Lamont-Doherty Earth Observatory
Office of Marine Affairs
61 Route 9W
Palisades, NY 10964
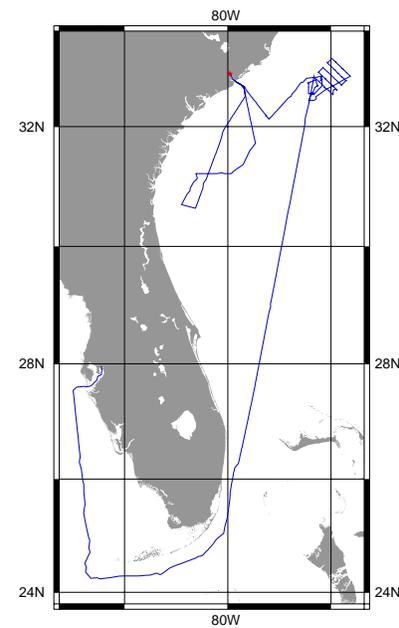
R/V Maurice Ewing Data Reduction Summary
EW-0101

Tampa, FL to Charleston, SC

Port Dates

Date	Julian	Time	Port
February 11, 2001	040	12:50	Tampa, FL
February 20, 2001	229	20:00	Charleston, SC

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Project Summary

LWAD - Littoral Warfare Advanced Development

This details the first Littoral Warfare Advanced Development (LWAD) experiment of 2001 (LWAD 01-1). LWAD 01-1 is a system concept validation test in support of the following projects:

1. ONR's Multipulse™ Air Gun testing of submarine detection/tracking capability.

2. NAWC's LWSS prototype detection performance capabilities testing.

3. NAVAIR (PMA 264) / NAWC's Beartrap Environmental Characterization.

Assets for LWAD 01-1 include two surface research ships, an underwater Target, a US Navy P-3C and a NAWC P-3C. LWAD 01-1 will take place in February 2001, off the east coast of North Carolina/South Carolina, in the northwest Atlantic Ocean.

Ship Staff

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Initial Setup

This was the first cruise after a 5 month layup period, so there were bound to be some problems; however most of the problems were pretty small and were taken care of within the first two days.

There were some initial problems getting hydrosweep running properly, which turned out to be that someone had switched off the power to one of the main circuits necessary for the hydrosweep to boot up.

The time synchronization with the Datum UTC clock wasn't running properly for the first 2 days, but the time should have been within 1 second of UTC time at all times during the cruise.

Hydrosweep

The beginning of the cruise saw major problems with Hydrosweep, which Joe managed to get working after about 48 hours at sea by performing some hardware replacements.

Weather probably affected the quality of the data initially, but ths seas were calm for most of the cruise, so the data should be fairly good. According to mbinfo, there were generally very few dropped beams.

Data Losses

There were several periods where data was lost due to the lack of wachstanders to keep watch of our normal logging processes, but at no time did we lose data that had no backup system (with the exception of time synchronization in the beginning of the cruise.)

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
040:21:01:30	Datum Time synchronization began
040:21:26:30	Datum lost synchronization
043:00:00:30	Datum regains synchronization
051:23:39	End data logging

GPS Receivers

Trimble Tasman Y-Code (Primary)

Trimble NT200D (Secondary)

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.

Instrument	Date	Comment
Trimble NT200 (gp02)	044:22:44:27	Lost GPS due to replacement of antenna
Trimble NT200(gp02)	049:01:41:51	Regained GPS

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, as well as the ship *pitlog*. 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.

The Furuno was turned off intermittently during the cruise in order to use the AWARE sonar system.

The following table lists all times during the cruise that the furuno was disconnected for more than 60 seconds

Furuno Data Gap (seconds)	Start of Gap	End of Gap
3662.65	2001+040:17:25:43.417	2001+040:18:26:46.069
1473.58	2001+040:18:27:16.035	2001+040:18:51:49.624
2004.60	2001+041:18:48:28.513	2001+041:19:21:53.117
255.55	2001+041:19:21:55.857	2001+041:19:26:11.408
69.03	2001+041:19:26:14.429	2001+041:19:27:23.463
68.99	2001+041:19:27:41.526	2001+041:19:28:50.520
1097.30	2001+042:00:01:58.608	2001+042:00:20:15.912
62.89	2001+042:00:21:27.886	2001+042:00:22:30.778
116.08	2001+042:00:23:51.919	2001+042:00:25:48.008
159.02	2001+042:07:56:05.107	2001+042:07:58:44.129
60.22	2001+042:08:03:23.199	2001+042:08:04:23.422
75.01	2001+042:08:04:26.202	2001+042:08:05:41.217
210.04	2001+042:08:09:26.262	2001+042:08:12:56.309
759.14	2001+042:08:13:14.292	2001+042:08:25:53.438
303.04	2001+042:08:25:56.459	2001+042:08:30:59.504
84.01	2001+042:08:32:11.519	2001+042:08:33:35.535
147.24	2001+042:08:33:44.537	2001+042:08:36:11.786
465.29	2001+042:08:36:32.570	2001+042:08:44:17.863
237.05	2001+042:08:44:20.644	2001+042:08:48:17.701
324.05	2001+042:08:48:29.903	2001+042:08:53:53.958
7181.33	2001+042:09:23:03.096	2001+042:11:22:44.436
69.01	2001+042:11:22:44.436	2001+042:11:23:53.455
435.08	2001+042:11:23:53.455	2001+042:11:31:08.536
399.08	2001+042:11:31:14.538	2001+042:11:37:53.627
738.15	2001+042:11:38:05.609	2001+042:11:50:23.766
69.03	2001+042:11:51:14.761	2001+042:11:52:23.795
81.01	2001+042:11:57:02.836	2001+042:11:58:23.852
63.01	2001+042:12:01:59.880	2001+042:12:03:02.892
168.05	2001+042:12:17:20.988	2001+042:12:20:09.047
792.24	2001+042:12:57:12.429	2001+042:13:10:24.672
526.05	2001+042:13:13:36.615	2001+042:13:22:22.665
1851.55	2001+042:13:22:40.789	2001+042:13:53:32.342
569.00	2001+042:17:35:12.020	2001+042:17:44:41.028
5901.23	2001+044:14:24:20.112	2001+044:16:02:41.342
1344.45	2001+045:13:16:04.885	2001+045:13:38:29.343
362.36	2001+045:15:59:20.129	2001+045:16:05:22.491

Furuno Data Gap (seconds)	Start of Gap	End of Gap
1030.96	2001+045:16:07:40.163	2001+045:16:24:51.129
1460.10	2001+045:17:39:36.279	2001+045:18:03:56.380
480.26	2001+045:18:12:38.505	2001+045:18:20:38.765
693.83	2001+045:18:23:14.767	2001+045:18:34:48.605
2749.73	2001+047:18:51:17.333	2001+047:19:37:07.071
19406.56	2001+049:03:02:09.266	2001+049:08:25:35.835
1140.54	2001+049:09:08:59.846	2001+049:09:28:00.395
71.83	2001+049:11:09:42.559	2001+049:11:10:54.394

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
042:15:25:18	HS Logging started
051:19:18:45	

Weather Station

R.M. Young Precision Meteorological Instruments; 26700 series

The weather station is used to log wind speed, direction, air temperature, and barometric pressure at 1-minute intervals.

Since the Furuno is used to determine the ship's gyro heading, when the Furuno is turned off, true wind direction and speed is calculated using the last known speed and heading, thus is probably incorrect for those times!

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.

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

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	East	Smooth Velocity North	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 | Instant | Bird 1 Wind Speed | | |
				60secAvg	60minAvg	60secMax
2000+175:01:49:00.288	17.5	62	19.6	21.3	24.6	29.3

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

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

| | Temperature | | |
Current	60minAvg	60minMin	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.

CD Contents

- *EW0101.pdf*
  this cruise report (Adobe Acrobat 4 PDF file)
- *docs/*
  file formats
- *processed/*
  final processed data tied to navigation (daily files) plus track plots.
- *raw/*
  original logged data (daily files)

Tape Contents

- EW0101.pdf
  this cruise report (Adobe Acrobat 4 PDF file)
- docs
  file formats
- processed
  data merged with navigation and track plots
- raw
  original logged data including hydrosweep and chirp sonar
- reduction
  internediate processing files