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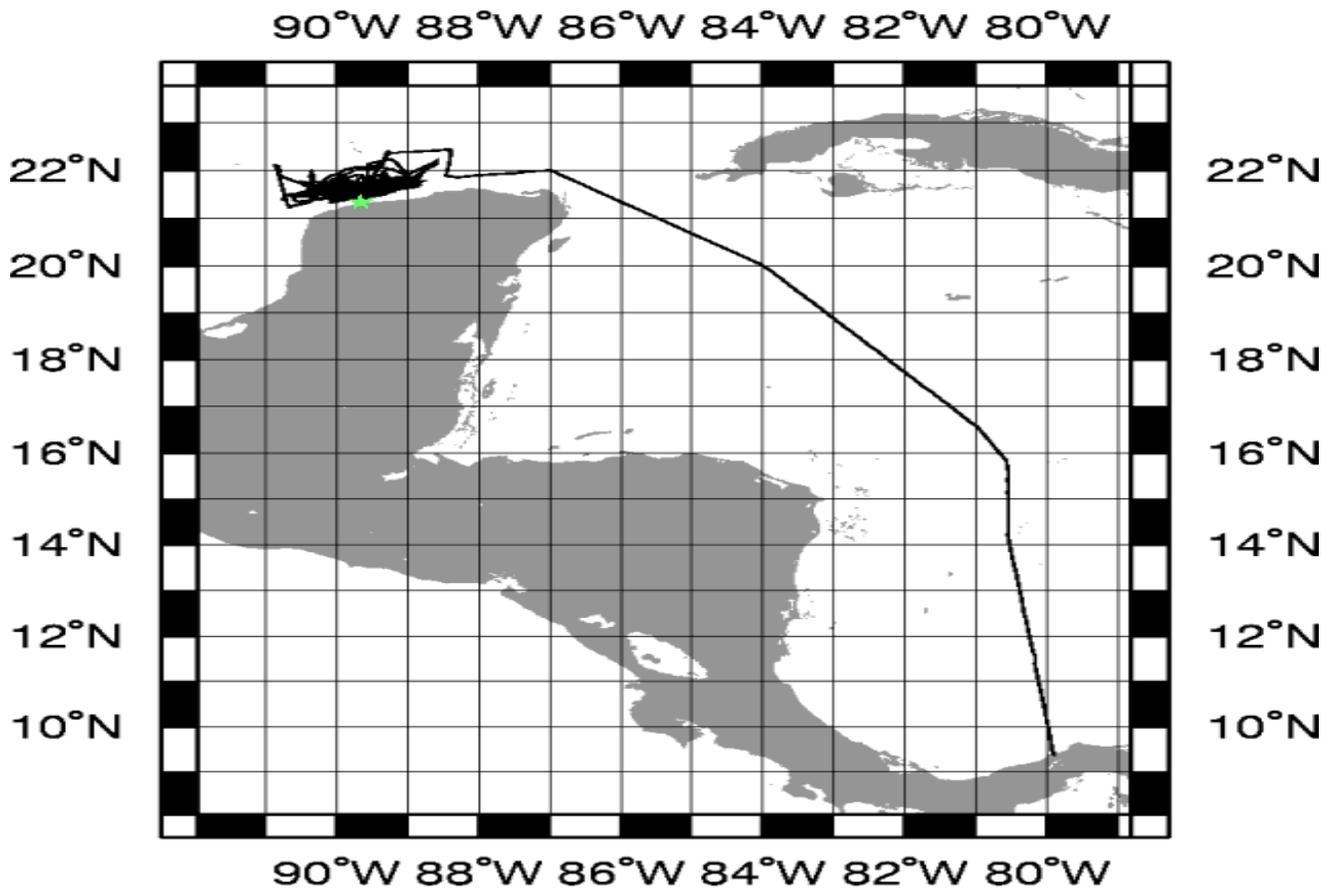
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Prepared on: April 25, 2005

## R/V Maurice Ewing Data Reduction Summary

EW0501 Colon, Panama -- Progresso, Mexico

Date	Julian Date	Time	Port
January 7, 2005	7	14:05:00	Colon, Panama
February	54	22:13:30	Progresso, Mexico



**GMT** 2005 Feb 23 00:54:31 **TO DATE**

# Project Summary

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## *DESCRIPTION*

### **Background and Scientific Objectives**

The cruise objective was to deploy OBSes and the MCS streamer to image the Chicxulub impact crater.

On JD 046, at 0206 UTC, the ship's main sonar pod impacted the ground at 21 24.670 N 90 20.477 W. The seismic equipment was recovered while damage was assessed and the hull was inspected. Operations were resumed on JD 048 at 0630 UTC, only to be halted again on 050 at 0730.

The only instruments affected by the impact were the hydrosweep and the Bathy2000. See the relevant section for details on data interruptions.

#### Note:

The cruise was summarily halted during an unexpected port stay in Progreso, Mexico. Previous, incomplete versions of this report exist.

# Cruise Members

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## Science Party

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Diana Antochiw	Mexican Observer	
Ruben Romero Rojas	Mexican Observer	
Manuel Reyes	Mexican Observer	
Gabriella Portilla	Mexican Observer	
Ernesto Vasquez	Mexican Observer	
Gabriel Gonzalez	Mexican Observer	
Elizabeth Reyes	Mexican Observer	
Juan Carlos Salinas	Mexican Observer	

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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.

## Hydrosweep

The hydrosweep is designed for deeper water, and consistently dropped 75% of the beams while operating near Chicxulub.

## Gravity

The gravimeter performed normally.

## Magnetics

No magnetometer data was collected during the cruise.

## Navigation

The POS/MV (gp4, gp04) exhibited a problem in which incorrect positions were reported. The reported track would veer off from actual, getting progressively worse, until the POS was restarted. The time and duration of these problems is noted below. POS/MV data is incorrect and should not be used for the times listed. This behavior did not affect spectra or the seismic data collection.

Days affected: 014, 020, 028, 035, 042, 049

The processed data directory uses the gps data from gp2 for the affected days.

## Seismic

Seisnet was used throughout the cruise without problems.

Syntrak and the GCS90 operated normally.

The ts files do not reflect shottimes during OBS-only lines, and should not be used. Refer to the shotlog files for shottimes.

## Timing

The ts files do not reflect shottimes during OBS-only lines, and should not be used. Refer to the shotlog files for shottimes.

# 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 to a UTC gps time clock.

GPStimes are also time- tagged with cpu time, although the time of the GPS position is from the GPSfix 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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### Joetime

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

Used as the CPU synchronization clock. This clock is polled once every thirty minutes 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*

<b>Log Date</b>	<b>LogDate</b>	<b>Comment</b>
2005+007:19:35:00		Logging officially started
2005+053:23:59:59		Logging officially ends

---

## GPS Receivers

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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.

The POS/MV with the CNAV GcGPS as an auxiliary input was the primary gps for this cruise.

### Trimble Tasmon P/Y Code Receiver

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

The Tasmon is the auxiliary GPS receiver for the Ewing Logging system and the

auxilliary GPSfor 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*

---

<b>Log Date</b>	<b>LogDate</b>	<b>Comment</b>
2005+007:19:35:00		Logging officially started
2005+053:23:59:59		Logging officially ends

---

### Trimble NT200D

**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*

---

<b>Log Date</b>	<b>LogDate</b>	<b>Comment</b>
2005+007:19:35:00		Logging officially started
2005+053:23:59:59		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*

---

<b>Log Date</b>	<b>LogDate</b>	<b>Comment</b>
2005+007:19:35:00		Logging officially started
2005+053:23:59:59		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 RTG, WTC, or WAAS 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*

---

<b>Log Date</b>	<b>LogDate</b>	<b>Comment</b>
2005+007:19:35:00		Logging officially started

---

Log Date	LogDate	Comment
2005+013:22:36:00	2005+014:00:10:00	Bad position
2005+020:22:36:32	2005+021:00:10:41	Bad position
2005+028:00:11:43	2005+028:01:03:50	Bad position
2005+035:01:04:48	2005+035:03:28:39.341	Bad position
2005+042:03:29:06	2005+042:04:20:21	Bad position
2005+049:04:20:48	2005+049:05:06:52	Bad position
2005+053:23:59:59		Logging Ends

## Speed and Heading

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

**logging interval:** 3 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
2005+007:19:35:00		Official start date
2005+053:23:59:59		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:** 0.018

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
2005+007:19:35:00		Official start date
2005+048:01:48:50	2005+048:01:59:15	Data Interruption

Log Date	Log Date	Comment
2005+053:23:59:59		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>.

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
2005+007:19:35:00		Official start logging
2005+046:04:16:18	2005+046:07:12:55	Shutdown after grounding
2005+046:14:03:59	2005+048:06:07:04	Shutdown for divers
2005+053:23:59:59		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
2005+007:19:35:00		Official start logging
2005+053:23:59:59		Official end logging

# Seismic Line

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There are several files for each line reflecting the line status:

<b>File</b>	<b>Description</b>
ts.n	Shot time is merged with Ewing navigation to determine shot location
nb2.r	Navigation is from Spectra, and includes tailbuoy, tailbuoy range and bearing

# Gravity Ties

Location 1

## EW0412 Balboa, Panama

<b>Pier/Ship</b>	<b>Latitude</b>	<b>Longitude</b>
	18 27.84N	66 06.36W
Pier 2		
<b>Reference</b>	<b>Latitude</b>	<b>Longitude</b>
	18 27.8N	66 05.5W
Cruise Ship terminal		

	Id	Julian	Date	Mistie	Drift/Day	Prev Mistie
<b>Pre Cruise</b>	EW0410	326	04. Nov 04	-5.53	0.15	8.99
<b>Post Cruise</b>	EW0412	357	22. Dec 04	<b>-0.88</b>	<b>0.097</b>	<b>-5.53</b>
<b>Total Days</b>			<b>48.00</b>	<b>4.65</b>		

Time	Entry	Value	
1446	CDeck Level BELOW Pier	2.00	
1446	Pier 1 L&R Value	2332.11	L&R
1446	Reference L&R Value	2334.21	L&R
	Pier 2 L&R Value	2332.11	L&R
	Reference Gravity	978680.69	mGals
	Gravity Meter Value (BGM Reading)	978691.80	mGals
	Potsdam Corrected	1	1 if corrected

Gravity meter is 5.5 meters below CDeck

Difference in meters between Gravity Meter and Pier	2.00	meters
Height Cor = Pier Height* FAA Constant	2.00	0.31
		0.62
		mGals/min

### Difference in mGals between Pier and Gravity Meter

Pier (avg) - Reference * 1.06 L&R/mGal	Delta L&R
2332.11 2334.21 1.06	-2.23
	mGals

### Gravity in mGals at Pierside

Reference + Delta mGals [+ Potsdam]	Pier Gravity
978680.69 -2.23 13.60	978692.06
	mgals

### Gravity in mGals at Meter

Pier Gravity+ Height Correction	Gravity@meter
978692.06 0.62	978692.68
	mGals

### Current Mistie

BGM Reading	Calculated Gravity	Current Mistie
978691.80	978692.68	-0.88
		mGals

## EW0502 Jacksonville, Florida

Pier/Ship	Latitude	Longitude
	30 23.3855	081 32.241
Reference	Latitude	Longitude
	30 23 20.6	081 27 39.9

	Id	Julian	Date	Mistie	Drift/Day	Prev Mistie
Pre Cruise	EW0412	357	22. Dec 04	-0.88	0.06	-5.53
Post Cruise	EW0502	64	05. Mar 05	7.47	0.114	-0.88
Total Days			73.00	8.35		

Time	Entry	Value	
1541	CDeck Level BELOW Pier	1.00	
1541	Pier 1 L&R Value	2987.61	L&R
2106	Reference L&R Value	2984.40	L&R
2200	Pier 2 L&R Value	2987.48	L&R
	Reference Gravity	978680.69	mGals
	Gravity Meter Value (BGM Reading)	978691.80	mGals
	Potsdam Corrected	0	1 if corrected

Gravity meter is 0.0 meters below CDeck

Difference in meters between Gravity Meter and Pier	1.00	meters
Height Cor = Pier Height* FAA Constant	1.00	0.31
		0.31

### Difference in mGals between Pier and Gravity Meter

Pier (avg) - Reference * 1.06 L&R/mGal	2987.55	2984.40	1.06	3.33	mGals
--	---------	---------	------	------	-------

### Gravity in mGals at Pierside

Reference + Delta mGals [+ Potsdam]	978680.69	3.33	0.00	978684.02	mGals
-------------------------------------	-----------	------	------	-----------	-------

### Gravity in mGals at Meter

Pier Gravity+ Height Correction	978684.02	0.31	978684.33	mGals
---------------------------------	-----------	------	-----------	-------

### Current Mistie

BGM Reading	978691.80	978684.33	7.47	mGals
-------------	-----------	-----------	------	-------

# 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      Centerbeam
Latitude 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 Used GPS 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	Centerbeam	Depth
2000+079:00:08:01.507	000295	N 15 49.5703	W 060 19.7843	strikel		2345.6

## 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:

```
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.

## 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                Direction
Inst 60sA  60mA  60sM  Inst 60sA 60mA          Inst 60sA 60mA
7.8  6.6   8.5  16.8  277  291  5          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
```

## 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 gpl 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)
```

## Shot Times from Spectra P1 Files

shots.p1

These files were created with the script: `extract_shots_from_p1 -a 1`

```
Epoch Time  Shot#  Source Lat/Lon      TB Lat      TB Lon
985788741.000 015570 30.283881 -41.854536  30.320144  -41.886642
```

<u>Vessel Ref</u>	<u>Lat/Lon</u>	<u>Antenna GPS</u>	<u>Lat/Lon</u>	<u>Water Depth</u>
30.283478	-41.854117	30.283531	-41.854078	2894.2

- Source is the Center of the Guns
- TB is the Tailbuoy, according to Spectra
- Vessel Ref is the location of the center of the Mast
- Antenna GPS is the location of Antenna 1 (-a 1 flag); in this case is the Tasmon GPS
- Water Depth is the HS Centerbeam depth

## Shot Times from Spectra P2 Files

shots.p2

These files were created with the script: `extract_shots_from_p2 -o "V1 G1"`

<u>Epoch Time</u>	<u>Shot#</u>	<u>Vessel Ref</u>	<u>Lat/Lon</u>	<u>Source</u>	<u>Lat/Lon</u>
985716772.4	00015572	30.282803	-41.866136	30.283207	\41.866540

- Vessel Ref is the location of the center of the Mast
- Source is the Center of the Guns

# Tape Contents

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Tar #1 – EW0501

Bathy2000 data

Tar #2 – EW0501

Cruise_Report_EW0412.pdf	this document
ew0501.cdf	NetCDF database file of this cruise
ew0501.cdf.nav	NetCDF database file of this cruises
navigation	
configs/	Ewing Data System configuration files
docs /	File Formats, Spectra manuals
processed/	Processed datafiles merged with navigation
trackplots/	daily cruise track plots ( <i>postscript</i> )
mbsystem/	Latest MBSsystem source code
raw/	Raw data directly from logger
reduction/	Reduced data files
clean/	daily processing directory,
includes daily	postscript plots of the
data.	