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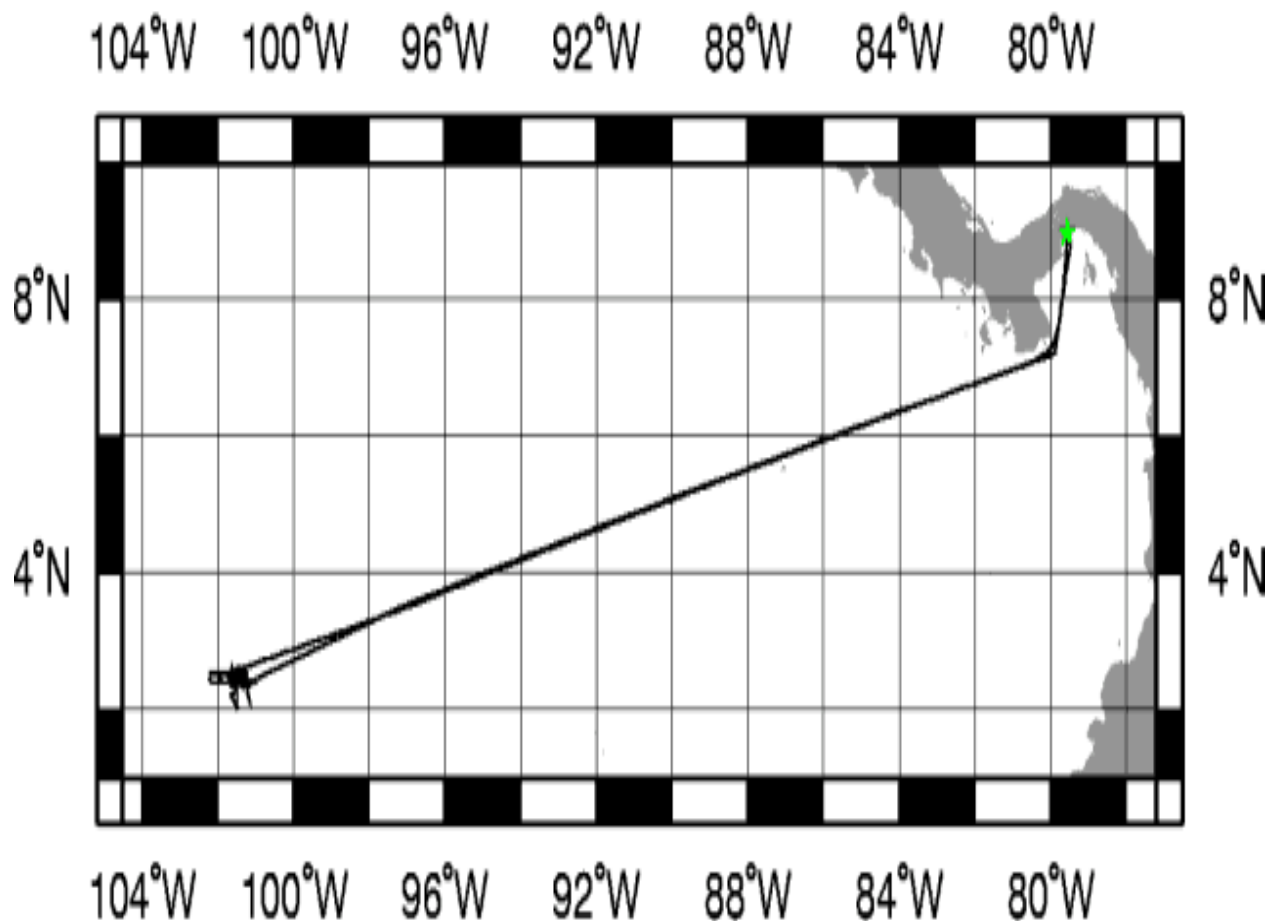
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## R/V Maurice Ewing Data Reduction Summary

EW-0305 Panama City, Panama – Panama City, Panama

Date	Julian Date	Time	Port
July 3, 2003	187	UTC 14:00	Panama City, Panama
July 28, 2003	209	UTC 15:30	Panama City, Panama



# Project Summary

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## *DESCRIPTION*

### **Background and Scientific Objectives**

The Hess Deep seismic program is aimed at correlating the seismic structure with the observed geological structure of the oceanic crust at this location. We plan to collect multi-channel seismic (MCS) profiles along the scarp edge and adjacent plateau. Two of the profiles will be extended to, and across, the East Pacific Rise so that the shallow seismic structure can be continuously mapped from zero-age crust to the tectonic windows where the shallow stratigraphy is exposed. Ocean bottom seismographs (OBS) will be deployed to constrain crustal velocity structure. Primary questions that should be addressed by the seismic experiments include: 1) Is there a correlation between seismic and geologic structure at Hess Deep? 2) Is the seismic structure at Hess Deep typical of fast-spreading crust? 3) What is the evolution of the shallow velocity structure from zero-age rise-axis crust to the 1–2 Ma crust in the study areas?

The planned program will acquire 16 scarp-parallel MCS profiles and 7 scarp-perpendicular MCS profiles. OBSs will be located along 3 of the scarp-parallel profiles, and these lines will be reshot with a longer shot interval in order to minimize previous shot noise.

# Cruise Members

## Science Party

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## Ship's Science

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## Ship Crew

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# Cruise Notes

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

## Gravity

No gravity notes

## Hydrosweep

Hydrosweep was logged the entire way using the vessel–referenced nav and POS/MV heading. A cursory glance suggests that this was some of the best hydrosweep data seen in awhile.

## Magnetics

The maggie was pulled several times due to leaks.

## Navigation

The POS/MV (gp04) was used as the vessel reference for the entire cruise. The use of the POS/MV for the daily reduction means that the final nav is all vessel–referenced. Hydrosweep and SEGD/Y tape headers are also vessel referenced. ts.n shot files are vessel–referenced with the position calculated by Spectra.

## Time

no notes

# Data Logging

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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 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.

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## Time Reference

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### Datum StarTime 9390-1000

**logging interval:** 30 minutes  
**file id:** tr2

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.

*Interruptions greater than 30 minutes are displayed in the following table*

Log Date	LogDate	Comment
2003+187:00:00:00.712		Logging officially started
2003+209:21:35:30.031		Logging officially ends

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## GPS Receivers

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GPS data is usually logged at 10 second intervals. The NMEA strings GPGGA and GPVTG are logged for position, speed, and heading fixes. This data was logged constantly throughout the cruise.

The Tasmon GPS was the primary GPS for this cruise.

#### Trimble Tasmon P/Y Code Receiver

**logging interval:** 2 seconds  
**file id:** gp1

The Tasmon is no longer the primary gps. The accuracy is around 15 meters.

*Interruptions greater than 10 minutes are displayed in the following table*

Log Date	LogDate	Comment
2003+187:01:36:38.002		Logging officially started
2003+199:16:10:50.709	2003+199:17:14:40.404	
2003+209:15:49:31.093		Logging officially 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.

*Interruptions greater than 10 minutes are displayed in the following table*

Log Date	LogDate	Comment
2003+187:01:37:23.317		Logging officially started
2003+209:15:49:30.546		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
2003+187:01:36:50.636		Logging officially started
2003+204:03:41:31.636	2003+207:02:34:38.531	
2003+209:15:49:31.626		Logging Ends

#### POS/MV

**logging interval:** 1 seconds  
**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
2003+187:01:39:10.717		Logging officially started
2003+209:15:49:31.780		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
2003+187:01:37:09.116		Official start date
2003+209:15:49:29.493		Official end date

## Gravity

### Bell Aerospace BGM-3 Marine Gravity Meter System

**logging interval:** 1 second  
**file id:** vc. (raw), vt. (processed)  
**drift per day:** 0.019

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
2003+187:01:37:47.096		Official start date
2003+209:15:49:31.093		Official end time



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## Bathymetry

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### 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>.

MBSYSTEM, 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
2003+187:01:40:28.000		Official start logging
2003+209:15:50:01.000		Official end logging

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## Weather Station

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### 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
2003+187:01:38:23.940		Official start logging
2003+209:15:49:00.820		Official end logging

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## Magnetics

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### Varian Magnetometer

**logging interval:** 12 seconds  
**file id:** mg

*The following table shows the times the magnetometer was logging*

<b>Log Date</b>	<b>LogDate</b>	<b>Comment</b>
2003+188:18:08:47.092	2003+188:21:35:02.358	Official start logging
2003+193:21:20:39.668	2003+194:06:01:02.558	
2003+194:15:29:05.122	2003+194:15:34:40.119	
2003+195:03:24:31.505	2003+196:21:08:14.595	
2003+196:23:50:27.492	2003+197:12:19:48.032	
2003+197:14:49:27.250	2003+198:15:50:33.148	
2003+198:16:03:37.115	2003+198:16:03:53.115	
2003+198:19:58:18.931	2003+202:05:48:13.019	Official end logging

# Gravity Ties

## LOCATION 1

### EW0304 Balboa, Panama

Pier/Ship	Latitude	Longitude
	30 21.330 N	089 05.555 W
Pier 15, Balboa container terminal		
Reference	Latitude	Longitude
	8 57.325N	079 33.934W
Used tie from March 1995, between two nearby known reference points with low deviation between them.		

	Id	Julian	Date	Mistie	Drift/Day	Prev Mistie
Pre Cruise	EW0302	143	23. May 03	25.76	0.74	0.00
Post Cruise	EW0304	186	05. Jul 03	24.64	-0.026	0.00
Total Days			43.00	-1.12		

Time	Entry	Value	
17:35:00	CDeck Level BELOW Pier	6.00	
16:00:00	Pier 1 L&R Value	0.00	L&R
17:35:00	Reference L&R Value	0.00	L&R
17:45:00	Pier 2 L&R Value	0.00	L&R
	Reference Gravity	978223.50	mGals
	Gravity Meter Value (BGM Reading)	978251.70	mGals
	Needs Potsdam Correction	0	1 if Potsdam referenced

Gravity meter is 5.5 meters below CDeck

Difference in meters between Gravity Meter and Pier	11.50	meters
Height Cor = Pier Height* FAA Constant	11.50	0.31
		3.57 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]	IGSN-71 Referenced Pier
978223.50	0.00
0.00	978223.50 mGals

#### Gravity in mGals at Meter

Pier Gravity+ Height Correction	Gravity@meter
978223.50	3.57
	978227.07 mGals

#### Current Mistie

BGM Reading	Calculated Gravity	Current Mistie
978251.70	978227.07	
		24.64 mGals

# Gravity Ties

Location 2

## EW0305 Balboa, Panama

Pier/Ship	Latitude	Longitude
	08 57.011 N	079 34.017 W
Pier 7, Balboa container terminal		
Reference	Latitude	Longitude
	8 57.325 N	079 33.934 W
Used tie from March 1995, between two nearby known reference points with low deviation between them.		

	Id	Julian	Date	Mistie	Drift/Day	Prev Mistie
Pre Cruise	EW0304	186	05. Jul 03	24.64	-0.03	0.00
Post Cruise	EW0305	209	28. Jul 03	30.32	0.247	0.00
Total Days			23.00	5.68		

Time	Entry	Value	
17:35:00	CDeck Level BELOW Pier	2.50	
16:00:00	Pier 1 L&R Value	0.00	L&R
17:35:00	Reference L&R Value	0.00	L&R
17:45:00	Pier 2 L&R Value	0.00	L&R
	Reference Gravity	978223.50	mGals
	Gravity Meter Value (BGM Reading)	978256.30	mGals
	Needs Potsdam Correction	0	1 if Potsdam referenced

Gravity meter is 5.5 meters below CDeck

Difference in meters between Gravity Meter and Pier	8.00	meters
Height Cor = Pier Height* FAA Constant	8.00	0.31
		2.48
		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]	IGSN-71 Referenced Pier (
978223.50	0.00
0.00	978223.50
	mgals

Gravity in mGals at Meter

Pier Gravity+ Height Correction	Gravity@meter
978223.50	2.48
	978225.98
	mGals

Current Mistie

BGM Reading	Calculated Gravity	Current Mistie
978256.30	978225.98	30.32
		mGals

# File Formats

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

## 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 Total Intensity	Anomaly	Gravity 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

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

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## Meteorological Data

WX

```

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

Bird1:
Speed              Direction
Inst 60sA  60mA  60sM  Inst 60sA 60mA
7.8   6.6   8.5   16.8  277  291  5

Bird 2
Speed              Direction
Inst 60sA  60mA  60sM  Inst 60sA 60mA
0.0   0.0   0.0   0.0   0    0    0

Temperature        Humidity
Inst 60mA  60mm  60mM  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
```

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## 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)
```

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# Tape Contents

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## EW0305/

EW0305.pdf	this document
ew0305.cdf	NetCDF database file of this cruise
ew0305.cdf_nav	NetCDF database file of this cruise' navigation
0305offset.pdf	R/V Ewing offsets
configs/	Ewing data system logging and reduction configuration files
docs/	File Formats
hs_data/	Raw and processed hydrosweep data
mbsystem	Latest MBSystem source
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.
XBT/	XBT data
• spectra/	Spectra P1/P2 files and configs
• mammals/	Marine Mammal sighting files
• waypoints/	Waypoints working directory
•	