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Short Cruise Report

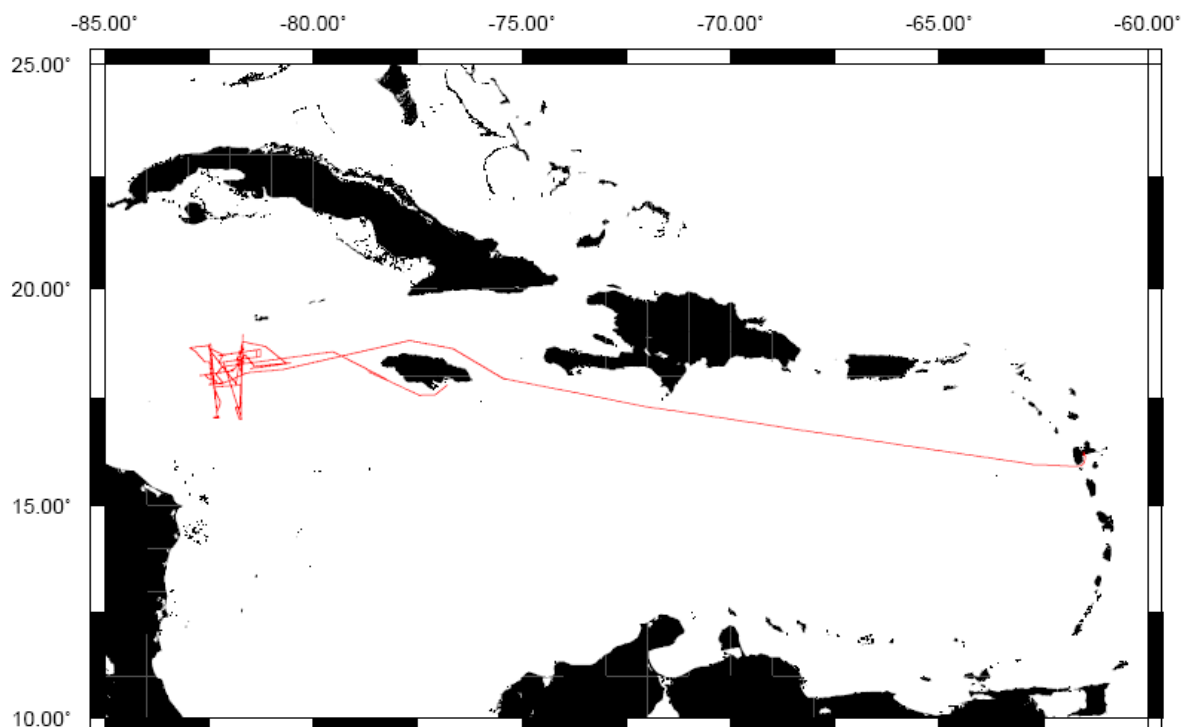
RV METEOR Cruise M115

Kingston, Jamaica – Pointe-à-Pitre, Guadeloupe, France

1. April – 28. April 2015

Chief Scientist: Ingo Grevemeyer

Captain: Rainer Hammacher



Objectives

About 57% of the Earth's surface are covered by oceanic crust and new ocean floor is continuously created along the 55.000-60.000 km long mid-ocean ridge (MOR) system. About 25% of the MOR spread at an ultra slow spreading rate of < 20 mm/yr. Most ultra slow spreading ridges occur in areas of the world that are difficult to reach, like the Gakkel Ridge in the Arctic Ocean and the Southwest Indian Ridge in the Indian Ocean. It has long been recognized that crustal accretion at ultra slow spreading rates is fundamentally different from crust generated at faster spreading rates. However, due to the remoteness of ultra slow ridges the formation of crust at these magma-starved centres is yet not well understood. During the CAYSEIS cruise we surveyed lithospheric formation at ultra slow spreading rates at the Mid Cayman Spreading Centre (MCSC) in the Caribbean Sea. The MCSC occurs in a back-arc setting and spreads at a full rate of ~17 mm/yr. Recent efforts detected the deepest ever observed black smoker system in the Cayman Trough. Using refraction and wide-angle seismics and passive local earthquake monitoring we studied the balance between magmatic accreting / tectonic stretching (and hence oceanic core complex formation) and the relationship between faulting and hydrothermal activity at ultra slow spreading rates. In addition, we explored transform margin formation at a unique setting, occurring at the southern terminus of the MCSC. The project CAYSEIS is a joint programme of German, British and US American scientists.

Narrative of the Cruise

The CAYSEIS cruise M115 of the German RV METEOR began on 1st of April 2015. At 9:20 h local time the METEOR left the pier. The pilot, Captain Hammacher and his crew safely left the harbor of Kingston, Jamaica. At 10:15 local time the pilot left the vessel and METEOR started its transit into the Cayman Trough to the west of Jamaica. At 11:00 h we left the 15 miles zone and began to record underway geophysical data, namely swath bathymetry with the hull mounted Kongsberg EM122 echosounder and gravity data with a Lacoste and Romberg marine gravimeter.

At 17:10 local time a first releaser test was run, testing release units that will be used to return ocean-bottom-seismometers (OBS) safely back to the surface, just leaving a small anchor behind. Over the next few days in the order of 50 releaser-tests were conducted, testing releasers of OBS from GEOMAR and the British OBIC pool.

On 2nd of April 2015 Meteor left at 4:40 in the morning the territorial waters of Jamaica and entered the EEZ of the Cayman's/UK. Rain showers that occurred in the first two days stopped and we sailed towards the Cayman Trough facing perfect weather

conditions with 4-5 Bft. and wind waves and swell of just 1-1.5 m. The excellent weather remained stable during the entire cruise, supporting all deck's operations.

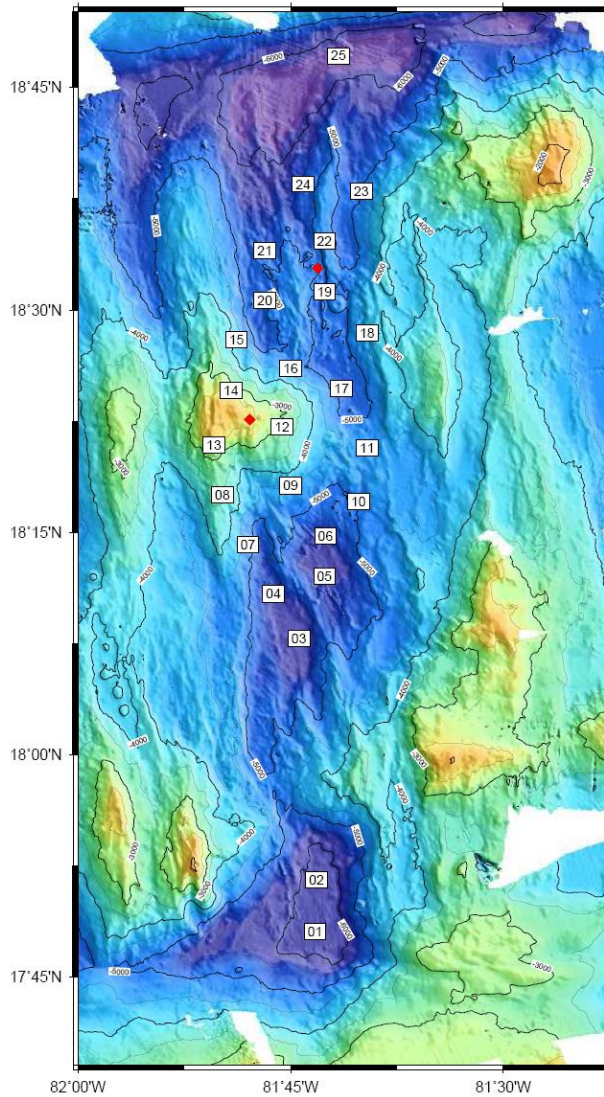


Figure 1: Location map of ocean-bottom-seismometers for local earthquake monitoring

At 1:17 h local time on 3rd of April 2015 the first OBS was deployed in the median valley of the Mid-Cayman Spreading Centre. The first 25 OBS were deployed for local earthquake monitoring along the spreading axis and to record offline shots to gain a 3-D coverage for 3-D tomography. Five of the OBS, however, were deployed to record inline shots of the first seismic line, all stations were placed on seabed deeper than 5500 m and three were below 6000 m.

On 3rd of April 2015 at 19:18 local time we start deploying OBS101 to OBS132 at 5 km station spacing along active source seismic profile P1, running along the median valley of the Cayman Trough. However, the last 15 stations were located on the continental slope to the south of the Cayman Trough, some within the territorial waters of Honduras. The last OBS of P1 was deployed at 9:38 on 4th of April. After a short mapping survey, another

releaser test, and a test of the magnetometer were conducted. Thereafter, we deployed the passive acoustic monitoring (PAM) system at 15:02 h to listen for whales and other marine mammals. In addition, a visual watch searched for marine mammals. Neither the PAM nor the visual watch could detect any marine mammal prior to the soft start of the airguns. At 15:31 h the airgun arrays were deployed and were ready for operation at 16:15 h. At 16:18 the soft start procedure began, adding every 5 min. another airgun cluster. After 30 min. all six clusters were in operation (one gun did not operate, though), providing a volume of 5000 cubic-inches (82 litres). PAM was recovered and a marine magnetometer deployed at the stern of the vessel. On 5th April at 2:40 p.m. the last shot was fired along P1 and magnetometer and airguns were recovered. At 5:58 p.m. the first OBS201 was released, it

surfaced at 7:31 p.m., and was on deck at 7:56 p.m. Over the next 2.5 days we recovered the OBS from line P1. Except OBS117 of UTUG all stations were recovered. Thus, one OBS was lost. On the 7th of April at 7:42 the last OBS132 was on deck.

After a transit of about 5 hours, we deployed 20 OBS along profile P2 (OBS201 to 218, plus two OBS to test new data loggers, i.e., OBS206B and OBS208b) and 18 OBS (OBS301 to OBS318) along P3. Station spacing was 5 km. The first OBS201 of P2 was deployed on 8th of April 2015 at 0:36 a.m.; the last OBS318 along P3 was installed on the 8th of April at 4:08 p.m. Both profiles P2 and P3 run across the axis of the Cayman Trough and survey two different domains, including an oceanic core complex at P2. Again, we deployed first the PAM to watch out for mammals. In addition, a visual watch searched for mammals using binoculars. About 15 min. later the airguns and the magnetometer were deployed. Neither PAM nor the visual pre-watch sighted any mammals. Therefore, airgun operation started with a soft start on 8th of April at 18:00 h. About 30 minutes later the array operated with its full volume of 5250 cubic-inches (86 litres) fired at 190 bars. On April 9 at 5:45 h profile P3 was finishes and METEOR changed course to approach P2. During change of course airguns where continuously operated to fire so called fan shots being recorded at OBS deployed along both profiles. About 45 min. later METEOR was steaming along P2. About 12 hours later the airgun operation was concluded and magnetometer and airguns were recovered. Over the next 2.5 days all 38 OBS were safely back on board.

A short transit of just 2 hours brought METEOR to the northernmost OBS position of line P4. On Sunday 12.4.20015 at 3:55 local time, we began to deploy 36 OBS at a spacing of 5 km along line P4, running approximately in NNW-SSE direction (being roughly centred at the 82°20'W meridian) across the basin floored with oceanic lithosphere and the Swan Island transform fault onto the continental margin of Honduras. Just before diner on 12.4.2015 all OBS were deployed. After diner, the pre-seismic profiling procedure of PAM deployment and mammal observations was conducted. Further, during the time of PAM operation the airguns and the magnetometer were deployed. Again, no mammals were observed. The airgun soft start procedure was initiated and at 20:30 h airguns were in full operation and the line was shot at 5 kn with a shot interval of 1 min. 22 hours later on 13th of April 2015 the magnetometer and airguns were recovered and we began to recover OBS from line P4. Unfortunately, neither OBH408 at 4400 m water depth nor OBH421 at 5600 m depth could be called back to the surface. At 15.4.2015 at 13:49 h the last OBS436 was on deck. After a transit of 40 sm, we tried releasing OBS421 again. However, we neither received any answer nor did the OBS surface.

METEOR sailed to the east to recover the first 11 OBS from the deployment of OBS in the median valley, recording local earthquakes, OBS01 to OBS06, OBS17, OBH18, and OBS23 to OBS25 were recovered from water depth of 4800 m to 6600 m. At 8 min. passed

midnight on 17.4.2015 the 11th OBS25 was on deck. A transit of 70 sm to the SE brought METEOR to the most eastward deployment location, OBS501 of profile P5. Seismic profile P5 was located off-axis, surveying mature crust along a flow line on the eastern flank of the Cayman spreading centre. In total 28 OBS were deployed along P5 at variable intervals of 2 to 5 km. On Friday 17th of April 2015 at 15:39 h the PAM system was deployed to watch out for marine mammals. Magnetometer and airgun deployment occurred 15 min. later. After 60 min. no mammals were detected and the airgun soft start procedure was initiated. 30 min. later airguns were in full operation mode. The line was shot at 3.8 kn and a shot interval of 1 min. On the 18th of April at 8:00 a.m. the line was terminated and the magnetometer and airguns were recovered. Over the next 28 hours all OBS from P5 were recovered. At 13:14 of 19.4.2015 the last OBS528 was on deck.

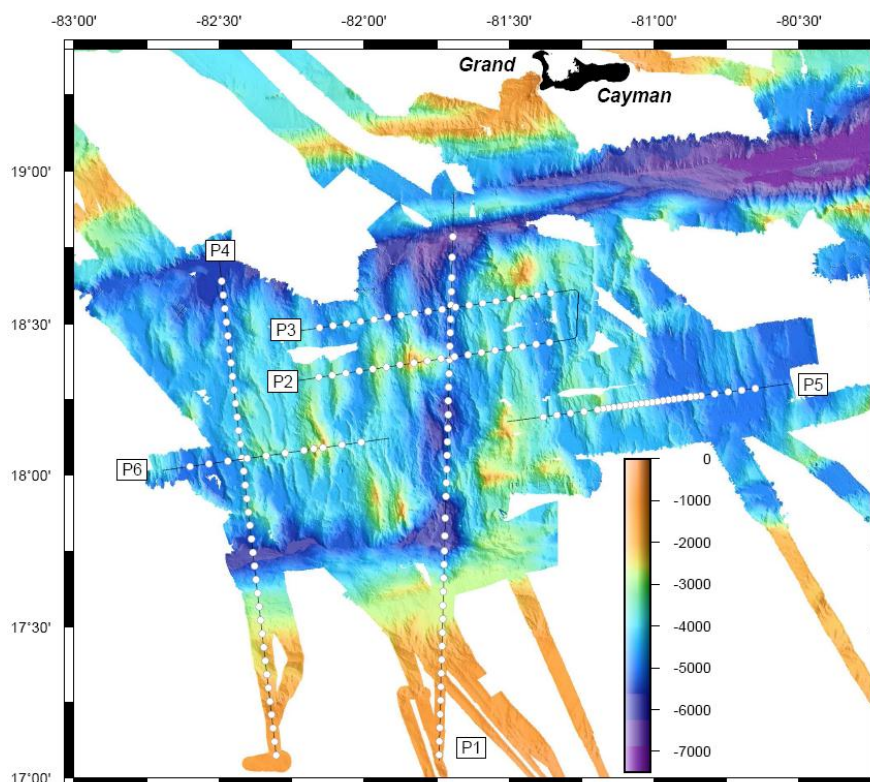


Figure 2: Location map of active source seismic refraction and wide-angle profiles shot during M115.

OBS16, OBS11 and OBS10 deployed in the spreading centre. OBS10 was on deck on 20th of April at 2:14 a.m.

Operation along the last seismic line P6 began with the deployment of OBS601 at 4:07 a.m. of 20.4.2015. Profile P6 was located on the western ridge opposite to P5, studying crustal structure of the conjugated ridge flank. In total 10 OBS were deployed at intervals of 7 km. In addition, an additional OBS (OBS604) was deployed to test a new seismic data logger 3.5 km to the west of OBS603. At 9:11 the PAM was deployed. Within one hour we did not

METEOR sailed west, approaching the northern median valley of the Cayman Trough to recover OBS of the earthquake monitoring network. On 19.4.2015 OBS22 was released at 3:06 p.m., surfaced at 4:47 p.m. and was recovered at 4:59 p.m. Over the next hours we recovered OBS21, OBS19, OBS20, OBS15,

detect any mammals, neither acoustically using the PAM nor visually. It might be of interest to note that during the entire cruise we did not observe any mammals during times of seismic profiling or within the hours before seismic profiling started. Airguns were in full operation at 10:45 h. About 10 h later airgun operation terminated and both the airguns and magnetometer were recovered. In the night of the 20th to 21st of April the last passive OBS were recovered from Mount Dent at the western flank of the Cayman Trough (OBS12 to OBS14, and OBS07 to OBS09) and over the next hours all 11 OBS from P6 were back on deck at 10:22 p.m. on the 21st of April 2015.

In total 170 OBS sites were occupied during the CAYSEIS cruise M115. Unfortunately, three OBS failed to return during recovery operations. However, all three stations, two GEOMAR-OBH and one UTIG-OBS, had a time release programmed. The time release would occur on 22.4.2015. The remaining time we used to fill in gaps in the bathymetric coverage of the Cayman Trough and adjacent ridge flanks. At 1 p.m. METEOR approached to deployment site of OBS408. Indeed, just 15 min. later the OBS surfaced and was recovered at 13:30 h. We sailed south the reach OBS421. About 5 miles from the deployment location we briefly picked up a radio signal of the OBS. We searched for 20 min. until we got a trustworthy reading from the direction finder. At 17:43 h OBS421 was on deck. Thereafter, we searched for OBS117 deployed near the southern end of the Cayman Trough along profile P1. Unfortunately, we did not receive any reading from the radio beacon. We therefore deployed the magnetometer at 21:20 to record in addition to bathymetry and gravity the Earth's magnetic field during our transit out of the Cayman Trough. On the 23.4.2015 METEOR left just before noon the territorial water of the Cayman/UK and entered the EEZ of Jamaica. South of Jamaica at $74^{\circ}40'W$ the magnetometer was recovered at 11:00 a.m. on the 24th of April. About one hour later we left the territorial waters of Jamaica and recording of underway geophysical data (swath bathymetry and gravity field) was suspended. On the evening of 27.4.2015 METEOR reached the pilot station of the port of Pointe-à-Pitre, Guadeloupe. At 8 p.m. a successful cruise terminated.

Acknowledgments

We are thankfully to Master Rainer Hammacher, and the crew of the RV METEOR cruise M115 for excellent sea-going support and a great working environment. The work conducted during this cruise was funded by the Deutsche Forschungsgemeinschaft (DFG), the National Environmental Research Council, UK, and the National Science Foundation, USA.

Cruise participants

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Papenberg, Cord, scientist	OBS	GEOMAR
Reußwig, Rabea, student	OBS	CAU / GEOMAR
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Wieprich, Margit, scientist	OBS	GEOMAR
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Peirce, Christine, scientist	OBS	OBIC / Durham
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Clegg, Andrew Paul, technician	OBS	OBIC
Erfanian-Mehr, Mahshid, technician	OBS	OBIC
Pitcairn, Ben, technician	OBS	OBIC
Hayman, Nicolas, scientist	OBS	UTIC
van Avendonk, Harm, scientist	OBS	UTIC
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Station Lists

Ocean-Bottom-Seismometers (OBS) Passive Network

Station	Latitude		Longitude		Depth in m	Type
OBS01	17°48,061	N	81°43,249	W	6133	GEOMAR
OBS02	17°51,573	N	81°43,176	W	6080	GEOMAR
OBS03	18°7,862	N	81°44,405	W	5804	GEOMAR
OBS04	18°10,859	N	81°46,207	W	5709	GEOMAR
OBS05	18°12,088	N	81°42,621	W	5735	GEOMAR
OBS06	18°14,777	N	81°42,619	W	5579	GEOMAR
OBS07	18°14,21	N	81°48,011	W	4200	OBIC
OBS08	18°17,587	N	81°49,855	W	3400	OBIC
OBS09	18°18,144	N	81°49,964	W	4493	OBIC
OBS10	18°17,109	N	81°40,205	W	4892	GEOMAR
OBS11	18°20,690	N	81°39,604	W	4678	GEOMAR
OBS12	18°22,155	N	81°45,586	W	3119	GEOMAR
OBS13	18°20,967	N	81°50,483	W	2435	GEOMAR
OBS14	18°24,567	N	81°49,204	W	2635	GEOMAR
OBS15	18°27,983	N	81°48,801	W	4235	GEOMAR
OBS16	18°26,102	N	81°45,004	W	4740	GEOMAR
OBS17	18°24,730	N	81°41,405	W	5235	GEOMAR
OBH18	18°28,513	N	81°39,614	W	4273	GEOMAR
OBS19	18°31,252	N	81°42,624	W	5069	GEOMAR
OBS20	18°30,646	N	81°46,813	W	5029	GEOMAR
OBS21	18°34,017	N	81°46,798	W	5139	GEOMAR
OBS22	18°34,637	N	81°42,605	W	4719	GEOMAR
OBS23	18°38,019	N	81°40,008	W	4993	GEOMAR
OBS24	18°38,509	N	81°44,112	W	5324	GEOMAR
OBS25	18°47,125	N	81°41,641	W	6431	GEOMAR

Ocean-Bottom-Seismometers (OBS) Profile P01

Station	Latitude		Longitude		Depth in m	Type
OBS101	18°43,078	N	81°41,759	W	5484	GEOMAR
OBS102	18°39,052	N	81°41,871	W	4999	UTIG
OBS103	18°36,359	N	81°41,953	W	5024	UTIG
OBS104	18°33,174	N	81°42,03	W	4825	UTIG
OBS105	18°30,949	N	81°42,093	W	4922	UTIG
OBS106	18°26,237	N	81°42,193	W	5108	UTIG
OBS107	18°25,573	N	81°42,221	W	5148	UTIG
OBS108	18°22,861	N	81°42,324	W	4662	GEOMAR
OBS109	18°20,136	N	81°42,401	W	4444	GEOMAR
OBS110	18°17,465	N	81°42,477	W	5076	GEOMAR
OBS111	18°09,369	N	81°42,690	W	5413	GEOMAR
OBS112	18°06,684	N	81°42,738	W	5076	GEOMAR
OBS113	18°3,981	N	81°42,832	W	5142	UTIG
OBS114	18°1,282	N	81°42,902	W	4659	UTIG
OBS115	17°58,596	N	81°42,96	W	4055	UTIG
OBS116	17°55,907	N	81°43,048	W	4918	UTIG
OBS117	17°45,113	N	81°43,34	W	5404	UTIG
OBS118	17°42,416	N	81°43,413	W	4434	UTIG
OBS119	17°39,75	N	81°43,497	W	3549	OBIC
OBS120	17°37,002	N	81°43,5739	W	2707	OBIC
OBS121	17°34,3	N	81°43,668	W	2678	OBIC
OBS122	17°31,609	N	81°43,717	W	2653	OBIC
OBS123	17°28,917	N	81°43,806	W	2243	OBIC
OBS124	17°26,2219	N	81°43,883	W	1709	OBIC
OBS125	17°23,528	N	81°43,951	W	1446	OBIC
OBS126	17°20,823	N	81°44,035	W	1313	OBIC
OBS127	17°18,128	N	81°44,104	W	1894	OBIC
OBS128	17°15,436	N	81°44,179	W	1103	OBIC
OBS129	17°12,733	N	81°44,2	W	1103	OBIC
OBS130	17°10,009	N	81°44,314	W	1088	OBIC
OBS131	17°07,369	N	81°44,396	W	999	OBIC
OBS132	17°04,669	N	81°44,458	W	890	OBIC

Ocean-Bottom-Seismometers (OBS) Profile P02

Station	Latitude		Longitude		Depth in m	Type
OBS201	18°19,417	N	82°9,391	W	3751	OBIC
OBS202	18°19,829	N	82°6,582	W	3355	OBIC
OBS203	18°20,234	N	82°3,767	W	4203	OBIC
OBS204	18°20,645	N	82°0,957	W	4568	OBIC
OBS205	18°21,054	N	81°58,148	W	3349	OBIC
OBS206	18°21,490	N	81°55,354	W	3523	OBIC
OBS206b	18°21,513	N	81°55,236	W	3582	OBIC
OS207	18°21,885	N	81°52,512	W	3240	OBIC
OBS208	18°22,304	N	81°49,740	W	2187	OBIC
OBS208b	18°22,307	N	81°49,606	W	2237	OBIC
OBS209	18°22,714	N	81°46,932	W	2529	OBIC
OBS210	18°23,123	N	81°44,11	W	3594	UTIG
OBS211	18°23,508	N	81°41,316	W	5063	UTIG
OBS212	18°23,895	N	81°38,48	W	4520	UTIG
OBS213	18°24,295	N	81°36,549	W	3573	UTIG
OBS214	18°24,697	N	81°32,875	W	3978	UTIG
OBH215	18°25,115	N	81°30,047	W	3678	GEOMAR
OBH216	18°25,516	N	81°27,258	W	4184	GEOMAR
OBH217	18°25,907	N	81°24,421	W	4678	GEOMAR
OBH218	18°26,348	N	81°21,631	W	4674	GEOMAR
OBH218b	18°26,348	N	81°21,631	W	4674	GEOMAR

Ocean-Bottom-Seismometers (OBS) Profile P03

Station	Latitude		Longitude		Depth in m	Type
OBH301	18°36,057	N	81°21,367	W	3719.9	GEOMAR
OBH302	18°35,667	N	81°24,196	W	3730.4	GEOMAR
OBS303	18°35,264	N	81°27,005	W	3256	UTIG
OBS304	18°34,865	N	81°29,826	W	3555	UTIG
OBS305	18°34,447	N	81°32,638	W	4068	UTIG
OBS306	18°34,06	N	81°35,444	W	4027	UTIG
OBS307	18°33,651	N	81°38,287	W	3986	UTIG
OBS308	18°33,268	N	81°41,051	W	5060	UTIG
OBH309	18°32,866	N	81°43,860	W	5017	GEOMAR
OBH310	18°32,465	N	81°46,698	W	4977.7	GEOMAR
OBH311	18°32,044	N	81°49,519	W	4485.9	GEOMAR
OBH312	18°31,670	N	81°52,301	W	4381	GEOMAR
OBH313	18°31,231	N	81°55,113	W	5220	GEOMAR
OBH314	18°30,871	N	81°57,985	W	4175	GEOMAR
OBS315	18°30,393	N	82°0,793	W	4450	OBIC
OBS316	18°30,021	N	82°3,577	W	4263	OBIC
OBS317	18°29,612	N	82°6,363	W	4470	OBIC
OBS318	18°29,126	N	82°9,223	W	4744	OBIC

Ocean-Bottom-Seismometers (OBS) Profile P04

Station	Latitude		Longitude		Depth in m	Type
OBH401	18°38,362	N	82°29,449	W	5509	GEOMAR
OBH402	18°35,676	N	82°29,132	W	5304	GEOMAR
OBH403	18°32,976	N	82°28,827	W	5015	GEOMAR
OBH404	18°30,298	N	82°28,486	W	4846	GEOMAR
OBH405	18°27,617	N	82°28,188	W	4849	GEOMAR
OBH406	18°24,927	N	82°27,858	W	4712	GEOMAR
OBH407	18°22,263	N	82°27,523	W	4491	GEOMAR
OBH408	18°19,583	N	82°27,223	W	4438	GEOMAR
OBS409	18°16,903	N	82°26,870	W	4409	GEOMAR
OBS410	18°14,223	N	82°26,542	W	3977	OBIC
OBS411	18°11,223	N	82°26,242	W	4250	OBIC
OBS412	18°8,878	N	82°25,91	W	4237	UTIG
OBS413	18°6,208	N	82°25,561	W	4225	UTIG
OBS414	18°3,519	N	82°25,262	W	4287	UTIG
OBS415	18°0,845	N	82°24,933	W	4472	UTIG
OBS416	17°58,186	N	82°24,584	W	4444	UTIG
OBS417	17°55,471	N	82°24,274	W	4105	UTIG
OBS418	17°52,807	N	82°23,957	W	3747	UTIG
OBS419	17°50,112	N	82°23,624	W	5187	UTIG
OBH420	17°47,417	N	82°23,352	W	5342	GEOMAR
OBH421	17°44,792	N	82°22,989	W	5759	GEOMAR
OBS422	17°42,069	N	82°22,672	W	5420	GEOMAR
OBS423	17°39,408	N	82°22,351	W	4600	OBIC
OBS424	17°36,704	N	82°22,020	W	3455	OBIC
OBS425	17°34,031	N	82°21,687	W	3005	OBIC
OBS426	17°31,342	N	82°21,397	W	2696	OBIC
OBS427	17°28,668	N	82°21,044	W	2542	OBIC
OBS428	17°26,026	N	82°20,705	W	2195	OBIC
OBS429	17°23,342	N	82°20,414	W	2357	OBIC
OBS430	17°20,643	N	82°20,082	W	2284	OBIC
OBS431	17°17,944	N	82°19,800	W	1690	OBIC
OBS432	17°15,282	N	82°19,455	W	1344	OBIC
OBS433	17°12,572	N	82°19,149	W	1165	OBIC
OBS434	17°9,905	N	82°18,835	W	1252	OBIC
OBS435	17°7,212	N	82°18,524	W	1287	OBIC
OBS436	17°4,528	N	82°18,196	W	1154	OBIC

Ocean-Bottom-Seismometers (OBS) Profile P05

Station	Latitude		Longitude		Depth in m	Type
OBS501	18°17,209	N	80°38,998	W	5239	UTIG
OBS502	18°16,888	N	80°41,799	W	4983	UTIG
OBS503	18°16,498	N	80°44,634	W	5171	GEOMAR
OBS504	18°16,166	N	80°47,454	W	4933	GEOMAR
OBS505	18°15,803	N	80°50,297	W	4904	GEOMAR
OBS506	18°15,625	N	80°51,453	W	4870	GEOMAR
OBS507	18°15,520	N	80°52,525	W	4676	GEOMAR
OBS508	18°15,393	N	80°53,639	W	5041	GEOMAR
OBS509	18°15,243	N	80°54,786	W	5047	GEOMAR
OBS510	18°15,083	N	80°55,896	W	5032	GEOMAR
OBS511	18°14,966	N	80°57,015	W	5293	GEOMAR
OBH512	18°14,786	N	80°58,151	W	5041	GEOMAR
OBH513	18°14,639	N	80°59,275	W	4761	GEOMAR
OBS514	18°14,492	N	81°0,420	W	4395	GEOMAR
OBH515	18°14,363	N	81°01,514	W	4174	GEOMAR
OBH516	18°14,221	N	81°02,676	W	3960	GEOMAR
OBS517	18°14,066	N	81°03,803	W	3862	GEOMAR
OBH518	18°13,925	N	81°04,931	W	3841	GEOMAR
OBH519	18°13,790	N	81°06,058	W	3787	GEOMAR
OBS520	18°13,641	N	81°07,176	W	4018	OBIC
OBS521	18°13,493	N	81°8,295	W	4121	OBIC
OBS522	18°13,353	N	81°9,416	W	3849	OBIC
OBS523	18°13,223	N	81°10,522	W	3576	OBIC
OBS524	18°13,068	N	81°11,670	W	3468	OBIC
OBS525	18°12,702	N	81°14,481	W	3571	UTIG
OBS526	18°12,333	N	81°17,298	W	3905	UTIG
OBS527	18°11,957	N	81°20,109	W	4083	UTIG
OBS528	18°11,591	N	81°22,931	W	4009	UTIG

Ocean-Bottom-Seismometers (OBS) Profile P06

Station	Latitude		Longitude		Depth in m	Type
OBS601	18°6,640	N	82°0,609	W	4066	OBIC
OBS602	18°6,078	N	82°4,520	W	4066	OBIC
OBS603	18°5,577	N	82°8,493	W	2484	UTIG
OBH604	18°5,289	N	82°10,422	W	2468	GEOMAR
OBS605	18°5,023	N	82°12,397	W	3735	UTIG
OBS606	18°4,484	N	82°16,349	W	3410	UTIG
OBS607	18°3,952	N	82°20,288	W	3098	UTIG
OBH608	18°3,450	N	82°24,210	W	4188	GEOMAR
OBH609	18°2,921	N	82°28,145	W	4702	GEOMAR
OBS610	18°2,383	N	82°32,056	W	5062	GEOMAR
OBH611	18°1,800	N	82°35,999	W	4996	GEOMAR

Airgun operation

M115 - CAYSEIS - April '15

Profile	No. Shots	date 1	time 1	Latitude 1		Longitude 1		date 2	time 2	Latitude 2		Longitude 2	
P01	1307	04.04.15	22:02:00	17.0576	N	81.7410	W	05.04.15	19:48	18.9314	N	81.9314	W
P02	701	09.04.15	12:53:00	18.4561	N	81.2670	W	10.04.15	00:13:00	18.3092	N	82.2579	W
P03	734	08.04.15	22:45:00	18.4711	N	82.2604	W	09.04.15	10:39:00	18.6103	N	81.2877	W
P04	1169	13.04.15	03:56:00	17.0784	N	82.2952	W	13.04.15	23:24:00	18.7119	N	82.4996	W
P05	884	17.04.15	22:24:00	18.1777	N	81.5061	W	18.04.15	13:07:00	18.3002	N	80.5340	W
P06	579	20.04.15	15:23:00	18.0172	N	82.6954	W	21.04.15	01:01:00	18.1232	N	81.9125	W

Magnetics

M115 - CAYSEIS - April '15

Profile	date 1	time 1	Latitude 1		Longitude 1		date 2	time 2	Latitude 2		Longitude 2	
P01	04.04.15	22:02:00	17.0576	N	81.7410	W	05.04.15	19:48:00	18.9314	N	81.9314	W
P02	09.04.15	12:53:00	18.4561	N	81.2670	W	10.04.15	00:13:00	18.3092	N	82.2579	W
P03	08.04.15	22:45:00	18.4711	N	82.2604	W	09.04.15	10:39:00	18.6103	N	81.2877	W
P04	13.04.15	03:56:00	17.0784	N	82.2952	W	13.04.15	23:24:00	18.7119	N	82.4996	W
P05	17.04.15	22:24:00	18.1777	N	81.5061	W	18.04.15	13:07:00	18.3002	N	80.5340	W
P06	20.04.15	15:23:00	18.0172	N	82.6954	W	21.04.15	01:01:00	18.1232	N	81.9125	W
Transit	23.04.15	03:30:00	17.9350	N	81.9233	W	24.04.15	16:04:00	18.0522	N	75.6385	W