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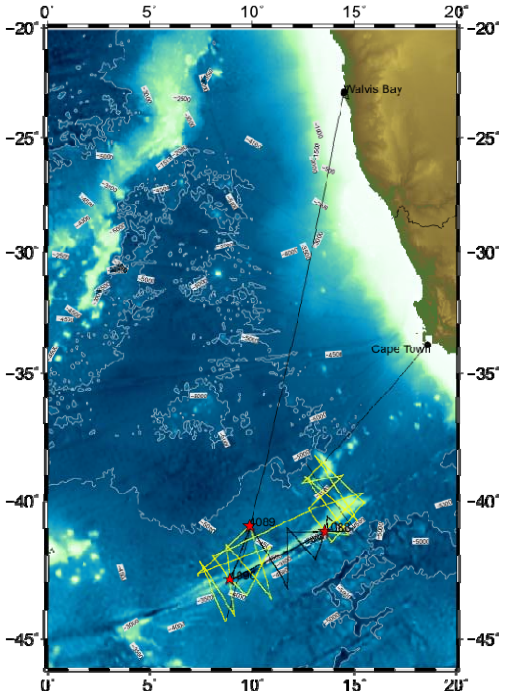
Cruise Report
RV MARIA S. MERIAN Cruise MSM19-2

Walvis Bay - Kapstadt
23.October – 30. November 2011
Chief Scientist: Gabriele Uenzelmann-Neben
Captain: Karl Friedhelm von Staa



Ship track of RV Maria S. Merian cruise MSM19-2 in the South Atlantic with locations of seismic profiles (yellow lines) marked.

Objectives

The Agulhas Ridge forms an elongated part of the Agulhas-Falkland Fracture Zone (AFFZ) (43° S/9° E - 41° S/16° E). It rises more than 2,000 m above the surrounding seafloor. In the northeast the ridge is characterized by a plateau whereas the main ridge is built up by two parallel segments. The ridge segments are separated by a deep depression, which is filled with sediments of > 1000 m thickness. The inner flanks of the ridge segments are much steeper than the outer flanks. The ridge itself is of tectono-magmatic origin and shows only a very thin sedimentary cover. We have aimed to solve the following questions:

1. Has the Agulhas Ridge been reactivated tectono-magmatically? Existing seismic reflection profiles show disturbances in the sedimentary layers. Basement highs in places pierce through the sedimentary column with basement being exposed at the seafloor. At least the pre-Oligocene sequences have been deformed, which points to a reactivation of the ridge in mid-Oligocene times. It is not clear what triggered the reactivation. Material channelized from the Discovery Hotspot via the AAFZ to the Agulhas Ridge has been discussed as an origin. To answer these questions we needed to map the distribution and spatial extent of the ridge using a grid of seismic reflection profiles and multibeam bathymetric data. This will lead to information on strike and structural relationship of the ridge segments to the AFFZ. Dredge locations were picked for a petrological sampling during MSM 19/3 based on this information.
2. What is the impact of the Agulhas Ridge with respect to oceanic circulation? The Agulhas Ridge has prevented a direct N-S water mass exchange and hence has restricted energy and heat transfer since its formation ~83 Ma. Presently, an eastsetting flow (Antarctic Circumpolar Current ACC, South Atlantic Current SAC, Circumpolar Deepwater CDW) can be observed south of the ridge. North of the ridge a westsetting flow is prevailent. Sediment drifts have been formed parallel to and north of the Agulhas Ridge, which indicate the influence of a water mass similar to CDW starting in Oligocene times. What is the situation between the Agulhas Ridge and the Cape Rise Seamounts? When and with what intensity have water masses started to shape sedimentary deposits there? An expansion of the existing grid of seismic reflection lines (Fig. 2-1) allowed the identification of sediment drifts in the northern Agulhas Basin as well. A detailed analysis will then show similarities in seismic character and the chronological development of drift structures identified north of the Agulhas Ridge.
3. The distribution of sedimentary layers on the eastern plateau of the ridge is largely unknown. This eastern plateau is of major importance, since here the Benguela Current (BC) sets north, the Agulhas Return Current (ARC) has its origin and Agulhas Rings transfer energy and heat from the Indian Ocean. When can we identify the first traces of sediment transport in this area? Can we identify a depth interval for the influence of BC, ARC and Agulhas Rings? The planned grid of seismic reflection profiles will lead to a better understanding on the development of the current systems in this area.

   Seismic reflection profile AWI-98007 shows a sedimentary column with at least 1 km thickness on the eastern plateau of the Agulhas Ridge, which are of mid-Miocene to recent age for the upper 240 m. Here, the ridge rises to a water depth of ~1,700 m and hence cannot receive turbidity currents of slides and slump masses. Age, origin and nature of the material are thus unclear. Do the sediments correspond to material observed on the Agulhas Bank or the Falkland Plateau? The newly collected seismic reflection data will enable to map the sedimentary structures and decipher the sedimentation history of the area.

   The project comprised geophysical operations in the area of the Agulhas Ridge (. Streamer, airguns, as well as PARASOUND and multi-beam systems were used. Seismic reflection profiles were gathered in order to study the sedimentary

distribution in relation to the tectonic and oceanographic evolution). Those profiles cover the whole Agulhas Ridge with the transition into the deep sea. Furthermore, the profiles cover the locations of ODP Leg 177 Sites 1088, 1089, and 1090.

Narrative

date	Approx. Board time (UCT)	Programme and event	weather
23.10.	9:00-19:00	On board, loading, set up of equipment	fine
24.10.	9:00-19:00; 13:00	leave harbour, set up of equipment; start of Parasound and Simrad recording	fine
25.10.		Transit into working area	Increasing winds, high swell
26.10.		Transit to working area	Increasing winds, high swell
27.10.		Transit to working area	Increasing winds, high swell
28.10.	 16:30	Transit to working area; CTD	Increasing winds, high swell
29.10.	 11:00	Transit to working area; deployment of streamer and airguns; seismic profiling	Strong winds, high swell
30.10.		Seismic profiling	Strong winds, high swell
31.10.		Seismic profiling	Strong winds, high swell
1.11.		Seismic profiling	Strong winds, high swell
2.11.		Seismic profiling	Strong winds, high swell
3.11.		Seismic profiling	Strong winds, high swell
4.11.		Seismic profiling	Strong winds, high swell
5.11.		Seismic profiling	Strong winds, very high swell
6.11.	 21:00	Seismic profiling; retrieval of streamer/airguns due to weather	Strong winds, very high swell
7.11.		Bad weather	Strong winds, very high swell
8.11.	8:00; 11:30	deployment of streamer/airguns; seismic profiling	Strong winds, high swell
9.11.		Seismic profiling	Strong winds, high swell
10.11.		Seismic profiling	Strong winds, high swell
11.11.		Seismic profiling	Strong winds, high swell
12.11.		Seismic profiling	Strong winds, high swell
13.11.		Seismic profiling	Strong winds, high swell
14.11.		Seismic profiling	Strong winds, high swell
15.11.		Seismic profiling	Strong winds, high swell
16.11.		Seismic profiling	Strong winds, high swell
17.11.		Seismic profiling	Strong winds, high swell
18.11.		Seismic profiling	fine
19.11.		Seismic profiling	Medium winds and swell
20.11.		Seismic profiling	Strong winds, high swell
21.11.		Seismic profiling	Strong winds, high swell
22.11.		Seismic profiling	Strong winds, high swell
23.11.		Seismic profiling	Medium winds and swell
24.11.		Seismic profiling	Strong winds, high swell

25.11.		Seismic profiling	Strong winds, high swell
26.11.		Seismic profiling	fine
27.11.	11:00	retrieval of seismic gear; CDT/rosette; leave working area	fine
28.11.		Transit to Cape Town	Medium winds and swell
29.11.	14:00	pilot, back in harbour , towing of containers	Medium winds and swell
30.11.	14:00	Unloading; scientists off-board	fine

6. Acknowledgements

We like to thank Captain Friedrich von Staa, his officers and crew of RV Maria S. Merian for their support of our measurement programme and for creating a very friendly atmosphere on board. We also appreciate that Thor was in a good mood during almost all the time providing us with weather allowing an efficient use of the cruise time.

The ship time of Merian 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 all this support.

Cruise participants

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Seismic profiles

Line	**begin**				**end**			
	date	UTC	lat	lon	date	UTC	lat	lon
AWI-20110401	29.10.11	10:03	-44.267	8.8	30.10.11	15:29	-42.21	7.42
AWI-20110402	30.10.11	18:42	-42.25	7.44	31.10.11	23:00	-44.2	9.17
AWI-20110403	1.11.11	2:10	-44.18	9.15	2.11.11	9:51	-41.567	8.747
AWI-20110404	2.11.11	12:08	-41.598	8.748	3.11.11	19:29	-43.606	10.97
AWI-20110405	3.11.11	22:15	-43.583	10.944	5.11.11	7:30	-40.905	9.878
AWI-20110406	5.11.11	9:37	-40.888	9.942	6.11.11	18:35	-42.714	7.296
AWI-	7.11.11	7:46	-42.74	7.378	9.11.11	19:39	-41.666	10.89

20110407								
AWI-20110408	97.11.11	22:52	-41.667	10.887	10.11.11	23:17	-43.96	9.727
AWI-20110409	11.11.11	1:50	-43.465	9.748	11.11.11	11:54	-42.909	8.9
AWI-20110410	11.11.11	11:54	-42.909	8.9	11.11.11	1:01	-42.029	8.054
AWI-20110411	12.11.11	3:01	-42.044	8.068	14.11.11	5:27	-40.265	13.107
AWI-20110412	14.11.11	5:27	-40.265	13.105	15.11.11	3:29	-39.668	15.474
AW1-20110413	15.11.11	6:54	-39.673	15.451	16.11.11	7:46	-41.145	13.545
AWI-20110414	16.11.11	10:30	-41.127	13.537	16.11.11	22:07	-41.244	14.761
AW-20110415	17.11.11	00:50	-41.241	14.719	18.11.11	8:02	-39.064	12.598
AWI-20110416	18.11.11	11:30	-39.066	12.599	19.11.11	17:02	-40.711	15.175
AWI-20110417	19.11.11	20:37	-40.709	15.17	21.11.11	2:43	-38.267	13.065
AWI-20110418	21.11.11	6:27	-38.2994	13.085	22.11.11	17:15	-40.083	15.533
AWI-20110419	22.11.11	19:46	-40.057	15.5	23.11.11	19:46	-41.528	13.873
AWI-20110420	23.11.11	23:03	-41.503	13.904	24.11.11	15:59	-40.295	12.772
AWI-20110421	24.11.11	18:58	-40.305	12.763	25.11.11	17:24	-38.989	14.478
AWI-20110422	25.11.11	20:37	-39.015	14.445	26.11.11	18:59	-39.33	12.435
AWI-20110423	26.11.11	21:47	-39.326	12.472	27.11.11	8:52	-38.481	13.53

CTD stations

Cast No.	Date	Start time	Latitude	Longitude
1	10/28/2011	16:28	41° 59.980’S	9° 20.530’E
2	11/7/2011	13:08	42° 44.831’S	7° 28.548’E
3	11/27/2011	10:35	38° 24.296’S	13° 37.499’E

Station book

Station No.	Date	Time [UTC]	Position Lat	Position Lon	Depth [m]	Gear	Action	Comment
MSM19/1068-1	10/28/2011	16:29	41° 59,98' S	9° 20,54' E	4785	CTD/rosette water sampler	surface	
MSM19/1068-1	10/28/2011	17:52	41° 59,99' S	9° 20,54' E	4783.6	CTD/rosette water sampler	at depth	SL max 4765m
MSM19/1068-1	10/28/2011	19:23	41° 59,99' S	9° 20,54' E	4785.6	CTD/rosette water sampler	on deck	
MSM19/1069-1	10/29/2011	7:25	44° 8,73' S	8° 52,06' E	4570.6	Seismic reflection profile	information	Beginn aussetzen Streamer
MSM19/1069-1	10/29/2011	8:40	44° 13,50' S	8° 49,63' E	4562	Seismic reflection profile	Streamer into water	SL max 3192
MSM19/1069-1	10/29/2011	8:58	44° 14,62' S	8° 49,04' E	4561.3	Seismic reflection profile	airguns in the water	
MSM19/1069-1	10/29/2011	11:45	44° 21,71' S	8° 40,45' E	4461.6	Seismic reflection profile	profile start	Kurs 337°
MSM19/1069-1	10/29/2011	15:13	44° 5,83' S	8° 31,04' E	4417.2	Seismic reflection profile	information	Schießen unterbrochen, austausch der Blasen an den Kanonen
MSM19/1069-1	10/29/2011	15:52	44° 3,35' S	8° 29,59' E	14.2	Seismic reflection profile	information	Blasen ausgetauscht
MSM19/1069-1	10/29/2011	16:00	44° 2,81' S	8° 29,27' E	4500.7	Seismic reflection profile	information	Fortsetzen Schießen
MSM19/1069-1	10/30/2011	11:05	42° 33,91' S	7° 37,21' E	4705.5	Seismic reflection profile	information	Schießpause wegen Triggertausch
MSM19/1069-1	10/30/2011	11:08	42° 33,68' S	7° 37,09' E	5389.7	Seismic reflection profile	information	Fortsetzung schießen
MSM19/1069-1	10/30/2011	15:06	42° 15,20' S	7° 26,41' E	4762.9	Seismic reflection profile	end of profile	
MSM19/1069-1	10/30/2011	15:29	42° 13,42' S	7° 25,35' E	4750.7	Seismic reflection profile	alter course	Neuer Kurs 147°
MSM19/1069-1	10/30/2011	18:42	42° 15,13' S	7° 26,37' E	4890	Seismic reflection profile	profile start	
MSM19/1069-1	10/31/2011	10:16	43° 17,61' S	8° 21,34' E	3107.9	Seismic reflection profile	information	Kursänderung nach Bb um Datenübertragung zu ermöglichen
MSM19/1069-1	10/31/2011	10:30	43° 18,51' S	8° 22,32' E	3900.6	Seismic reflection profile	information	Rückkehr auf Profil
MSM19/1069-1	10/31/2011	10:54	43° 20,20' S	8° 23,75' E	4298.4	Seismic reflection profile	information	erneute Abweichung gen Bb zwecks Datenübertragung
MSM19/1069-1	10/31/2011	11:08	43° 21,08' S	8° 24,82' E	3927.8	Seismic reflection profile	information	Drehen wieder auf Kurs
MSM19/1069-1	10/31/2011	23:01	44° 10,84' S	9° 8,90' E	4661.1	Seismic reflection profile	end of profile	
MSM19/1069-1	10/31/2011	23:02	44° 10,91' S	9° 8,97' E	4660.3	Seismic reflection profile	alter course	Neuer Kurs 352°
MSM19/1069-1	11/1/2011	2:10	44° 10,84' S	9° 8,83' E	4660	Seismic reflection profile	profile start	
MSM19/1069-1	11/1/2011	17:38	42° 54,61' S	8° 54,00' E	3701.4	Seismic reflection profile	alter course	Neuer Kurs 355°

MSM19/1069-1	11/2/2011	9:28	41° 35,92' S	8° 45,06' E	4925.2	Seismic reflection profile	end of profile	
MSM19/1069-1	11/2/2011	9:52	41° 33,95' S	8° 44,84' E	5047.3	Seismic reflection profile	alter course	neuer Kurs 141°
MSM19/1069-1	11/2/2011	12:09	41° 35,91' S	8° 44,98' E	4646.7	Seismic reflection profile	profile start	
MSM19/1069-1	11/3/2011	10:02	43° 0,04' S	10° 17,69' E	4219.1	Seismic reflection profile	information	Kursänderung nach Bb um Datenübertragung zu ermö
MSM19/1069-1	11/3/2011	10:48	43° 2,95' S	10° 20,97' E	3959.1	Seismic reflection profile	information	wieder auf Profilkurs
MSM19/1069-1	11/3/2011	14:03	43° 15,45' S	10° 34,88' E	4352.2	Seismic reflection profile	information	vorübergehende Kusänderung um Daten zu übertragen Kurs 132°
MSM19/1069-1	11/3/2011	14:15	43° 16,19' S	10° 35,75' E	4328.7	Seismic reflection profile	information	Zurück auf Kurs 141°
MSM19/1069-1	11/3/2011	18:00	43° 30,63' S	10° 51,87' E	4510.4	Seismic reflection profile	information	vorübergehende Kursänderung auf 131° zwecks Datenaustausch
MSM19/1069-1	11/3/2011	18:35	43° 32,80' S	10° 54,36' E	4461.2	Seismic reflection profile	information	zurück auf Kurs 141°
MSM19/1069-1	11/3/2011	19:06	43° 34,83' S	10° 56,56' E	4491.9	Seismic reflection profile	end of profile	
MSM19/1069-1	11/3/2011	19:30	43° 36,37' S	10° 58,28' E	4535.5	Seismic reflection profile	alter course	neuer Kurs 343°
MSM19/1069-1	11/3/2011	22:16	43° 34,88' S	10° 56,60' E	4906.7	Seismic reflection profile	profile start	
MSM19/1069-1	11/5/2011	7:06	40° 56,47' S	9° 53,44' E	4637.8	Seismic reflection profile	end of profile	
MSM19/1069-1	11/5/2011	7:30	40° 54,53' S	9° 52,71' E	14.2	Seismic reflection profile	alter course	neuer Kurs 227°
MSM19/1069-1	11/5/2011	9:37	40° 53,30' S	9° 56,50' E	4606.5	Seismic reflection profile	profile start	
MSM19/1069-1	11/5/2011	10:54	40° 57,69' S	9° 50,23' E	4649.1	Seismic reflection profile	information	Kursänderung für e-mail Übertragung
MSM19/1069-1	11/5/2011	11:09	40° 58,53' S	9° 48,98' E	4670.1	Seismic reflection profile	information	wieder auf Profil
MSM19/1069-1	11/5/2011	13:35	41° 6,87' S	9° 37,08' E	4667.2	Seismic reflection profile	information	Ein Kanonenauftriebskörper losgerissen
MSM19/1069-1	11/5/2011	13:50	41° 7,66' S	9° 35,96' E	4715.3	Seismic reflection profile	airgun on deck	
MSM19/1069-1	11/5/2011	14:36	41° 9,71' S	9° 32,99' E	4688.1	Seismic reflection profile	airguns in the water	Fortsetzen Schießen
MSM19/1069-1	11/6/2011	17:43	42° 41,51' S	7° 19,75' E	5149.5	Seismic reflection profile	end of profile	
MSM19/1069-1	11/6/2011	18:07	42° 42,89' S	7° 17,74' E	4948.9	Seismic reflection profile	information	aufgehört zu schießen
MSM19/1069-1	11/6/2011	19:02	42° 42,64' S	7° 12,73' E	4661.8	Seismic reflection profile	airgun on deck	
MSM19/1069-1	11/6/2011	19:53	42° 41,12' S	7° 8,91' E	4734.3	Seismic reflection profile	streamer on deck	
MSM19/1069-2	11/7/2011	13:13	42° 44,83' S	7° 28,54' E	4945.1	CTD/rosette water	surface	

						sampler		
MSM19/1069-2	11/7/2011	14:17	42° 44,82' S	7° 28,55' E	4956.7	CTD/rosette water sampler	at depth	SL max. 4946m
MSM19/1069-2	11/7/2011	15:33	42° 44,82' S	7° 28,56' E	4948.3	CTD/rosette water sampler	on deck	
MSM19/1070-1	11/8/2011	6:07	42° 43,00' S	7° 31,30' E	4588.4	Seismic reflection profile	information	Beginn Aussetzen Streamer
MSM19/1070-1	11/8/2011	7:11	42° 43,78' S	7° 25,70' E	4886.4	Seismic reflection profile	Streamer into water	SL max. 3191m
MSM19/1070-1	11/8/2011	7:38	42° 44,19' S	7° 23,32' E	4789.5	Seismic reflection profile	airguns in the water	Bb-Seite
MSM19/1070-1	11/8/2011	7:47	42° 44,45' S	7° 22,61' E	4789.4	Seismic reflection profile	information	Beginn Schießen
MSM19/1070-1	11/8/2011	9:35	42° 41,47' S	7° 19,81' E	4842.2	Seismic reflection profile	profile start	Kurs 069°
MSM19/1070-1	11/9/2011	19:39	41° 40,07' S	10° 53,14' E	4381.5	Seismic reflection profile	end of profile	
MSM19/1070-1	11/9/2011	20:03	41° 39,36' S	10° 55,62' E	4389.1	Seismic reflection profile	alter course	neuer Kurs 205°
MSM19/1070-1	11/9/2011	22:52	41° 40,03' S	10° 53,21' E	4384.1	Seismic reflection profile	profile start	
MSM19/1070-1	11/10/2011	22:52	43° 27,79' S	9° 44,89' E	4305.5	Seismic reflection profile	end of profile	
MSM19/1070-1	11/10/2011	23:17	43° 29,68' S	9° 43,72' E	4340.1	Seismic reflection profile	alter course	neuer Kurs 312°
MSM19/1070-1	11/11/2011	1:50	43° 27,92' S	9° 44,88' E	4307.9	Seismic reflection profile	profile start	
MSM19/1070-1	11/11/2011	11:52	42° 54,79' S	8° 54,27' E	3711.4	Seismic reflection profile	alter course	neuer Kurs 325°
MSM19/1070-1	11/11/2011	11:54	42° 54,67' S	8° 54,11' E	3705	Seismic reflection profile	end of profile	
MSM19/1070-1	11/11/2011	11:55	42° 54,61' S	8° 54,05' E	3701.3	Seismic reflection profile	profile start	
MSM19/1070-1	11/12/2011	0:49	42° 2,61' S	8° 4,10' E	5252.4	Seismic reflection profile	end of profile	
MSM19/1070-1	11/12/2011	1:12	42° 1,10' S	8° 2,56' E	4855.1	Seismic reflection profile	alter course	neuer Kurs 065°
MSM19/1070-1	11/12/2011	3:01	42° 2,67' S	8° 4,09' E	4764.7	Seismic reflection profile	profile start	
MSM19/1070-1	11/14/2011	1:50	40° 23,78' S	12° 44,68' E	4806.5	Seismic reflection profile	information	Kurshalten durch achterlichen Wind und Strom nur erschwert möglich
MSM19/1070-1	11/14/2011	5:27	40° 15,95' S	13° 6,31' E	4643.3	Seismic reflection profile	alter course	Neuer Kurs 072°
MSM19/1070-1	11/15/2011	3:42	39° 39,79' S	15° 29,48' E	4871.1	Seismic reflection profile	end of profile	
MSM19/1070-1	11/15/2011	5:04	39° 37,04' S	15° 34,19' E	4311.8	Seismic reflection profile	information	EInholen der ersten Meter des Streamers um Batterien in den Birds zu wechseln
MSM19/1070-1	11/15/2011	5:21	39° 36,55' S	15° 32,94' E	4510.3	Seismic reflection profile	airgun on deck	zu Wartungstwecken
MSM19/1070-	11/15/2011	5:44	39°	15°	4776.2	Seismic	information	Streamer bis zum 6.

1			36,75' S	31,15' E		reflection profile		Bird an Deck
MSM19/1070-1	11/15/2011	6:27	39° 38,93' S	15° 29,01' E	4593.5	Seismic reflection profile	airguns in the water	
MSM19/1070-1	11/15/2011	6:32	39° 39,18' S	15° 28,71' E	4573.9	Seismic reflection profile	Streamer into water	SL max 3192m
MSM19/1070-1	11/15/2011	6:54	39° 40,39' S	15° 27,07' E	4689.1	Seismic reflection profile	profile start	Kurs 225°
MSM19/1070-1	11/16/2011	7:33	41° 7,77' S	13° 33,64' E	2075.3	Seismic reflection profile	alter course	neuer Kurs 219°
MSM19/1070-1	11/16/2011	7:46	41° 8,60' S	13° 32,77' E	2081	Seismic reflection profile	end of profile	
MSM19/1070-1	11/16/2011	8:12	41° 10,26' S	13° 30,96' E	2086.7	Seismic reflection profile	alter course	neuer Kurs 098°
MSM19/1070-1	11/16/2011	10:30	41° 7,66' S	13° 32,21' E	2070.3	Seismic reflection profile	profile start	
MSM19/1070-1	11/16/2011	21:44	41° 14,38' S	14° 42,99' E	4423.4	Seismic reflection profile	end of profile	
MSM19/1070-1	11/16/2011	22:08	41° 14,64' S	14° 45,62' E	4399.2	Seismic reflection profile	alter course	neuer Kurs 323°
MSM19/1070-1	11/17/2011	0:51	41° 14,43' S	14° 43,08' E	4427.1	Seismic reflection profile	profile start	
MSM19/1070-1	11/18/2011	8:03	39° 3,92' S	12° 35,97' E	4979.2	Seismic reflection profile	end of profile	
MSM19/1070-1	11/18/2011	8:26	39° 2,21' S	12° 34,38' E	4845.9	Seismic reflection profile	alter course	neuer Kurs 130°
MSM19/1070-1	11/18/2011	11:29	39° 3,88' S	12° 35,84' E	4976.2	Seismic reflection profile	profile start	
MSM19/1070-1	11/18/2011	22:46	39° 42,48' S	13° 35,90' E	4623.3	Seismic reflection profile	information	Unterbrechung Schießen, wegen Blasenverlust
MSM19/1070-1	11/18/2011	23:14	39° 43,73' S	13° 37,85' E	4672.7	Seismic reflection profile	information	Fortsetzung Profil
MSM19/1070-1	11/19/2011	12:00	40° 24,79' S	14° 42,30' E	1726.7	Seismic reflection profile	information	
MSM19/1070-1	11/19/2011	17:22	40° 43,67' S	15° 12,06' E	4446.7	Seismic reflection profile	end of profile	
MSM19/1070-1	11/19/2011	17:22	40° 43,67' S	15° 12,06' E	4446.7	Seismic reflection profile	information	Unterbrechen Schießen, Wartung der Kanonen
MSM19/1070-1	11/19/2011	17:23	40° 43,73' S	15° 12,15' E	4448.3	Seismic reflection profile	alter course	Neuer Kurs 326°
MSM19/1070-1	11/19/2011	17:37	40° 44,17' S	15° 13,50' E	4477.5	Seismic reflection profile	airgun on deck	
MSM19/1070-1	11/19/2011	20:27	40° 42,97' S	15° 10,53' E	4483	Seismic reflection profile	airguns in the water	
MSM19/1070-1	11/19/2011	20:32	40° 42,69' S	15° 10,30' E	4511.7	Seismic reflection profile	information	Beginn Schießen
MSM19/1070-1	11/19/2011	20:37	40° 42,35' S	15° 10,02' E	4402.3	Seismic reflection profile	profile start	
MSM19/1070-1	11/20/2011	11:13	39° 40,36' S	14° 16,06' E	4707.2	Seismic reflection profile	information	Airguns über Streamer
MSM19/1070-1	11/20/2011	11:21	39° 39,75' S	14° 15,55' E	5066.3	Seismic reflection	information	Airguns aus; reduzieren auf 4 kn

						profile		
MSM19/1070-1	11/20/2011	11:32	39° 39,06' S	14° 15,08' E	4733.7	Seismic reflection profile	information	Streamer frei, Fahrterhöhung auf 5,5kn
MSM19/1070-1	11/20/2011	12:00	39° 37,00' S	14° 13,16' E	4793.5	Seismic reflection profile	information	Fortsetzung Schießen
MSM19/1070-1	11/21/2011	2:21	38° 18,02' S	13° 5,55' E	5091.5	Seismic reflection profile	information	Probleme mit den GPS Positionen, fahren nach FDW
MSM19/1070-1	11/21/2011	2:43	38° 16,28' S	13° 4,07' E	5085.1	Seismic reflection profile	end of profile	
MSM19/1070-1	11/21/2011	2:57	38° 15,17' S	13° 3,28' E	6087.5	Seismic reflection profile	information	GPS Geräte zeigen wieder gute Positionen
MSM19/1070-1	11/21/2011	2:58	38° 15,10' S	13° 3,23' E	5076.7	Seismic reflection profile	alter course	Neuer Kurs 133°
MSM19/1070-1	11/21/2011	6:29	38° 17,85' S	13° 5,39' E	5091.9	Seismic reflection profile	profile start	
MSM19/1070-1	11/21/2011	12:00	38° 34,25' S	13° 27,61' E	4415.7	Seismic reflection profile	information	ein Bird verloren gemeldet, hieven Streamer um nachzusehen
MSM19/1070-1	11/21/2011	12:17	38° 34,85' S	13° 28,42' E	4402.4	Seismic reflection profile	information	Beginn hieven
MSM19/1070-1	11/21/2011	12:48	38° 35,40' S	13° 29,15' E	4367.8	Seismic reflection profile	information	Defekter Bird an Deck
MSM19/1070-1	11/21/2011	13:28	38° 36,11' S	13° 30,12' E	4295.7	Seismic reflection profile	information	Streamer wird wieder ausgesteckt
MSM19/1070-1	11/21/2011	13:49	38° 36,48' S	13° 30,66' E	4249	Seismic reflection profile	information	Fortsetzung Schießen und Profil
MSM19/1070-1	11/22/2011	17:15	40° 4,84' S	15° 31,85' E	4806.5	Seismic reflection profile	end of profile	
MSM19/1070-1	11/22/2011	17:17	40° 4,98' S	15° 32,05' E	4800.6	Seismic reflection profile	alter course	Neuer Kurs 220°
MSM19/1070-1	11/22/2011	19:46	40° 3,45' S	15° 30,00' E	4831.9	Seismic reflection profile	profile start	
MSM19/1070-1	11/23/2011	15:17	41° 14,99' S	14° 11,07' E	4104.1	Seismic reflection profile	information	Druckabfall durch Defekt einer Kanone. Profil wird mir 3 Kanonen fortgesetzt
MSM19/1070-1	11/23/2011	19:16	41° 30,08' S	13° 54,23' E	4301.9	Seismic reflection profile	end of profile	
MSM19/1070-1	11/23/2011	19:40	41° 31,60' S	13° 52,51' E	4573.8	Seismic reflection profile	alter course	neuer Kurs 325°
MSM19/1070-1	11/23/2011	22:03	41° 30,18' S	13° 54,24' E	4314.5	Seismic reflection profile	profile start	
MSM19/1070-1	11/24/2011	3:32	41° 7,80' S	13° 33,59' E	2075.8	Seismic reflection profile	alter course	WP 1088 Neuer Kurs 324°
MSM19/1070-1	11/24/2011	16:23	40° 16,20' S	12° 44,88' E	4868.7	Seismic reflection profile	end of profile	
MSM19/1070-1	11/24/2011	16:25	40° 16,07' S	12° 44,76' E	4868.8	Seismic reflection profile	alter course	Neuer Kurs 045°
MSM19/1070-1	11/24/2011	19:05	40° 17,91' S	12° 46,35' E	4843.8	Seismic reflection profile	profile start	
MSM19/1070-1	11/25/2011	17:25	38° 59,44' S	14° 28,58' E	4762.8	Seismic reflection profile	end of profile	
MSM19/1070-	11/25/2011	17:25	38°	14°	4762.8	Seismic	alter	Neuer Kurs 259°

1			59,44' S	28,58' E		reflection profile	course	
MSM19/1070-1	11/25/2011	20:37	39° 0,93' S	14° 26,69' E	4773.9	Seismic reflection profile	profile start	
MSM19/1070-1	11/26/2011	18:34	39° 19,43' S	12° 28,60' E	5038.1	Seismic reflection profile	end of profile	
MSM19/1070-1	11/26/2011	19:02	39° 19,85' S	12° 25,96' E	5011.9	Seismic reflection profile	alter course	neuer Kurs 044°
MSM19/1070-1	11/26/2011	21:47	39° 19,46' S	12° 28,49' E	5032.5	Seismic reflection profile	profile start	
MSM19/1070-1	11/27/2011	8:31	38° 30,48' S	13° 29,82' E	5029.9	Seismic reflection profile	end of profile	
MSM19/1070-1	11/27/2011	8:54	38° 28,88' S	13° 31,83' E	4975.6	Seismic reflection profile	information	Ende Schießen
MSM19/1070-1	11/27/2011	9:03	38° 28,44' S	13° 32,35' E	4967.2	Seismic reflection profile	airgun on deck	
MSM19/1070-1	11/27/2011	10:23	38° 24,54' S	13° 37,23' E	4945	Seismic reflection profile	streamer on deck	
MSM19/1071-1	11/27/2011	10:36	38° 24,29' S	13° 37,50' E	4975.1	CTD/rosette water sampler	surface	
MSM19/1071-1	11/27/2011	12:08	38° 24,30' S	13° 37,51' E	4965.2	CTD/rosette water sampler	at depth	SL max 4954m
MSM19/1071-1	11/27/2011	13:35	38° 24,28' S	13° 37,50' E	4955.1	CTD/rosette water sampler	on deck	