DEEP-C
PHYSICAL OCEANOGRAPHY
CRUISE REPORT

CRUISE PE13- 27 Speer
16th -19th May 2013
R/V Pelican

by
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Background

In the Deep-C Consortium, the physical oceanography effort is directed to the topographic control of oil transport. A preferential location of exchange and transport will occur at De Soto Canyon. We focus on determining the physical controls on the dispersion and transport of surface and subsurface contaminants exerted by the De Soto Canyon geomorphology. Our primary goals are (1) to determine the offshore circulation linkages and mechanisms controlling lateral dispersion, upwelling and downwelling in the De Soto Canyon region, (2) to understand the effects of large-scale stochastic events, such as hurricanes, in the deep sea, (3) to quantify the movement of re-suspended sediments in and near the canyon, and (4) to produce physical observations to constrain and calibrate models of the region.

Another key questions the Deep-C Consortium seeks to answers is "how does the transport of particles and dissolved substances (including oil, gas nutrients, solutes, and organisms) influence geochemical, biological and demographic processes and food web dynamics across seafloor, pelagic, and near-shore ecosystems?" The Consortium's geochemistry team is tasked with assessing: (1) the influence of oil and gas on water column and sediment biogeochemical processes, (2) the distribution of substances that affect biological productivity, and (3) the evolution of the hydrocarbon itself under a range of environmental conditions.

Within this context, the main goals of the cruise were:

(1) Recover six moorings, including one sound source, and three trawl resistant bottom mounts (TRBMs) concentrated in the upper De Soto Canyon. Instruments recovered have collected a years worth of: temperature, conductivity, pressure, and current data.
(2) Occupy CTD stations at the mooring locations and along the western edge of De Soto Canyon, collecting measurements of: temperature, conductivity, pressure, dissolved oxygen, turbidity (amount of suspended particles in the water), optical properties of water (transmittance or attenuation of incident radiation), and chlorophyll - A.
(3) Sample water from the western edge of De Soto Canyon, up to and including mooring M6, in order to better understand the chlorophyll max. Collected samples will be analyzed for methane concentration, oxygen concentration, nutrients, cell microscopy (identifying cells and performing a cell count using a microscope), microbes, for DNA/RNA work, and particulate organic carbon (POC), for carbon isotope work.
(4) Acquire shipboard ADCP data (75 kHz, 150 kHz and 300 kHz), from surface to bottom, for the duration of the cruise

Cruise Narrative

We left Cocodrie shortly before midnight May 15th and proceeded out the channel into the Gulf of Mexico. CTD operations commenced at 10 am on May 16th, completing all stations on the CTD line by 7 am May 17th. The CTD Rossette used had a twenty-four 12L bottle configuration with the following instruments: two temperature sensors, two conductivity sensors, one pressure sensor, one Chealsea fluorometer, two dissolved oxygen sensors, one transmissometer, one altimeter and one turbidity sensor. In addition, water samples were taken at six depths at each station, to be analyzed for: methane concentration, oxygen concentration, nutrients, cell microscopy, microbes for DNA/RNA work and POC for carbon isotope work. The shipboard ADCPs (75 kHz, 150 kHz and 300 kHz) were turned on at station 2 on the CTD line and kept on for the duration of the cruise.

Friday May 17th was occupied with recovering moorings M6 (with the sound source), M5, M4 and M3. Surface marker buoys at M4 and M5 were still on site, though the light and radar reflector had been removed (sawed off) at M5. M3 had been dragged approximately 3500 meters due east, and took some time to locate and recover. Only the bottom flotation, release and bottom Schlumberger CTD recorder were recovered, as the wire had been cut directly above the lower flotation element. That night was busy with CTD stations, completing casts at M6, M5 and M4. Water samples were taken at six depths at M6 and M5.

The following day, Saturday May 18th, mooring M1 and M2, along with TRBMs M1, M2 and M3, were recovered. Again, the surface marker buoy at M2 was still on site at recovery. Both TRBM's at M1 (Mooring Systems, Inc.) and M3 (Flotation

Technologies, Inc.) did not surface upon activation of the release. We ended up having to drag for them due to the following issues:

(1) The pop-up float recovery line on the M1 (MSI) TRBM snagged and failed to deploy completely leaving the pop-up float below the surface.
(2) The syntactic recovery module on the M2 (FTI) TRBM failed to surface, probably due to heavy fouling on the release hook mechanism, which, though activated, could not be cleared for the recovery module to surface. It popped up during grapnel operations.

After all mooring work was completed; a last CTD cast was done at M2, before heading back to LUMCON. A map of the cruise track, including CTD cast and mooring locations, provides an overview of these activities (Figure 1 and 2). Table 1 summarizes instruments recovered, Table 2 lists instruments lost, Table 3 provides the location of moorings and TRBMs, Table 4 provides a CTD station summary, and Table 5 provides a summary of water samples taken at each CTD station.

Cruise Summary

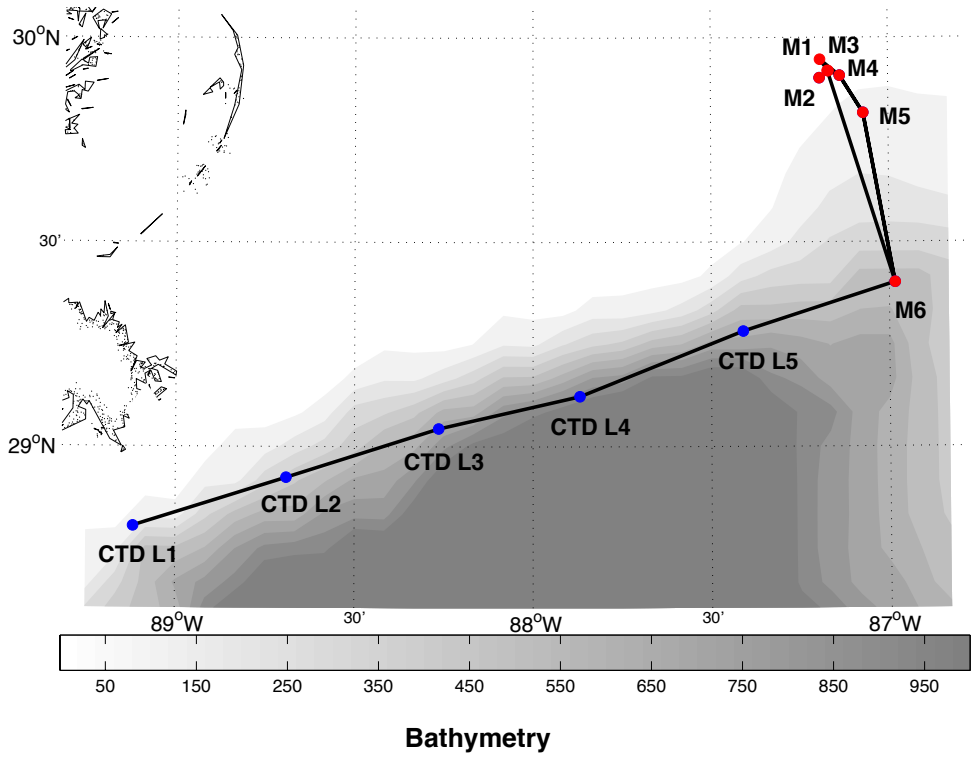

Figure 1. Map of cruise track near De Soto Canyon and various CTD stations occupied during the cruise. Blue circles indicate CTD stations and red circles moorings/TRBMs.

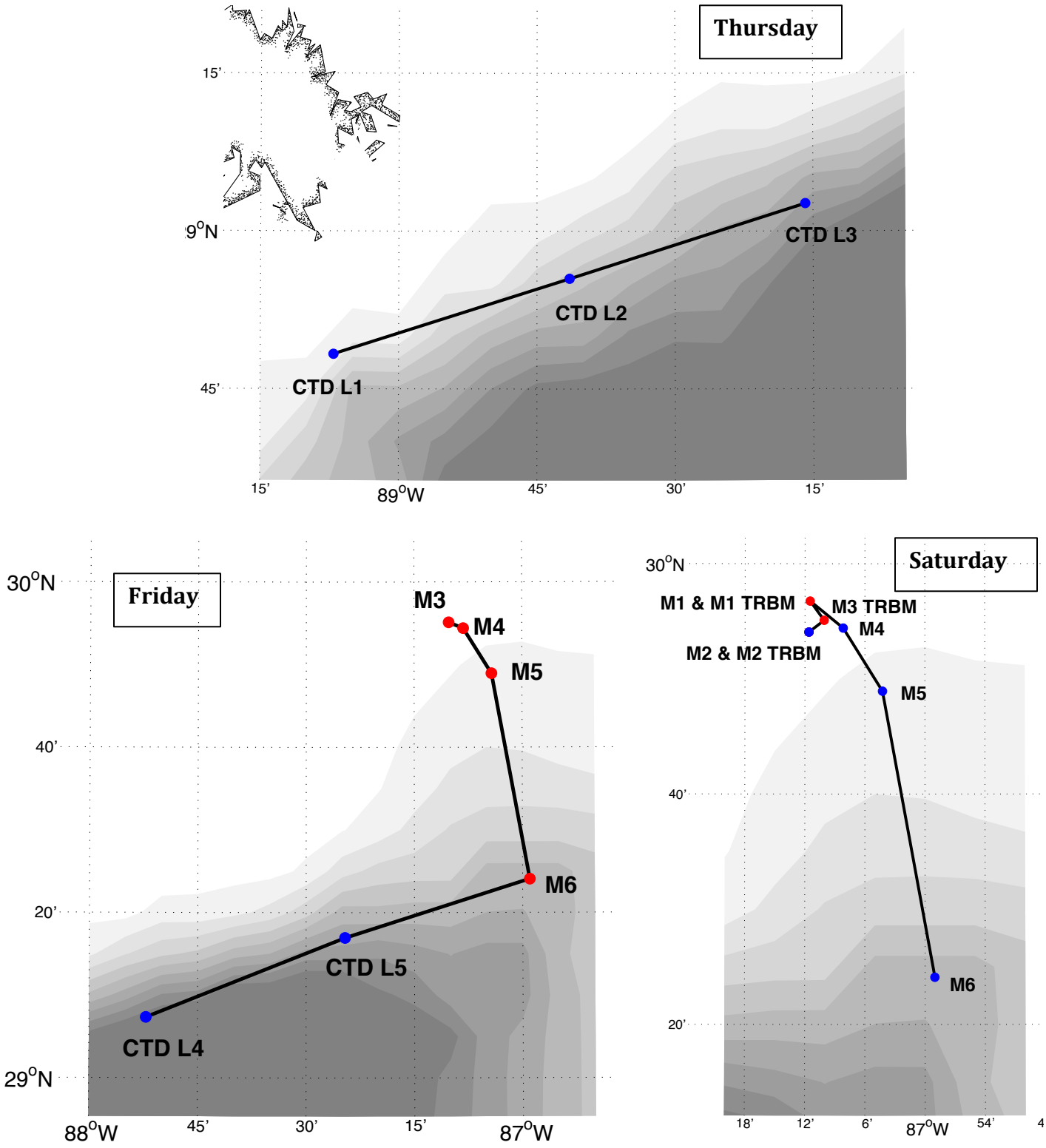

Figure 2. Map of cruise track divided into separate cruise days; Thursday (top), Friday (bottom left) and Saturday (bottom right). Blue circles indicate CTD stations and red circles moorings/TRBMs. Bathymetry is as in Figure 1.

Table 1. Instruments Recovered

Instrument	Serial Num.	Owner	Location
ORE/Edgetech 8242XS Acoustic Release	018319	FSU	M1
ORE/Edgetech 8242XS Acoustic Release	018327	FSU	M3
ORE/Edgetech Port-LF Acoustic Release	36435	FSU	M1-TRBM
Orca Beacon	005229	FSU	M1
OAR Flasher	5780	FSU	M1
RDI 300 kHz Workhorse Sentinel ADCP	7114	FSU	M1-TRBM
RDI 300 kHz Workhorse Sentinel ADCP	718	FSU	M2-TRBM
Schlumberger CTD Recorder	K6746	FSU	M1
Schlumberger CTD Recorder	K6770	FSU	M1
Schlumberger CTD Recorder	K6752	FSU	M1
Schlumberger CTD Recorder	M0053	FSU	M1
Schlumberger CTD Recorder	K1308	FSU	M1
Schlumberger CTD Recorder	M0054	FSU	M3
Schlumberger CTD Recorder	K6750	FSU	M3-TRBM
CTD Diver	K1269	FSU	M1-TRBM
Aanderaa RCM-11 Current Meter	362	BOEM	M4
Aanderaa RCM-11 Current Meter	364	BOEM	M5
Benthos 865-A Acoustic Release	109	BOEM	M2
Benthos 865-A Acoustic Release	161	BOEM	M2
Benthos 865-A Acoustic Release	108	BOEM	M4
Benthos 865-A Acoustic Release	162	BOEM	M4
Benthos 865-A Acoustic Release	102	BOEM	M5
Benthos 865-A Acoustic Release	125	BOEM	M5
Benthos 865-A Acoustic Release	117	BOEM	M6
Benthos 865-A Acoustic Release	159	BOEM	M6
Benthos 866-A Acoustic Release	539	SAIC	M2-TRBM
Benthos 866-A Acoustic Release	540	SAIC	M3-TRBM
NovaTech ST-400A Flasher	S01-293	BOEM	M6
NovaTech ST-400A Flasher	T01-005	BOEM	M5
NovaTech AS-900A Argos Beacon++	56208	BOEM	M6
RDI 75 kHz LongRanger ADCP	4913	BOEM	M5
RDI 75 kHz LongRanger ADCP	4914	BOEM	M6
RDI 75 kHz LongRanger ADCP	4918	BOEM	M6
RDI 300 kHz Workhorse Sentinel ADCP	1200	BOEM	M3-TRBM
RDI 300 kHz Workhorse Sentinel ADCP	209	BOEM	M4
Sea-Bird MicroCat	2697	BOEM	M2
Sea-Bird MicroCat	2696	BOEM	M4
Sea-Bird MicroCat	2693	BOEM	M5
Sea-Bird MicroCat	2695	BOEM	M5
Sea-Bird MicroCat	2694	BOEM	M6
Seimac CML Argos Locator++	30042	BOEM	M5
Seimac CML Argos Locator++	30043	BOEM	M6

Star-Oddi Temperature Recorder	T-1187	BOEM	M2
Star-Oddi Temperature Recorder	T-1270	BOEM	M2
Star-Oddi Temperature Recorder	T-1271	BOEM	M2
Star-Oddi Temperature Recorder	T-1276	BOEM	M2
Star-Oddi Temperature Recorder	T-1277	BOEM	M4
Star-Oddi Temperature Recorder	T-1278	BOEM	M4
Star-Oddi Temperature Recorder	T-1279	BOEM	M4
Star-Oddi Temperature Recorder	T-3001	BOEM	M4
Star-Oddi Temperature Recorder	T-1624	BOEM	M5
Star-Oddi Temperature Recorder	T-1625	BOEM	M5
Star-Oddi Temperature Recorder	T-3008	BOEM	M5
Star-Oddi Temperature Recorder	T-3009	BOEM	M5
Star-Oddi Temperature Recorder	T-3030	BOEM	M5
Star-Oddi Temperature Recorder	T-3031	BOEM	M5
Star-Oddi Temperature Recorder	T-3010	BOEM	M6
Star-Oddi Temperature Recorder	T-3032	BOEM	M6
Star-Oddi Temperature Recorder	T-3033	BOEM	M6
Star-Oddi Temperature Recorder	T-3034	BOEM	M6
Star-Oddi Temperature Recorder	T-3037	BOEM	M6
Star-Oddi Temperature Recorder	T-3485	BOEM	M6
Star-Oddi Temperature Recorder	T-3038	BOEM	M6
URI RAFOS Sound Source	-	WHOI	M6

[++] These are Argos ID numbers and not serial numbers.

Table 2. Instruments Lost

Instrument	Serial Num.	Owner	Location
Orca Beacon	005590	FSU	M3
OAR Flasher	5778	FSU	M3
Schlumberger CTD Recorder	K1283	FSU	M3
Schlumberger CTD Recorder	K1239	FSU	M3
Schlumberger CTD Recorder	K6725	FSU	M3
Schlumberger CTD Recorder	K6755	FSU	M3

Table 3. Mooring and TRBM locations

Mooring/TRBM	Latitude (N)	Longitude (W)	Depth (m)
M1	29 ° 56.685'	87 ° 11.614 '	53
M1-TRBM	29 ° 56.749'	87 ° 11.473'	53
M2	29 ° 54.067'	87 ° 11.637'	78
M2-TRBM	29 ° 54.078'	87 ° 11.586'	79
M3	29 ° 55.101'	87 ° 10.190'	97
M3[1]	29 ° 55.244'	87 ° 08.020'	92
M3-TRBM	29 ° 55.084'	87 ° 10.071'	97
M4	29 ° 54.424'	87 ° 08.173'	106
M5	29 ° 48.940'	87 ° 04.242'	206
M6	29 ° 24.090'	86 ° 59.012'	715

Table 4. CTD Station Summary

CTD cast	Latitude (N)	Longitude (W)	Date	Time (GMT)	Depth (m)
CTD L1	28 ° 48.410'	89 ° 07.140'	05/16/13	15:13	240
CTD L2	28 ° 55.681'	88 ° 41.683'	05/16/13	18:27	420
CTD L3	29 ° 02.590'	88 ° 15.827'	05/16/13	22:02	740
CTD L4	29 ° 07.467'	87 ° 52.249'	05/17/13	01:50	1116
CTD L5	29 ° 17.028'	87 ° 24.611'	05/17/13	06:40	779
M6	29 ° 24.143'	86 ° 58.938'	05/18/13	04:37	700
M5	29 ° 48.960'	87 ° 04.183'	05/18/13	08:13	200
M4	29 ° 54.420'	87 ° 08.174'	05/18/13	10:02	108
M2	29 ° 54.090'	87 ° 11.632'	05/18/13	23:14	80

[1] Location of M3 upon recovery

[2] Niskin bottles 4, 10, 11,12, 20, and 24 leaked and were not used for gas sampling.

Table 5. Water Sample Summary

CTD Station	Water Sample Depths[2] (m)						
	#1	#2	#3	#4	#5	#6	Bottle misfires
CTD L1	228	45	33	25	5	-	15 and 11
CTD L2	385	125	52	34	21	5	17
CTD L3	699	451	60	49	35	5	11
CTD L4	1031	705	81	66	55	6	-
CTD L5	749	612	124	67	45	6	-
M6	659	410	80	71	59	5	3, 15 and 21
M5	160	83	75	65	5	-	1 and 3
M4	99	-	-	-	-	-	11

Acknowledgements

We thank the Captains and crew of the R/V Pelican for their helpfulness and support for this work. The help of Peter Lazarevich with pre- and post-cruise loading, packing and transportation is gratefully acknowledged.

[2] Niskin bottles 4, 10, 11,12, 20, and 24 leaked and were not used for gas sampling.

Appendix A : Cruise Event Summary

FSU GULF RESEARCH INITIATIVE
MOORING RECOVERY CRUISE EVENT SUMMARY
R/V PELICAN CRUISE PE-13-27 (16-19 MAY 2013)

	CDT		
Wed. 15 May	2304	•	Depart LUMCON; underway for CTD Station #1.
Thurs. 16 May	0000	•	Enroute to CTD Station #1.
	1002	•	Arrive **CTD Station #1**.
	1013	•	CTD in the water.
	1050	•	CTD onboard; underway for CTD Station #2.
	1320	•	Arrive **CTD Station #2.**
	1326	•	CTD in water.
	1407	•	CTD onboard; underway for CTD Station #3.
	1657	•	Arrive **CTD Station #3**.
	1702	•	CTD in water.
	1757	•	CTD onboard; underway for CTD Station #4.
	2025	•	All stop. Something possibly snagged in port prop.
	2036	•	Will run on starboard engine until light and then check port engine prop. Large pieces of thick white plastic appear to be coming off prop.
	2048	•	Arrive **CTD Station #4.**
	2052	•	CTD in water
	2214	•	CTD onboard; underway for CTD Station #5.
Fri. 17 May	0000	•	Enroute to CTD Station #5
	0136	•	Arrive **CTD Station #5**.
	0144	•	CTD in water.
	0259	•	CTD onboard; underway for M6 Mooring site.
	0547	•	Arrive **M6 Mooring site**; standby to enable releases while crew investigates fouled prop.
	0656	•	Releases enabled; standing by while crew clears prop.
	0737	•	Prop cleared.
	~ 0750	•	Release activated.
	1028	•	Mooring onboard; underway for M5 Mooring site.
	1259	•	Arrive **M5 Mooring site**; standby to range on releases.
	1318	•	Release activated.

	CDT		
Fri. 17 May	1435	•	Mooring onboard; standby to clean equipment and secure deck.
	1500	•	Underway for M4 Mooring site.
	1545	•	Arrive **M4 Mooring site**; standby to range on releases.
	1555	•	Release activated.
	1648	•	Mooring onboard; standby to secure deck.
	1655	•	Underway for M3 Mooring site.
	~1710	•	Arrive **M3 Mooring site**; standby to range on release.
	1733	•	Mooring ranges ~3500 m from deployment site; must re-triangulate to determine new location.
	1849	•	Release activated.
	1909	•	Mooring onboard; only recover lower flotation element and one instrument along with acoustic release. Top of mooring and four instruments missing from mooring. Wire cut just above lower flotation element. Mooring recovered in 92 m water depth, 3502 m east of deployment site at: 29° 55.244'N, 87° 80.202'W
	1951	•	Underway to do CTD casts beginning at M6 Mooring site.
	2331	•	Arrive **M6 CTD site**.
	2336	•	CTD in water.
Sat. 18 May	0040	•	CTD on deck; underway for M5 Mooring site to do CTD cast.
	0308	•	Arrive **M5 CTD site**.
	0313	•	CTD in water
	0342	•	CTD on deck; underway to M4 Mooring site to do a CTD cast.
	0502	•	Arrive **M4 CTD site**.
	0504	•	CTD in water.
	0521	•	CTD on deck; underway for M1 Mooring site.
	0545	•	Arrive **M1 Mooring site**.
	0700	•	Release activated.
	0720	•	Mooring onboard; standby to recover M1 TRBM (MSI design w/pop up float)
	~ 0815	•	M1 TRBM release activated.
	0834	•	No float on surface; must drag for TRBM.
	0930	•	Begin grapnel run toward ground tackle.

	CDT		
Sat. 18 May	1050	•	TRBM on deck; standby to clean up deck and move to M3 TRBM site.
	1152	•	Arrive **M3 TRBM site**; standby to range on release.
	1157	•	Release enabled; break for lunch.
	1249	•	Release activated; TRBM on surface.
	1441	•	TRBM and all line components on deck; standby to clean deck and move to M2 Mooring site.
	1453	•	Arrive **M2 Mooring site**; standby to range on release.
	1457	•	Release activated.
	1515	•	Surface marker buoy on deck.
	1550	•	Mooring onboard; standby to recover M2 TRBM after clean deck.
	1615	•	Release activated; nothing seen on surface so must drag.
	1732	•	Grapnel hook on deck with snagged ground tackle line.
	1749	•	TRBM flotation element on surface in distance as we begin recovery of ground tackle line element closest to TRBM.
	1800	•	TRBM onboard; standby to do CTD cast at TRBM Mooring site and secure deck.
	1813	•	Begin CTD cast.
	1824	•	CTD on deck; underway for LUMCON.
Sun. 19 May	0000	•	Enroute to LUMCON.
	1804	•	Arrive LUMCON; begin unloading vessel.
	2130	•	Vessel unloaded.

B = Begin
E = End

CRUISE PE-13-27_Speer

DATES: B 5/16/2013

E

Mooring Station#	CTD/XBT STATION	LATITUDE	LONGITUDE	Day	Time	Depth	Wave Dir.	WMO 3700 Sea State	Wind Dir.	Wind Spd.	Bar. Pres.	Air Temp.	WMO 4501 Weather
—	CTD #1	28° 48.410	89° 7.140	5/16/13	15:20	240m	deg	code	deg	5	1015.61	24	X
	CTD 2	27 55.681	88°41.683	5/16/13	~~5~~18:57	420m	deg	code 3	deg 106	6	1015.61	24.5	X 1
	CTD 3	29° 3591'N	88°15.860W	5/16/13	22:03	740m	deg 130	code 3	deg 90	10	1014	23.3	X 1
	CTD 4	29 7.480	87°52.279	5/17/13	02:02	1116m	deg 120	code 3	deg 115	14	1015	22.8	X 1
	CTD 5	29°17.[illegible]5	87°24.618	5/17/13	06:44	779m	deg	code 3	deg 110	14	1014	22.8	X 1
M6		29°24.138	86 58.937	5/18/13	04:37	700	deg	code 3	deg 110	12	1016.76	23.4	X 1
M5		29° 48.961'	87° 4.480	5/18/13	08:13	200m	deg 170	code 2	deg 110	10.5	1015	25	X 1
M4		29°54.421'	87° 8.174	5/18/13	10:02	108m	deg	code 2	deg 140	9.05	1015	22.7	X 1
M2		29° 54.082	87°11.620	5/18/13	23:13	80m	deg 120	code 1	deg ~~120~~ 120	6	1015.84	24	X 1
							deg	code	deg				X
							deg	code	deg				X
							deg	code	deg				X
							deg	code	deg				X
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