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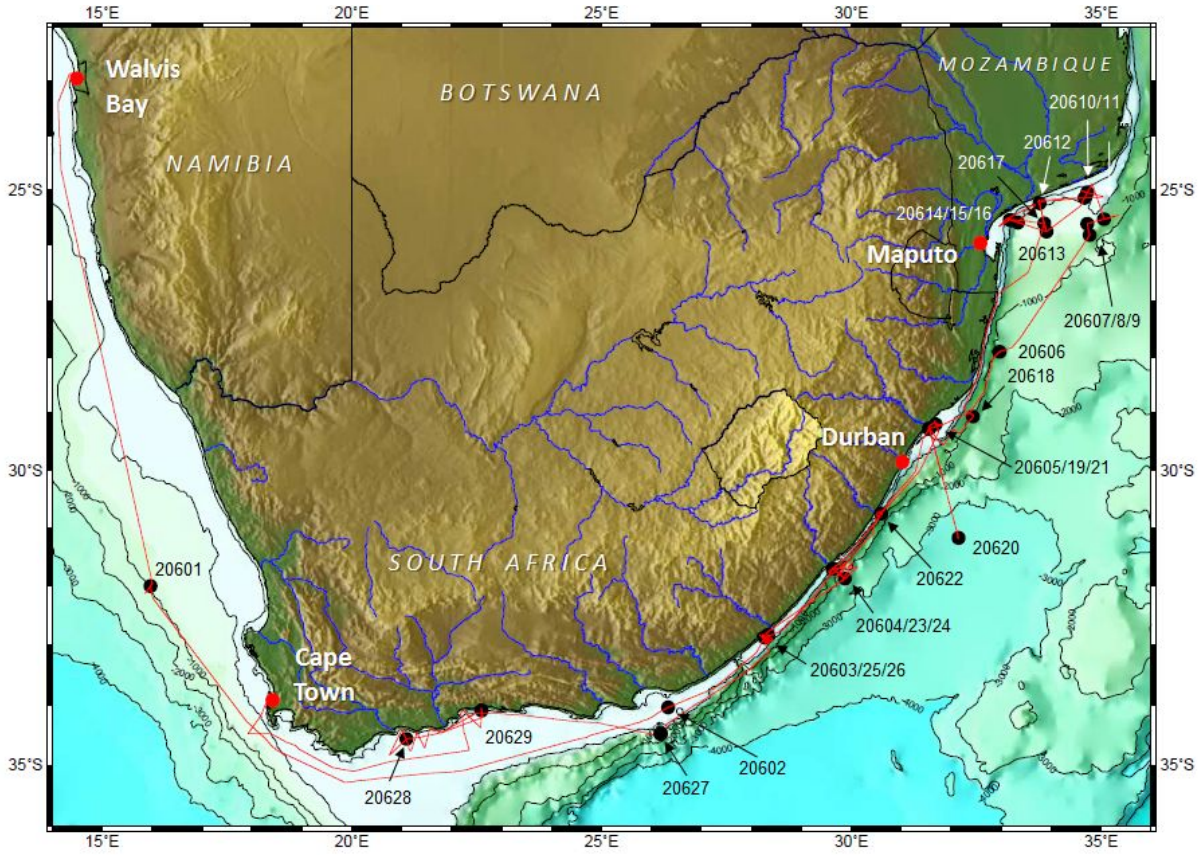
Short Cruise Report
RV METEOR Cruise M123

Walvis Bay (Namibia) – Cape Town (South Africa)
03. – 27. February 2016
Chief Scientist: Matthias Zabel
Captain: Michael Schneider



Ship track of RV Meteor cruise M123 with GeoB locations of sampling marked.

Summary / Objectives

This research cruise was directly connected with the collaborative research project RAiN (*Regional Archives for Integrated iNvestigations*) which is funded by the Ministry of Education and Research (BMBF) in the framework of the SPACES program (*Science Partnerships for the Assessment of Complex Earth System Processes*). The overreaching goal of this project is to expand the current state of knowledge on the drivers and dynamics of South African Late Quaternary climate change by directly comparing marine and terrestrial proxy-records. Whereas sufficient sample material for these analyses was retrieved from the western South African coast during former expeditions, suitable marine cores with high resolution deposits were not available from the south and east coast of southern Africa so far. This is due to the regional sedimentation regimes along these shores, which is influenced primarily by the strong south-westward flowing Agulhas contour current causing erosive and sediment redistribution processes rather than accumulation and preservation. As we suspected and now proved true, based on detailed information on surface sediment characteristics and recent geomorphological studies of the shelf and continental slope areas, both provided by the South African co-proponents and partners, we could find the small-scale Holocene sediment bodies with sufficient thickness and were able to retrieve long sediment cores in front of all major rivers along the coast of southern Africa up to the Limpop River. Depending on the sediment composition, sea floor samples were taken with gravity corer, vibrocorer, box corer and multicorer. Surface samples and sediment cores could be retrieved at 25 sites from water depth between 32m and 3.059m. The total recovery length is more than 107m. For the purpose of finding and identifying the best locations for coring, the ships acoustic systems were used along more than 900nm long profile lines. Additionally to the sediment work, at six sites planktonic foraminifera could be sampled by use of a multinet. Beside the scientific goals of this expedition, a strong focus was put on the training of young scientists and advanced students from Germany and South Africa.

Research Program and Narrative

Our research program concentrated on three main working areas along the south and east coast of southern Africa. On the south coast off Mossel Bay and on the east coast south of Durban, we continued a first sampling campaign, which has started successfully in December 2013 during RV METEOR expedition M102. The third area was the outer Maputo Bay, where we expected to find deposits consisting of sediments from the Limpopo River catchment. From two former expeditions (M63-1 and M75-3) seismic information exist, which have been published in the meantime and now could be used to better understand the regional sediment distribution pathways and to identify areas with high accumulation rates during the Late Quaternary. Due to the lack of detailed information from the shelf areas, on both previous expeditions shallow water areas have not been searched for fine-grained deposits, which are a prerequisite for most investigations when the target is to identify and decipher climate signals in terrigenous sediments. Instead, both cruises had focused on the continental slope.

The expedition started in the morning of February 3 from the harbor of Walvis Bay (Namibia). Due to the very long transits (from Walvis Bay (Namibia) to the other side of the continent and back to Cape Town) and taking the current pattern into account, we decided to start our pre-site surveys in Mozambican waters off the Limpopo River Mouth. On the 10-

day-transit one gravity core in the southern Cape Basin and a first set of surface sediments at four sites on the narrow east coast shelf were taken. We had to learn that the patches of more muddy sediments are very local and very restricted, that it takes some effort to identify them with the Parasound system and that it is even more difficult to sample them. Although the grain sizes spectrum of the minerals showed a great variety, heavy mineral assemblages could already be assigned to different source areas. On February 12 we arrived at the first location in working area 1 (GeoB 20607). During the next nearly five days nine successful gravity corer deployments followed at 11 sites. On Tuesday, February 16, we left working area 1 and started to return. With the strong Agulhas stream the vessel made rapid progress. At about 29,4°S, 31,5°E we found a several meter thick package of muddy sediments north of the Tugela River mouth in about 32m water depth. At this location we could retrieved three up to 8,26m long sediment cores, a very unusual procedure at a very unique site. According to the previous plan the work was carried out successively in both other working areas. After 25 days with mostly very favorable weather conditions the expeditions ended in the early morning of February 27 in the harbor off Cape Town.

Acknowledgements

The overall successful course of this expedition needs to be attributed to the friendly cooperation and very efficient technical assistance of Captain Michael Schneider, his officers and crew. No matter in which area, we always were attentively cared for. It was always obvious that all people on board worked on a common task. For this we would like to thank everybody involved, last but not least also the Leitstelle METEOR Hamburg. We would like to cordially thank Götz Ruhland (MARUM/Bremen University), Klaus Bohn (LPL Projects + Logistics GmbH) and their teams for professional support of expedition logistics.

The expedition was funded by the Federal Ministry of Education and Research (BMBF; 03F0731A) and strongly supported by MARUM.

Cruise participants

Name	Discipline	Institution
Zabel, Matthias, PD Dr.	Chief Scientist	MARUM
Amberg, Sebastian	Student	MARUM
Andò, Sergio, Prof. Dr.	Mineralogy	UMB
Bergh, Eugene, PhD-stud.	Student	UCT-Geo
Cawthra, Heylay, Dr.	Marine Geology	CG
Du Plesis, Nadia, PhD-stud.	Student	UCT-EGS
Eichenauer, Christian, Ing.	Documentation	---
Friedrich, Thomas, Dr.	Geophysics	GeoB
Frenzel, Peter, PD Dr.	Micropalaeontology	FSUJ
Gander, Lukas	Student	FSUJ
Gilson, Dirk, Journalist	Documentation	---
Gomes, Megan	Student	UW
Green, Andrew, Prof. Dr.	Geomorphology	UKZN-Geo
Hahn, Annette, Dr.	Sediment Geochemistry	MARUM
Higgs, Caldin	Student	UW
Hinkeldey, Alexander	Student c	GeoB
Hoffmann, Daniel	Student	GeoB
Humphries, Marc, Dr.	Geochemistry	UW
Kossack, Michael	Student	MARUM
Maboya, Matjie Lilian	Student	UCT-EGS
Khumalo, Vamamusa	Student	UCT-Geo
Pillay, Talicia	Student	UKZN-Geo
Pretorius, Lauren	Student	UKZN-Geo
Rohleder, Christian, Met.	Meterology	DWD
Siccha, Dr.	Mircopaleontology	MARUM
Schade, Tobias, Tech.	Technology	MARUM
Schefuß, Enno, Dr.	Organic Geochemistry	MARUM
Stelzner, Martin, Tech.	Meterology	DWD
Strachan, Kate, Dr.	Micropaleontology	UKZN-ES
Wiles, Errol, Dr.	Geomorphology	UKZN-Geo

Participating Institutions

CG	Council for Geosci., Geophys. Competency – Marine Geosci. Unit, 3 Oos Street, 7535 Bellville, South Africa	www.geoscience.org.za
DWD	Deutscher Wetterdienst, Geschäftsfeld Seeschifffahrt, Bernhard-Nocht-Str. 76, D 20359 Hamburg, Germany	www.dwd.de
GeoB	Dept. of Geosciences, Bremen University Klagenfurter Str., D 28359 Bremen, Germany	www.geo.uni-bremen.de
FSUJ	Friedrich-Schiller-Univ. Jena, Institut für Geosci., Burgweg 11, 07749 Jena, Germany	www.igw-ahg.uni-jena.de

MARUM	Centre for Marine Environmental Sciences Leobener Str., D 28359 Bremen, Germany	www.marum.de
UCT-EGS	University of Cape Town, Dept. of Environmental Geographical Sci., 7701 Rondebosch / South Africa	www.egs.uct.ac.za
UCT-Geo	University of Cape Town, Dept. of Geological Sci., 7701 Rondebosch / South Africa	www.geology.uct.ac.za
UKZN-ES	University of KwaZulu-Natal, Environ. Sci. / Phys. Geography, 4000 Westville / South Africa	www.ukzn.ac.za
UKZN-Geo	University of KwaZulu-Natal, Geology – Mar. Geol. Res. Unit, 4000 Westville / South Africa	www.ukzn.ac.za
UMB	Univ. of Milano Bicocca, Dept. of Earth and Environ. Sci., Piazza della Scienza 4, 20126, Milano, Italy	www.ighg.it
UW	Univ. of the Witwatersrand - Faculty of Science – School of Chemistry, Private Bag 3, 2050 PO WITS / South Africa	www.wits.ac.za/chemistry

Station List

Station Nr	GeoB Nr	Gear	Date	Time	Lat (S)	Long (E)	Water Depth (m)	Recovery (cm)
m1230/106-1	20601-1	MN-700	05.02.16	22:45:00	31°59.780'	15°58.180'	874	
m1230/106-1	20601-2	MN-100	05.02.16	22:45:00	31°59.783'	15°58.184'	874	
m1230/106-1	20601-3	MN-500	05.02.16	22:45:00	31°59.783'	15°58.184'	874	
m1230/106-2	20601-4	GC-12	05.02.16	22:45:00	31°59.783'	15°58.184'	874	868
m1230/106-3	20602-1	BC	08.02.16	16:45:00	34° 2.241'	26°20.301'	117	
m1230/162-1	20603-1	BC	09.02.16	06:45:00	32°51.971'	28°15.987'	75	
m1230/163-1	20604-1	BC	09.02.16	19:13:00	31°42.310'	29°38.040'	668	
m1230/165-1	20605-1	BC	10.02.16	19:46:00	29°11.506'	31°41.452'	69	
m1230/106-1	20606-1	MN-700	11.02.16	08:00:00	27°54.863'	32°58.039'	1227	
m1230/165-1	20606-2	MN-100	11.02.16	08:00:00	27°54.863'	32°58.039'	1227	
m1230/165-1	20606-3	MN-500	11.02.16	08:00:00	27°54.863'	32°58.039'	1227	
m1230/166-1	20607-1	MUC	12.02.16	02:00:00	25°49.262'	34°46.153'	485	
m1230/-166-1	20607-2	GC-12	12.02.16	02:00:00	25°49.262'	34°46.153'	485	870
m1230/167-1	20608-1	GC-12	12.02.16	06:00:00	25°36.711'	34°43.320'	286	273*
m1230/167-1	20608-2	MUC	12.02.16	06:00:00	25°36.711'	34°43.320'	286	
m1230/168-1	20609-1	MUC	12.02.16	14:31:00	25°31.658'	35° 3.590'	461	
m1230/168-1	20609-2	GC-12	12.02.16	14:33:00	25°31.658'	35° 3.590'	461	831
m1230/169	20610-1	BC	14.02.16	08:00:00	25° 2.696'	34°43.543'	59	
m1230/169	20610-2	GC-6	14.02.16	08:00:00	25° 2.696'	34°43.543'	59	321
m1230/170-1	20611-1	BC	14.02.16	08:33:00	25° 8.352'	34°40.300'	120	
m1230/170-1	20611-2	GC-6	14.02.16	08:33:00	25° 8.352'	34°40.300'	120	empty
m1230/171-1	20612-1	BC	14.02.16	17:30:00	25°14.233'	33°45.880'	88	
m1230/172-1	20613-1	BC	14.02.16	18:00:00	25°45.451'	33°54.289'	424	
m1230/172-1	20613-2	GC-6	14.02.16	18:00:00	25°45.451'	33°54.289'	424	463
m1230/173-1	20614-1	BC	15.02.16	09:10:00	25°32.489'	33°10.135'	51	
m1230/174-1	20615-1	BC	15.02.16	11:04:00	25°33.073'	33°12.181'	200	
m1230/174-1	20615-2	GC-6	15.02.16	11:04:00	25°33.073'	33°12.181'	200	532

Station Nr	**GeoB Nr**	**Gear**	**Date**	**Time**	**Lat** (S)	**Long** (E)	**Water Depth** (m)	**Recovery** (cm)
m1230/175-1	20616-1	GC-12	15.02.16	13:00:00	25°35.395'	33°20.084'	460	957
m1230/176-1	20617-1	GC-12	16.02.16	08:00:00	25°36.442'	33°51.795'	430	862
m1230/177-1	20618-1	MN-700	17.02.16	04:30:00	29°03.330'	32°26.070'	1290	
m1230/177-2	20618-2	MN-100	17.02.16	04:30:00	29°03.330'	32°26.070'	1272	
m1230/177-3	20618-3	MN-500	17.02.16	04:30:00	29°03.330'	32°26.070'	1290	
m1230/178-1	20619-1	BC	17.02.16	18:30:00	29°15.965'	31°33.525'	32	
m1230/178-1	20619-2	GC-6	17.02.16	18:30:00	29°15.965'	31°33.525'	32	600
m1230/178-1	20619-3	GC-12	17.02.16	18:30:00	29°15.965'	31°33.525'	32	826
m1230/179-1	20620-1	MN-700	18.02.16	08:30:00	31°10.459'	32°08.637'	3059	
m1230/179-2	20620-2	MN-100	18.02.16	08:30:00	31°10.459'	32°08.637'	3059	
m1230/179-3	20620-3	MN-500	18.02.16	10:30:00	31°10.459'	32°08.637'	3059	
m1230/179-4	20620-4	GC-12	18.02.16	12:30:00	31°10.459'	32°08.637'	3059	387*
m1230/179-5	20620-5	BC	18.02.16	13:30:00	31°10.459'	32°08.637'	3059	
m1230/180-1	20621-1	GC-12	19.02.16	07:24:00	29°15.981'	31°33.490'	34	717
m1230/181-1	20622-1	BC	19.02.16	18:40:00	30°45.301'	30°35.520'	85	
m1230/181-2	20622-2	VC	19.02.16	18:40:00	30°45.301'	30°35.520'	85	399
m1230/182-1	20623-1	GC-6	21.02.16	10:45:00	31°42.294'	29°38.034'	671	316
m1230/183-1	20624-1	GC-6	21.02.16	13:32:00	31°52.034'	29°52.273'	2644	600
m1230/183-2	20624-2	BC	21.02.16	14:32:00	31°52.034'	29°52.273'	2643	
m1230/184-1	20625-1	BC	22.02.16	12:10:00	32°49.530'	28°20.110'	37	
m1230/185-1	20626-1	MN-700	24.02.16	16:00:00	33°06.480'	28°21.060'	1259	
m1230/185-2	20626-2	MN-100	24.02.16	16:00:00	33°06.480'	28°21.060'	1259	
m1230/185-3	20626-3	MN-500	24.02.16	16:00:00	33°06.480'	28°21.060'	1259	
m1230/185-4	20626-4	MN-500	24.02.16	16:00:00	33°06.480'	28°21.060'	1259	
m1230/186-1	20627-1	MN-700	24.02.16	05:32:00	34°29.690'	26°11.310'	1267	
me1230/186-2	20627-2	MN-100	24.02.16	05:32:00	34°29.690'	26°11.310'	1267	
me1230/186-3	20627-3	MN-500	24.02.16	05:32:00	34°29.690'	26°11.310'	1267	
m1230/187-1	20628-1	VC	24.02.16	10:30:00	34°33.880'	21°05.670'	71	436
m1230/106-1	20629-1	VC	25.02.16	06:43:00	34°05.605'	22°35.993'	50	499

* bent core tube (“banana”)