

RV Langseth Data Reduction Summary

MGL1208

Honolulu, HI – Honolulu, HI

FINAL

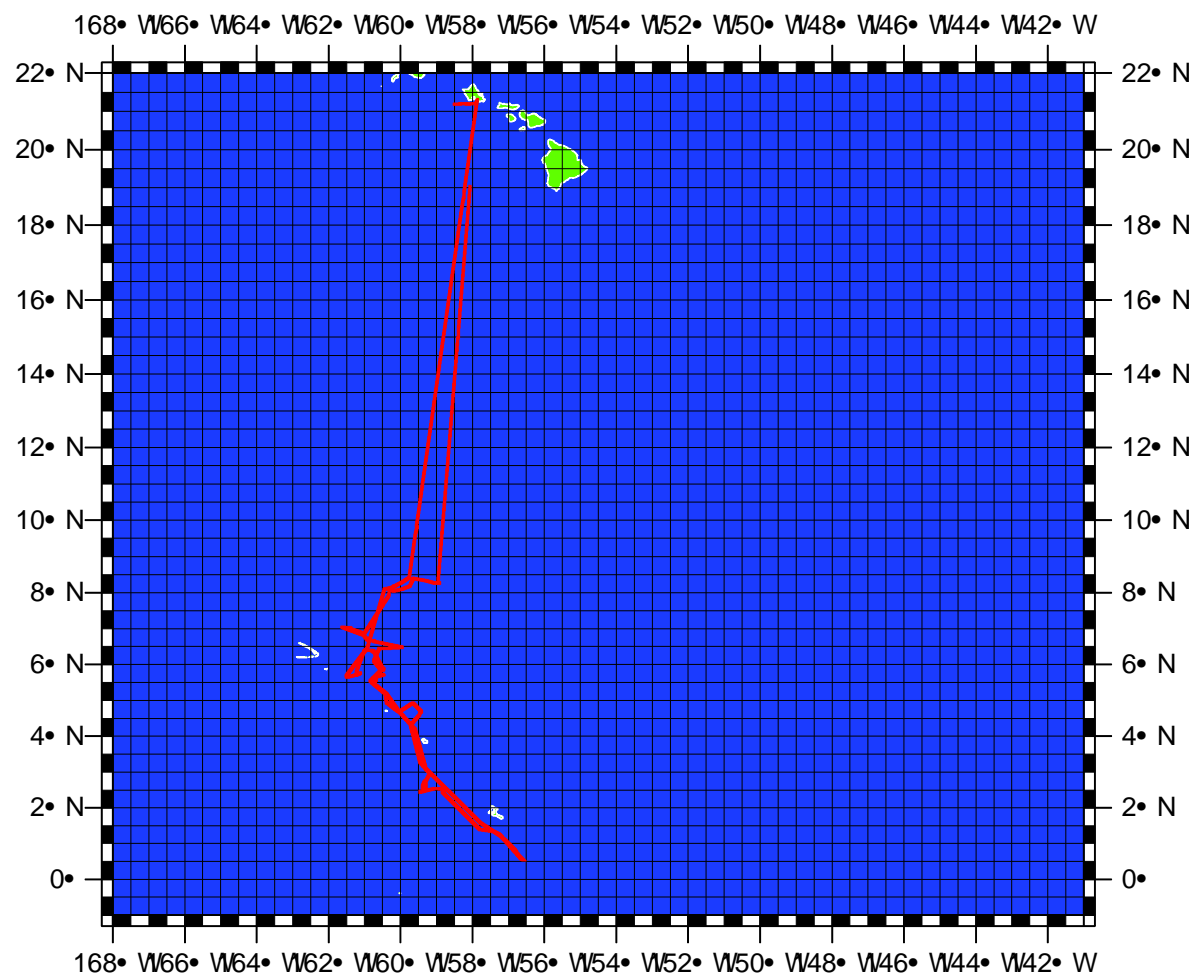
V1.1, 2012-06-21

Lamont-Doherty Earth Observatory, Columbia University

Saturday May 26th 2012 08:00:00L

| Date | Julian Date | Time | Port |
|------------|-------------|-----------------|--------------|
| 2012-05-01 | 2012-124 | 0000 UTC, 0200L | Honolulu, HI |
| 2012-05-26 | 2012-150 | 1500 UTC, 0500L | Honolulu, HI |

Prepared by:
David Martinson
Science Officer
dmartins@ldeo.columbia.edu



GMT 2012 May 26 02:15:52 MGL1208 • Cruise Track

Table of Contents

| | |
|--|----|
| Table of Contents | 4 |
| I. Background and Scientific Objectives..... | 7 |
| II. Personnel | 12 |
| III. Instrumentation Summary..... | 14 |
| IV. Seismic Summary | 28 |
| A. Acquisition Parameter Table..... | 28 |
| B. Seismic Overview..... | 29 |
| V. RV Langseth Gravity Tie Information..... | 31 |
| VI. Archive Contents | 32 |
| VII. Data Formats | 33 |

Please refer to the Langseth Data Report Supplement for information regarding data formats.

I. Background and Scientific Objectives

(Pulled from foreign clearance application information submitted by PI)

We will survey selected areas of the Line Islands Ridge that appear promising for collecting cores suitable for paleoceanographic work. We will also collect water samples, multi-cores, gravity cores, and piston cores from a meridional transect of sites along the ridge. This new material will be used for geochemical and micropaleontological studies of past changes in the Pacific Marine Intertropical Convergence zone El Nino/Southern Oscillation over time scales of thousands to hundreds of thousands of years. Better understanding these important atmospheric phenomenon in the past can constrain the ocean-atmosphere models which predict future climatic change. In addition, the material will be used to better understand the history and controls on biological productivity in the tropical Pacific. The materials we collect will allow us to investigate the behavior of the tropical Pacific ocean-climate system during the past. Previous work using corals and Lake sediments on or near the northern Line Islands has been limited to the last 1000 years, and previous work on longer time scales has been on sediments from deeper waters which are compromised by dissolution.

II. Personnel

Shipboard Technical Staff

| | | |
|---|-----------------|-----------------------------|
| 1 | David Martinson | Chief Science Officer |
| 2 | Tom Spoto | Science Officer |
| 3 | Lisa Hawkins | Marine Tech |
| 4 | Robb Hagg | UNOLS Tech |
| 5 | Tina Thomas | Tech (Duke University) |
| 6 | Mike Martello | Navigator/Tech (Geomotive) |
| 7 | Chris Francis | Source Mechanic (Geomotive) |
| 8 | Mike Tatro | Source Mechanic (Geomotive) |
| 9 | West Groves | Source Mechanic (Geomotive) |

Ship's Crew

| | | |
|----|----------------------|--------------------------------|
| 1 | Mark Landow | Captain |
| 2 | Lee Dortzbach | Chief Mate |
| 3 | Breckenridge Crum | 2 nd Mate |
| 4 | West Wilson | 3 rd Mate |
| 5 | Jason Woronowicz | Bosun |
| 6 | Inocencio Rimando | AB |
| 7 | Ben Nadler | AB |
| 8 | Glenice James | AB |
| 9 | Joshua Schaffner | OS |
| 10 | Joselyn White | OS |
| 11 | Steve Pica | Chief Engineer |
| 12 | Matt Tucke | 1 st Asst. Engineer |
| 13 | Michael Romero | 2 nd Asst. Engineer |
| 14 | Ross Himebauch | 3 rd Asst. Engineer |
| 15 | Jack Schwartz | Electrician |
| 16 | Jack Billings | Oiler |
| 17 | Rudy Florendo | Oiler |
| 18 | Fernando Uribe | Oiler |
| 19 | Hervin McLean-Fuller | Steward |
| 20 | Ricardo Rios | Cook |

Science Party

| | | |
|----|----------------------|-----------------------------------|
| 1 | Jean Lynch-Stieglitz | Co-Chief Scientist (Georgia Tech) |
| 2 | Pratigya Polissar | Co-Chief Scientist (LDEO)) |
| 3 | Mitch Lyle | Scientist (TAMU) |
| 4 | Rob Pockalny | Scientist (URI) |
| 5 | Richard Murray | Scientist (Boston U) |
| 6 | Steve Hovan | Scientist (U of Pennsylvania) |
| 7 | Samantha Bova | Grad Student (Brown) |
| 8 | Victor Castro | Post Doc (UCSC) |
| 9 | Ann Dunlea | Grad Student (Boston U) |
| 10 | Heather Ford | Grad Student (UCSC) |
| 11 | Jennifer Hertzberg | Grad Student (TAMU) |
| 12 | Allison Jacobel | Grad Student (LDEO) |
| 13 | Christina King | Grad Student (URI) |
| 14 | Ashley Maloney | Grad Student (UW) |
| 15 | Julia Shackford | Grad Student (TAMU) |
| 16 | Katherine Wejnert | Grad Student (Georgia Tech) |
| 17 | Ruifang Xie | Post Doc (TAMU) |

PSO staff

| | | |
|---|----------------|----------------|
| 1 | Heidi Ingram | PSO-RPS Energy |
| 2 | Emily Ellis | PSO-RPS Energy |
| 3 | Tatiana Moreno | PSO-RPS Energy |

OSU Coring staff

| | | |
|---|----------------|-----|
| 1 | Chris Moser | OSU |
| 2 | Paul Walczak | OSU |
| 3 | Maziet Cheseby | OSU |
| 4 | Eric Arnesen | OSU |

III. Instrumentation Summary

All science instruments aboard the Langseth are listed below with data formats in section VII. Summary notes on operation during this cruise are listed below. Seismic equipment is not listed here; refer to Part IV for the seismic summary. Other instruments not listed were not in operation.

Instrument Data Files

| Instrument | Description | Data Set | Data Outputs | Files | Interval |
|------------|---|----------|--------------------------|--------------------|----------|
| FE700 | Furuno FE700 Echosounder | N/A | serial logs | MGL-bath01.* | 1s |
| EM122 | Kongsberg EM122 Multibeam Sonar | Partial | raw output to file | See below | variable |
| | | | centerbeam serial logs | MGL-bath02.* | variable |
| KNUDSEN | Knudsen Engineering 3260 Sub-bottom Profiler | Partial | KEA, KEB, SEG-Y | See below | variable |
| DS50 | Furuno DS50 Doppler Speedlog | Full | serial logs | MGL-slog01.* | 1s |
| XBT/XCT | Sippican MK21 XBT/XCTD Launcher | N/A | raw output to file | See below | n/a |
| | | | converted output to file | See below | n/a |
| WX1 | RM Young 5103 Weather Bird and | Full | serial logs | MGL-wx01.* | 1s |
| | | | mwv conversion | MGL-mwv01.* | 1s |
| TSG | SeaBird SBE45 Thermosalinograph | Full | raw serial logs | MGL-tsgraw.* | 1s |
| CNAV | C&C Tech. CNAV 2000 DGPS Receiver | Full | serial logs | MGL-cnnav.* | 1s |
| CNAV3050 | C&C Tech. CNAV 3050 DGPS Receiver | Full | raw serial logs | MGL-cnnav3050all.* | 1s |
| | | | converted data | MGL-cnnav3050.* | 1s |
| MAG01 | GeoMetrics 882 Magnetometer | N/A | serial logs | MGL-mag01.* | 1s |
| BGM | Bell Aerospace BGM-3 Gravimeter | Full | serial logs | MGL-vc01.* | 1s |
| GYRO | Simrad GC80 Gyrocompass/AD100 | Full | serial logs | MGL-gy01.* | 1s |
| POSMV | Applanix POSMV Integrated Nav System | N/A | serial logs | MGL-posmv.* | 1s |
| SEAPATH | Kongsberg SeaPath Integrated Nav System | Full | serial logs | MGL-seapath.* | 1s |
| STU | Sercel Streamer Tension | N/A | serial logs | MGL-stu1.* | 15s |
| MICROSV | Applied Microsystems Sound Velocity Pod Unit #1 | Full | serial logs | MGL-svpod01.* | 1s |
| MICROSV | Applied Microsystems Sound Velocity Pod Unit #2 | Full | serial logs | MGL-svpod02.* | 1s |
| SBE38 | SeaBird SBE38 Pod Thermometer Pod Unit #1 | Full | serial logs | MGL-tempod01.* | 1s |
| SBE38 | SeaBird SBE38 Pod Thermometer Pod Unit #2 | Full | serial logs | MGL-tempod02.* | 1s |
| PCO2 | LDEO PCO2 System | Full | serial logs | MGL-pco2.* | ~180s |

All timestamps in this report are presented using UTC time and day of year in order to avoid confusion with local time changes.

Science Navigation Instrumentation

FE700

Logging interval: 1 second

File id: bath01

The FE700 only operated up to 800m depth. The echosounder is normally switched off before the unit goes out of depth.

Interruptions greater than ten seconds are displayed in the following table.

| Log Date | Event | Comment |
|---|--------------|--------------------------|
| 2012:150:13:39:29.1695 - 2012:150:14:24:10.8810 | Missing data | Secured after 500 meters |

bath01 data sample:

| | | |
|--------|------------------------|------------------------|
| bath01 | 2008:220:13:45:42.0681 | \$SDDBT,,,,,, |
| bath01 | 2008:220:13:45:42.0690 | \$SDDBS,,,,,, |
| bath01 | 2008:220:13:45:42.0691 | \$SDDPT,,0006.6*49 |
| bath01 | 2008:220:13:45:42.1482 | \$PFEC,Alarm,0,0*6F |
| bath01 | 2008:220:13:45:42.1483 | \$PFEC,xdr,FORE,050*79 |

EM-122 Mutibeam

The EM122 multibeam sonar was operated throughout the cruise. The system is designed for deeper water, and does not track ground well in less than 50m of water.

EM122 swath data is saved to the cruise archive under MGL1208/raw/multibeam. Center beam depth is recorded separately to serial log. The MicroSV (svpod01) probe in the pod supplied sound velocity to the EM122. The EM122 was secured during coring and CTD operations.

Logging interval: variable with water depth

File id: bath02

Interruptions greater than one hundred and twenty seconds are displayed in the following table.

| Log Date | Event | Comment |
|------------------------|-------|----------------------------|
| 2012:121:00:00:00.6749 | Start | Logging officially started |
| 2012:150:18:39:16.5528 | End | Logging officially ended |

bath02 data format:

| | | |
|--------|------------------------|--------------------------------|
| bath02 | 2008:192:00:00:12.6663 | \$KGDPT,2938.25,0.0,12000.0*4a |
| bath02 | 2008:192:00:00:30.3301 | \$KGDPT,2954.08,0.0,12000.0*4f |

Knudsen Engineering 3260 Sub-bottom Profiler

File id: n/a

Logging interval: Variable with water depth

The Knudsen 3260 is a chirp echosounder/sub-bottom profiler. It was in operation for the length of the cruise. Unit was secured while on station for coring operations and CTD casts.

There are two sets of segy data recorded/processed this cruise. The segy set in the /raw/knudsen directory are generated by the knudsen software. The segy set in the /processed/knudsen directory are post-processed in the SEG-Y-Rev0 format.

DS50 Speedlog

File id: slog01

Logging interval: 1 second

The Furuno DS-50 is a Doppler speed log. It was in operation for the length of the cruise.

Interruptions greater than ten seconds are displayed in the following table.

| Log Date | Event | Comment |
|------------------------|-------|----------------------------|
| 2012:121:00:00:00.6749 | Start | Logging officially started |
| 2012:150:18:39:16.5528 | End | Logging officially ended |

slog01 data format:

| | | |
|--------|------------------------|--|
| slog01 | 2008:231:00:00:00.0744 | \$VDVHW,,T,,M,09.68,N,17.93,K*4C |
| slog01 | 2008:231:00:00:00.1906 | \$VDVBW,009.68,000.09,A,009.68,000.09,V*46 |
| slog01 | 2008:231:00:00:00.1908 | \$VDVLW,0005960.30,N,0005960.30,N*5F |

RMYoung Integrated Weather

File id: wx01

Logging interval: 1 second

The weather station is used to log wind speed, direction, air temperature, and barometric pressure. The unit was functioning during the cruise. See also mwv01 below.

Interruptions greater than ten seconds are displayed in the following table.

| Log Date | Event | Comment |
|----------|-------|---------|
|----------|-------|---------|

| | | |
|------------------------|-------|----------------------------|
| 2012:121:00:00:00.6749 | Start | Logging officially started |
| 2012:150:18:39:16.5528 | End | Logging officially ended |

wx01 data format:

| | | | | | | | | | | | |
|------|------------------------|------|------|------|------|-----|-----|----|------|------|-----|
| wx01 | 2011:130:00:00:00.3553 | 19.0 | 18.6 | 19.3 | 22.5 | 328 | 328 | 2 | 16.6 | 17.1 | 3.7 |
| | 21.1 355 355 0 | 28.2 | 31.1 | 28.0 | 31.2 | 96 | 85 | 97 | 1006 | | |
| wx01 | 2011:130:00:00:01.2983 | 18.8 | 18.6 | 19.3 | 22.5 | 331 | 328 | 2 | 16.2 | 17.1 | 3.7 |
| | 21.1 355 355 0 | 28.2 | 31.1 | 28.0 | 31.2 | 96 | 85 | 97 | 1006 | | |

File id: mwv01

Logging interval: 1 second

The weather station is used to log wind speed, direction, air temperature, and barometric pressure. The wx01 strings are converted in real-time to produce mwv strings for the DP. The mwv output is strictly a derivative of the w01 output. See also the wx01 description above.

Interruptions greater than ten seconds are displayed in the following table.

| Log Date | Event | Comment |
|------------------------|-------|----------------------------|
| 2012:121:00:00:00.6749 | Start | Logging officially started |
| 2012:150:18:39:16.5528 | End | Logging officially ended |

mwv01 data sample:

| | | | | | | | | | | | |
|-------|------------------------|-------|-------|-------|-------|-----|-----|---|--------|-----|-----|
| mwv01 | 2008:231:00:00:00.5173 | 6.1 | 6.6 | 6.6 | 8.8 | 354 | 321 | 5 | 0.0 | 0.0 | 0.0 |
| | 0.0 355 355 0 | ***** | ***** | ***** | ***** | 8 | 8 | 8 | 1009.7 | | |
| mwv01 | 2008:231:00:00:01.5172 | 5.9 | 6.6 | 6.6 | 8.8 | 353 | 321 | 5 | 0.0 | 0.0 | 0.0 |
| | 0.0 355 355 0 | ***** | ***** | ***** | ***** | 8 | 8 | 8 | 1009.6 | | |
| mwv01 | 2008:231:00:00:02.5190 | 6.3 | 6.6 | 6.6 | 8.8 | 354 | 321 | 5 | 0.0 | 0.0 | 0.0 |
| | 0.0 355 355 0 | ***** | ***** | ***** | ***** | 8 | 8 | 8 | 1009.8 | | |

CNAV2000

File id: cnav

Logging interval: 1 second

The C-NAV is a global satellite-based differential receiver. This was used as a secondary GPS system on the ship. This system was operational during the cruise.

Interruptions greater than ten seconds are displayed in the following table.

| Log Date | Event | Comment |
|------------------------|-------|----------------------------|
| 2012:121:00:00:00.0259 | Start | Logging officially started |

| | | |
|------------------------|-----|--------------------------|
| 2012:150:18:39:16.0928 | End | Logging officially ended |
|------------------------|-----|--------------------------|

cnav data format:

```
cnav 2008:231:00:00:00.6936
$GPGGA,000000.00,1434.94372,N,10444.85748,W,2,8,1.1,15.52,M,-20.60,M,9,0108*65
cnav 2008:231:00:00:00.7137 $GPVTG,006.5,T,,M,9.64,N,17.85,K*53
```

CNAV3050

File id: cnav3050

Logging interval: 1 second

The C-NAV 3050 is a global satellite-based differential receiver. This is the best individual receiver currently on the ship. This system was operational during the cruise.

Interruptions greater than ten seconds are displayed in the following table.

| Log Date | Event | Comment |
|------------------------|-------|----------------------------|
| 2012:121:00:00:00.6329 | Start | Logging officially started |
| 2012:150:18:39:16.0288 | End | Logging officially ended |

cnav3050 data format:

```
cnav3050 2011:132:00:00:00.0717
$GNNGGA,000000.00,0842.538264,N,08427.839561,W,2,16,0.9,28.395,M,0.0,M,9.0,035
8*48
cnav3050 2011:132:00:00:00.0877 $GNVTG,338.4,T,,M,5.78,N,10.71,K,D*27
```

GC80 Gyrocompass

The GC80 gyrocompass is installed on the bridge and used for ship and seismic navigation.

File id: gy01

Logging interval: 1 second

Interruptions greater than ten seconds are displayed in the following table.

| Log Date | Event | Comment |
|------------------------|-------|----------------------------|
| 2012:121:00:00:00.0239 | Start | Logging officially started |
| 2012:150:18:39:16.7769 | End | Logging officially ended |

gy01 data format:

```
gy01 2008:231:00:00:00.4110 $PTKM,HEALM,0000,0,G1*09
gy01 2008:231:00:00:00.6395 $HEHDT,005.8,T*22
gy01 2008:231:00:00:00.6396 $HEROT,-005.25,A*34
```


| | | |
|------|------------------------|----------------------|
| gy01 | 2008:231:00:00:01.6394 | \$HEHDT,005.7,T*2D |
| gy01 | 2008:231:00:00:01.6395 | \$HEROT,-004.53,A*34 |

POSMV Integrated Nav

The POS/MV is a receiver that uses CNAV input in addition to its own antennae, an inertial sensor and optional RTG, WTC, or WAAS corrections and a Kalman filter to produce a smooth navigation output and very accurate heading. System was not in operation for MGL1208. It has been decommissioned and is awaiting upgrade.

File id: posmv

Logging interval: 1 second

Interruptions greater than ten seconds are displayed in the following table.

| Log Date | Event | Comment |
|------------------------|-------|--------------------|
| 2012:121:00:00:00.6979 | N/A | decommissioned |
| 2012:150:18:32:11.6757 | N/A | Instrument failure |

posmv data format:

| | | |
|-------|------------------------|--|
| posmv | 2008:231:00:00:00.0885 | \$INGGA,235959.842,1434.95002,N,10444.85734,W,2,,1.1,12.71,M,,,9.0,0108*2E |
| posmv | 2008:231:00:00:00.0889 | \$INHDT,15.0,T*11 |
| posmv | 2008:231:00:00:00.2047 | \$INVTG,7.0,T,,M,9.7,N,17.9,K*46 |
| posmv | 2008:231:00:00:00.3208 | \$INGST,235959.842,,0.9,0.9,0.0,0.9,0.9,2.5*51 |
| posmv | 2008:231:00:00:00.4411 | \$PASHR,235959.842,15.05,T,- |
| | | 0.58,0.48,0.15,0.069,0.069,0.045,2,0*05 |
| posmv | 2008:231:00:00:00.4412 | \$INZDA,235959.0000,17,08,2008,,*73 |

SeaPath Integrated Nav

The Kongsberg Seapath is an inertial navigation system. Operational for the duration of the cruise.

Logging interval: 1 second

File id: seapath

Interruptions greater than ten seconds are displayed in the following table.

| Log Date | Event | Comment |
|------------------------|-------|----------------------------|
| 2012:121:00:00:00.3939 | Start | Logging officially started |
| 2012:150:18:39:16.9444 | End | Logging officially ended |

seapath data format:

```
seapath      2008:231:00:00:00.0504  $INZDA,235959.99,17,08,2008,,*73
seapath      2008:231:00:00:00.1686
              $INGGA,235959.99,1434.953109,N,10444.859147,W,2,08,1.1,-
16.30,M,,M,1.0,0291*70
seapath      2008:231:00:00:00.1687  $INVTG,5.97,T,,M,9.7,N,,K,D*03
seapath      2008:231:00:00:00.1688  $INHDT,5.82,T*1A
```

Sercel Streamer Tension Unit

The Sercel Streamer Tension Unit measures streamer tension in pounds. Not used during 1208.

Logging interval: 15 seconds

File id: stu1

Data intermittent interruptions greater than thirty seconds are displayed in the following table.

| Log Date | Event | Comment |
|------------------------|-------|----------|
| 2012:121:20:03:44.1402 | N/A | Not used |
| 2012:150:16:53:53.6708 | N/A | Not used |

stu1 data format:

```
stu1  2011:130:00:02:12.8968  111 129  22  0 49  1  0      3360      3472      -179
33  1  1      3643      3643      -157      31  1  2      3964      3994      -157
34  1  3      3487      3584      -157      32

stu1  2011:130:00:02:27.8994  111 129  22  1  4  1  0      3375      3487      -164
33  1  1      3643      3793      -157      31  1  2      3950      4002      -164
34  1  3      3509      3606      -179      32
```

Geometrics 882 Magnetometer

The Geometrics 882 magnetometer is towed behind the ship. Raw serial output is logged using LDS. Deployment is dependent upon seismic operations. See the deployment notes below. For further information, see the elog files in docs/elog. Magnetometer was not deployed during MGL1208.

Magnetometer Deployment Notes

Interruptions greater than ten seconds are displayed in the following table.

| Time | Event |
|------------------------|----------------------|
| 2012:121:18:55:00.0000 | Not used for MGL1208 |
| 2012:150:19:04:00.0000 | Not used for MGL1208 |

Logging interval: 1 second

File id: mag01

mag01 data sample:

| | | |
|-------|------------------------|---------------------------------------|
| mag01 | 2008:185:09:45:58.1820 | \$107714.673,0042,0024,0110,3533,1143 |
| mag01 | 2008:185:09:46:01.0333 | \$ 63703.933,0042,0024,0110,3533,1143 |
| mag01 | 2008:185:09:46:04.0330 | \$ 44031.029,0042,0027,0110,3533,1143 |

SBE-45 Thermosalinograph

The Seabird TSG output is logged by LDS to the “tsg” set.

File id: tsgraw

Logging interval: 1 second

Data intermittent interruptions greater than ten seconds are displayed in the following table.

| Log Date | Event | Comment |
|------------------------|-------|----------------------------|
| 2012:121:01:19:27.7541 | Start | Logging officially started |
| 2012:150:15:53:14.5345 | End | Logging officially ended |

tsgraw data sample:

| | | | | |
|--------|------------------------|----------|----------|---------|
| tsgraw | 2012:050:05:59:11.0312 | 27.3455, | 5.52201, | 34.7764 |
| tsgraw | 2012:050:05:59:21.0406 | 27.3435, | 5.52175, | 34.7760 |
| tsgraw | 2012:050:05:59:31.0341 | 27.3304, | 5.52027, | 34.7753 |

BGM-3 Gravimeter

The Bell Aerospace BGM-3 Gravimeter operated normally during the length of this cruise.

File id: vc01

Logging interval: 1 second

Interruptions greater than ten seconds are displayed in the following table.

| Log Date | Event | Comment |
|------------------------|-------|----------------------------|
| 2012:121:00:00:00.9419 | Start | Logging officially started |
| 2012:150:18:39:16.8808 | End | Logging officially ended |

vc01 data format:

| | | | |
|------|------------------------|-----------|----|
| vc01 | 2011:130:00:00:08.2866 | 01:024436 | 00 |
| vc01 | 2011:130:00:00:09.2926 | 01:024548 | 00 |

Applied Microsystems MicroSV Pod Unit #1

The Applied Microsystems MicroSV probe #1 in the pod was functional and logging during the length of the cruise.

File id: svpod01

Logging interval: 1 second

Interruptions greater than ten seconds are displayed in the following table.

| Log Date | Event | Comment |
|------------------------|-------|----------------------------|
| 2012:121:00:00:00.3469 | Start | Logging officially started |
| 2012:150:18:39:17.1709 | End | Logging officially ended |

svpod01 data format:

| | | |
|---------|------------------------|---------|
| svpod01 | 2011:130:00:00:08.6626 | 1540.52 |
| svpod01 | 2011:130:00:00:09.6527 | 1540.53 |

Applied Microsystems MicroSV Pod Unit #2

The Applied Microsystems MicroSV probe #2 in the pod was functional and logging during the length of the cruise.

File id: svpod02

Logging interval: 1 second

Interruptions greater than ten seconds are displayed in the following table.

| Log Date | Event | Comment |
|------------------------|-------|----------------------------|
| 2012:121:00:00:00.4629 | Start | Logging officially started |
| 2012:150:18:39:17.3029 | End | Logging officially ended |

svpod02 data format:

| | | |
|---------|------------------------|---------|
| svpod02 | 2011:130:00:00:08.0686 | 1541.87 |
| svpod02 | 2011:130:00:00:09.0746 | 1541.88 |

Seabird SBE38 Temperature Probe Pod Unit #1

The Seabird SBE38 temperature probe #1 in the pod was functional and logging during the length of the cruise.

File id: temppod01

Logging interval: 1 second

Interruptions greater than ten seconds are displayed in the following table.

| Log Date | Event | Comment |
|------------------------|-------|----------------------------|
| 2012:121:00:00:00.2439 | Start | Logging officially started |
| 2012:150:18:39:17.1129 | End | Logging officially ended |

temppod01 data format:

| | | |
|-----------|------------------------|---------|
| temppod01 | 2011:130:00:00:07.0855 | 29.4851 |
| temppod01 | 2011:130:00:00:07.9476 | 29.4850 |

Seabird SBE38 Temperature Probe Pod Unit #2

The Seabird SBE38 temperature probe #2 in the pod was functional and logging during the length of the cruise.

File id: temppod02

Logging interval: 1 second

Interruptions greater than ten seconds are displayed in the following table.

| Log Date | Event | Comment |
|------------------------|-------|----------------------------|
| 2012:121:00:00:00.8179 | Start | Logging officially started |
| 2012:150:18:39:16.8119 | End | Logging officially ended |

temppod02 data format:

| | | |
|-----------|------------------------|---------|
| temppod02 | 2011:130:00:00:07.2015 | 29.4884 |
| temppod02 | 2011:130:00:00:08.0786 | 29.4883 |

LDEO PCO2 System

The LDEO PCO2 system output is logged by LDS to the “pco2” set.

See below for more information.

File id: pco2

Logging interval: ~180 seconds

Interruptions greater than three hundred seconds are displayed in the following table.

| Log Date | Event | Comment |
|---|--------------|-----------------------------|
| 2012:121:02:20:50.6694 | Start | Logging officially started |
| 2012:088:02:20:50.6694 - 2012:088:02:27:35.9564 | Missing data | Reason not specified |
| 2012:088:09:02:13.0141 - 2012:088:12:40:24.2720 | Missing data | USS pump failure |
| 2012:091:08:16:47.6809 - 2012:091:08:30:51.6197 | Missing data | No serial data output |
| 2012:091:08:30:51.6197 - 2012:091:08:37:34.4209 | Missing data | Restart instrument's laptop |
| 2012:150:15:51:08.0021 | End | Logging officially ended |

pco2 data format:

| | | | | | |
|-------|------------------------|---------------|---------|---------|---------|
| pco2 | 2011:130:00:27:11.9162 | 2011130.02002 | 2370.39 | 37.54 | 1007.07 |
| | 404.51 | 28.42 | 386.9 | 5000.00 | 19 |
| Equil | | | | | 0 |
| pco2 | 2011:130:00:30:00.5374 | 2011130.02198 | 2370.02 | 37.53 | 1007.14 |
| | 404.42 | 28.46 | 386.8 | 5000.00 | 19 |
| Equil | | | | | 0 |

Mk21 XBT System

Files: *.RDF,*.EDF

Twenty XBT drops (14x T-5 and 6x T-7) were made during this cruise (2 – T7 drops failed at shallow depths and data was discarded). The data set is saved to the raw/XBT directory in the cruise archive. Refer to the MGL1208_Expendable_Drops.xls spreadsheet in the docs/operations directory of the cruise archive for more information.

IV. Seismic Summary

A. Acquisition Parameter Table

| Acquisition Parameter Table | |
|------------------------------------|--|
| AcquisitionParameterID | MGL1208_ACQ01 |
| FieldActivityID | MGL1208 |
| ReceiverType | Sentry Solid Streamer |
| SourceType | Airgun |
| Acquisition System Name | Sercel Syntrak 960 |
| Acquisition System Type | MCS |
| Seismic_Nav_System | C-Nav 3050 primary |
| Survey_datum | WGS84 |
| Navigation Reference Point | Fore/Aft+29.5 m, Stb/pt +0.00 m, vertical +16.9 m Keel, centerline, ~frame 42 (Seapath 200 calculated center of gravity) waterline |
| NRP to source | 78.00 m |
| Source_to_Near_Channel | 151.50 m |
| Number_of_channels_recorded | 60 |
| Number_of_cables | 1 |
| Number_of_channels_each_cable | 60 |
| Channel_length | 12.5 m |
| Cable_length | 0.9 km |
| Cable_spacing | N/A |
| Near_Channel_Number | N/A |
| Cable_depth | 9.0 m |
| Number_sources | 1 |
| Sub-arrays_per_source | 1 |
| Alternate_Shooting | No |
| Source_separation | N/A |
| Sub-array_separation | N/A |
| Source_volume | 225 cu in |
| Source_pressure | 2000 psi nominal |
| Source_make,model | GI Gun |
| Source_number | 2 |
| Source_depth | 3.0 m |
| Shot_control | Distance |
| Shot_Interval | 25 m |
| Sample_interval | 0.5ms |
| Record_length | 8s |
| Compass_birds | 4 Digicourse 5011 |
| Recording_delay | N/A |

B. Seismic Overview

Physical Configuration

The towing configuration for the air guns and streamers is detailed in the document titled *MGL1208_Offsets.xls*.

Offsets

All antenna and in-water offset drawings are in the file *MGL1208_Offsets.xls*

Spectra

Spectra was used for all timing and navigation during the cruise. Spectra generated UKOOA P294 and P190 files for each MCS line acquired.

V. RV Langseth Gravity Tie Information

The Gravimeter was tied before and after the cruise at the tie point located at the pier in Kodiak.

| Date / Time | Ship Location | Reference Location | Mistie |
|------------------|---|---|---|
| 2012-04-29T19:32 | Honolulu, HI, UH Marine Center 21 18.9737 N 157 53.1742 W | Honolulu, HI, UH Marine Center UH Marine Center Pierside Tiepoint 21 18.962 N 157 53.180 W | Honolulu, HI, UH Marine Center 21 18.972 N 157 53.181 W |
| | | | |

Please refer to the documents located under MGL1208/docs/gravity_tie for detailed records.

VI. Archive Contents

Key files are bolded.

| | |
|--|--|
| MGL1208/docs | Cruise documents and logs |
| MGL1208/docs/config | Configuration archive |
| MGL1208/docs/elog | Cruise elog |
| MGL1208/docs/gravity_tie | Gravity Tie information |
| MGL1208/docs/map | Cruise maps, track map |
| MGL1208/docs/offsets | Vessel/sensor offsets |
| MGL1208/docs/operations/ | Operations documents |
| MGL1208/docs/operations/Daily_Reports | Cruise Daily Reports from Chief Science Officer |
| MGL1208/docs/operations/NavLogs | Seismic navigation logs (spectra) |
| MGL1208/docs/operations/ObsLogs | Seismic acquisition logs (gun controller) |
| MGL1208/docs/operations/MGL1208_B15_line_log_multi_channel_seismics.xls | Master line log table |
| MGL1208/docs/permits | Clearance Documents |
| MGL1208/docs/waypoints | Waypoint files |
| MGL1208/docs/personnel | Personnel rosters, org chart, bunk and phone lists |
| MGL1208/docs/reports | Cruise Report and supplemental docs |
| MGL1208/docs/reports/MGL1208_DataReport_v1.0.doc | This file |
| MGL1208/docs/offsets/MGL1208_Offsets.xls | Vessel/sensor offsets |
| MGL1208/docs/screencaps | Screen captures |
| MGL1208/processed | Processed data |
| MGL1208/processed/reflex (3D data-sets only, not applicable to OBS and 2D) | Spectra reflex files |
| MGL1208/processed/shotlogs | Shot log files |
| MGL1208/processed/sprint | Sprint files |
| MGL1208/processed/svp | Sound velocity profiles |
| MGL1208/raw | Raw data |
| MGL1208/raw/adcp | Raw ADCP data |
| MGL1208/raw/knudsen | Raw Knudsen sub-bottom profiler data |
| MGL1208/raw/multibeam | Raw EM122 data |
| MGL1208/raw/serial | Underway serial data: gps, tsg, weather, etc. |
| MGL1208/raw/spectra/P1 | Spectra p190 |
| MGL1208/raw/spectra/P2 | Spectra p294 |
| MGL1208/raw/XBT | Raw XBT data |

VII. Data Formats

Gravimeter data

The gravimeter serial data is output in the following format:

01:025610 01

01:xxxxxx ff

| Item | Definition | Units |
|--------|------------------|-------|
| 01 | output frequency | Hz |
| xxxxxx | raw counts | n/a |
| ff | sensor status | n/a |

CNAV GPS receiver data

CNAV outputs data in NMEA 0183 compatible format. Currently* the following sentence types are enabled:

- \$GPVTG-GPS Velocity, Track made good and Ground speed data (computed by the CNAV GPS receiver).
- \$GPGGA-Global Positioning System Fix data (computed by the CNAV GPS receiver).

*Note: there are other sentence types available from CNAV. Please consult the software manual for more options.

\$GPVTG, xxx.x, T,, M, m.mm, N, n.nn, K*hh

\$GPVTG Sentence Fields

| Item | Definition | Units |
|-------|--|---------------------------------|
| xxx.x | Course over ground (COG) | Degrees from True North |
| T | Indicates course relative to True North | n/a |
| M | COG | Degrees from Magnetic North |
| m.mm | Speed over ground (SOG) | Nautical miles per hour (knots) |
| N | Indicates that the speed over ground is in knots | n/a |
| n.nn | SOG | km/h |
| K | Indicates that the SOG is in km/h | n/a |
| *hh | Checksum (hexadecimal representation) | n/a |

\$GPGGA,hhmmss.ss, ddm. mmmmm, a, ddm. mmmmm, a, x, xx, x.x, xx.xx, M, xx.xx, M, x.x, xyy*hh

\$GPGGA Sentence Fields

| Item | Definition | Units |
|------------|--|---|
| hhmmss.ss | UTC time of position | Hours/Minutes/Seconds.decimal. |
| ddmm.mmmmm | Latitude | Degrees/Minutes.decimal. |
| a | Direction of Latitude N = North S = South | n/a |
| ddmm.mmmmm | Longitude | Degrees/Minutes.decimal |
| a | Direction of Longitude E = East W = West | n/a |
| x | GPS Quality indicator 0 = fix not valid 1 = GPS Autonomous fix 2 = GcGPS Corrected Fix | n/a |
| xx | Number of GPS satellites used in solution fix | n/a |
| x.x | Horizontal Dilution of Precision (HDOP) | n/a |
| xx.xx | C-NAV GPS receiver antenna altitude reference to Mean Sea Level (MSL) | n/a |
| M | Altitude units--M indicates meters | n/a |
| xx.xx | WGS-84 Geoidal separation distance from MSL based on the NIMA/NASA EGM96 15-minute (Earth Gravity Model) | Meters |
| M | Geosoidal separation units--M indicates meters | n/a |
| x.x | Age of GcGPS corrections used in solution fix | n/a |
| xyy | C-NAV GPS receiver reference identification | x is downlink satellite communication beam in use yy is the GPS correction signal mode/type being used |
| *hh | Checksum (hexadecimal representation) followed by CRLF terminator pair | n/a |

CNAV 3050 GPS receiver data

CNAV 3050 outputs data in NMEA 0183 compatible format. Currently* the following sentence types are enabled:

- \$GPVTG-GPS Velocity, Track made good and Ground speed data (computed by the CNAV GPS receiver).
- \$GPGGA-Global Positioning System Fix data (computed by the CNAV GPS receiver).

*Note: there are other sentence types available from CNAV. Please consult the software manual for more options.

\$GPVTG, xxx.x, T,, M, m.mm, N, n.nn, K*hh

\$GPVTG Sentence Fields

| Item | Definition | Units |
|-------|--|---------------------------------|
| xxx.x | Course over ground (COG) | Degrees from True North |
| T | Indicates course relative to True North | n/a |
| M | COG | Degrees from Magnetic North |
| m.mm | Speed over ground (SOG) | Nautical miles per hour (knots) |
| N | Indicates that the speed over ground is in knots | n/a |
| n.nn | SOG | km/h |
| K | Indicates that the SOG is in km/h | n/a |
| *hh | Checksum (hexadecimal representation) | n/a |

\$GPGGA,hhmmss.ss, ddm. mmmmm, a, ddm. mmmmm, a, x, xx, x.x, xx.xx, M, xx.xx, M, x.x, xxy*hh

\$GPGGA Sentence Fields

| Item | Definition | Units |
|------------|---|--------------------------------|
| hhmmss.ss | UTC time of position | Hours/Minutes/Seconds.decimal. |
| ddm. mmmmm | Latitude | Degrees/Minutes.decimal. |
| a | Direction of Latitude N = North S = South | n/a |
| ddm. mmmmm | Longitude | Degrees/Minutes.decimal |
| a | Direction of Longitude E = East W = West | n/a |
| x | GPS Quality indicator 0 = fix not valid 1 = GPS Autonomous fix 2 = GcGPS Corrected Fix | n/a |
| xx | Number of GPS satellites used in solution fix | n/a |
| x.x | Horizontal Dilution of Precision (HDOP) | n/a |
| xx.xx | C-NAV GPS receiver antenna altitude reference to Mean Sea Level (MSL) | n/a |
| M | Altitude units--M indicates meters | n/a |

| | | |
|-------|--|---|
| xx.xx | WGS-84 Geoidal separation distance from MSL based on the NIMA/NASA EGM96 15-minute (Earth Gravity Model) | Meters |
| M | Geosoidal separation units--M indicates meters | n/a |
| x.x | Age of GcGPS corrections used in solution fix | n/a |
| xyy | C-NAV GPS receiver reference identification | x is downlink satellite communication beam in use yy is the GPS correction signal mode/type being used |
| *hh | Checksum (hexadecimal representation) followed by CRLF terminator pair | n/a |

EM122 Center Beam Depth

This page describes the EM122 centerbeam depth serial output, used for real-time depth display. For full multibeam data, please see the [multibeam](#) page.

The EM122 outputs serial data in the following formats:

- KIDPT - Depth below transducer

SKIDBT,x.x,x.x,x.x,*hh

SDDBT sentence format

| Item | Definition | Units |
|------|-------------|---------|
| x.x | Water depth | feet |
| x.x | Water depth | meters |
| x.x | Water depth | fathoms |
| *hh | Checksum | n/a |

FE700 Navigational Echosounder data

The FE700 Navigational Echosounder outputs data in the following formats

- \$PFEC - unspecified
- \$SDDBT - Depth Below Transducer
- \$SDDBS - Depth Below Surface

\$PFEC ,aaaa,x,*hF

PFEC sentence format

| Item | Definition | Units |
|------|-------------|-------------|
| aaaa | unspecified | unspecified |
| x | unspecified | unspecified |
| x | unspecified | unspecified |
| *hF | unspecified | unspecified |

\$DBT,x.x,f,x.x,M,x.x,F*hh

SDDBT sentence format

| Item | Definition | Units |
|------|-------------|--------|
| x.x | Water depth | feet |
| f | f = feet | n/a |
| x.x | Water depth | meters |

| | | |
|-----|-------------|---------|
| M | M = meters | n/a |
| x.x | Water depth | fathoms |
| F | F = fathoms | n/a |
| *hh | Checksum | n/a |

\$DBS,x.x,f,x.x,M,x.x,F*hh

SDDBS sentence format

| Item | Definition | Units |
|------|-------------|---------|
| x.x | Water depth | feet |
| f | f = feet | n/a |
| x.x | Water depth | meters |
| M | M = meters | n/a |
| x.x | Water depth | fathoms |
| F | F = fathoms | n/a |
| *hh | Checksum | n/a |

Gyroscope data

The gyroscope serial data is output in the following sentence formats:

- PTKM,HEALM -- Unspecified
- HEHDT -- Heading - True
- HEROT -- Rate Of Turn

\$PCICM,HEALM,xxxx,x,xx*hh

ALM sentence format

| Item | Definition | Units |
|------|-------------|-------|
| xxxx | unspecified | n/a |
| x | unspecified | n/a |
| *hh | unspecified | n/a |

\$HEHDT,xxx.x,T*hh

HDT sentence format

| Item | Definition | Units |
|-------|--------------|---------|
| xxx.x | Heading true | degrees |
| T | T = true | n/a |
| *hh | Checksum | n/a |

\$HEROT,-xxx.x,A*hh

HEROT sentence format

| Item | Definition | Units |
|--------|----------------|---|
| xxxx.x | Rate of turn | Degrees per minute, Note: "-" means bow turns to port |
| A | A = data valid | n/a |
| *hh | Checksum | n/a |

Geometrics 882 Magnetometer Data

The magnetometer serial data is output in the following format:

\$ 53863.927,0652

\$ xxxxx.xxx,vvvv

| Item | Definition | Units |
|-----------|--------------------------|-------|
| xxxxx.xxx | Magnetic field intensity | nT |
| vvvv | Reserved for future use | n/a |

RM Young Meteorological Station Data

The meteorological data from the RMYoung integrated weather station is output in the following sentence format:

12.6 13.2 12.6 16.9 1 335 2 0.0 0.0 0.0 0.0 355 355 0 -11.9 -23.8 ***** 7.3 8 4 9 1006.9
aaa.a bbb.b ccc.c dd.d eee fff ggg hhh.h iii.i jjj.j kkk.k lll mmm nnn -oo.o -pp.p -qq.q -rr.r ss tt uu vvvv.v

Langseth WX station sentence format

| Item | Definition | Units |
|--------|-------------------------------------|-----------|
| aaa.a | bird 1 speed, instantaneous | knots |
| bbb.b | bird 1 speed, 60 second average | knots |
| ccc.c | bird 1 speed, 60 minute average | knots |
| ddd.d | bird 1 speed, 60 second peak | knots |
| eee | bird 1 direction, instantaneous | knots |
| fff | bird 1 direction, 60 second average | knots |
| ggg | bird 1 direction, 60 minute average | knots |
| hhh.h | bird 2 speed, instantaneous | knots |
| iii.i | bird 2 speed, 60 second average | knots |
| jjj.j | bird 2 speed, 60 minute average | knots |
| kkk.k | bird 2 speed, 60 second peak | knots |
| lll | bird 2 direction, instantaneous | knots |
| mmm | bird 2 direction, 60 second average | knots |
| nnn | bird 2 direction, 60 minute average | knots |
| ooo.o | temperature, instantaneous | Degrees C |
| ppp.p | temperature, 60 minute average | Degrees C |
| qqq.q | temperature, 60 minute low | Degrees C |
| rrr.r | temperature, 60 minute high | Degrees C |
| ss | relative humidity, instantaneous | % |
| tt | relative humidity, 60 minute low | % |
| uu | relative humidity, 60 minute high | % |
| vvvv.v | Baromoeter, instantaneous | knots |

OBSIP Shotlog Format (not used on MGL1208)

Each OBSIP shotlog contains a header followed by shot records:

#obsipshotfile v1.0

#shotnumber date time sourceLat sourceLon shipLat shipLon waterDepth sciTag

```
0001280 2009-08-27 05:08:49.807873 48.495334 -129.201444 48.494097 -129.203017 2530.6 MGL0910_05
0001279 2009-08-27 05:12:33.961869 48.491860 -129.204474 48.490060 -129.205425 2526.4 MGL0910_05
0001278 2009-08-27 05:16:36.302883 48.488608 -129.206115 48.486807 -129.206944 2530.3 MGL0910_05
0001277 2009-08-27 05:19:51.053880 48.485157 -129.209212 48.483406 -129.209755 2526.1 MGL0910_05
0001276 2009-08-27 05:24:01.863875 48.480813 -129.212088 48.479293 -129.213152 2516.1 MGL0910_05
```

Shot records are in the following format:

```
0001276 2009-08-27 05:24:01.863875 48.480813 -129.212088 48.479293 -129.213152 2516.1 MGL0910_05
sssssss yyyy-mm-dd hh:mm:ss.ssssss xx.xxxxxx yy.yyyyyy vv.vvvvvv ww.wwwwww dddd.d llllllllllll
```

OBSIP record format

| Item | Definition | Units |
|-----------------|-------------|----------------|
| sssssss | shot number | n/a |
| yyyy-mm-dd | date | ISO8601 format |
| hh:mm:ss.ssssss | time | ISO8601 format |
| xx.xxxxxx | source lat | degrees, WGS84 |
| yy.yyyyyy | source lon | degrees, WGS84 |
| vv.vvvvvv | vessel lat | degrees, WGS84 |
| ww.wwwwww | vessel lon | degrees, WGS84 |
| dddd.d | depth | meters |
| llllllllllll | linename | n/a |

LDEO PCO2 System

PCO2 outputs data in the following sentence format:

yyyyjjj.jjj aaaa.aa bb.bb cccc.cc ddd.dd e.ee fff.f gggg.gg hh i k

PCO2 Data

| Item | Definition | Value | Units |
|-------------|-------------------------------|---|--|
| yyyyjjj.jjj | pco2 Computer Date/Time | n/a | Year/Julian Day.decimal Four fixed digits of year. Three fixed digits of julian day. Five fixed digits for decimal fractions of a julian day. |
| aaaa.aa | CO2 Raw Signal | n/a | mVolts |
| bb.bb | CO2 Analyzer Cell Temperature | n/a | Celcius |
| cccc.cc | PCO2 Barometer | n/a | mbar |
| ddd.dd | VCO2 | n/a | ppm |
| e.ee | Equilibrator Water Temp | n/a | Celcius |
| fff.f | pCO2 | n/a | uatm |
| gggg.gg | Flow Controller | n/a | mVolts |
| hh | Flow Meter | n/a | cc/min |
| i | Sample ID # | 0 to 16 | integer |
| k | Sample ID | Equil, Atmos, Nitrogen, CC18798, CA07163, CC15551, or CC63668 | alphanumeric |

LDEO PCO2 + CNav + TSG + WX01 + SBE38 Systems

PCO2 merge is a combination of outputs of various serial data in the following sentence format:

**yyyyjjj.jjj aaaa.aa bb.bb cccc.cc ddd.dd e.ee fff.f gggg.gg hh i k, llll.lllllm,
nnnnn.nnnnnno, pppp.pp, q.qq, r.rr, s.ss, tt.tt, uu.u, vvv, w.w, xxx.x, y.yy, zzz.z,
@@.@@@@**

PCO2 Data

| Item | Definition | Value | Units |
|---------------|---------------------------------------|---|--|
| yyyyjjj.jjj | pco2 Computer Date/Time | n/a | Year/Julian Day.decimal Four fixed digits of year. Three fixed digits of julian day. Five fixed digits for decimal fractions of a julian day. |
| aaaa.aa | CO2 Raw Signal | n/a | mVolts |
| bb.bb | CO2 Analyzer Cell Temperature | n/a | Celcius |
| cccc.cc | PCO2 Barometer | n/a | mbar |
| ddd.dd | VCO2 | n/a | ppm |
| e.ee | Equilibrator Water Temp | n/a | Celcius |
| fff.f | pCO2 | n/a | uatm |
| gggg.gg | Flow Controller | n/a | mVolts |
| hh | Flow Meter | n/a | cc/min |
| i | Sample ID # | 0 to 16 | integer |
| k | Sample ID | Equil, Atmos, Nitrogen, CC18798, CA07163, CC15551, or CC63668 | alphanumeric |
| llll.lllllm | CNav Latitude | 0 to 90, N/S | degrees/minutes.decimal/direction |
| nnnnn.nnnnnno | CNav Longitude | 0 to 180, E/W | degrees/minutes.decimal/direction |
| pppp.pp | TSG Speed of Sound | n/a | m/s |
| q.qq | TSG Internal Temperature | n/a | Celcius |
| r.rr | TSG External Temperature | n/a | Celcius |
| s.ss | TSG Conductivity | n/a | S/m |
| tt.tt | TSG Salinity | 25 to 40 | ppm |
| uu.u | WX01 Bird 1 Wind Speed 60 sec avg | n/a | knots |
| vvv | WX01 Bird 1 Wind Direction 60 sec avg | 0 to 360 | degrees |
| w.w | WX01 Temperature Instantaneous | n/a | Celcius |
| xxx.x | WX01 Ship Barometer Instantaneous | n/a | mbar |

| | | | |
|---------|--|----------|---------|
| y.yy | CNav Speed Over Ground / Speed Made Good | 0 to 15 | knots |
| zzz.z | CNav Course Made Good | 0 to 360 | degrees |
| @@.@@@@ | SBE38 Temperature Probe | n/a | Celcius |

POS/MV Position and Orientation System for Marine Vessels

POS/MV outputs data using the NMEA 0183 format at rates of up to fifty sentences per second. The following seven different sentence formats are available.

- 1. \$INGGA-Global System Position Fix Data
- 2. \$INHDT-Heading - True data
- 3. \$INVTG-Course over ground and Ground speed data
- 4. \$INGST-GPS pseudorange noise statistics
- 6. \$PRDID-Attitude data
- 7. \$INZDA-Time and date

\$INGGA, hhmmss.sss, llll.llll, a, yyyy.yyyy, b, t, nn, v.v, x.x, M,,c.c,rrrr*hh

\$INGGA-Global System Position Fix Data

| Item | Definition | Value | Units |
|-------------|---|---|--|
| \$INGGA | Header | \$INGGA | Hours/Minutes/Seconds.decimal. Two fixed digits of hours. |
| hhmmss.sss | UTC time of position | n/a | Two fixed digits of minutes. Two fixed digits of seconds. Three digits for decimal fractions of a second. |
| llll.llll | Latitude | -90 to +90 | Degrees Minutes.decimal. Two fixed digits of degrees Two fixed digits of minutes Five digits for decimal minutes. |
| a | N (north) or S (south) | N or S | Degrees/Minutes.decimal. |
| yyyyy.yyyyy | Longitude | -180 to +180 | Three fixed digits of degrees. Two fixed digits of minutes. Five digits for decimal minutes. |
| b | E (east) or W (west) | E or W 0 = Fix not available or invalid 1 = CIA standard GPS; fix valid. | |
| t | GPS Quality Indicator | 2 = DGS mode; fix valid. 3 = PPP mode; fix valid. 4 = RTK fixed 5 = RTK float 6 = free inertial | |
| nn | Number of satellites used in fix | 0 to 32 | |
| v.v | Horizontal dilution of precision | | |
| x.x | Altitude of the IMU above or below the mean sea level. A negative value | n/a | Metres |

| | | | |
|--------|---|--------------|---------|
| | indicates below sea level. | | |
| M | Units of measure = metres | M | |
| Null | Null | | |
| Null | Null | | |
| c.c | Age of differential corrections in records since last RTCM-104 message. | 0 to 99.9 | Seconds |
| rrr | DGPS reference station identity | 0000 to 1023 | |
| *hh | Checksum | 00 - FF | |
| /CR/LF | Carriage return and line feed | /CR/LF | |

Note that, in the case of the HDOP, IMU altitude and age of differential connections, POS/MV adds leading digits as required (i.e. if the value exceeds 9.9). Also, note that commas separate all items, including null fields. The information is valid at the location of the vessel frame.

\$INHDT, x.x, T*hh

\$INHDT-Heading - True data

| Item | Definition | Value | Units |
|---------|---|-------------|---------|
| \$INHDT | Header | \$INHDT | |
| x.x | True vessel heading in the vessel frame | 0 to 359.99 | degrees |
| *hh | Checksum | n/a | |
| /CR/LF | Carriage return and line feed | /CR/LF | |

\$INVTG, x.x, T,, M, n.n, N, k.k, K*hh

\$INVTG-Course over ground and Ground speed data

| Item | Definition | Value | Units |
|--------|---------------------------------------|-------------|---------|
| %INVTG | Header | \$INVTG | |
| x.x | True vessel track in the vessel frame | 0 to 359.99 | degrees |
| T | True | T | |
| null | Not supported | null | |
| M | | M | |
| n.n | Speed in the vessel frame | n/a | Knots |
| N | Knots | N | |
| k.k | Kilometres | K | |
| *hh | Checksum | n/a | |
| /CR/LF | Carriage return and line feed | /CR/LF | |

Note that, in the case of the track and the speed fields, POS/MV adds the leading digits as required (i.e. if the value exceeds 9.9). Also, note that commas separate all items in the including null fields.

\$INGST, hhmmss,sss,,smjr.smjr,smnr.smnr, o.o, l.l, y.y, a.a *hh

\$INGST-GPS pseudorange noise statistics

| Item | Definition | Value | Units |
|------------|----------------------|---------|--------------------------------|
| \$INGST | Header | \$INGST | |
| hhmmss.sss | UTC time of position | n/a | Hours/Minutes/Seconds.decimal. |

| | | | |
|-----------|--|------------|---|
| | | | 2 fixed digits of hours. 2 fixed digits of minutes. 2 fixed digits of seconds. Three digits for decimal fractions of a second. |
| null | Not supported | null | |
| smjr.smjr | Standard Deviation of semi-major axis of error ellipse | n/a | Metres |
| smnr.smnr | Standard deviation of semi-minor axis of error ellipse | n/a | Metres |
| o.o | Orientaion of semi-major axis ellipse | 0 to 359.9 | Degrees from true north |
| l.l | Standard deviation of latitude | n/a | Metres |
| y.y | Standard deviation of longitude | n/a | Metres |
| a.a | Standard deviation of Altitude | n/a | Metres |
| *hh | Checksum | n/a | |
| /CR/LF | Carriage return and line feed | /CR/LF | |

Note that, in the case of all fields POS/MV adds leading digits as required (i.e. if the value exceeds 9.9). Also, note that commas separate all items, including null fields. The information is valid at the location of the vessel frame.

Note that commas separate all items

Two attitude data strings are available. The strings are identical except for the definition of roll and pitch angles. One string uses Tate-Bryant angles and the

other uses TSS angles. Use the POS/MV Controller program to set the required angle convention.

\$PRDID, PPP.PP, RRR.RR, xxx.xx*hh

\$PRDID-Attitude data

| Item | Definition | Value | Units |
|---------|-------------------------------|------------------|---------|
| \$PRDID | Header | \$PRDID | |
| PPP.PP | Pitch | -90.00 to +90.00 | Degrees |
| RRR.RR | Roll | -90.00 to +90.00 | Degrees |
| xxx.xx | Sensor heading | 0 to 359.99 | Degrees |
| *hh | Checksum | n/a | |
| /CR/LF | Carriage return and line feed | /CR/LF | |

Note that commas separate all items

Two attitude data strings are available. The strings are identical except for the definition of roll and pitch angles. One string uses Tate-Bryant angles and the

other uses TSS angles. Use the POS/MV Controller program to set the required angle convention.

\$INZDA, hhmmss.ss, DD, MM, YYYY,, *hh

\$INZDA-Time and date

| Item | Definition | Value | Units |
|---------|------------|---------|-------|
| \$INZDA | Header | \$INZDA | |

| | | | |
|------------|---------------|----------|---|
| hhmmss.sss | UTC time | n/a | Hours/Minutes/Seconds.decimal. 2 fixed digits of hours 2 fixed digits of minutes 2 fixed digits of seconds Three digits for decimal fractions of a second |
| DD | Day of month | 01 to 31 | |
| MM | Month of year | 01 to 12 | |
| YYYY | Year | | |
| Null | Null | | |
| Null | Null | | |
| *hh | Checksum | n/a | /CR/LF |

RM Young Rain Gauge & Eppley PSP data

RM Young Rain Gauge & Eppley PSP data is formatted in the following sentences:

x.xxxxxx,y.y

Sentence field

| Instrument | Item | definition | units |
|---------------------|----------|----------------|-------|
| Eppley PSP | x.xxxxxx | voltage | mV |
| RM Young Rain Gauge | y.y | amount of rain | mm |

Seabird SBE-45 Thermosalinograph Data

Data from the SBE-45 TSG is output in the following format:

2012:050:06:02:01.0294 27.2958, 5.51684, 34.7768

yyyy:ddd:hh:mm:ss.ssss tttt, cccc, xxxx

| Item | Definition | Units |
|---------|--------------------------------------|-------|
| yyyy | year | n/a |
| ddd | day of year | n/a |
| hh | hours | n/a |
| mm | minutes | n/a |
| ss.ssss | seconds | n/a |
| tttt | Raw internal temperature sensor data | n/a |
| cccc | Raw conductivity sensor data | n/a |
| xxxx | Raw salinity sensor data | n/a |

SEAPATH 200 Intertial Navigation System

SEAPATH outputs data in NMEA format using the following sentence formats:

- 1. \$INGGA-Global System Position Fix Data
- 2. \$INHDT-Heading - True data
- 3. \$INVTG-Course over ground and Ground speed data
- 4. \$INZDA-Time and date

\$INGGA, hhmmss.sss, llll.lllll, a, yyyyyy.yyyyy, b, t, nn, v.v, x.x, M,,,c.c,rrrr*hh

\$INGGA-Global System Position Fix Data

| Item | Definition | Value | Units |
|--------------|--|---|---|
| \$INGGA | Header | \$INGGA | |
| hhmmss.sss | UTC time of position | n/a | Hours/Minutes/Seconds.decimal. Two fixed digits of hours. Two fixed digits of minutes. Two fixed digits of seconds. Three digits for decimal fractions of a second. |
| llll.lllll | Latitude | -90 to +90 | DegreeslMinutes.decimal. Two fixed digits of degrees Two fixed digits of minutes Five digits for decimal minutes. |
| a | N (north) or S (south) | N or S | |
| yyyyyy.yyyyy | Longitude | -180 to +180 | Degrees/Minutes.decimal. Three fixed digits of degrees. Two fixed digits of minutes. Five digits for decimal minutes. |
| b | E (east) or W (west) | E or W | |
| t | GPS Quality Indicator | 0 = Fix not available or invalid 1 = CIA standard GPS; fix valid. 2 = DGS mode; fix valid. 3 = PPP mode; fix valid. 4 = RTK fixed 5 = RTK float 6 = free inertial | |
| nn | Number of satellites used in fix | 0 to 32 | |
| v.v | Horizontal dilution of precision | | |
| x.x | Altitude of the IMU above or below the mean sea level. A negative value indicates below sea level. | n/a | Metres |
| M | Units of measure = metres | M | |
| Null | Null | | |
| Null | Null | | |
| c.c | Age of differential corrections in records since last RTCM-104 message. | 0 to 99.9 | Seconds |
| rrr | DGPS reference station identity | 0000 to 1023 | |
| *hh | Checksum | | |
| /CR/LF | Carriage return and line feed | /CR/LF | |

\$INHDT, x.x, T*hh

\$INHDT-Heading - True data

| Item | Definition | Value | Units |
|---------|---|-------------|---------|
| \$INHDT | Header | \$INHDT | |
| x.x | True vessel heading in the vessel frame | 0 to 359.99 | degrees |
| *hh | Checksum | n/a | |
| /CR/LF | Carriage return and line feed | /CR/LF | |

\$INVTG, x.x, T,, M, n.n, N, k.k, K*hh

\$INVTG-Course over ground and Ground speed data

| Item | Definition | Value | Units |
|---------|---------------------------------------|-------------|---------|
| \$INVTG | Header | \$INVTG | |
| x.x | True vessel track in the vessel frame | 0 to 359.99 | degrees |
| T | True | T | |
| null | Not supported | null | |
| M | | M | |
| n.n | Speed in the vessel frame | n/a | Knots |
| N | Knots | N | |
| k.k | Kilometres | K | |
| *hh | Checksum | n/a | |
| /CR/LF | Carriage return and line feed | /CR/LF | |

\$INZDA, hhmmss.ss, DD, MM, YYYY,, *hh

\$INZDA-Time and date

| Item | Definition | Value | Units |
|------------|-------------------------------|----------|---|
| \$INZDA | Header | \$INZDA | |
| hhmmss.sss | UTC time | n/a | Hours/Minutes/Seconds.decimal. 2 fixed digits of hours 2 fixed digits of minutes 2 fixed digits of seconds Three digits for decimal fractions of a second |
| DD | Day of month | 01 to 31 | |
| MM | Month of year | 01 to 12 | |
| YYYY | Year | | |
| Null | Null | | |
| Null | Null | | |
| *hh | Checksum | n/a | |
| /CR/LF | Carriage return and line feed | /CR/LF | |

Speed log data

Speed log data is formatted in the following sentences:

- VHW - Water speed and heading
- VBW - Dual Ground/Water Speed

\$VHW,x.x,T,x.x,M,x.x,N,x.x,K*hh

VHW sentence fields

| Item | definition | units |
|------|-----------------------------------|------------|
| x.x | degrees true | ? |
| T | T=true | n/a |
| x.x | degrees Magnetic | ? |
| M | M = Magnetic | n/a |
| x.x | Speed of vessel relative to water | Knots/hour |
| N | N = Nots | n/a |
| x.x | Speed of vessel relative to water | Km/hour |
| K | K = Kilometers | n/a |
| *hh | Checksum | n/a |

\$VBW,x.x,x.x,A,x.x,x.x,A*hh

VBW sentence fields

| Item | Definition | Units |
|------|---|-------|
| x.x | Longitudinal water speed, "-" means astern | ? |
| x.x | Transverse water speed, "-" means port | ? |
| A | A = Data Valid | n/a |
| x.x | Longitudinal ground speed, "-" means astern | ? |
| x.x | Transverse ground speed, "-" means port | ? |
| A | A = data valid, V = data invalid | n/a |
| *hh | Checksum | n/a |

Streamer Tension Unit Data

STU outputs data in the following sentence format:

**aaa bbb cc dd ee f g hhhh iiii jjjj kkkk l m nnnn oooo pppp qqqq r s tttt uuuu
vvvv wwww x y zzzz !!!! @@@@ #####**

STU Data

| Item | Definition | Value | Units |
|------|---------------------|----------|---------|
| aaa | na | n/a | n/a |
| bbb | Julian Day | 1 to 366 | day |
| cc | Hour | 0 to 24 | integer |
| dd | Minutes | 0 to 60 | integer |
| ee | Seconds | 0 to 60 | integer |
| f | # 1 ID | 1 | integer |
| g | # 1 Channel # | 0 | integer |
| hhhh | # 1 Peak Tension | n/a | lbs |
| iiii | # 1 Average Tension | n/a | lbs |
| jjjj | # 1 Delta Tension | n/a | n/a |
| kkkk | # 1 Temperature | n/a | Celcius |
| l | # 2 ID | 1 | integer |
| m | # 2 Channel # | 1 | integer |
| nnnn | # 2 Peak Tension | n/a | lbs |
| oooo | # 2 Average Tension | n/a | lbs |
| pppp | # 2 Delta Tension | n/a | n/a |
| qqqq | # 2 Temperature | n/a | Celcius |
| r | # 3 ID | 1 | integer |
| s | # 3 Channel # | 2 | integer |
| tttt | # 3 Peak Tension | n/a | lbs |
| uuuu | # 3 Average Tension | n/a | lbs |
| vvvv | # 3 Delta Tension | n/a | n/a |
| wwww | # 3 Temperature | n/a | Celcius |
| x | # 4 ID | 1 | integer |
| y | # 4 Channel # | 3 | integer |
| zzzz | # 4 Peak Tension | n/a | lbs |
| !!!! | # 4 Average Tension | n/a | lbs |
| @@@@ | # 4 Delta Tension | n/a | n/a |
| #### | # 4 Temperature | n/a | Celcius |

Applied Microsystems Sound Velocity Probe Data

The sound velocity probe serial data is output in the following format:

1479.35

xxxx.xx

| Item | Definition | Units |
|---------|----------------|-------|
| xxxx.xx | Sound Velocity | m/s |

Seabird SBE38 Thermometer Probe Data

The sound velocity probe serial data is output in the following format:

8.2221

xx.xxxx

| Item | Definition | Units |
|---------|-------------|---------|
| xx.xxxx | Temperature | Celcius |

RM Young Meteorological Station Data

The meteorological data from the RMYoung integrated weather station is output in the following sentence format:

12.6 13.2 12.6 16.9 1 335 2 0.0 0.0 0.0 0.0 355 355 0 -11.9 -23.8 ***** 7.3 8 4 9 1006.9
aaa.a bbb.b ccc.c dd.d eee fff ggg hhh.h iii.i jjj.j kkk.k lll mmm nnn -oo.o -pp.p -qq.q -rr.r ss tt uu vvvv.v

Langseth WX station sentence format

| Item | Definition | Units |
|-------|-------------------------------------|-----------|
| aaa.a | bird 1 speed, instantaneous | knots |
| bbb.b | bird 1 speed, 60 second average | knots |
| ccc.c | bird 1 speed, 60 minute average | knots |
| ddd.d | bird 1 speed, 60 second peak | knots |
| eee | bird 1 direction, instantaneous | knots |
| fff | bird 1 direction, 60 second average | knots |
| ggg | bird 1 direction, 60 minute average | knots |
| hhh.h | bird 2 speed, instantaneous | knots |
| iii.i | bird 2 speed, 60 second average | knots |
| jjj.j | bird 2 speed, 60 minute average | knots |
| kkk.k | bird 2 speed, 60 second peak | knots |
| lll | bird 2 direction, instantaneous | knots |
| mmm | bird 2 direction, 60 second average | knots |
| nnn | bird 2 direction, 60 minute average | knots |
| ooo.o | temperature, instantaneous | Degrees C |
| ppp.p | temperature, 60 minute average | Degrees C |
| qqq.q | temperature, 60 minute low | Degrees C |

| | | |
|--------|-----------------------------------|-----------|
| rrr.r | temperature, 60 minute high | Degrees C |
| ss | relative humidity, instantaneous | % |
| tt | relative humidity, 60 minute low | % |
| uu | relative humidity, 60 minute high | % |
| vvvv.v | Baromoeter, instantaneous | knots |