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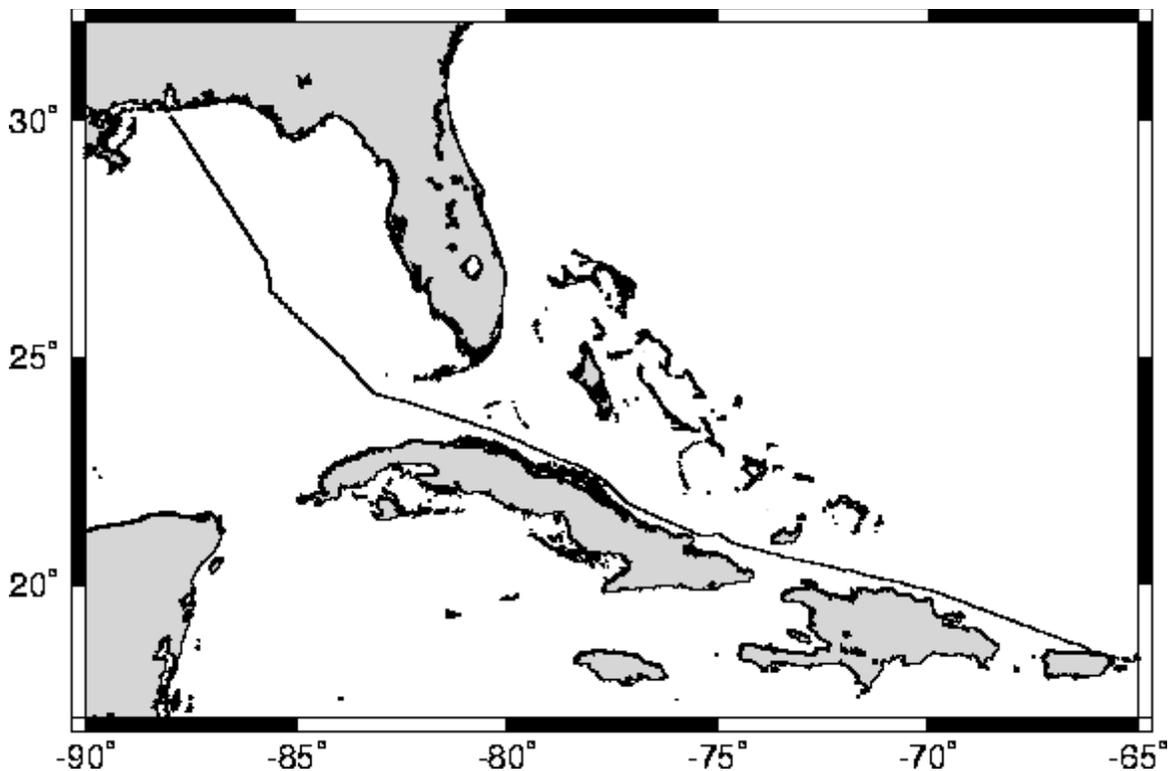
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R/V Maurice Ewing Data Reduction Summary

EW0403 Mobile, AL – San Juan, PR

Date	Julian Date	Time	Port
April 7, 2004	98	12:00 UTC	Mobile, AL
April 13, 2004	104	21:00 UTC	San Juan, PR



Project Summary

DESCRIPTION

Background and Scientific Objectives

This leg was a transit. Our goals were to train new science support staff, shake down instruments in preparation for upcoming MCS work, and conduct a roll bias test of the DS2.

Cruise Members

Science Party

(none)

Ship's Science

Ted Koczynski	Science Officer	sci@ewing.ldeo.columbia.edu
John Collins	Science Officer (<i>in training</i>)	collins@ewing.ldeo.columbia.edu
Robert Arko	Systems Manager	arko@ldeo.columbia.edu
Anthony Johnson	Systems Manager (<i>in training</i>)	ajohnson@ldeo.columbia.edu
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Carlos Gutierrez	Gunner	carlosgu@ewing.ldeo.columbia.edu
Chad Robinson	Gunner (<i>in training</i>)	chad@ewing.ldeo.columbia.edu

Ship Crew

Mark Landow	Master	captain@ewing.ldeo.columbia.edu
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Amie Carter	3 rd A/Engineer	carter@ewing.ldeo.columbia.edu

Cruise Notes

All data in this report is logged using GMT time and Julian days in order to avoid confusion with local time changes.

Hydrosweep

Hydrosweep operated throughout the cruise. A roll bias test was conducted on day 099 in the Gulf of Mexico, including a XBT cast to install a new sound velocity profile. The test data were ftp'd to shore for immediate analysis by Dale Chayes and Val Schmidt at LDEO. Hydrosweep is judged to be performing well, and plans for a second test were cancelled.

Gravity

The Gravimeter for this cruise was a loaner from NAVOCEANO. Our meter recently returned from Lockheed following repair but has not been swapped in yet. A block of test data was collected simultaneously from both meters on days 100–102 in order to compare them, and sent to Joe Stennett at LDEO for evaluation.

A gravity tie was taken on day 097 in Mobile AL.

Magnetics

The Magnetometer was operated on days 099 –101 for testing, judged to be performing well, then stowed for the remainder of the cruise.

Navigation

Navigation operated normally.

Time

Timing operated normally.

Spectra

Various system testing was done, but no data were collected.

Data Logging

The R/V Maurice Ewing data logging system is run on a Sparc Ultra Enterprise Server. Attached are 48 serial ports via 3 16-port Digi International SCSI Terminal Servers. Generally, all data logged by the Ewing Data Acquisition System (DAS) is time stamped with the CPU time of the server, and broadcast to the Ewing network using UDP packet broadcasts. The CPU time of the server is synchronized once every half hour to a Datum UTC gps time clock.

GPS times are also time-tagged with cpu time, although the time of the GPS position is from the GPS fix itself.

The following tables describe the data instruments which performed logging during this cruise. The tables associated with the instruments describe logging periods and data losses for that instrument.

Time Reference

Datum StarTime 9390-1000

logging interval: 30 minutes
file id: tr2

Used as the visual UTC reference on top of the computer racks.

This clock was running and synchronizing the system the entire cruise.

Interruptions greater than 30 minutes are displayed in the following table

Log Date	LogDate	Comment
2004+098 18:00		Logging officially started
2004+104 21:00		Logging officially ends

JOETIME

logging interval: 30 minutes
file id: tr3

Used as the CPU synchronization clock. This clock is polled once every half hour to synchronize the CPU clock of the data logger to UTC time. The logger (octopus) is responsible for updating the times of the other CPUs.

This clock was running and synchronizing the system the entire cruise.

Interruptions greater than 30 minutes are displayed in the following table

Log Date	LogDate	Comment
2004+098 18:00		Logging officially started
2004+099 14:03		lost GPSxx and RT Nav; time daemon restarted on octopus
2004+104 21:00		Logging officially ends

GPS Receivers

GPS data is usually logged at 1 – 2 second intervals. The NMEA strings GPGGA and GPVTG are logged for position, speed, and heading fixes. This data was logged constantly throughout the cruise.

Trimble Tasmon P/Y Code Receiver

logging interval: 10 seconds
file id: gp1

The Tasmon is the primary GPS receiver for the Ewing Logging system and the primary GPS for Spectra fixes. The accuracy is around 15 meters. There were no interruptions during this cruise.

Interruptions greater than 10 minutes are displayed in the following table

Log Date	LogDate	Comment
2004+098 18:00		Logging officially started
2004+104 21:00		Logging Ends

Trimble NT300D

logging interval: 2 seconds
file id: gp2

The Trimble is the secondary receiver for GPS data. Data is logged at 2 second intervals and is also used as an input to Spectra, although it is weighed at a lower value than the Tasmon receiver.

Interruptions greater than 10 minutes are displayed in the following table

Log Date	LogDate	Comment
2004+098 18:05		Logging officially started
2004+104 21:00		Logging Ends

C-Nav

logging interval: 2 seconds
file id: gp3

The C-Nav is a global satellite-based differential receiver. This is the best individual receiver currently on the ship.

Interruptions greater than 10 minutes are displayed in the following table

Log Date	LogDate	Comment
2004+098 18:00		Logging officially started
2004+104 21:00		Logging Ends

POS/MV

logging interval: 1 second
file id: gp4

The POS/MV is a receiver which uses C-Nav input, its own antennae, an inertial sensor, and optional RTCM corrections (when available) and a kalman filter to produce a smooth nav output and very accurate heading. As of June 2003 it is used as the primary GPS for Hydrosweep, as an input to Spectra, and can be used as the gps for reduction processing. With the C-Nav auxiliary input, this is the most accurate receiver on the ship.

Interruptions greater than 10 minutes are displayed in the following table

Log Date	LogDate	Comment
2004+098 18:00		Logging officially started
2004+104 21:00		Logging Ends

Speed and Heading

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

logging interval: 6 seconds
file id: fu

The Furuno and Gyro are combined to output speed, heading and course information to a raw Furuno file, as well as an NMEA VDVHW signal used as an input to various systems including steering and Spectra.

Interruptions greater than 30 minutes are displayed in the following table

Log Date	Log Date	Comment
2004+098 18:00		Official start date
2004+098 23:11		lost Furuno; defaulted to GT at shelf break
2004+099 01:07		regained Furuno
2004+104 21:00		Official end date

Magnetics

Varian V-75 Magnetometer

logging interval: 12 seconds
file id: mg

Log Date	Log Date	Comment
2004+098 18:00		Official start date
2004+099 00:15		started Mag
2004+101 23:45		interrupted Mag for ET work
2004+102 19:04		pulled up Mag and stowed
2004+104 21:00		Official end time

Gravity

Bell Aerospace BGM-3 Marine Gravity Meter System

logging interval: 1 second
file id: vc. (raw), vt. (processed)
drift per day: -0.205

The BGM consists of a forced feedback accelerometer mounted on a gyro stabilized platform. The gravity meter outputs raw counts approximately once per second which are logged and processed to provide real-time gravity displays during the course of the cruise as well as adjusted gravity data at the end of the cruise.

Interruptions greater than 10 minutes are displayed in the following table

Log Date	Log Date	Comment
2004+098 18:00		Official start date
2004+104 21:00		Official end time

Bathymetry

Krupp Atlas Hydrosweep-DS2

logging interval: variable based on water depth
file id: hb (centerbeam), hs (swath)

The hydrosweep full swath data is continuously logged for every cruise, and centerbeam data is extracted and processed separately. The centerbeam operates at a logging frequency dependent on the water depth.

The full swath data is not routinely processed, but can be processed with the MB-System software which can be downloaded for free. For instructions, use the website: <http://www.ldeo.columbia.edu/MB-System>.

MBSsystem, version 5.0beta3 is necessary to process data after June 1, 2001.

Interruptions greater than 10 minutes are displayed in the following table

Log Date	LogDate	Comment
2004+098 18:00		Official start logging
2004+099 14:43		interrupt on accidental reboot

Log Date	LogDate	Comment
2004+099 18:18		BIAS TEST: start pass 1
2004+099 19:03		BIAS TEST: end pass 1
2004+099 19:32		BIAS TEST: start pass 2
2004+099 20:17		BIAS TEST: end pass 2
2004+099 20:26		BIAS TEST: start pass 3
2004+099 21:21		BIAS TEST: end pass 3
2004+103 06:02		lost DS2; failed transition to Deep Sea mode at 4000m
2004+103 09:28		regained DS2
2004+103 11:41		lost DS2
2004+103 12:43		regained DS2
2004+104 21:00		Official end logging

Weather Station

RM Young Precision Meteorological Instruments, 26700 series

logging interval: 1 minute
file id: wx

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

Log Date	LogDate	Comment
2004+098 18:00		Official start logging
2004+100 18:39		interrupt while ETs work on weather vane
2004+104 21:00		Official end logging

Gravity Ties

Land gravity readings were taken in Mobile, AL on day 2004–097 by Ted Koczynski and Anthony Johnson using the portable L&R but a complete gravity tie was not made.

17:00 CST	29688.50	30 40.80 N 85 02.01 W	at Marine Atlantic pier (+1.5m main deck)
19:30 CST	29517.35	30 42.99 N 88 01.74 W	at MOB airport (+2.0m old airport reference)
	29517.71	(repeat)	
	29518.00	(repeat)	
	29517.89	(repeat)	

File Formats

For all formats, a – in the time field means an invalid value for some reason.

Streamer Compass/Bird Data

cb.r

This data is not processed, but can still be found in the "processed" data directory.

```
Shot Time      Line   Shot   Latitude   Longitude
2000+079:00:08:40.085  strike1 000296  N 15 49.6217 W 060 19.8019

2nd GPS Position                               Tailbuoy Position
Latitude   Longitude                               Latitude   Longitude
N 15 49.6189 W 060 19.8101   N 15 47.1234 W 060 20.1901

Furuno Streamer
Gyro   Compasses & Heading
344.1      C01 2.3 C02 1.7 ...
```

Gun Depths

dg

Gun depths in tenths of meters. There will always be 20 gundepths even if only one gun was configured and shooting.

```
Shot Time      Gun Depths
                  1  2  3  4  5  6  7  8  9  ... 20
2001+089:06:47:05.909 189 068 005 005 096 005 060 054 005 ... 6
```

Raw Furuno Log

fu.s

This data has been smoothed and output 1 fix per minute.

```
CPU Time Stamp   Track Speed Hdg   Gyro
2000+166:00:01:53.091 -      4.4   140.5 148.3
```

Hydrosweep Centerbeam

hb.n

Hydrosweep data merged with navigation

```
CPU Time Stamp   Latitude Centerbeam Longitude Depth
2000+074:09:55:00.000 N 13 6.6206   W 59 39.3908 134.9
```

Merged Data

m

```
CPU Time Stamp   Latitude   Longitude   GPS
                  Used Set Drift Depth
2000+200:12:25:00.000 N 45 54.1583 W 42 47.1770   gp1  0.0  0.0

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
```

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

Temperature, Salinity and Conductivity will only be valid while logging a Thermosalinograph, which is not usually the case.

Magnetics Data

mg.n

- A minus sign in the time stamp is flagged as a spike point, probably noise...
- Anomaly is based on the International Geomagnetic Reference Field revision 2000

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

Navigation File

n

CPU Time Stamp	Latitude	Longitude	Used	Set	Drift
2000+074:00:03:00.000	N 13 6.2214	W 59 37.9399	gp1	0.0	0.0

Navigation Block

nb0

Navigation is a compendium of Ewing logged data at shot time. The shot position here is the shot position from the Spectra system.

Shot Time	Shot #	CPU Time	Shot Position
2001+088:00:00:00.606	016967	2001+088:00:00:03.031	N 30 11.8324 W 042 10.8162

Water Depth	Sea Temp	Wind Spd	Wind Dir	Tailbuoy Latitude	Tailbuoy Longitude	Line Range	Bearg Name	Speed	Heading
2565.1	20.7	16.4	164	N 30 12.0427	W 042 14.7319	6296.3	93.5 MEG-10	4.2	101.1

Tailbuoy Navigation

tb1.c

Raw tailbuoy fixes

CPU Time Stamp	Latitude	Longitude	GPS Precision
2001+088:00:00:02.000	N 30 12.0424	W 042 14.7309	SA

GPS Precision is either SA, DIFF or PCODE

Ewing Processed Shot Times

ts.n

Shot times and positions based on the Ewing navigation data processing

CPU Time Stamp	Shot #	Latitude	Longitude	Line Name
2000+079:00:08:01.507	000295	N 15 49.5703	W 060 19.7843	strikel

Shot Data Status

ts.n.status

The ts.nxxx.status file describes the line information for that day, giving some basic statistics about the line: start, end times; missing shots; start and end shots.

```
LINE strikel: 98+079:00:00:15.568 : 000283 .. 002286
      MISSING: 347, 410, 1727
```

```
LINE dip2: 98+079:23:05:22.899 : 000002 .. 000151
```

This example says that on Julian Day 079 of 1998, two lines (strikel and dip2) were run: the end of strike 1 (shots 000283 to 002286) and the start of dip2 (shots 000002 to 000151).

Line strikel had some missing shots in the data file (probably missing on the SEG-d header as well).

Spectra Shot Times

nb2.r

The shot times and positions based on the Spectra positioning; with raw tailbuoy range and bearing.

```
CPU Time Stamp      Shot # Latitude      Longitude      Line Name
2001+084:00:00:05.924 009245 N 23 31.2410 W 045 25.0894

                Tailbuoy
Latitude      Longitude      Range Bearing Line Name
N 23 30.4540 W 045 21.4338 6389.8 283.2      KANE-4
```

Raw Gravity Counts

vc.r

sample BGM-3 gravity count record (without time tag):

pp:dddddd ss

```
| | | _____ status: 00 = No DNV error; 01 = Platform DNV
| | |                02 = Sensor DNV; 03 = Both DNV's
| | | _____ count typically 025000 or 250000
| _____ counting interval, 01 or 10
|
The input of data can be at 1 or 10 seconds.
```

Gravity Data

vt.n

- * A minus sign in the time stamp is flagged as a spike point
- * m_grv3 calculates the Eotvos correction as:
$$\text{eotvos_corr} = 7.5038 * \text{vel_east} * \cos(\text{lat}) + .004154 * \text{vel} * \text{vel}$$
- * The theoretical gravity value is based upon different models for the earth's shape.
 - 1930 = 1930 International Gravity Formula
 - 1967 = 1967 Geodetic Reference System Formula
 - 1980 = 1980 Gravity Formula
- * The FAA is computed as:
$$\text{faa} = \text{corrected_grv} - \text{theoretical_grv}$$
- * Velocity smoothing is performed w/ a 5 point window

```
CPU Time Stamp      Latitude      Longitude      Model FAA      RAW
2000+148:00:10:00.000 N 09 34.7255 W 085 38.5826 1980 9.48 978264.16

Eotvos Drift DC Raw Velocity Smooth Velocity
Smooth Total Shift North East North East
-74.78 0.06 4.16 1.875 -10.373 1.927 \10.166
```

Datum Time

ts2.r

```
CPU Time      Datum Time      Time Reference
2001+069:00:15:29.727 069 00 15 29.378 datum
```

Raw GPS

gp[12].d, tb1.d

Raw GPS is in NMEA Format.

Meteorological Data

WX

```

                True
CPU Time Stamp      Spd Dir
2001+045:00:00:00.967  7.8 22

Bird1:
Speed              Direction              Bird 2
Inst 60sA  60mA  60sM  Inst 60sA 60mA          Speed
Inst 60sA  60mA  60sM  Inst 60sA 60mA          Direction
7.8  6.6   8.5   16.8  277  291  5          0.0  0.0  0.0  0.0  0  0  0
Temperature
Inst 60mA  60mm  60mM          Humidity
Inst 60mm  60mM          Barometer
15.0  14.2  14.3  15.1          92  90  93          1027.5

Inst:      Current
60sA:      60 second average
60mA:      60 minute average
60sM:      60 second maximum
60mm:      60 minute minimum
60mM:      60 minute maximum
```

Merged Meteorological Data

mmet

```
TSG, WX, CT merged with Nav at 1 minute fixes
date      time      lat      lon      gpu head spd
2001+244:00:00:00.000  12.14071  44.98469  gp1 10.2 83.0
```

```
tws twd  temp hum  press  cti  cte  con sal  ct
26.5 228.0 30.6 87.0 1000.8 28.8 28.8 5.9 36.3 28.8
```

```
gpu = gps unit in use
head = ship's heading
spd = ship's speed in knots
tws = true wind speed
twd = true wind direction
temp = air temp (celcius)
hum = relative humidity (%)
press= pressure in mb
cti = sea temp from the internal TSG sensor
cte = sea temp from the external TSG sensor
con = conductivity, Siemens/meter
sal = salinity, practical salinity units
ct = sea temp from the C-keel sensor (to tenths of a degree)
```

Tape Contents

EW0403

CruiseReport_EW0403.pdf	This document
ew0403.cdf	NetCDF database file of this cruise
ew0403.cdf_nav	NetCDF database file of this cruise' navigation
XBT/	XBT data
configs/	logging and reduction configs
docs/	File Formats, UKOOA Formats
processed/	Processed datafiles merged with navigation
trackplots/	daily cruise track plots (<i>postscript</i>)
raw/	Raw data directly from logger
reduction/	Reduced data files
clean/	daily processing directory, includes daily
postscript plots of the data	
scripts/	Perl scripts and their friends