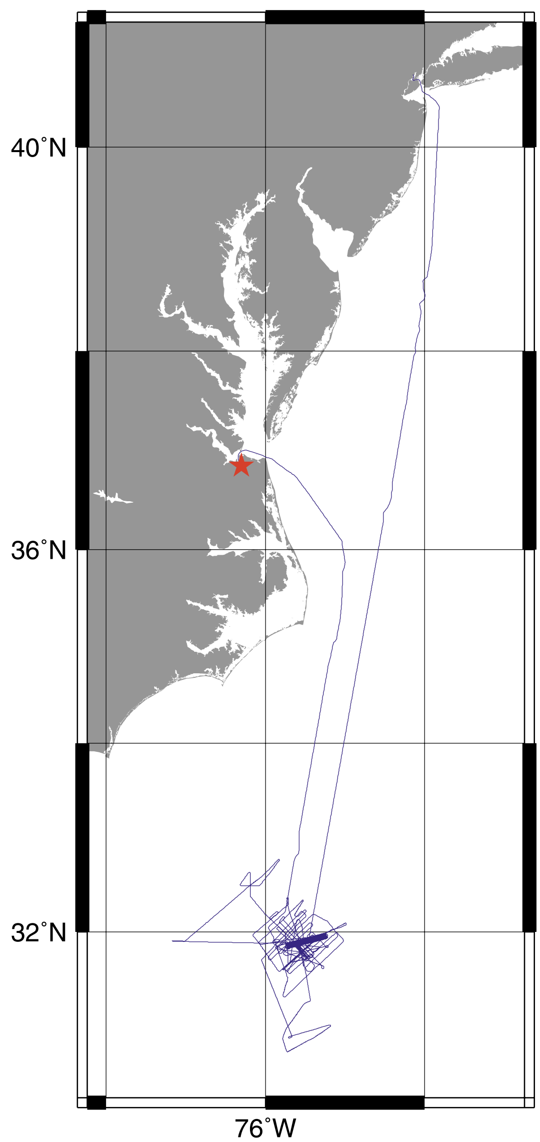
Lamont-Doherty Earth Observatory
Office of Marine Affairs
61 Route 9W
Palisades, NY 10964

R/V Maurice Ewing - Data Reduction Summary - EW-0008

Date	Day	Time	Port
September 2, 2000	246	10:00	Newark, NJ
October 17, 2000	291	10:00	Norfolk, VA



Project Summary

BLAKE RIDGE MCS 2000

Gas hydrate, an ice-like crystalline solid of water and low-molecular-weight gas formed at low temperature and high pressure, appears to be widespread on continental margins and thus constitutes an enormous reservoir of methane in shallow marine sediments. Hydrates and the underlying zone of free gas bubbles are of broad interest for several reasons: they may form a future fossil fuel reserve; they may affect the shear strength, diagenesis, and lithification of marine sediments; and they may play a role in the global carbon cycle and climate change. At present, the lateral variability and dynamics of the methane hydrate/gas system are poorly understood.

The Blake Ridge, offshore South Carolina, constitutes a premier natural laboratory for the study of gas hydrate dynamics, for several reasons. First, the lithological homogeneity of much of the sediment column provides a virtual tabula rasa against which deviations in physical properties can be confidently interpreted in terms of hydrate and gas. Second, the lack of tectonic activity removes a major complicating factor that affects many other hydrate locales. Third, a critical mass of previous geological and geophysical data exist, including single-channel seismic data, deep-towed acoustic data, ocean-bottom seismic data, and sampling and downhole logging conducted in three deep (700+ m) holes during Leg 164 of the Ocean Drilling Program. Fourth, circumstantial evidence exists for explusion of massive amounts of methane from the Blake Ridge collapse structure, implying a connection here between the hydrate/gas reservoir and the ocean/atmosphere system. Fourth, previous ocean-bottom seismometer and vertical seismic profile data showed strong P-to-S conversions from the BSR and HSZ, suggesting that a targeted ocean-bottom seismometer (OBS) survey has the potential to determine the effects of hydrate and gas on the shear-wave structure of marine sediments. Finally, strong lateral variations exist in gas distribution, including complex, three-dimensional structures, with several generations of faults, local gassy zones, evidence for recent re-equilibration of a BSR, and a possible incursion of free gas into the hydrate stability zone. These observations point to a highly dynamic, active geological system that offers clear opportunities to test recent ideas regarding the dynamics and mass balance of hydrate/gas systems.

On Leg EW-0008 of the R/V Maurice Ewing we investigated this dynamic hydrate/gas system with three approaches: (1) detailed, three-dimensional multichannel seismic (MCS) data acquired over a 250 km2 area with a 4-km-long streamer, which will provide basic 3D geometries of stratigraphy, structures, gas accumulations, and gas migration pathways; (2) long-offset (6-km), high-fold (480-channel) 2D data, which will allow both high-quality images of regional structure and accurate P-velocity determination in the hydrate and free gas zones; and (3) three-component OBS data, which will provide estimates of shear-wave velocities. The goals of this work are to better understand gas accumulation and migration pathways, to test the hypothesis that the Blake Ridge collapse structure represents a site of methane escape into the ocean/atmosphere system, to investigate evidence for free gas in the hydrate stability zone, to assess whether hydrate cements sediments, and to test whether gas-charged sediments represent a zone of weakness. Ultimately these data will contribute to an improved understanding of the processes that control the mass balance of methane in the hydrate/gas reservoir.

This project is a joint NSF-DOE venture.

Cruise Members

Ship Staff

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Data Logging

The following tables describe the data instruments performing logging during this cruise. The tables associated with some of the instruments describe the logging intervals for those instruments not logged during the entire cruise. Daily QA postscript plots can be found on the data tape under the "reduction/ clean/d*xxx*.ps" directories.

Time References

Datum StarTime 9390-1000

Used as the CPU Synchronization clock at 1/2 hour intervals. This keeps the CPU in synch with UTC time with a varying error of up to 10ms. This is QA'd every day with a plot showing the drift of the CPU clock based on the UTC clock time: *ps.tr2.xxx* The CPU seems to lose approximately 20ms/hour when not synchronized to UTC at regular intervals.

Date	Comment
245/23:46	lost Datum
246/18:28	Datum fixed

TrueTime GPS/VME (Syntron system)

This clock which is integrated with the Syntron VME system is used to time tag the shot times through its IRIG interface connected to *Joe's TimeTagger* box. Every shot is synced to this interface to get the exact shot time. In case of a rare failure, the CPU clock is used. These shots are tagged with a '-' in the shot time. This process is QA'd against the CPU clock for every shot in the plot *ps.ts2.xxx.*

GPS Receivers

Trimble 4000DS (Primary) w/Fugro

Trimble NT200D (Secondary) w/Fugro

Garmin G8 (Tertiary)

Garmin G8 (Tailbuoy)

GPS NMEA data is logged at 10 second intervals. The NMEA strings GPGGA, and GPVTG are logged for position, speed and heading fixes. This data is logged constantly throughout the cruise with minor interruptions on the secondary GPS during e-mail connects when the INMARSAT interrupts communications with the GPS receiver. A Fugro differential receiver was installed by the science party.

Instrument	Date	Comment
GP01	245/19:46	replaced Tasman with 4000DS
GP02	246/01:24	added Fugro differential to NT200D
GP03	247/01:23	new serial stream added (G8)
GP01	290/20:33	lost 4000DS
GP01	291/00:23	4000DS fixed

Speed and Heading

Furuno CI-30 Dual Axis Speed Log, Sperry MK-27 Gyro

The Furuno is used to log the ship's water speed, heading, and gyro. The gyro data is fed into the ship's steering as an NMEA VDVHW signal. The Furuno data is logged constantly at 3 second intervals and is also used during data reduction for determining drift in case of GPS failures.

Additionally, the Furuno logs the "pitlog" distance. This is logged as raw data in the file 0008pl.dxxx.

Date	Comment
247/09:31	lost Furuno
247/10:56	Furuno fixed

Gravimeter

Bell Aerospace BGM-3 Marine Gravity Meter System

The BGM consists of a forced feedback accelerometer mounted on a gyro stabilized platform. The gravity meter outputs counts at approximately once per second which are all logged. There were no interruptions of gravity logging during the cruise.

NOTE: The gravimeter's gyro was replaced, so a post-cruise gravity tie was not taken.

Hydrosweep Bathymetry

Krupp Atlas Hydrosweep-DS

The HS full swath data is logged for each ping, and the centerbeam data is extracted and processed separately. The hydrosweep operates at varying intervals based on water depth.

The full swath data can be read and processed using the MB-System software which can be downloaded from the web site: http://www.ldeo.columbia.edu/MB-System/

MB-System 4.6.10 is necessary to process data after Jan. 1, 2000.

Date	Comment
263/01:47	lost Hydrosweep
263/02:21	Hydrosweep fixed
272/05:39	logging restarted following crash - duplicate Hydrosweep logging processes
273/00:17	Hydrosweep fixed

Weather Station

R.M. Young Precision Meteorological Instruments; 26700 series

The weather station logs wind speed, direction, air temperature and barometric pressure at 1-min intervals.

Sea Temperature

Sea temperature is logged at one minute intervals from a thermometer mounted at the ship's keel.

Seismic Lines

Gun Depths
Shot Times
Compass Block Data

Seismic logging outside of the Syntron MCS system logs gun depths via individual depth transducers mounted on each gun; shot times via the TrueTime clock IRIG interface (described previously); and compass block data from the Digicon system.

Additionally, data from the logging system (shot time, navigation, weather, centerbeam, sea temp, tailbuoy, furuno course and speed, gun depths and compass information) is inserted into the SEG-D Header of the MCS 3490 tape data for every shot. r. *See "Seismic SEG-D Header Data" on page 18.*

Realtime navigation is calculated via a "real-time" navigation program that filters the shot points to come up with an average speed and heading in order to calculate the time until the next shot. This navigation, while far from perfect, is fairly accurate and is used as the navigation fix for the 3490 tape header.

NOTE: The Tailbuoy was logged continuously, but it never really worked.

Date	Comment
254/11:03	lost compass - DigiCourse froze
254/13:07	DigiCourse fixed
257/04:08	stopped shooting - Florence approaching
258/08:43	started shooting
259/10:01	lost compass - DigiCourse froze
259/10:11	DigiCourse fixed
264/16:47	lost Syntrak's tape drive (froze)
264/16:59	Syntrak fixed
265/16:21	stopped shooting - streamer unbalanced
266/05:03	started shooting
272/05:31	all logging crashed - moray unplugged
272/05:39	restarted logging
276/16:30	starboard gun not firing
276/17:29	starboard gun fixed

Line	Start Shot	Start Date/Time	End Shot	End Date/Time
obs1	000001	249/09:33:48	002458	249/20:14:15
obs2	002460	249/22:41:26	004770	250/08:42:32
obs2t	004771	250/08:43:11	005243	250/10:54:22
obs3	005244	250/10:55:39	006411	250/15:45:35

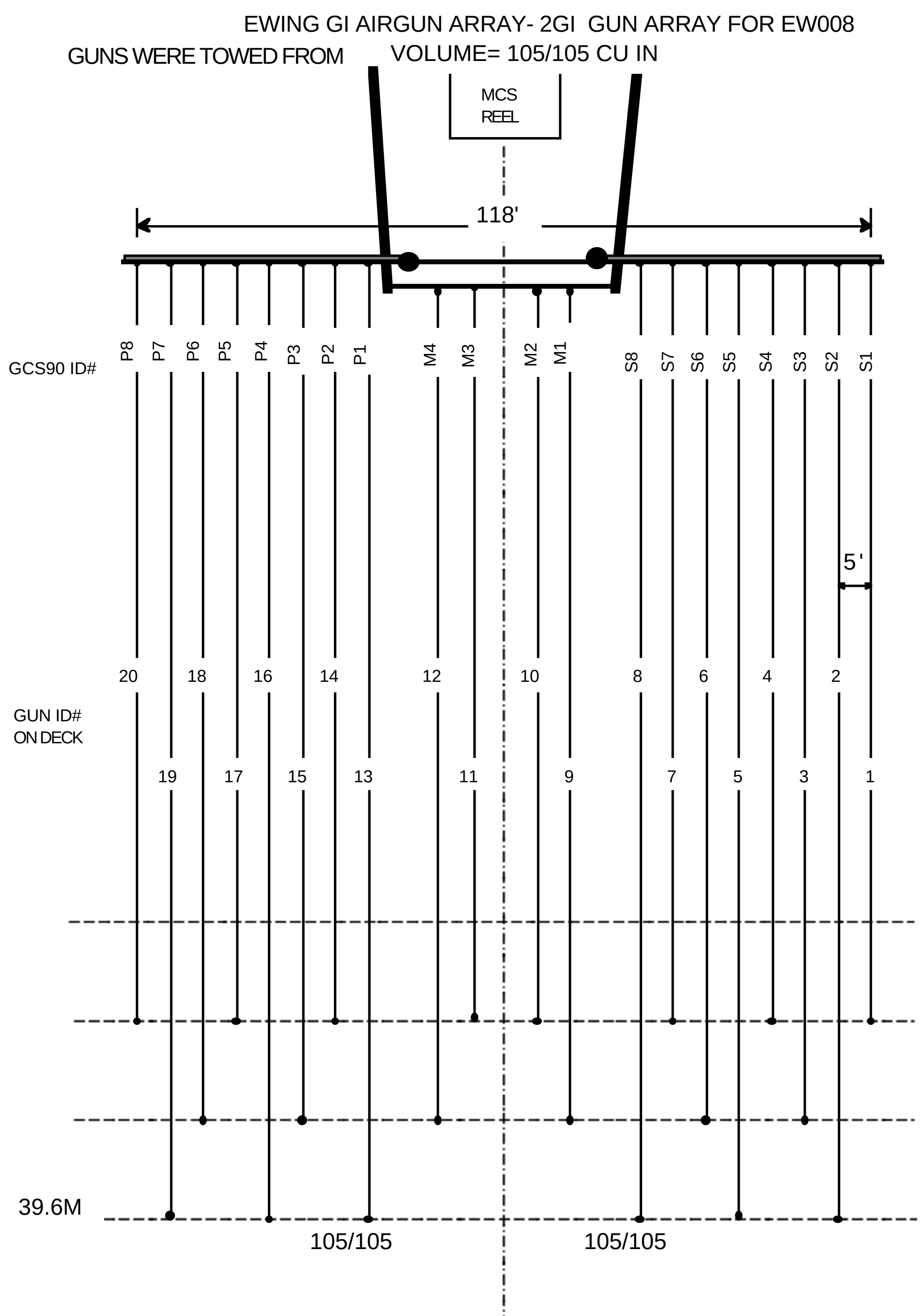
Line	Start Shot	Start Date/Time	End Shot	End Date/Time
obs4	006440	250/15:58:08	007335	250/19:49:11
obs5	007336	250/20:33:56	010882	251/12:15:24
obs8	010883	251/12:15:53	011843	251/17:23:42
R0	012723	253/23:47:24	013512	254/03:01:45
R1	013513	254/05:44:38	017381	254/22:18:54
R3	017595	255/11:26:40	019214	255/18:02:15
R4	019215	255/18:02:33	019938	255/20:48:33
R5	019939	255/21:54:04	021192	256/02:42:20
R7	021193	256/03:18:00	022831	256/09:22:34
R8	022832	256/09:22:58	024738	256/17:28:27
R10	024739	256/17:28:51	025833	256/21:31:14
R11	025834	256/21:31:32	027436	257/03:37:51
R12	027437	257/03:40:26	027552	257/04:08:25
R14	027553	258/08:43:56	028834	258/13:57:46
R15	028835	258/13:58:03	029427	258/16:16:49
R16	029428	258/16:17:06	030154	258/19:13:08
R17	030155	258/19:13:34	031782	259/01:40:27
R18	031783	259/01:45:19	032231	259/03:31:06
3D-01	032232	259/03:34:08	033569	259/08:53:04
3D-47	033570	259/08:53:40	034902	259/14:04:41
3D-05	034903	259/14:05:00	037421	259/23:59:53
3D-51	036255	259/19:23:55	037596	260/00:39:25
3D-09	037597	260/00:40:09	038879	260/05:42:00
3D-55	038880	260/05:44:12	040262	260/11:06:30
3D-13	040263	260/11:07:27	041561	260/16:15:02
3D-59	041562	260/16:15:23	042865	260/21:23:31
3D-17	042866	260/21:30:07	044274	261/03:03:53
3D-63	044275	261/03:05:07	045646	261/08:06:28
3D-21	045647	261/08:07:00	046979	261/13:21:58
3D-67	046980	261/13:22:35	048303	261/18:14:18
3D-25	048304	261/18:14:52	049653	261/23:30:28

Line	Start Shot	Start Date/Time	End Shot	End Date/Time
3D-71	049654	261/23:31:00	050959	262/04:34:04
3D-29	050960	262/04:35:14	052355	262/10:04:32
3D-75	052356	262/10:05:05	053634	262/15:04:24
3D-33	053635	262/15:04:41	055008	262/20:21:09
3D-79	055009	262/20:21:38	056313	263/01:29:49
3D-37	056314	263/01:30:38	057640	263/06:27:01
3D-83	057641	263/06:27:32	059037	263/11:51:49
3D-41	059038	263/11:52:16	060369	263/16:58:14
3D-87	060370	263/16:58:31	061701	263/22:08:12
3D-45	061702	263/22:08:48	063010	264/03:18:20
3D-03	064334	264/08:26:38	065720	264/13:49:21
3D-49	065721	264/13:49:50	067117	264/19:21:05
3D-07	067118	264/19:21:24	068436	265/00:31:10
3D-53	068437	265/00:31:45	069722	265/05:16:27
3D-11	069723	265/05:16:49	071121	265/10:43:41
3D-15	072457	265/15:56:58	072561	265/16:21:03
3D-15x	072562	266/05:03:55	073863	266/10:10:45
3D-61	073864	266/10:11:10	075206	266/15:27:58
3D-19	075207	266/15:28:14	076550	266/20:46:30
3D-65	076551	266/20:46:53	077884	267/02:00:06
3D-23	077885	267/02:00:53	079191	267/07:09:44
3D-69	079192	267/07:10:05	080556	267/12:31:19
3D-27	080557	267/12:31:39	081840	267/17:35:28
3D-73	081841	267/17:35:40	083233	267/23:01:17
3D-31	083234	267/23:01:50	084517	268/04:04:41
3D-77	084518	268/04:05:20	085922	268/09:35:43
3D-35	085923	268/09:36:17	087193	268/14:36:30
3D-81	087194	268/14:36:43	088583	268/19:55:15
3D-39	088584	268/19:55:44	089861	269/00:56:10
3D-85	089862	269/00:56:36	091253	269/06:28:01
3D-43	091254	269/06:28:26	092544	269/11:35:14

Line	Start Shot	Start Date/Time	End Shot	End Date/Time
3D-86	092545	269/11:35:36	093865	269/16:45:06
3D-40	093866	269/16:45:34	095147	269/21:48:31
3D-82	095148	269/21:48:51	096399	270/02:45:33
3D-36	096400	270/02:45:51	097833	270/08:29:08
3D-78	097834	270/08:29:36	099094	270/13:31:25
3D-32	099095	270/13:31:53	100383	270/18:34:44
3D-74	100384	270/18:35:04	101691	270/23:37:20
3D-28	101692	270/23:37:46	102968	271/04:36:43
3D-70	102969	271/04:39:39	104233	271/09:32:04
3D-24	104234	271/09:32:33	105488	271/14:24:36
3D-66	105489	271/14:24:50	106801	271/19:28:47
3D-20	106802	271/19:29:05	108113	272/00:34:55
3D-62	108114	272/00:35:29	109371	272/05:25:08
3D-16	109371	272/05:43:09	110613	272/10:32:07
3D-58	110614	272/10:32:40	111846	272/15:19:13
3D-12	111847	272/15:19:26	113183	272/20:32:04
3D-56	113184	272/20:32:40	114437	273/01:20:31
3D-10	114438	273/01:21:05	115705	273/06:19:56
3D-52	115706	273/06:20:17	117038	273/11:25:43
3D-04	117039	273/11:26:10	117551	273/13:30:55
3D-42x	117552	273/15:33:54	117769	273/16:24:41
3D-04b	117769	273/16:24:59	119036	273/21:29:52
3D-50	119037	273/21:30:19	120333	274/02:30:06
3D-02	120334	274/02:33:38	121657	274/08:09:30
3D-44	121658	274/08:09:53	123364	274/15:04:17
3D-88	123365	274/15:04:42	123418	274/15:22:58
3D-88	123419	275/05:35:22	123633	275/06:37:25
3D-88x	123634	275/06:37:42	124817	275/11:29:54
3D-48	124818	275/11:30:24	126091	275/17:08:28
3D-80	126092	275/17:08:50	127363	275/22:06:37
3D-42	127364	275/22:07:13	127837	276/12:56:48

Line	Start Shot	Start Date/Time	End Shot	End Date/Time
3D-42x	127838	276/12:57:12	128232	276/14:56:24
3D-42y	128233	276/14:56:56	129496	276/20:53:56
3D-76	129497	276/20:54:21	130793	277/01:58:39
3D-38	130794	277/01:59:09	132057	277/07:43:38
3D-72	132058	277/07:44:10	133305	277/12:32:09
3D-34	133306	277/12:32:39	134576	277/17:57:06
3D-68	134577	277/17:57:24	135860	277/22:58:50
3D-30	135861	277/22:59:23	137140	278/03:57:53
3D-64	137141	278/03:58:11	138417	278/08:53:56
3D-26	138418	278/08:54:30	139623	278/13:35:47
3D-60	139624	278/13:36:09	140932	278/18:40:43
3D-22	140933	278/18:41:11	142237	279/00:01:50
3D-65x	142238	279/00:02:22	143505	279/04:57:08
3D-14	143506	279/04:57:25	144791	279/10:04:57
3D-50x	144792	279/10:05:27	146035	279/14:56:31
3D-28x	146036	279/14:56:42	147452	279/20:47:57
3D-87x	147453	279/20:48:20	148651	280/01:28:48
3D-39x	148652	280/01:29:12	149747	280/05:55:05
3D-11x	149748	280/05:55:20	151010	280/10:49:39
3D-29x	151011	280/10:50:05	152351	280/16:11:37
3D-58x	152352	280/16:12:05	152948	280/18:31:16
3D-38x	152949	280/18:31:32	153554	280/20:58:27
3D-13x	153555	280/20:59:00	154878	281/02:09:20
3D-21x	154879	281/02:09:46	156172	281/07:11:44
3D-82x	156173	281/07:12:08	157453	281/12:15:17
3D-82y	157454	281/12:15:42	157890	281/13:56:45
OBS-9	157891	282/11:35:27	159236	282/17:49:11
OBS-10	159237	282/19:27:28	162157	283/06:39:17
OBS-10x	161259	283/04:40:41	162157	283/06:39:17
OBS-11	162158	283/06:41:01	163303	283/11:16:46
R13	163304	284/16:02:09	164367	284/20:20:09

Line	Start Shot	Start Date/Time	End Shot	End Date/Time
R13b	164368	284/20:20:33	165462	285/00:43:40
R14	165463	285/00:44:14	165869	285/02:23:05
R21	165870	285/02:23:29	166640	285/05:29:56
R22	168461	285/12:49:26	170335	285/20:21:40
R23	170336	285/20:22:11	171456	286/00:55:34
R24	171457	286/01:02:31	172568	286/05:33:11
R25	172569	286/05:49:59	174659	286/14:34:28
R26	174660	286/14:34:41	176633	286/22:31:42
R27	176634	286/22:32:53	178045	287/04:18:23
R28	178046	287/04:18:54	180044	287/12:24:18
R29	180045	287/12:24:44	181872	287/19:48:44
R30	181873	287/19:49:34	183241	288/01:19:15
R31	183242	288/01:19:37	184718	288/07:23:26
R32	184719	288/07:23:45	185515	288/10:36:01
R33	185516	288/10:36:24	185712	288/11:23:58
R34	185713	288/11:24:19	185915	288/12:13:28
R35	185916	288/12:13:53	186392	288/14:08:06
R36	186393	288/14:08:18	188274	288/21:43:48
R37	188275	288/21:44:15	190364	289/06:17:59
R38	190365	289/06:18:25	190712	289/07:41:29
R39	190713	289/07:41:47	193256	289/18:00:44
vmetest	193257	289/18:30:59	193566	289/22:38:08


EWING GI AIRGUN ARRAY- 2GI GUN ARRAY FOR EW008
GUNS WERE TOWED FROM
VOLUME= 105/105 CU IN
MCS
REEL
118'
GCS90 ID#
P8
P7
P6
P5
P4
P3
P2
P1
M4
M3
M2
M1
S8
S7
S6
S5
S4
S3
S2
S1
5'
20
18
16
14
12
10
8
6
4
2
GUN ID#
ON DECK
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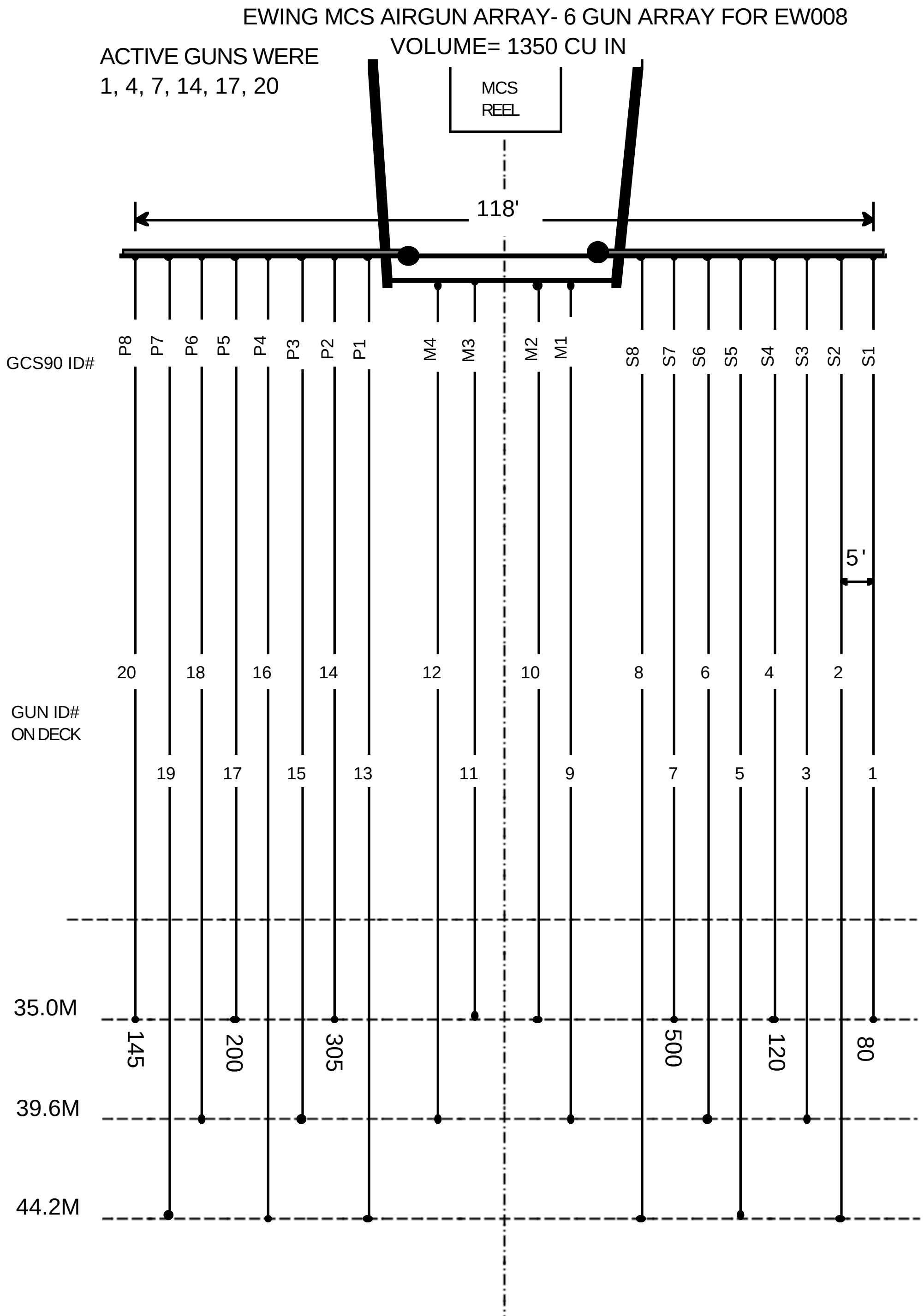
13
11
9
7
5
3
1
39.6M
105/105
105/105



EWING MCS AIRGUN ARRAY- 6 GUN ARRAY FOR EW008
VOLUME= 1350 CU IN
ACTIVE GUNS WERE
1, 4, 7, 14, 17, 20
MCS
REEL
118'
GCS90 ID#
P8
P7
P6
P5
P4
P3
P2
P1
M4
M3
M2
M1
S8
S7
S6
S5
S4
S3
S2
S1
5'
GUN ID#
ON DECK
20
18
16
14
12
10
8
6
4
2
19
17
15
13
11
9
7
5
3
1
35.0M
145
200
305
500
120
80
39.6M
44.2M

Data Reduction

GPS Processing

Navigation data is post-processed in order to accurately determine the position and remove GPS accuracy errors.

1. Format the raw NMEA data, removing any data that has a DOP greater than 4.0. If we are using differential data, remove all data of quality less than differential quality:
   2000+009:00:28:50.091 N 42 14.1536 W 063 25.5897 P-trimble
2. Interpolate and reduce data. Fixes are reduced to 30 second fixes using GMT sample1d:
   sample1d -Fl -I30
3. Further reduce to 1 minute intervals.
4. Perform dead reckoning using the smoothed Furuno speed and heading to insure the accuracy of the GPS data

Furuno Processing

Furuno speed and heading is processed by smoothing the data using a vector summing algorithm. Data is reduced and output at 60 second intervals by taking the smoothed values and calculating the mean value for the 30 seconds before and after the whole minute.

Hydrosweep Processing

Center Beam

1. Remove all survey and calibration records from the raw data and all 0 level depths
2. Reduce data to one minute intervals on 00 seconds of the minute by computing the median values from the raw values that lie between +-30 seconds of 00 seconds of the minute.
3. Merge the data with the processed navigation to end up with one minute hydrosweep centerbeam fixes with navigation.

Gravity Processing

bias	*= 852645.3;*	*Dec. 5, 1997*
scale	*= 5.0940744*	*July 9, 1992*
mGals	*= raw_gravity_count * scale + bias;*	

Each cruise, the gravity meter is tied to a local reference point. The offset between the gravity tie and the gravity meter is known as the '*dc-shift*'. The difference between the last two ***dc**-shifts* gives us a ***drift** rate*. Using the last known ***dc** shift*, as well as the last known ***drift** rate*; we continue to accumulate the drift onto the at-sea values to give an approximate gravity value at sea.

At-sea values:
dc=2.80 *drift=0.011* *dt=2000:194:19:00:00*

1. Raw gravity is filtered using a 6 minute gaussian filter and mGals are output. The raw mGals are represented by, outputting a gravity count once every 6 seconds. This is plotted to *ps1.vt.xxx*
   `mGals = gravitycount * scale + bias`
2. A second filter is then applied; an 8 minute Gaussian filter using the GMT system:
   `filter1D -G480 -R -E`
3. The filtered output is then reduced to 1 minute intervals by using sample1d to tie the gravity values to the processed navigation. This smoothed data is plotted to *ps2.vt.xxx*
   `sample1d -Nnavtimes`
4. The results from step 3 are used to calculate the velocities between navigation fixes, which are smoothed using a 9-minute averaging window. The smoothed velocities are used to calculate the Eotvos correction. At this point, the drift corrections are applied and the final faa value calculated using the 1980 theoretical gravity formula.
   ```
   corrected_grv = raw_grv + eotvos_corr - drift - dc_shift
   faa = corrected_grv - theoretical_grv
   ```
5. Finally, this output is checked for spikes which are then removed (flagged as bad). This final output is plotted to *ps.vt.fxxx,* with the resultant file saved as *vt.nxxx.*
6. At the end of the cruise, a new gravity tie is taken, and a new DC shift value is calculated. Thus, a new drift rate is determined from the previous two gravity ties. At this time, all the gravity values are reprocessed using the latest known values. Of course, this assumes a constant drift rate over the cruise, but that's the best we can hope to get.

Gravity Tie

It is usual practice to have a *gravity tie* to a gravity reference base station during the port stay. A portable gravity meter: the Lacoste Model G #70, is used to make **1)** a pier-side reading; **2)** a reading at the base station; **3)** an additional pier-side reading.

The pier-side gravity value, adjusted in value to correspond to the height of the BGM gravity meter, (5.5 meters below the waste deck, aka c-deck) is compared to the real-time BGM Gravity Reading. This *real-time* reading is actually a 6 minute gaussian filtered reading.

The practice is not to adjust the BGM-3 so that its reading agrees with the pier-side gravity value, but to establish a *bgm-offset*, aka *dc-shift*, which represents a constant correction to be applied to all gravity values on the next cruise.

For example, suppose the pier-side value equaled 980274.7 mGal and the BGM reading was 980279.9, the *bgm-offset* would be 5.2 mGal. In other words, the BGM is 5.2 mGal high. This value is subtracted from observed values of gravity following the cruise as a constant correction. The "drift" of the Bell gravity meter is determined from the two in-port gravity station ties. In the pre-cruise tie the BGM might have been found to be 5.3 mGal high and during the post-cruise tie it is 8.4 mGal high. The drift during the cruise is therefore equal to 3.2 mGal (8.4 - 5.2). The amount of drift per day is then calculated and gravity data is processed with the drift values corrected for the length of the cruise.

While at sea, the drift rate from the last gravity tie is used. Once in port, the gravity values are all recalculated based on the new in-port gravity tie.

Pre-Cruise

EW0007 Newark, NJ

Pier/Ship	Latitude	Longitude
	40 41.866N	074 08.774W

Berth 11, Port Newark

Reference	Latitude	Longitude

Oceanography Building at Lamont; Potsdam Corrected
Used the gravity tie from 1997 as a reference to this point

	Id	Julian	Date	Mistie	Drift/Day	Prev Mistie
Pre Cruise	EW0006	194	7/12/00	2.80	0.01	2.63
Post Cruise	EW0007	230	8/12/00	3.44	0.021	2.80
Total Days			31.00	0.64		

Time	Entry	Value	
15:30	CDeck Level BELOW Pier	0.33	
	Pier 1 L&R Value	0.00	L&R
	Reference L&R Value	0.00	L&R
	Pier 2 L&R Value	0.00	L&R
4/9/97 0:00	Reference Gravity	980228.95	mGals
15:30	Gravity Meter Value (BGM Reading)	980247.80	mGals
	Potsdam Corrected	1	1 if corrected

*Gravity meter is **5.5** meters below CDeck*

	Difference in meters between Gravity Meter and Pier				5.83	meters
Height Cor =	Pier Height*	FAA Constant				
	5.83	0.31			1.81	mGals/min

Difference in mGals between Pier and Gravity Meter

	Pier (avg) -	Reference *	1.06 L&R/mGal		Delta L&R	
	0.00	0.00	1.06		0.00	mGals

Gravity in mGals at Pierside

	Reference + Delta mGals [+ Potsdam]				Pier Gravity	
	980228.95	0.00	13.60		980242.55	mgals

Gravity in mGals at Meter

	Pier Gravity+	Height Correction			Gravity@meter	
	980242.55	1.81			980244.36	mGals

Current Mistie

	BGM Reading-	Calculated Gravity			Current Mistie	
	980247.80	980244.36			3.44	mGals

Raw Compass Block cb1.d

Official Shot Time	Line	Shot	GPS1 Position	
2000+009:00:01:29.572	LAU1	021144	S 19 26.4331	W 176 16.3491

GPS2 Position *Trimble*	Tailbuoy Position	Gyro	Compass# Position
S 19 26.4393 W 176 16.3198	S 19 25.2864 W 176 19.7897	107.0	C01 97.8...

No processing is performed on compass block data.

Raw Furuno Log fu.d

CPU Time Stamp	Track	Speed	Heading	Gyro
2000+009:00:01:53.091	-	4.4	140.5	148.3

Hydrosweep Center Beam merged w/ Navigation hb.n

CPU Time Stamp	Position		Depth
2000+009:09:55:00.000	N 13 6.6206	W 59 39.3908	3409.1

Hydrosweep is median filtered at 1 minute intervals, then merged with navigation at 1 minute intervals.

Magnetic Data mg.n

CPU Time Stamp	Position	Raw Value	Anomaly
200+077:00:23:00.000	N 16 11.2918 W 59 47.8258	36752.2	-166.8

Merged Data m.

CPU Time Stamp	Position		GPS	Set	Drift	Depth
2000+200:12:25:00.000	N 45 54.1583	W 42 47.1770	gp1	0.0	0.0	4662.0

Magnetic.........................		Gravity..				
Total Intensity	**Anomaly**	**FAA**	**GRV**	**EOTVOS**	**Drift**	**Shift**
49464.7	55.5	22.2	980735.0	-8.4	-0.1	2.8

Temperature	Salinity	Conductivity
0.0	0.0	0.0

Magnetic Anomaly is the IGRF for the given year subtracted from the recorded intensity.

The gravity drift and shift are values that have been added to the raw gravity logged to make up for drift in the meter that has been lost in accordance with a gravity check at each port stop.

Temp, salinity and conductivity are only valid when the thermosalinograph is being logged.

Navigation File n.

CPU Time Stamp	Position		Used	Set	Drift
2000+009:00:03:00.000	N 13 6.2214	W 59 37.9399	gp1	0.0	0.0

Time Shot File ts.n

Official Shot Time	Shot #	Shot Position		Line Name
2000+009:00:15:00.000	000295	N 16 11.8600	W 59 48.0157	strike1

Navblock File (processing file) nb.r

Official Shot Time	Shot Number	CPU Time Stamp	Official Shot Position	
2000+103:00:00:05.150	012016	2000+103:00:00:05.138	N 02 33.4911	W 094 16.3357

Depth	Sea Temp	Wind Speed	Wind Direction	Tailbuoy Position	Tailbuoy Distance	Tailbuoy Bearing
2444.2	27.7	2.5	52	N 02 33.8605 W 094 19.7385	6338.9	96.2

Line Name	Speed	Course
gsc-AA2	4.9	100.0

Gravity File merged with navigation vt.n

```
eotvos_corr = 7.5038 * vel_east * cos(lat) + .004154 * vel*vel
faa = corrected_grv - theoretical_grv
```

CPU Time Stamp	Position		Model	FAA	Raw
2000+009:00:15:00.000	N 16 11.8600	W 59 48.0157	1980	-175.9	978253.6

Eotvos Smooth	Drift Total	DC Shift	Raw Velocity North	Raw Velocity East	Smooth Velocity North	Smooth Velocity East
9.7	0.0	4.5	-4.350	1.282	-4.333	1.329

Raw Weather File Format wx.d

CPU Time Stamp	True Speed	True Dir	Bird 1 Wind Speed Instant	Bird 1 Wind Speed 60secAvg	Bird 1 Wind Speed 60minAvg	Bird 1 Wind Speed 60secMax
2000+175:01:49:00.288	17.5	62	19.6	21.3	24.6	29.3

Bird1 Wind Direction Current	Bird1 Wind Direction 60secAvg	Bird1 Wind Direction 60minAvg
303	302	2

Bird2 Wind Speed Instant	Bird2 Wind Speed 60secAvg	Bird2 Wind Speed 60minAvg	Bird2 Wind Speed Max	Bird2 Wind Direction Current	Bird2 Wind Direction 60secAvg	Bird2 Wind Direction 60minAvg
0.0	0.0	0.0	0.0	0	0	0

Temperature Current	Temperature 60minAvg	Temperature 60minMin	Temperature 60minMax
28.7	28.7	28.6	28.8

	Humidity		
Current	**60minMin**	**60minMax**	**Barometric Pressure**
69	67	75	1011.3

Bird 2 is deactivated.

True wind speed and direction are calculated based on the heading and speed of the ship.

Seismic SEG-D Header Data

The following data is included on the tape in the SEG-D Extended header. Much of it is used by Paul Henkart's **sioseis** software when converting SEG-D to SEG-Y. Our Syntrak system uses SEG-D Revision 1.0.b

Data	Description	N Bytes	Position	type
000000-999999	shot number	6	00-05	ascii
\s	space	1	06	ascii
yyyy+ddd:hh:mm:ss.mmm	Official Shot-time	21	07-27	ascii
\s	space	1	28	ascii
yyyy+ddd:hh:mm:ss.mmm	shot cpu clock tag	21	28-49	ascii
\s	space	1	50	ascii
N/S	North/South Lat.	1	51	ascii
\s	space	1	52	ascii
0-90	Latitude in degrees	2	53-54	ascii
\s	space	1	55	ascii
0.0000-60.0000	Latitude in minutes	7	56-62	ascii
\s	space	1	63	ascii
E/W	East/West Lon	1	64	ascii
\s	space	1	65	ascii
0-180	Longitude in degrees	3	66-68	ascii
\s	space	1	69	ascii
0.0000-60.0000	Longitude in minutes	7	70-76	ascii
\s	space	1	77	ascii
0.0-9999.9	Hydrosweep Center Beam Depth	6	78-83	ascii
\s	space	1	84	ascii
0.0-99.9	Sea Temperature in degrees. C	4	85-88	ascii
\s	space	1	89	ascii
0.0-99.9	Wind Speed in knots	4	90-93	ascii
\s	space	1	94	ascii
0-999	Wind Direction	3	95-97	ascii
\s	space	1	98	ascii
N/S	Tail Buoy North/South Lat.	1	99	ascii
\s	space	1	100	ascii
0-90	Tail Buoy Latitude in degrees	2	101-102	ascii
\s	space	1	103	ascii

Data	Description	N Bytes	Position	type
0.0000-60.0000	Tail Buoy Latitude in minutes	7	104-110	ascii
\s	space	1	111	ascii
E/W	Tail Buoy East/West Lon	1	112	ascii
\s	space	1	113	ascii
0-180	Tail Buoy Longitude in degrees	3	114-116	ascii
\s	space	1	117	ascii
0.0000-60.0000	Tail Buoy Longitude in minutes	7	118-124	ascii
\s	space	1	125	ascii
0.0-9999.9	distance between ship and tailbuoy	6	126-131	ascii
\s	space	1	132	ascii
0.0-360.0	bearing ship - tailbuoy	5	133-137	ascii
line name	Current line name	10	138-147	ascii
0.0-99.9	Furuno speed over water	4	148-151	ascii
\s	space	1	152	ascii
0.0-360.0	Furuno course	5	153-157	ascii
0	blanks	32	158-189	0
0-255	gun depth 1	1	190	binary
0-255	gun depth 2	1	191	binary
0-255	gun depth 3	1	192	binary
0-255	gun depth 4	1	193	binary
0-255	gun depth 5	1	194	binary
0-255	gun depth 6	1	195	binary
0-255	gun depth 7	1	196	binary
0-255	gun depth 8	1	197	binary
0-255	gun depth 9	1	198	binary
0-255	gun depth 10	1	209	binary
0-255	gun depth 11	1	200	binary
0-255	gun depth 12	1	201	binary
0-255	gun depth 13	1	202	binary
0-255	gun depth 14	1	203	binary
0-255	gun depth 15	1	204	binary
0-255	gun depth 16	1	205	binary
0-255	gun depth 17	1	206	binary
0-255	gun depth 18	1	207	binary
0-255	gun depth 19	1	208	binary
0-255	gun depth 20	1	209	binary
0-255	checksum	1	210	binary

The following bytes represent the extended navblock information (Streamer Data)

Data	Description	N Bytes	Position	Type
0 - 9999	Number of bytes in extended navblock	4	211 - 214	ascii
24 hour format: hh:mm:ss	Digicourse time	8	215 - 222	ascii
0 - 99999	Event number?	5	223 - 227	ascii

Data	Description	N Bytes	Position	Type
Compass Data				
0 - 32 (inclusive)	Number of compasses	2	228 - 229	ascii
C/c	compass status (C=good, c = bad)	1		ascii
0 -31	compass unit number	2		ascii
0 - 3599	heading (tenths of degree)	4		ascii
Depth Sensors				
0 - 63	Number of Depth Sensors	2		ascii
D/d	Depth Sensor Status	1		ascii
T/t	Temperature Sensor Status	1		ascii
0 -62	Unit number	2		ascii
0 - 6096 centimeters	Depth	4		ascii
0 - 80	Temperature (tenths of Celsius)	2		ascii
Birds				
0 - 64	Number of Birds	2		ascii
B/b	Bird Status	1		ascii
T/t	Temp status	1		ascii
0 - 63	unit number	2		ascii
0 - 6096	Depth (centimeters)	4		ascii
0 - 37	Fin Angle (tenths of degree)	2		ascii
0 - 80	Temperature (tenths of celsius)	2		ascii

Tape Contents

- *EW0008.pdf*
  this cruise report (Adobe Acrobat 3 PDF file)
- *ew0008.cdf*
  final one-minute processed data tied to navigation (NetCDF files) for LDEO MG&G database
- *ew0008.cdf_nav*
  final one-minute processed navigation only (NetCDF files) for LDEO MG&G database
- *processed/*
  final processed data tied to navigation (daily files) plus track plots.
- *raw/*
  original logged data (daily files)
- *reduction/*
  intermediate processed data (daily files), including daily PS plots of various reduction parameters: gravity plots, magnetics plots, hydrosweep centerbeam, etc. These postscript plots can be found for each day in the directories *d**jjj**.ps/*, where ***jjj*** is the julian day.