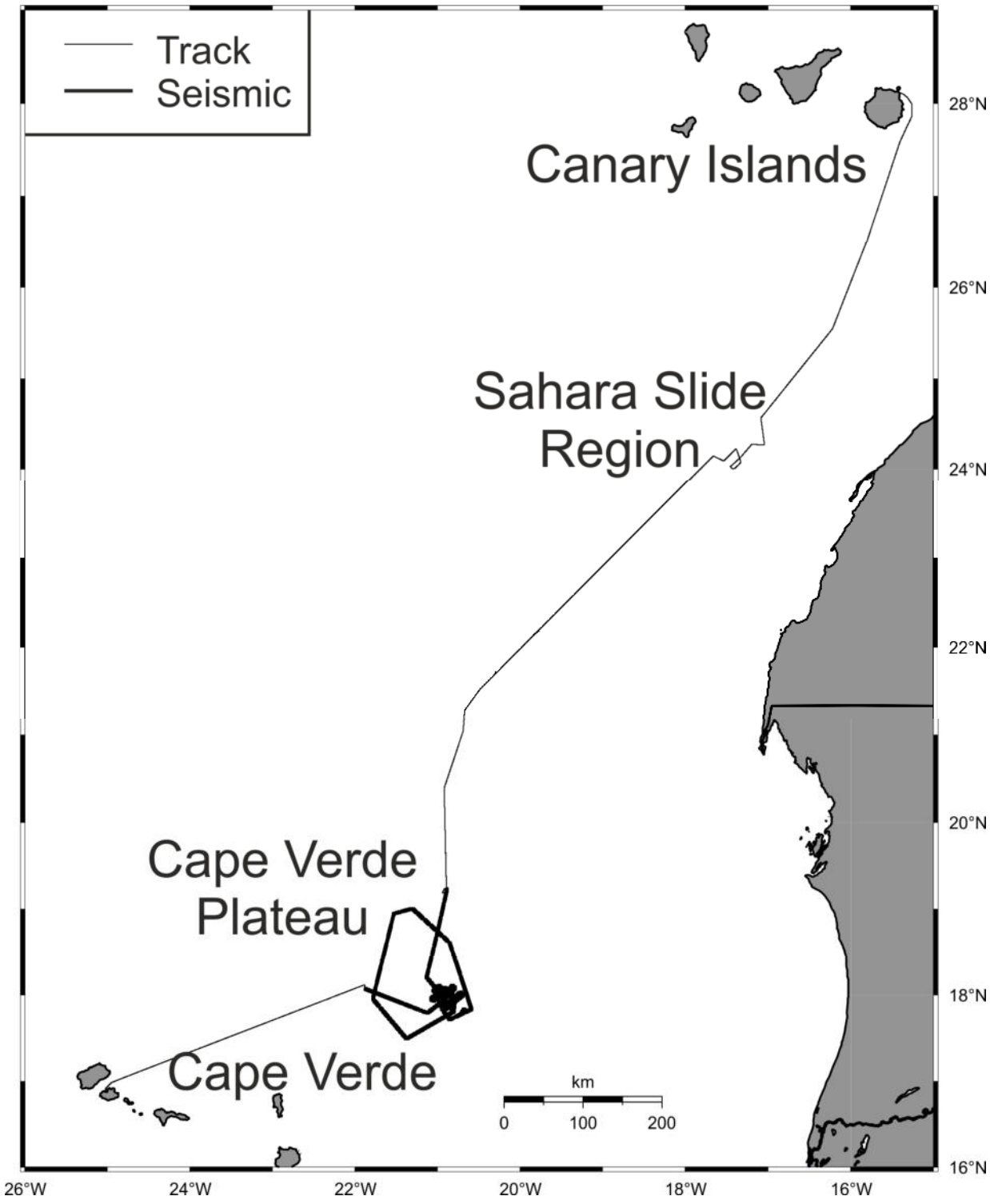


Fig 1: Track chart of Cruise MSM87 (Las Palmas - Mindelo).

Objectives

The main objective of RV MARIA S. MERIAN Cruise MSM87 was to carry out a seismic pre-site survey for the proposal 'Neogene Climate of NW Africa' in the frame of the International Ocean Discovery Program (IODP). The IODP proposal suggests investigating: i) NW African climate in a warmer world, and ii) High productivity ecosystem response to climates different from today. Sediment cores should be retrieved at five locations off NW-Africa. A central site is proposed on the Cape Verde Plateau close to ODP Site 659 but no modern high-resolution seismic data are available for this area. The main goal of Cruise MSM87 was to collect the missing seismic data.
Specific objectives of the cruise are:

- Development of a seismic stratigraphic framework for the Cape Verde Plateau: No modern high-resolution seismic data exits for the Cape Verde Plateau. The interpretation of new high-resolution seismic data in combination with the available stratigraphic information from DSDP Site 368 and ODP Site 659 will allow the development of a detailed stratigraphic framework for the Cape Verde Plateau.
- Identification of a new IODP site in the vicinity of Site 659: Modern seismic data are required for selecting IODP sites. The survey aimed in identifying a site close to ODP site 659 where the Plio-Pleistocene is thinner and the Miocene is thicker than at site 659. This would allow to APC-XCB deeper into the Miocene, which is crucial for retrieving high-quality cores for paleoclimate investigations.

Narrative

The scientific crew of Cruise MSM87 was supposed to board RV MARIA S. MERIAN in the morning of November 16 but the vessel left the port the evening before because high swells led to significant movements of the vessel at the pier and it was decided to stay in the roadstead in front of the port of Las Palmas. The vessel entered port again in the afternoon of November 16, allowing the scientific crew to board. The berth, however, was only available until 18:00h and RV MARIA S. MERIAN left the port of Las Palmas on November 16 at 18:00h local time, half a day prior to the scheduled departure on November 17 at 08:00h. The scientific crew of Cruise MSM87 consisted of 12 scientists from Kiel University and one photographer.
Hydroacoustic data collection started at 02:40h on November 17 after leaving the Spanish EEZ. A short survey at the headwall area of the Sahara Slide was carried out in the afternoon of the same day. The data were collected to complement the site survey data for two proposed IODP-sites in this area. We also collected some additional data of a landslide scar located slightly south of the Sahara Slide. The data look very promising. The transit was continued on November 18. It was interrupted for a short test of the seismic equipment in the afternoon. The test revealed problems with one streamer section and a trigger box. Both problems could be quickly solved following the test. We reached the northern boundary of the Cape Verde Plateau on November 19 at 08:00h local time. Deployment of the seismic equipment was very smooth. The initial profiles crossed the Cape Verde Plateau from North to South. This set of profiles included crossings of a proposed IODP site at the northern part of the plateau and the old ODP Site 659. The data show relatively homogeneous sediment patterns with a slight thickness decrease of the Plio/Pleistocene sediments to the north. We crossed DSDP-Site 368 around noon on November 20. November 21 was used for a acquiring a long line at the western edge of the Cape Verde Plateau, where the GEBCO bathymetry shows a few embayments of the 3200 m contour, which may indicate erosional processes. The line showed only small variations of the Plio/Pleistocene sediment thickness. A cross line for a potential site identified on the first seismic line north of the plateau was collected in the evening the same day. This was followed by a long line on the eastern site of the plateau in the night November 21/22. The survey was interrupted for short period in the morning of November 22 due to a leakage of the

airgun. This problem was fixed very quickly. The data analysis revealed relatively homogenous sediment patterns for most parts of the surveys but significant variations with a potential thinning of the Plio/Pleistocene sediments were identified south of ODP-Site 659. A detailed survey of this area was carried out from noon November 22 and continued until the evening of November 23. These data show some significant thinning of the near surface sedimentary successions and we are optimistic to locate promising drill sites along these seismic lines. On our way to the west, we collected another line across the ODP site 659 and a potential new site on the eastern edge of the Cape Verde Plateau. The seismic gear was retrieved on November 24 at 08:00h. Hydroacoustic imaging was continued until 18:00h the same day during the transit to Mindelo. We arrived in the port of Mindelo on November 25 at 08:30h.

RV MARIA S. MERIAN-Cruise MSM87 was a great success. Hydroacoustic data were collected along the entire cruise. Continuous seismic data acquisition at the Cape Verde Plateau over 5 days resulted in 1000 km of high-quality high-resolution seismic data. The data will allow to collected promising sites for drilling in the frame of the International Ocean Discovery Program. In addition, the data can be used to investigate the sedimentary architecture of the Cape Verde Plateau.

Acknowledgements

The scientific party of RV MARIA S. MERIAN Cruise MSM87 gratefully acknowledges the very friendly and most effective cooperation with Captain Maaß and his crew. Their great flexibility and their perfect technical assistance substantially contributed to make this cruise a scientific success. We also appreciate the valuable support by the Leitstelle Deutsche Forschungsschiffe (German Research Fleet Coordination Centre) at the University of Hamburg. The expedition was funded by the Deutsche Forschungsgemeinschaft.

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List of Participants

Name	Discipline	Institution
Krastel, Sebastian, Prof.	Chief Scientist	CAU
Barrett, Rachel	Seismics	CAU
Gross, Felix, Dr	Seismics	CAU
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Schneider, Ralph, Dr.	Hydroacoustics	CAU
Jähmlich, Heiko	Technician	CAU
Heinrich, Sven	Technician	CAU
Gross, Nikolai	Photographer	

CAU Christian-Albrechts-Universität zu Kiel

Stationslist

Station-No.	Date, Time	Device	Latitude	Longitude	Depth (m)	Remarks
MSM87_0_Underway	17.11.2019 02:40	MB + Para	26° 30,110' N	015° 48,315' W	3283.1	start
MSM87_0_Underway	17.11.2019 02:40	Thermosalin	26° 30,110' N	015° 48,315' W	3283.1	start
MSM87_0_Underway	24.11.2019 19:00	Thermosalin	17° 36,168' N	023° 17,055' W	3473.5	end
MSM87_0_Underway	24.11.2019 19:00	MB + Para	17° 36,176' N	023° 17,030' W	3472.6	end
MSM87_1-1	17.11.2019 14:29	XSV	24° 34,634' N	017° 04,464' W	2036.5	
MSM87_2-1	17.11.2019 16:12	MB + Para	24° 16,102' N	017° 02,753' W	1490	
MSM87_3-1	18.11.2019 09:05	XSV	22° 41,287' N	019° 14,184' W	3555.5	
MSM87_4-1	19.11.2019 09:06	MCS	19° 11,880' N	020° 56,421' W	3367.4	start
MSM87_4-1	24.11.2019 09:29	MCS	18° 05,993' N	021° 53,087' W	3261.9	end
MSM87_5-1	19.11.2019 14:19	XSV	18° 55,491' N	020° 57,559' W	3246.2	
MSM87_5-1	19.11.2019 14:23	XSV	18° 55,184' N	020° 57,636' W	3240	
MSM87_6-1 XSV	23.11.2019 14:32	XSV	17° 54,760' N	020° 50,082' W	3056.7	

List of Seismic Profiles

Profil-Nr.	Date	Time Start	Time End	Latitude Start	Longitude Start	Latitude End	Longitude End	Geometrics FFN Start	Geometrics FFN End
			End	Start		End		FFN	FFN
				NORTH	WEST	NORTH	WEST	Start	End
MSM87		UTC	UTC	xx° xx.x‘	xx° xx.x‘	xx° xx.x‘	xx° xx.x‘		
P101	19.11.2019	10:03	23:54	19°12.11	020°53.68	18°12.16	021°08.09	1193	8770
P102	19.11.2019	23:54	6:48	18°12.16	021°08.09	17°48.74	020°48.65	8770	12920
P103	20.11.2019	6:48	14:50	17°48.74	020°48.65	17°29.68	021°22.79	12920	17730
P104	20.11.2019	14:50	22:17	17°29.68	021°22.79	17°56.96	021°47.03	17730	22207
P105	20.11.2019	22:17	11:00	17°56.96	021°47.03	18°56.44	021°32.05	22207	29844
P106	21.11.2019	11:00	13:49	18°56.44	021°32.05	19°00.28	021°18.53	29844	31524
P107	21.11.2019	13:49	21:03	19°00.28	021°18.53	18°36.83	020°51.61	31524	35866
P108	21.11.2019	21:03	7:12	18°36.83	020°51.61	17°50.38	020°35.68	35866	41949
P109	22.11.2019	7:12	8:43	17°50.38	020°35.68	17°36.95	020°42.34	41949	42858
P110	22.11.2019	10:40	12:50	17°47.47	020°41.19	17°43.00	020°51.04	43395	44684
P111	22.11.2019	12:50	14:18	17°43.00	020°51.04	17°48.28	020°55.75	44684	45567
P112	22.11.2019	14:18	17:53	17°48.28	020°55.75	17°59.25	020°42.27	45567	47727
P113	22.11.2019	17:56	18:26	17°59.50	020°42.02	18°01.65	020°42.99	47728	48032
P114	22.11.2019	18:26	21:54	18°01.65	020°42.99	17°52.18	020°56.23	48032	50109
P115	22.11.2019	21:54	22:36	17°52.18	020°56.23	17°53.41	020°58.82	50109	50523
P116	22.11.2019	22:36	01:56	17°53.41	020°58.82	18°04.52	020°47.40	50523	52481
P117	23.11.2019	01:56	02:24	18°04.52	020°47.40	18°06.39	020°48.87	52481	52800
P118	23.11.2019	02:24	06:03	18°06.39	020°48.87	17°55.75	021°03.21	52800	54997
P119	22.11.2020	06:03	06:27	17°55.75	021°03.21	17°56.93	021°04.81	54997	55240
P120	23.11.2019	06:27	08:55	17°56.93	021°04.81	18°04.96	020°55.98	55240	56733
P121	23.11.2019	08:55	11:13	18°04.96	020°55.98	17°58.15	020°47.43	56733	58087
P122	23.11.2019	11:13	13:20	17°58.15	020°47.43	17°48.95	020°48.29	58087	59250
P123	23.11.2019	13:20	15:20	17°48.95	020°48.29	17°58.38	020°20.26	59250	60538
P124	23.11.2019	15:20	17:41	17°58.38	020°20.26	18°06.25	020°58.69	60538	61979
P125	23.11.2019	17:41	18:48	18°06.25	020°58.69	18°03.57	021°03.15	61979	62647
P126	23.11.2019	18:48	20:54	18°03.57	021°03.15	17°54.73	020°58.42	62647	63902
P127	23.11.2019	20:54	23:15	17°54.73	020°58.42	17°47.59	021°07.36	63902	65320
P128	23.11.2019	23:15	09:00	17°47.59	021°07.36	18°04.29	021°53.05	65320	71166