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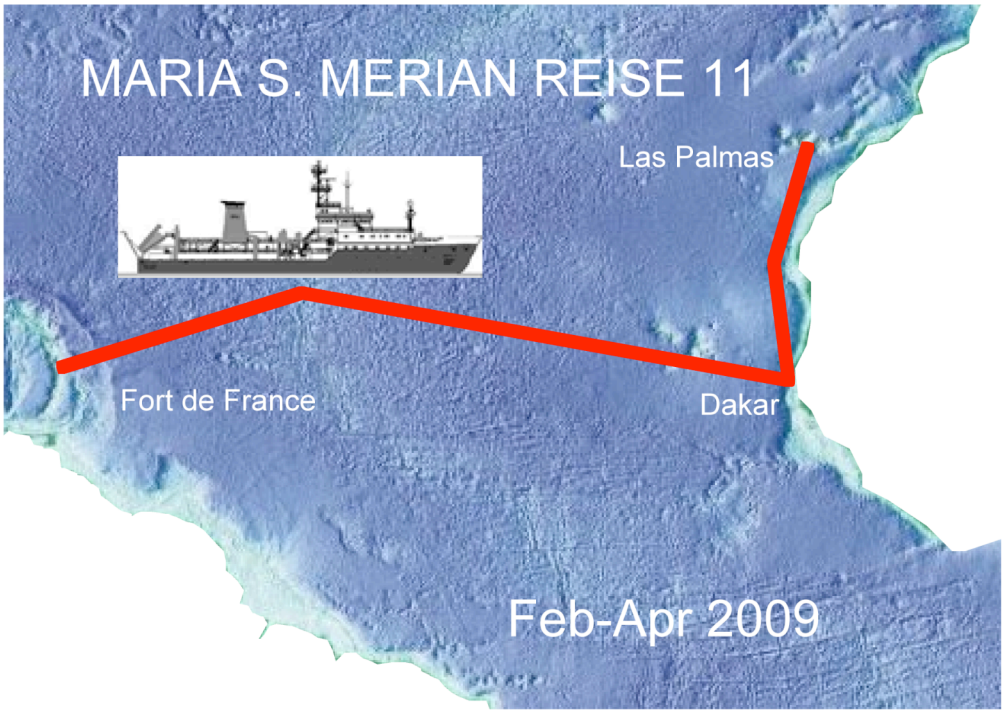
MARIA S. MERIAN-CRUISE MSM 11/2

Dakar – Las Palmas, 14.03.2009 - 09.04.2009

Chiefscientist: Dr. Torsten Bickert

Captain: Friedhelm von Staa

Short Cruise Report



Research Program

Main topic of MARIA S. MERIAN leg 11/2 was the preparation of an IODP expedition entitled 'Neogene Paleoclimate and sediment transport at the continental margin of NW Africa'. Between Cap Bojador, southeast of the Canary Islands, and the deltas of rivers Senegal and Gambia we intended to collect seismic data in five different areas as a presite survey. 4 out of 10 sites should cover at least the last 10 to 15 Ma to reconstruct the Neogene development of the African monsoon and to document the early Pliocene aridification of the north African continent. Further six sites should explore sediments in high accumulation areas for a high resolution study of rapid climate changes in the subtropics and related sediment transport. Another topic of the cruise was the investigation of particle transport and characteristics of the upwelling area off Cap Blanc. Long-term moorings of sediment traps, oceanographic and optical sensors at stations CB (since 1988) and CBi (since 2002) had to be renewed. Additional samples of particles in the water column and at the sediment surface should been taken by water samplers, in-situ pumps, and multicorers. The investigations are related to projects of the DFG Research Center / Excellence Cluster 'The Ocean in the Earth System' sections OC (Ocean and Climate), GB (Geosphere-Biosphere interactions) and SD (Sediment dynamics), University of Bremen, as well as to the project B4 (Submarine hazards at continental margins) within the Excellence Cluster 'Future Ocean', University of Kiel.

Narrative of the cruise

MARIA S. MERIAN left the harbour of Dakar, Senegal, on Saturday, March 14, 2009, for a 25 day expedition along the continental margin off NW Africa towards the Canary Islands. Scientists from the Center of Marine Environmental Sciences and the Department of Geosciences, University of Bremen, the Alfred-Wegener-Institute for Polar and Marine Research, Bremerhaven, the Leibnitz Insitute of Marine Sciences, Kiel, and from the Instituto Canario de Ciencas Marinas from Telde, Gran Canaria, were on board. Two guests from Senegal joined the cruise.

The first working area at the continental margin of South Senegal was reached within several hours, only. Despite the short preparation time, the seismic survey began immediately. First focus was a sediment accumulation structure downslope the Casamance river delta. Continuous sequences of sediment layers indicated an undisturbed stratigraphic succession of the late Neogene. Pre-investigations of a nearby sediment core suggest a temporal resolution of at least 60 m /m.y. Further north, the survey was continued with seismic lines off the deltas of Gambia and Senegal rivers to study the internal layering of the river-dominated sediments off shore. Promising localities for deep ocean drilling were confirmed with short cross profiles as well as gravity coring in water depth between 1000 and 3000 m. The

chosen depth range will allow to propose drill sites in high accumulating sequences upslope as well as sediments with a lower time resolution, but with a longer stratigraphic range.

The second week of the cruise started with a detailed bathymetric and Parasound survey of a short section of the Senegalesian shelf. Off the mouth of the Senegal river, a mudbelt has formed along with the Holocene postglacial transgression, which represents an ideal archive for climate development of the hinterland. The survey completed an earlier investigation running cross profiles and additional gravity core sampling at the center, the edge and northward outside of the accumulation belt. From March 24 on, we continued the seismic survey off Mauretania, along the Cap Timiris Canyon. This 500 km long channel system drains the upper slope sediments towards the deep sea. The seismic lines were chosen to connect several previous surveys across the canyon as well as documenting the normal sedimentation south of the canyon for comparison. Again, we were able to define several locations suitable for ocean drilling. The weather conditions were rough during this survey. However, despite winds at Bft 6 and wave heights around 3 m the excellent stability of RV MERIAN allowed for an unobstructed survey.

From March 27 on, we began the particle flux studies within the upwelling area off Cape Blanc. This trade-wind driven upwelling area is one of the four major high productivity areas of the world ocean. The enormous dust input in that area influences the particle formation and transport in the water column, which is important for the efficiency of the biological pump. On March 28, the first mooring CBi at 20°45' N and 18°42' W was released in 2700 m water depth and brought on deck within $2^1/_4$ hours, only. The upper sediment trap moored at 1300 m water depth brought a complete series of plankton samples, the lower trap unfortunately stopped after the third cup exchange due to a technical failure. However, the video system deployed for the first time successfully recorded the particle transport pathways within intermediate water depth. On March 31, the mooring was re-deployed in a similar configuration. The sediment trap sampling was associated with a detailed particle flux study in the upwelling area. At six stations systematically arranged around the mooring positions, profiling using a particle camera indicated high particle concentrations within the photic zone and within the nepheloid layer close to the seafloor. The deep particle maximum usually found in intermediate depths was absent this year. The stable weather conditions and a weak influx of wind-blown dust might not have allowed for a larger depositional event. The camera profiles have also been used to define the sampling depth for the in-situ pumps, which were deployed in three different water depths filtering each some 3000 l of water. These samples will be used for organic geochemical analyses and radiocarbon datings. On April 02, the second mooring CB at 21°16'N and 20°49'W was released in 4155 m water depth and brought on deck immediately. Except for three cups in the upper trap, both

devices sampled continously the particle flux throughout the past year in 1200 m and 3600 m water depths. The mooring was re-deployed the same afternoon.

The planned seismic survey for the continental margin off Cap Blanc was carried out for 1.5 days after release of CBi, to give enough time for technical recovery of the devices to be deployed. Focus of the survey was a detailed investigation of the sediment sequences in the vicinity of the well known ODP Site 658. Despite many discordances and slide deposites we were able to find a continuous sediment sequence, which exhibited an undisturbed stratigraphic cover of the late Neogene upwelling history off NW Africa. On April 05, a bathymetric survey was done to map the upper headwall of the Saharan Debris Flow at about 24.5°N. With an area of 48.000 km^2 and a thickness up to 80 m this slide is one of the biggest downslope mass movements at the continental margin off NW Africa. This survey was a preparatory work for a detailed sidescan sonar mapping scheduled for 2010 using RV POSEIDON. From April 06 on, a last seismic survey was started off Cap Bojador crossing two sites recently drilled with the seafloor drill rig MEBO (MERIAN cruise 04/4 in 2007) as well as the old DSDP Site 569. However, too many faults, discordances and slumps prevent a continuous sequence of Neogene sediments in that area. Therefore, a further profile was investigated off Western Sahara, where high primary productivity in the filament area off Cap Yubi led to a high sedimentation rate of up to 200 m/m.y.. Two promising stations were checked with cross profiles close to the position of existing sediment cores. A second profile had to be skipped due to bad weather conditions at Bft 9.

On the morning of April 08, the third mooring CI north of Gran Canaria at 29°03'N and 15°16'W was released in 3590 m water depth and recovered in less than 2 hours. Except of the last four cups in the two upper traps, all devices sampled continuously the last year in 700 m, 1100 m and 3070 m, respectively. This mooring was not deployed again, so that an 18-year long sampling period of seasonal fluxes is finished. The scientific program ended with a last water sample profiling at the international recognized ESTOC position. RV MERIAN returned to Las Palmas, Gran Canaria, in the morning of April 09, 2009.

During MERIAN cruise MSM 11-2 over 1200 nautical miles of seismic profiles were collected along the continental margin of NW Africa, mostly in exceptional quality. At least 12 positions suitable for deep ocean drilling could be identified, all checked with cross profiles and -if not available - sampled with a gravity core. All mooring deployments could be completed successfully. The sampling of particles off Cap Blanc brought valuable samples in addition.

The scientific party of MERIAN cruise MSM 11-2 gratefully acknowledges the very friendly and most effective cooperation with Captain von Staa and his crew. Their perfect technical assistance substantially contributed to make this cruise a scientific success. We also appreciate the valuable support by the Leitstelle METEOR/MERIAN at the University of Hamburg. This expedition was funded by the Deutsche Forschungsgemeinschaft.

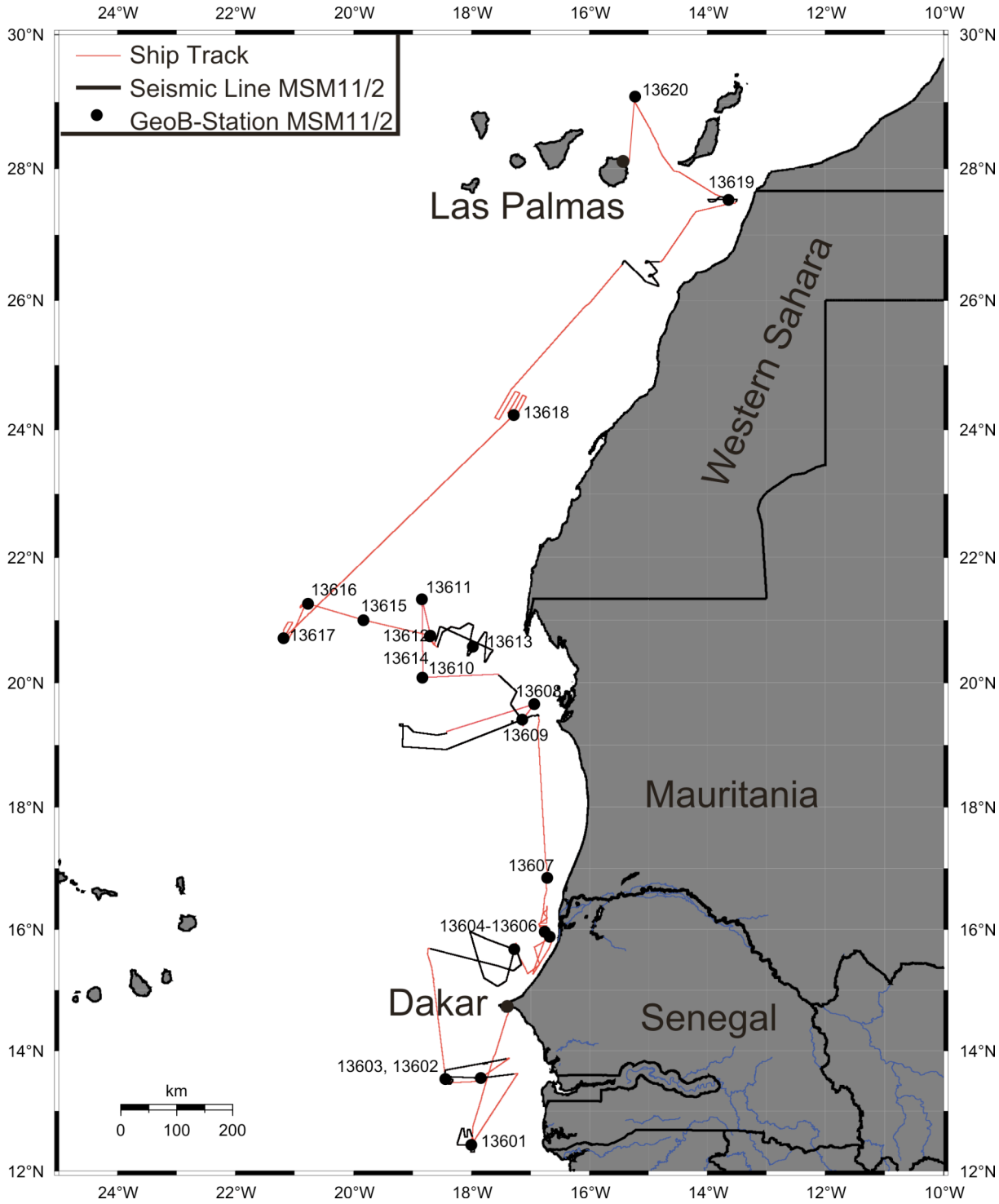


Figure: Cruise track, seismic lines and stations during MERIAN Cruise MSM 11/2.

Participants

1.	Bickert, Torsten, Dr.	Chief scientist	MARUM
2.	Mollenhauer, Gesine, Prof. Dr.	Marine Geology, Biogeochemistry	AWI
3.	Stuut, Jan-Behrend, Dr.	Marine Geology, Dust	MARUM
4.	Meyer, Inka (PhD student)	Marine Geology, Dust	MARUM
5.	Klann, Marco (Techn)	Lab Marine Geology	MARUM
6.	Braun, Stefan (Student)	Lab Marine Geology	MARUM
7.	Mai, Anh (Techn)	Technical Assistance	MARUM
8.	Krastel, Sebastian, Prof. Dr.	Seismics/Hydroacoustics	IfM-GEO
9.	Hermann, Bernd (Techn)	Seismics/Hydroacoustics	IfM-GEO
10.	Kurschat, Stephanie (Student)	Seismics/Hydroacoustics	IfM-GEO
11.	Meyer, Matthias (PhD student)	Seismics/Hydroacoustics	IfM-GEO
12.	Schwenk, Tilmann, Dr.	Seismics/Hydroacoustics	GeoB
13.	Keil, Hanno, Dr.	Seismics/Hydroacoustics	GeoB
14.	Fricke, Sascha (Student)	Seismics/Hydroacoustics	GeoB
15.	Schilling, Stephen (Student)	Seismics/Hydroacoustics	GeoB
16.	Schwab, Arne (Student)	Seismics/Hydroacoustics	GeoB
17.	Just, Janna (PhD student)	Seismics/Hydroacoustics	GeoB
18.	Nowald, Nicolas, Dr.	Particle flux	MARUM
19.	Ruhland, Götz (Logistics)	Particle flux	MARUM
20.	Vega, Daura, Dr.	Oceanography, Marine Chemistry	ICCM
21.	Ndiaye, Abdel Kader, Ltd.	Guest Senegal (Navy)	MNS
22.	Ndour, Cheikh	Guest Senegal (Scientist)	CRO

Participating Institutions:

MARUM	Zentrum für Marine Umweltwissenschaften, Universität Bremen
GeoB	Fachbereich Geowissenschaften, Universität Bremen
IfM-GEOMAR	Leibniz-Institut für Meereswissenschaften, Universität Kiel
AWI	Alfred-Wegener-Institut für Polar- und Meeresforschung, Bremerhaven
ICCM	Instituto Canario de Ciencias Marinas, Gran Canaria, Canary Islands
MNS	Marine National Senegalaise, Dakar
CRO	Centre de Recherches Oceanographiques, Dakar

List of seismic lines

Profil-Nr.	Date	Time Start UTC	Time End UTC	Latitude Start Nord	Longitude Start West	Latitude End Nord	Longitude End West
GeoB09-001	15.03.2009	10:10	13:41	12°34,72	17°59,42	12°19,27	18°00,91
GeoB09-002	15.03.2009	13:49	14:22	12°19,02	18°00,26	12°19,01	17°57,46
GeoB09-003	15.03.2009	14:30	15:40	12°19,54	17°57,16	12°25,44	17°57,28
GeoB09-004	15.03.2009	15:52	18:54	12°26,06	17°57,96	12°26,08	18°13,96
GeoB09-005	15.03.2009	19:14	22:10	12°27,24	18°14,65	12°42,05	18°10,08
GeoB09-006	15.03.2009	22:43	23:59	12°41,53	18°08,11	12°34,55	18°07,00
GeoB09-007	16.03.2009	0:10	0:28	12°34,03	18°06,27	12°34,15	18°04,74
GeoB09-008	16.03.2009	0:34	1:48	12°34,61	18°04,48	12°40,83	18°04,11
GeoB09-009	16.03.2009	1:58	2:14	12°41,28	18°03,67	12°41,28	18°02,24
GeoB09-010	16.03.2009	2:21	3:50	12°40,82	18°01,86	12°33,77	17°59,24
GeoB09-011	16 - 17.03.2009	20:35	9:45	13°36,78	17°16,97	13°34,10	18°23,76
GeoB09-012	17.03.2009	9:52	10:45	13°33,39	18°24,37	13°30,46	18°27,70
GeoB09-013	17.03.2009	10:59	11:58	13°29,41	18°27,30	13°26,61	18°22,84
GeoB09-014	17.03.2009	12:07	13:00	13°26,75	18° 22,15	13°30,07	18°18,99
GeoB09-015	17.03.2009	13:17	15:08	13°31,24	18°19,62	13°35,88	18°27,87
GeoB09-016	17.03.2009	15:15	16:05	13°36,34	18°27,72	13°40,28	18°26,65
GeoB09-017	17 - 18.03.2009	16:15	6:19	13°40,74	18°25,98	13°52,01	17°24,56
GeoB09-018	19.03.2009	5:17	21:58	15°40,90	18°42,25	15°19,30	17°18,27
GeoB09-019	19 - 20.03.2009	22:25	0:02	15°20,00	17°16,45	15°25,06	17°09,77
GeoB09-020	20.03.2009	0:13	3:05	15°25,85	17°09,60	15°39,32	17°14,28
GeoB09-021	20.03.2009	3:10	11:59	15°39,51	17°14,80	15°57,56	18°01,40
GeoB09-022	20.03.2009	12:10	20:47	15°56,54	18°01,70	15°12,18	17°47,53
GeoB09-023	20.03.2009	20:53	23:54	15°11,81	17°47,19	15°03,82	17°33,98
GeoB09-024	21.03.2009	0:02	1:58	15°03,81	17°33,39	15°09,10	17°24,94
GeoB09-025	21.03.2009	2:01	9:00	15°09,28	17°24,89	15°43,22	17°15,81
GeoB09-026	24.03.2009	2:23	3:18	19°28,89	16°53,51	19°28,27	16°58,19
GeoB09-027a	24.03.2009	3:21	8:12	19°28,24	16°58,44	19°23,06	17°18,58
GeoB09-027b	24.03.2009	8:45	22:23	19°20,80	17°18,46	18°55,51	18°26,09
GeoB09-028	24 - 25.03.2009	22:32	6:33	18°55,54	18°26,71	18°58,20	19°09,83
GeoB09-029	25.03.2009	6:48	11:12	18°58,99	19°10,46	19°19,90	19°09,94
GeoB09-030	25.03.2009	11:20	11:50	19°20,15	19°10,50	19°20,38	19°13,02
GeoB09-031	25.03.2009	12:00	12:07	19°19,83	19°13,66	19°19,21	19°13,68
GeoB09-032	25.03.2009	12:20	13:57	19°18,51	19°13,09	19°18,01	19°04,99
GeoB09-033	25.03.2009	14:05	15:29	19°17,75	19°04,49	19°12,70	18°59,49
GeoB09-034	25.03.2009	15:35	19:59	19°12,52	18°58,99	19°09,49	18°35,53
GeoB09-035	25.03.2009	20:01	21:53	19°09,48	18°35,31	19°11,28	18°25,50
GeoB09-036	26.03.2009	11:32	12:22	19°18,87	17°07,50	19°22,01	17°07,48
GeoB09-037	26.03.2009	12:22	16:33	19°22,01	17°07,48	19°39,66	17°20,27
GeoB09-038	26.03.2009	16:33	18:56	19°39,66	17°20,27	19°51,35	17°14,39
GeoB09-039	26.03.2009	18:56	23:16	19°51,35	17°14,39	20°07,21	17°32,41
GeoB09-040	29.03.2009	06:24	09:23	20°39,88	18°36,87	20°53,57	18°32,44
GeoB09-041	29.03.2009	09:45	20:17	20°53,53	18°30,74	20°31,68	17°38,98
GeoB09-042	29.03.2009	20:30	22:50	20°30,41	17°38,96	20°20,11	17°45,95
GeoB09-043	29 - 30.03.2009	23:08	4:08	20°20,62	17°47,05	20°47,40	17°44,52
GeoB09-044	30.03.2009	4:16	4:31	20°48,02	17°45,00	20°48,37	17°46,39
GeoB09-045	30.03.2009	4:40	9:30	20°48,05	17°47,26	20°26,10	18°03,24
GeoB09-046a	30.03.2009	9:52	11:42	20°26,57	18°04,47	20°36,48	18°02,30
GeoB09-046b	30 - 31.03.2009	22:47	2:31	20°34,65	18°02,60	20°54,50	17°58,19
GeoB09-047	31.03.2009	2:36	3:24	20°54,83	17°58,37	20°57,11	18°02,91
GeoB09-048	31.03.2009	3:35	5:19	20°56,88	18°03,58	20°51,84	18°12,35
GeoB09-049	31.03.2009	5:25	6:46	20°51,74	18°12,93	20°53,54	18°20,71

GeoB09-050	31.03.2009	6:53	8:30	20°53,32	18°21,39	20°48,56	18°29,50
GeoB09-051	31.03.2009	8:37	11:10	20°48,06	18°29,98	20°34,74	18°34,72
GeoB09-052	06.04.2009	1:54	7:07	26°36,07	15°23,98	26°17,24	15°02,91
GeoB09-053	06.04.2009	7:10	9:31	26°17,13	15°02,71	26°13,17	14°50,08
GeoB09-054	06.04.2009	9:47	12:03	26°14,20	14°49,90	26°23,89	14°57,64
GeoB09-055	06.04.2009	12:13	12:31	26°23,76	14°58,64	26°22,56	14°59,76
GeoB09-056	06.04.2009	12:52	14:23	26°21,77	14°58,59	26°26,14	14°51,61
GeoB09-057	06.04.2009	14:36	16:49	26°27,25	14°51,73	26°35,56	14°59,71
GeoB09-058	06.04.2009	16:51	17:11	26°35,64	14°59,97	26°36,25	15°01,67
GeoB09-059	06.04.2009	17:22	17:46	26°35,94	15°02,65	26°34,23	15°03,36
GeoB09-060	06.04.2009	17:56	18:54	26°33,99	15°02,76	26°35,20	14°57,21
GeoB09-061	06.04.2009	18:56	20:26	26°35,21	14°57,00	26°35,14	14°48,07
GeoB09-062	07.04.2009	7:45	8:09	27°29,97	13°31,32	27°31,68	13°30,05
GeoB09-063	07.04.2009	8:09	13:07	27°31,68	13°30,05	27°32,22	13°59,48
GeoB09-064	07.04.2009	13:13	13:39	27°31,74	13°59,56	27°30,14	12°57,69
GeoB09-065	07.04.2009	13:39	14:24	27°30,14	12°57,69	27°30,44	13°53,04
GeoB09-066	07.04.2009	14:33	15:39	27°30,87	13°52,39	27°34,65	13°47,56
GeoB09-067	07.04.2009	15:43	16:08	27°34,65	13°47,12	27°34,50	13°44,56
GeoB09-068	07.04.2009	16:12	17:05	27°34,31	13°44,20	27°30,55	13°40,53

Station list

GeoB #	**Ships # MSM11/**	**Date 2009**	**Device**	**Time seafloor/ max. wire -length [UTC]**	**Latitude [°N]**	**Longitude [°W]**	**Water depth [m]**	**Recovery**	**Remarks**
Southern Senegal									
13601-1	407-1	16.03	PARCA	06:46	12°26.06'	18°00.29'	1200		Test; pictures out of focus
13601-2	407-2	16.03	ROS	07:46	12°26.06	18°0.29'	1501	24/24	
13601-3	407-3	16.03	MUC	09:41	12°26.06'	18°0.29'	2996.6	12/12 45 cm	
13601-4	407-4	16.03	SL12	11:31	12°26.06'	18°0.29	2997.4	860 cm	
13601-5		16.03	SWS	12 :05	12°26.05'	18°0.29		1l	Surface water for hydrocarbon analysis
13601-6	407-5	16.03.	NOAA	12 :20	12°26.06'	18°0.29'			#71107
13602-1	409-1	18.03	SL12	10 :45	13°32.71	17°50.96'	2393.5	878 cm	
13603-1	410-1	18.03	SL12	15:17	13°31.62'	18°26.64'	3553.5	805 cm	
Northern Senegal									
13604-1	412-1	21.03.	SL12	11:29	15°40.18'	17°16.50'	1052.1	665 cm	
13604-2	412-2	21.03.	MUC	12:25	15°40.17'	17°16.49'	1051.4	12/12 36 cm	
13604-3	412-3	21.03.	ROS	13:44	15°40.48'	17°16.05'	950		
13604-4		21.03.	SWS	13:41	15°40.48'	17°16.05		1l	Surface water for hydrocarbon analysis
13604-5	412-4	21.03.	PARCA	14:50	15°40.48'	17°16.09'	10		2 test casts

GeoB #	Ships # MSM11/	Date 2009	Device	Time seafloor/ max. wire -length [UTC]	Latitude [°N]	Longitude [°W]	Water depth [m]	Recovery	Remarks
				15:02					
13604-6	412-5	21.03.	NOAA	15:02	15°40.52’	17°16.09’			#71127
Senegal Mudbelt									
13605-1	415-1	22.03.	SL12	19:22	15°52.66’	16°40.50’	42.9	638 cm	
13606-1	416-1	22.03.	SL12	22:14	15°57.61’	16°45.82’	78.1	349 cm	Core barrel bent twice
13606-2	416-2	22.03.	MUC	22:32	15°57.62’	16°45.82’	80.8	10/12 45-56 cm	Penetration at angle
Southern Mauritania									
13607-1	417-1	23.03.	MUC	11:47	16°50.44’	16°43.37’	285.6	12/12 43-52 cm	
13607-2	417-2	23.03.	SL12	12:10	16°50.44’	16°43.37’	288.9	420 cm	
Northern Mauretania, Cape Timiris									
13608-1	419-1	26.03.	SL12	06:06	19°39.37’	16°56.36’	51.6	892 cm	
13609-1	420-1	26.03	ROS	08:10	19°24.33’	17°08.34’	800	24/24	
13609-2	420-2	26.03.	SL12	08:59	19°24.33’	17°08.34’	918.2	821 cm	
Cape Blanc									
13610-1	422-1	27.03.	PARCA	08:00	20°05.00’	18°50.00’	2870		
13610-2	422-2	27.03.	MUC	10:41	20°05.00’	18°50.01’	2891.2	12/12 34-38 cm	
13610-3	422-3	27.03.	ISP + CTD	14:08	20°05.68’	18°49.65’	2860	6/6	
13611-1	423-1	28.03.	PARCA	01:19	21°20.00’	18°50.51’	3060		
13611-2	423-2	28.03.	ISP	04:21	21°20.00’	18°50.51’	3050	6/6	
13611-3	423-3	28.03.	MUC	08:27	21°20.00’	18°50.51’	3073.4	12/12 34-41 cm	
13612-1	424-1	28.03.	CBi 6	13:26	20°44.56’	18°42.04’	2704.7		Mooring on deck at 15:46
13612-2	424-2	28.03.	ROS	16:38	20°45.10’	18°41.91’	1000	24/24	
13612-3	424-3	28.03.	MUC	18:12	20°45.10’	18°41.91’	2690.6	12/12 29-39 cm	
13612-4		28.03.	SWS	17:20	20°45.10’	18°41.92’		1 l	
13612-5	424-4	28.03.	NOAA	19:44	20°45.22’	18°41.91’		#71106	

GeoB #	Ships # MSM11/	Date 2009	Device	Time seafloor/ max. wire -length [UTC]	Latitude [°N]	Longitude [°W]	Water depth [m]	Recovery	Remarks
13612-6	424-5	28.03.	PARCA	21:47	20°46.12'	18°41.77'	2640		
13612-7	424-6	28.03.	ISP	23:51	20°46.13'	18°41.77'	2645	6/6	
13613-1	426-1	30.03.	ISP	14:38	20°34.73'	17°58.80'	725	6/6	
13613-2	426-2	30.03.	ROS	18:43	20°34.70'	17°58.80'	650	24/24	
13613-3	426-3	30.03	MUC	19:42	20°34.70'	17°58.80'	739	12/12	
13613-4	426-4	30.03.	PARCA	21:10	20°34.97'	17°58.77'	720		
13614-1	428-1	31.03.	CBi 7	14:37	20°44.66'	18°42.40'	2712		Ground weight deployed
13615-1	430-1	01.04.	PARCA	01:25	21°00.00'	19°50.00'	3680		
13615-2	430-2	01.04	ISP	04:03	21°00.00'	19°50.00'	3688	6/6	
13615-3	430-3	01.04.	ROS	09:26	21°00.00	19°50.00'	1005	24/24	
13615-4	430-4	01.04.	MUC	11:33	21°00.01'	19°50.00'	3702	11/12	
13616-1	432-1	01.04.	PARCA	23:11	21°15.61'	20°46.40'	4140		
13616-2	432-2	02.04.	ISP	02:17	21°15.61'	20°46.40'	4135		
13616-3	432-3	02.04.	ROS	07:22	21°15.61'	20°46.40'	1000	24/24	
13616-4	433-1	02.04.	CB19	08:35	21°15.53'	20°49.30'			Mooring on deck at 12:18
13616-5	434-1	02.04.	CB20	15:29	21°15.90'	20°49.93'	4173		Ground weight deployed
13616-6	435-1	02.04.	MUC	18:14	21°16.21'	20°48.70'	4167		
Western Sahara									
13617-1	437-1	03.04.	SL12	08:11	20°42.58'	21°11.24'	4105		
13618-1	438-1	04.04.	ROS	13:30	24°13.84'	17°17.37'	1500		
13618-2	438-2	04.04.	MUC	15:43	24°13.84'	17°17.37'	1862		
Cape Yubi									
13619-1	443-1	07.04.	ROS	18:31	27°31.62'	13°38.92'	450	24/24	
Canary Islands / ESTOC									
13620-1	444-1	08.04.	CI22	08:12	29°02.29'	15°16.84'			Mooring on deck at 11:19
13620-2	444-2	08.04.	ROS	12:45	29°04.97'	15°13.82'	3500	24/24	
13620-3		08.04.	SWS	13:42	29°04.97'	15°13.82'		1l	
13620-4		08.04	NOAA	15:40	29°04.98'	15°13.77'			#71105

CB, CBi - Sediment trap moorings off Cape Blanc
CI - Sediment trap mooring north of Canary Islands
ISP - In-situ pump
MUC – Multicorer
PARCA – Particle Camera System
NOAA - Satellite-tracked surface drifting buoy
ROS – Multi-water sampler with CTD
SL – Gravity Corer
SWS – surface water sampler for hydrocarbons