Cruise Report Meteor 48-2

Walvis Bay-Walvis Bay, 5 to 23 August, 2000

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Introduction and objectives

Sediments rich in opal and organic carbon are deposited in a narrow belt on the inner shelf beneath the upwelling area off Namibia. Their distribution and facies are determined by water depth, the physical energy at the sea floor, biological productivity (both pelagic and benthic), terrigenous input, and diagenesis. Due to high sedimentation rates together with suboxic and anoxic conditions of the bottom water, the sediments are expected to provide a detailed archive of the climatic and paleoceanographic history in this coastal upwelling area since the Holocene transgression.

Biogeochemical processes at the sediment-water interface are determined by very high accumulation rates of organic material which result in high oxygen consumption at the sea floor. High concentration of nitrate in the bottom waters support bacterial assemblages, which dominate benthic processes on oxygen-deficient seafloors. The endemic spherical species of sulfur bacteria *Thiomargarita namibiensis* stores nitrate in its vacuole and it can oxidize sulfide in the seafloor for months. One important objective of the expedition was the investigation of this recently discovered species of sulfur bacteria. We hoped to elucidate its metabolism, areal distribution and impact on the biogeochemical processes in the sediment.

The main objectives were to recover short and long sediment cores from the ”diatomaceouos mud belt” and the neighbouring lithogenic and carbonate sediments of the upper continental slope. Sampling was to be carried out along transects parallel and perpendicular to the coast. Surface sediment samples were to be used to map the microbiological assemblages, as well as geochemical, micropaleontological, isotopical and mineralogical indicators of recent environmental conditions. These include gradients of temperature, water column structure and physical processes at the sea floor, and the nutrient regime. Once established, the set of proxy indicators will help to reconstruct the climate control on the intensity of upwelling und the prevailing wind regime, as well as the aridity in the hinterland during the Holocene. An additional objective was to service two sediment trap moorings on the upper continental slope, one situated beneath the perennial upwelling cell offshore Lüderitz, the other beneath the seasonal upwelling area offshore Walvis Bay.

Participants

Name	**Subject**	**Institution**
Bening, Gerd.	coring technician	IOW
Berger, Jana.	geology student	IOW/EMAU
Brüchert, Volker, Dr.,	biogeochemistry	MPI
Currie, Bronwen.	biology	MFMR
Emeis, Kay, Prof. Dr.	chief scientist	IOW
Endler, Rudolf, Dr.	geophysics	IOW
Ferdelman, Tim, Dr.	biogeochemistry	MPI
Finke, Nico,	biogeochemistry	MPI

Graco, Michelle,	microbiology	MPI
Haferburg, Götz,	biogeochemistry	MPI
Heyn, Tobias	geology student	LMU
Kiessling, André	geology student	IOW/EMAU
Lage, Susanne	geology technician	IOW
Leipe, Thomas, Dr.	geology	IOW
Möllenhauer, Gesine	geology student/traps	FB Geo
Neumann, Karin	biogeochemistry technician	MPI
Nickel, Gerald	CTD technician	IOW
Noli, Katherine	biology	MFMR
Riechmann, Daniela	microbiology	MPI
Schippers, Axel, Dr.	biogeochemistry	MPI
Schneider, Ralph, Dr.	geology	FB Geo
Schulz, Heide, Dr.	microbiology	MPI
Shidjuu, Abel	geology	MME
Sonnabend, Hartmut	meteorology	DWD
Stregel, Sven	geology student/traps	FB Geo
Struck, Ulrich	geology	LMU
Treppke, Ute, Dr.	micropaleontology	IOW
Vogt, Thomas	geology student	IOW/EMAU
Zemskaya, Tamara, Dr.	microbiology	MPI

IOW: Institut für Ostseeforschung Warnemünde, EMAU: Ernst-Moritz-Arndt-Universität Greifswald
MPI: Max-Planck-Institut für Marine Microbiologie Bremen
LMU: Ludwig-Maximilian-Universität München
FB Geo: Fachbereich Geowissenschaften, Universität Bremen
MFMR: Ministery of Fisheries and Marine Resources of Namibia
MME: Ministery of Mines and Energy/Geological Survey of Namibia

Operations:

A list of acoustic profiles is given in Table 1, a list of stations and sampling gear is given in Table 2. The location of sampling stations and geophysical tracks is depicted in Figure 1. The cruise was very successful indeed and all operational goals have been achieved. A full cruise report that also gives preliminary results will be finalised at the end of the year 2000 and will be distributed to interested scientific institutions and individuals in Namibia.

Profile Name	Date	Time	Course	Speed	Station	Lat°	Min´		Lon°	Min´	
Ps0008051040	05.08.00	10:40:00	300	10,8		22	50,691	S	14	28,480	E
		11:40:00				22	45,551	S	14	18,830	E
	05.08.00	12:09:00			226620	22	45,510	S	14	18,870	E
Ps0008060026	06.08.00	0:26:00	210	10,5		22	45,550	S	14	18,307	E
		2:12:00				23	0,244	S	14	8,844	E
	06.08.00	2:25:00			226630	23	0,000	S	14	8,980	E
Ps0008060832	06.08.00	8:32:00	170	10,5		22	59,804	S	14	8,681	E
		9:52:00				23	12,640	S	14	11,105	E
	06.08.00	10:00:00			226640	23	11,800	S	14	11,020	E
Ps0008061602	06.08.00	16:02:00	203	10,3		23	12,185	S	14	11,284	E
	07.08.00	6:42:00				25	27,659	S	13	5,331	E
	07.08.00				226650	25	28,020	S	13	5,050	E
Ps0008071606	07.08.00	16:06:00	344	10,8		25	28,674	S	13	5,033	E
		23:38:00				24	8,342	S	12	40,702	E
	08.08.00	0:30:00			226660	24	6,450	S	12	45,940	E

Ps0008081038	08.08.00	10:38:00	76	8,1		24	6,299	S	12	46,228	E
		21:42:00				23	45,659	S	14	21,029	E
	08.08.00	22:25:00			226670	23	46,300	S	14	18,170	E
	09.08.00	3:30:00			226680	23	46,520	S	14	17,960	E
	09.08.00	9:50:00			226690	23	46,810	S	14	15,740	E
Ps0008091646	09.08.00	16:46:00	293	10,3		23	46,803	S	14	15,641	E
	10.08.00	2:58:00				23	2,569	S	12	27,835	E
	10.08.00	3:20:00			226700	23	1,700	S	12	26,760	E
Ps0008101404	10.08.00	14:04:00	15	11,0		23	0,801	S	12	25,463	E
		20:20:00				21	56,025	S	12	44,266	E
	10.08.00	20:40:00			226710	21	56,930	S	12	43,950	E
Ps0008102300	10.08.00	23:00:00	76	8,0		21	57,528	S	12	44,184	E
	11.08.00	7:58:00				21	44,026	S	13	52,836	E
Ps0008110800	11.08.00	8:00:00	183	8,0		21	44,140	S	13	53,001	E
		12:02:00				22	15,710	S	13	50,061	E
Ps0008111206	11.08.00	12:06:00	65	8,0		22	15,951	S	13	50,268	E
		13:52:00				22	10,026	S	14	3,824	E
	11.08.00	14:00:00			226720	22	9,980	S	14	4,070	E
Ps0008111830	11.08.00	18:30:00	315	10,8		22	8,806	S	14	2,376	E
		19:50:00				22	0,123	S	13	51,441	E
	11.08.00	19:50:00			226730	22	0,170	S	13	51,520	E
	11.08.00	23:45:00			226740	21	55,100	S	13	51,930	E
	12.08.00	2:15:00			226750	21	54,700	S	13	51,960	E
Ps0008120446	12.08.00	4:46:00	318	10,6		21	54,731	S	13	51,913	E
		6:00:00				21	45,760	S	13	43,394	E
	12.08.00	6:00:00			226760	21	45,770	S	13	43,400	E
Ps0008012956	12.08.00	9:56:00	352	11,4		21	45,742	S	13	43,598	E
		12:06:00				21	22,278	S	13	39,884	E
	12.08.00	12:25:00			226770	21	22,970	S	13	40,000	E
Ps0008121434	12.08.00	14:34:00	324	11,3		21	23,054	S	13	39,754	E
		17:14:00				20	59,089	S	13	21,285	E
	12.08.00	17:30:00			226780	20	59,950	S	13	21,990	E
Ps0008122100	12.08.00	21:00:00	270	8,0		20	59,967	S	13	21,784	E
	13.08.00	13:16:00				20	59,980	S	11	0,071	E
Ps0008131318	13.08.00	13:18:00	42	10,0		20	59,789	S	11	0,079	E
		20:30:00				20	5,850	S	11	52,280	E
Ps0008132032	13.08.00	20:32:00	72	7,8		20	5,746	S	11	52,532	E
	14.08.00	4:04:00				19	47,182	S	12	51,451	E
	14.08.00	4:10:00			226790	19	47,000	S	12	51,610	E
	14.08.00	8:00:00			226800	19	48,830	S	12	46,360	E
	14.08.00	12:10:00			226810	19	50,660	S	12	40,500	E
Ps0008141530	14.08.00	15:30:00	250	11,0		19	50,799	S	12	40,013	E
		19:54:00				20	6,074	S	11	52,151	E
	14.08.00	20:00:00			226820	20	5,960	S	11	51,970	E
Ps0008142314	14.08.00	23:14:00	171	8,0		20	6,242	S	11	51,964	E
	15.08.00	5:58:00				21	0,068	S	12	0,031	E
Ps0008150600	15.08.00	6:00:00	55	8,4		21	0,247	S	12	0,247	E
		15:28:00				20	14,981	S	13	8,165	E
Ps0008151530	15.08.00	15:30:00	156	8,6		20	15,146	S	13	8,189	E
		21:48:00				21	3,909	S	13	25,102	E
Ps0008152150	15.08.00	21:50:00	240	8,6		21	4,129	S	13	25,029	E
	16.08.00	6:44:00				21	40,121	S	12	14,900	E
Ps0008160646	16.08.00	6:46:00	92	8,6		21	40,206	S	12	15,035	E
		17:48:00				21	43,962	S	13	52,949	E
	16.08.00				226830	21	44,000	S	13	53,020	E
Ps0008161938	16.08.00	19:38:00	185	8,2		21	44,189	S	13	52,950	E
		21:00:00				21	54,987	S	13	51,877	E
	16.08.00	21:05:00			226840	21	55,060	S	13	51,990	E
Ps0008162126	16.08.00	21:26:00	154	8,2		21	55,193	S	13	51,972	E
	17.08.00	1:40:00				22	27,049	S	14	7,045	E
	17.08.00	1:50:00			226850	22	27,010	S	14	6,970	E
Ps0008170540	17.08.00	5:40:00	150	8,2		22	27,295	S	14	7,184	E
		8:06:00				22	44,812	S	14	18,112	E

	17.08.00	8:10:00			226860	22	45,000	S	14	18,040	E
Ps0008170824	17.08.00	8:24:00	286	8,3		22	44,984	S	14	17,945	E
		10:32:00				22	40,047	S	14	0,077	E
	17.08.00	10:35:00			226870	22	40,030	S	14	0,030	E
Ps0008171422	17.08.00	14:22:00	340	11,0		22	39,855	S	13	59,851	E
		18:02:00				21	59,998	S	13	47,493	E
Ps0008171804	17.08.00	18:04:00	335	11,6		21	59,643	S	13	47,336	E
		23:58:00				20	58,894	S	13	17,587	E
Ps0008180000	18.08.00	0:00:00	340	11,4		20	58,539	S	13	17,459	E
		4:24:00				20	11,840	S	12	59,901	E
Ps0008180426	18.08.00	4:26:00	322	11,2		20	11,545	S	12	59,650	E
		12:40:00				19	0,112	S	12	2,112	E
Ps0008181242	18.08.00	12:42:00	270	8,0		18	59,945	S	12	1,838	E
		14:06:00				19	0,015	S	11	50,055	E
Ps0008181416	18.08.00	14:16:00	90	8,0		19	1,010	S	11	50,127	E
		18:04:00				19	0,995	S	12	22,067	E
		18:30:00			226880	19	0,970	S	12	20,620	E
		21:00:00			226890	19	1,000	S	12	16,540	E
		23:38:00			226900	19	1,010	S	12	17,740	E
Ps0008190030	19.08.00	0:30:00	164	10,3		19	1,263	S	12	13,748	E
		5:28:00				19	48,620	S	12	27,734	E
Ps0008190530	19.08.00	5:30:00	146	10,3		19	48,932	S	12	27,840	E
		8:18:00				20	12,383	S	12	44,761	E
Ps0008190818	19.08.00	8:18:00	155	10,3		20	12,383	S	12	44,761	E
		13:36:00				21	1,306	S	13	8,700	E
Ps0008191338	19.08.00	13:38:00	160	10,3		21	1,622	S	13	8,824	E
		19:42:00				21	59,789	S	13	31,289	E
Ps0008191944	19.08.00	19:44:00	90	8,4		21	59,995	S	13	31,436	E
		22:00:00				22	0,183	S	13	51,565	E
		22:12:00			226910	22	0,190	S	13	51,510	E
Ps0008200034	20.08.00	0:34:00	251	8,0		22	0,314	S	13	51,481	E
		11:22:00				22	26,843	S	12	21,552	E
		12:25:00			226920	22	26,940	S	12	21,480	E
Ps0008201912	20.08.00	19:12:00	90	10,3		22	26,937	S	12	21,604	E
	21.08.00	5:38:00				22	26,867	S	14	15,007	E
Ps0008210540	21.08.00	5:40:00	170	10,3		22	26,879	S	14	15,364	E
		7:30:00				22	45,403	S	14	18,863	E
Ps0008210732	21.08.00	7:32:00	270	10,3		22	45,582	S	14	18,701	E
		15:40:00				22	45,544	S	13	0,096	E
Ps0008211542	21.08.00	15:42:00	180	8,5		22	45,741	S	12	59,974	E
		17:22:00				22	59,780	S	12	59,988	E
Ps0008211724	21.08.00	17:24:00	90	9,5		23	0,010	S	13	0,056	E
	22.08.00	0:04:00				22	59,969	S	14	8,883	E
Ps0008220006	22.08.00	0:06:00	170	8,5		23	0,172	S	14	9,001	E
		1:30:00				23	11,888	S	14	11,020	E
Ps0008220132	22.08.00	1:32:00	270	10,0		23	12,015	S	14	10,868	E
		7:56:00				23	11,974	S	13	0,363	E
Ps0008220758	22.08.00	7:58:00	180	9,0		23	12,151	S	13	0,092	E
		10:10:00				23	29,902	S	13	0,134	E
Ps0008221012	22.08.00	10:12:00	90	10,1		23	29,981	S	13	0,428	E
		17:00:00				23	29,994	S	14	16,804	E

Station number	Date (dd_mm_yy)	Time UTC	Latitude	Longitude	water depth	CTD	BG	RL	MUC	SL-6	SL-9	SL-12	KaL6	KaL12	KoL 12	SF		Ship number
226620	05_08_00	12:08	22°45.51´S	014°18.87´E	83 m													#353
226630	06_08_00	02:25	23°00.00´S	014°08.98´E	121m													#354
226640	06_08_00	10:00	23°11.80´S	014°11.02´E	118m													#355
226650	07_08_00	06:30	25°28.02´S	013°05.05´E	1781m													#356
226660	08_08_00	00:30	24°06.45´S	012°45.94´E	1821m													#359
226670	08_08_00	22:25	23°46.30´S	014°18.17´E	107m													#360
226680	09_08_00	03:30	23°46.52´S	014°17.96´E	109m													#361
226690	09_08_00	09:50	23°46.81´S	014°15.74´E	109m													#362
226700	10_08_00	03:20	23°01.70´S	012°26.76´E	1800m													#363/364
226710	10_08_00	20:40	21°56.93´S	012°43.95´E	379m													#365
226720	11_08_00	14:00	22°09.98´S	014°04.07´E	69m													#366
226730	11_08_00	19:50	22°00.17´S	013°51.52´E	91m													#367
226740	11_08_00	23:45	21°55.10´S	013°51.93´E	79m													#368
226750	12_08_00	02:15	21°54.70´S	013°51.96´E	77m													#369
226760	12_08_00	06:00	21°45.77´S	013°43.40´E	94m													#370
226770	12_08_00	12:25	21°22.97´S	013°40.00´E	51m													#371
226780	12_08_00	17:30	20°59.95´S	013°21.99´E	81m													#372
226790	14_08_00	04:00	19°47.00´S	012°51.61´E	50m													#373
226800	14_08_00	08:00	19°48.83´S	012°46.36´E	93m													#374
226810	14_08_00	12:10	19°50.66´S	012°40.50´E	116m													#375
226820	14_08_00	20:00	10°05.96´S	011°51.97´E	424m													#376
226830	16_08_00	17:55	21°44.00´S	013°53.02´E	35m													#377
226840	16_08_00	21:05	21°55.06´S	013°51.99´E	77m													#378
226850	17_08_00	01:50	22°27.01´S	014°06.97´E	95m													#379
226860	17_08_00	08:10	22°45.00´S	014°18.04´E	83m													#380
226870	17_08_00	10:35	22°40.03´S	014°00.03´E	125m													#381
226880	18_08_00	18:30	19°00.97´S	012°20.62´E	98m													#382
226890	18_08_00	21:00	19°01.00´S	012°16.54´E	109m													#383
226900	18_08_00	23:38	19°01.01´S	012°13.74´E	119m													#384
226910	19_08_00	22:12	22°00.19´S	013°51.51´E	90m													#385
226920	20_08_00	12:25	22°26.94´S	012°21.48´E	1683m													#386

BG: Grab sampler, RL: sdhort gravity core (<200 cm), MUC: Multicorer (<50cm), SL-6 (Gravity corer 600 cm), SL-9: gravity corer (900 cm), SL-12: gravity corer (1200 cm),
KaL6: kasten corer 15x15 cm, 600 cm, KaL12: kasten corer 15x15cm, 1200 cm; KoL: piston corer, SF: sediment trap mooring

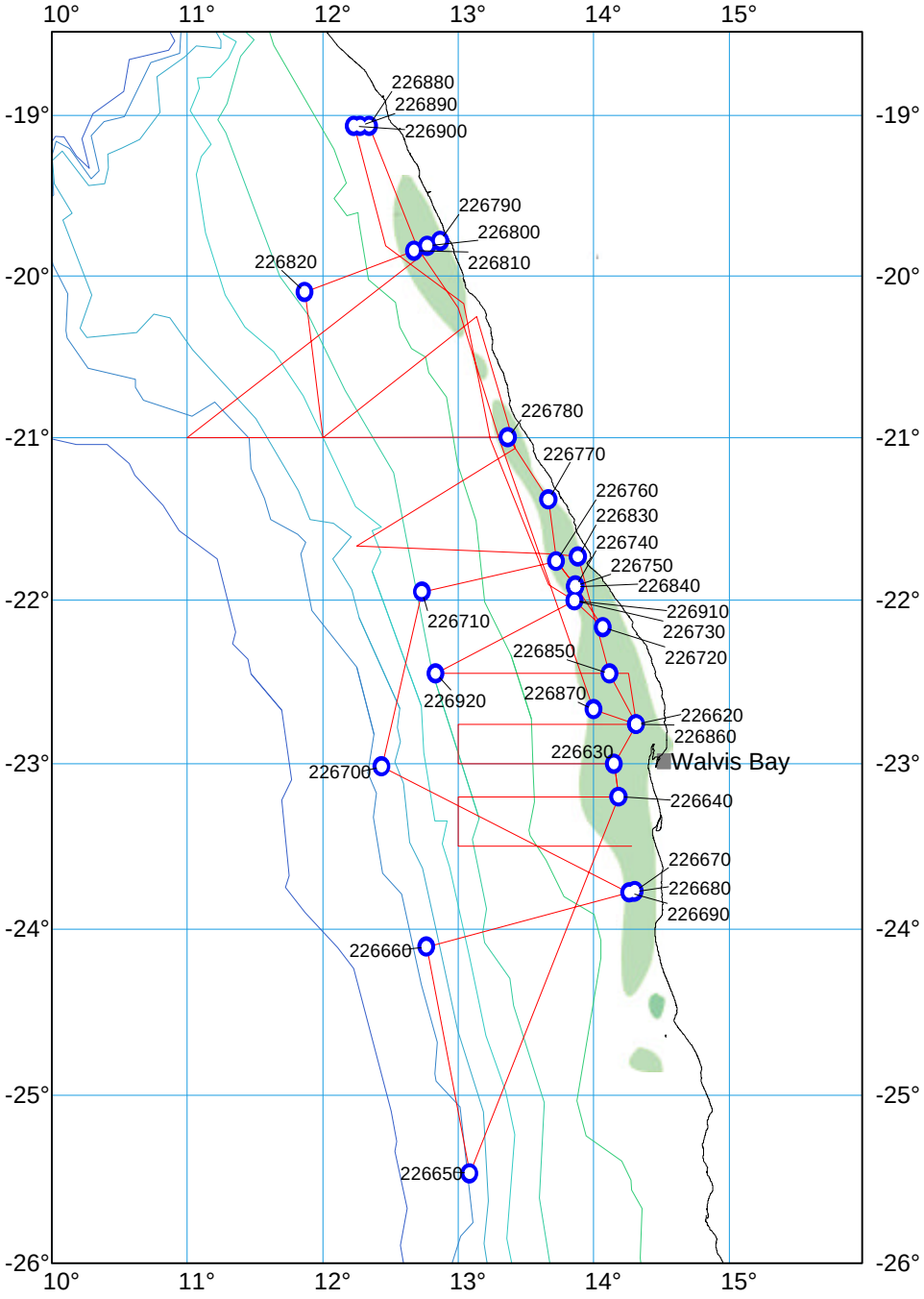

Figure 1: Station and tracks of acoustic surveys during expedition Meteor 48-2

Source: GEBCO.