
LMG0501

LTER

Cruise Data Report

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Introduction

The LMG data acquisition systems continuously log data from a suite of instrumentation throughout the cruise. This document describes the format of that data and its location on the distribution CDs. It also contains important information that may affect how this data is processed such as instrument failures or other known problems with acquisition.

The data collected during this cruise is distributed on a CD-ROM written in ISO9660 level-1 format. This data format has very strict requirements on filenames and organization. However, it is readable by virtually every computing platform.

All of the data has been archived with the Unix “tar” command and/or compressed using Unix “gzip” compression. Tar files have a “.tar” extension and Gzipped files have a “.gz” extension. Tools are available on all platforms for uncompressing and de-archiving these formats. On Macintosh, Stuffit Expander with DropStuff will open a tar archive and uncompress gzipped and Unix compressed files. For Windows9X, WinZip, a shareware utility included on this CD (remember, it is shareware) will open these files.

In some cases to adhere to the ISO9660 format the .tar extension was removed. When we tarred the files then gzip the tar archive the name of the file became *File.tar.gz*. This name does not follow the 8.3 naming convention of the ISO9660 format. So the file was renamed without .tar making the file name **File**.gz. On Windows and Mac Platforms Winzip and Stuffit Expander handles this just fine. When they expand the *File.gz* the expanded file becomes *File.tar*, which both software packages can handle. On Unix platforms gunzip expands *File.gz* but it does not append the .tar extension. So you may not recognize the file as a tar archive, but OS does recognize it as a tar archive. If you use the file command it will return saying it is a tar file. The below tar command will un-archive the file just fine.

IMPORTANT: Read the last section in this document, Acquisition Problems and Events, for important information that may affect the processing of this data.

Archive Data Extraction

It is often useful to know exactly how an archive was produced when expanding its contents. Tar files were created using the following commands:

```
tar cvf archive-file files-to-be-archived
```

To create a list of the files in the archive:

```
tar tvf archive-file > contents.list
```

To extract the files from the archive:

```
tar xvf archive-file file(s)-to-extract
```

G-zipped files will have a “.gz” extension on the filename. These files can be decompressed after de-archiving, using:

```
gunzip filename.gz
```

CD Directory Structure

./ADCP: lmg0501a.tar lmg0501b1.tar lmg0501b.tar lmg0501.tar ./CAL: CTD_CALS.pdf instrmnt.cof MET_CALS.tar SVP_CALS.tar UW_CALS.tar ./CTD: CONFIG.XLS Graphs.tgz Process.tgz Raw.tgz scripts.tar setup.tar ./CTD/LOGS: *.pdf ./DRIFTERS: DriftLog.pdf ./EVENTLOG: EVENTLOG.XLS ./ICE: Ice.tar ./ISOBARS: Isobars.tar ./JGOF: lmgjgof.tar ./MAPS: Map24.ps Map8.ps ./MOORING: Mooring.tar ./NUT: Nutr.tar	./Oxygen: Oxy.tar ./PCO2: lmgpco2.tar ./QC_PLOTS: lmgqc.tar ./REPORT: REPORT.DOC REPORT.htm REPORT.txt ./RVDAS: lmgnav.tar lmgtsqfl.tar lmguw.tar xrvdas.log ./SALINITY: SAL.tar ./SALINITY/Drake: SaltLog.pdf XBTsalts.xls ./TCO2: TCO2Log.pdf ./WAYPTS: 0301wpt.txt 0501wpt.txt ./XBT: DAT.ZIP EFILES.ZIP LOG.ZIP NAV.ZIP SFILES.ZIP XBTLog.pdf	./XCTD: *.edf *.RDF XCTD_Log.pdf ./XCTD/Drake: *.edf *.RDF XCTDLog.pdf
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Distribution Contents

ADCP

/Adcp/

This directory contains a tar file of gentoo's proc directory. Which contains a database of the averaged ping data, Matlab m-files used in processing the data, and daily graphs of the currents. There are multiple directories LMG0501, LMG0501a, LMG0501b, and LMG0501b1 due to having to restart the software's logging because the OS38 did not want to communicate with the software. For more information contact Teri Chereskin at tchereskin@ucsd.edu.

Calibration

/Cal/

The tar files in the Cal directory contain images of calibration sheets for each of the following systems: Sound Velocity Probe(SVP_CALS.TAR), Meteorological System(MET_CALS.TAR), Underway System(UW_CALS.TAR), and CTD_CALS.pdf.

Refer to the instrmnt.cof file along with the specific instrument calibration sheets, both located in this directory, for information on how the RVDAS data was collected and processed.

CTD

CTD/

The ctd data was collected and processed on a computer running Windows 98, using Seasave Win32 – Version 5.31a and SBE Data Processing – Version 5.31a

For more information and software visit the web site at www.seabird.com.

CTD/Setup/

In the Setup directory there is a Config file in html, excel, and text form which contain information of which sensors were used and what freq or volt the were connected to. The file also contains a table with the vertical distance in meters from the pressure port that each sensor was mount. The distances are positive as pressure increases.

CTD/Scripts/

This directory contains the batch file and psu files that we used for post processing the data. The data was processed with the standard seabird processing method. This is just a preliminary processing which was done to verify that the sensors were functioning properly during the cruise. The raw data should be re-processed using the pre and post cruise sensor calibrations.

CTD/Data/raw

The raw.gz file is a tar archive file that has been compressed with gzip, for more information on this see the above *Introduction* section. This archive contains the raw file collect at each CTD cast, which is represented by a set of four files containing a bottle-firing file (.bl), a configuration file (.con), a data file (.dat) and a header file (.hdr). Casts are named with the following g501CCC.ext, where g is for the LMG, 501 is the cruise 05-01, CCC is the cast number. For example; the raw files associated with the Cast 1on this cruise are: g501001.bl, g501001.con, g501001.dat, g501001.hdr. The raw data files(*.dat) are binary files.

CTD/Data/process

The process.gz file is a tar archive file that has been compressed with gzip. For more information on this see the above *Introduction* section. This archive contains the processed data files for each CTD cast, the

processing method used is briefly described in the above section *CTD/Pscripts/*. Also see the above section *CTD/Data/raw* for a description of the file naming convention used. Each processed cast is represented here by a set of ten files:

GXXXCCC.con	A copy of the configuration file for the cast.
GXXXCCC.cnv	The converted file for the whole cast.
GXXXCCC.ros	The rosette file that contains the scan lines for each bottle trip.
GXXXCCC.btl	The bottle file that contains the avg, standard deviation, min, and max for a select set of variables for each bottled fired during the upcast.
DGXXXCCC.cnv	The converted file for the down cast.
DGXXXCCC.asc	An ASCII formatted file for the down cast without a header.
DGXXXCCC.hdr	The header for the down cast.
UGXXXCCC.cnv	The converted file for the up cast.
UGXXXCCC.asc	An ASCII formatted file for the up cast without a header.
UGXXXCCC.hdr	The header for the up cast.

Ice Images

/ICE_IMAGE/

This directory contains .jpg files of Terrascan ice imagery sent to the ship from Palmer station before and during the cruise.

Isobar Charts

/Isobars/

This directory contains GIF image files. These file are an analysis of mean sea level pressure from the National Center for Environmental Prediction's Medium Range Forecast Model. They are updated every 6 hours. Naming the convention is as follows yyjjj.hh.gif where yy is the year, jjj is the day number, and hh is the hour.

Data and Science Report

/Report/

Copies of this report in MS Word, HTML, and text formats.

XBT

/XBT/

Expendable Bathythermographic (XBT) probes were used to obtain water column temperature profiles. On the South bound Drake crossing Deep Blue XBT were used, data was collected with the auto-launcher software for Janet Sprintall's project. During the cruise digital XCTD-1 were dropped along the LTER grind. The data was collected using the MK21 Sipcan Software. The .RDF files contain the raw data, and the .EDF contain the exported ascii data.

XCTD

/XCTD/Drake

Expendable Conductivity, Temperature, and Depth (XCTD) probes were used to obtain water column temperature and Salinity profiles. On the South bound Drake crossing digital XCTD-1 probes were used, data was collected with the MK21 Sipican software. This data was collected for Janet Sprintall's project. The two files were created for each drop .RDF files contain the raw data, and the .EDF contain the exported ascii data.

/XCTD/Drake

During the cruise digital XCTD-1 were dropped along the LTER grid to fill in hole where the CTD was not deployed. The data was collected using the MK21 Sipican Software. The two files were created for each drop .RDF files contain the raw data, and the .EDF contain the exported ascii data.

TCO2

/TCO2/

This directory contains the log sheet for the TCO2 sample during the Drake Transect Sampling. For further information on this data, contact Tim Newberger at tnewberg@ldeo.columbia.edu

Salts

/SALT/

This directory contains

Drifters

/DRIFTERS/

This directory contains the log sheet for the drifter buoys release through out the LTER grid.

Science

/Science/

This directory contains data and photos collected by the individual scientists.

Maps

/Maps/

This directory contains a tar file, maps.tar, which contains various cruise maps generated with GMT. The tar file scripts.tar contains the csh scripts use to create these maps, along with data point files.

QC Plots

/QC_PLOTS/

Postscript files of data stored each day on RVDAS for quality control analysis during the cruise. There are 3 types of files, named metXXX.ps, navXXX.ps, and oceanXXX.ps, where XXX represents the Julian day. Met files are a summary of the data from the meteorological instruments, Nav files are a summary of navigational data, and Ocean files are a summary of the underway seawater and bathymetry data.

JGOFS Data Set

/JGOF/

The JGOFS data set consists of a single file produced each day named jg<julian_day>.dat.gz where <julian_day> is the day the data was acquired. The “.gz” extension indicates that the individual files are compressed before archiving. The daily file consists of 22 separate columnar fields in text format, which are described below. The JGOFS data set is obtained primarily by applying calibrations to raw data and decimating to whole minute intervals. However, several fields are derived measurements from more than a single raw input. *Note: Null, unused, or unknown fields are filled with 9's in the JGOFS data.*

Additionally, 3 separate QC plots are generated daily by the ET using the JGOFS data set. These plots include TSG and Bathymetry data, meteorological data, and navigation data. The files are called ocean<julian_day>.ps, met<julian_day>.ps, and nav<julian_day>.ps respectively.

Field	Data	Units
01	GMT date	dd/mm/yy
02	GMT time	hh:mm:ss
03	PCOD latitude (negative is South)	Ddd.dddd
04	PCOD longitude (negative is West)	Ddd.dddd
05	Ships speed	Knots
06	GPS HDOP	-
07	Gyro Heading	Degrees (azimuth)
08	Course over ground	Degrees (azimuth)
09	Mast PAR	μEinsteins/meters ² sec
10	Sea surface temperature	°C
11	Not used	-
12	Sea surface salinity	PSU
13	Sea depth (uncorrected, calc. sw sound vel. 1500 m/s)	meters
14	True wind speed (port windbird)	meters/sec
15	True wind direction (port windbird)	degrees (azimuth)
16	Ambient air temperature	°C
17	Relative humidity	%
18	Barometric pressure	mBars
19	Sea surface fluorometry	volts (0-5 FSO)
20	Not used	-
21	PSP	W/m ²
22	PIR	W/m ²

RVDAS

/rvdas/

RVDAS (Research Vessel Data Acquisition System) was developed at Lamont-Doherty Earth Observatory of Columbia University and has been used on the R/V Maurice Ewing for several years. It was adapted for use on the Nathaniel B. Palmer and her sister ship, the R/V Laurence M. Gould.

Below you will find detailed information on the data included. Be sure to read the “Significant Acquisition Events” section below for important information about data acquisition during this cruise.

Meteorological and Light Data

Measurement	File ID	Collect. Status	Rate	Instrument
Air Temperature	lmet	continuous	1 sec	R. M. young 41372VC
Relative Humidity	lmet	continuous	1 sec	R. M. young 41372VC
Wind Speed/Direction	lmet	continuous	1 sec	R. M. young 5106
PIR (LW radiation)	lmet	continuous	1 sec	Eppler PIR
PSP (SW radiation)	lmet	continuous	1 sec	Eppler PSP
Photosynthetically-Available Radiation	lmet	continuous	1 sec	BSI QSR-240
Barometer	lmet	continuous	1 sec	R. M. young 61201
GUV & PUV	lguv	continuous	1 sec	GUV2511 & PUV2510

Navigational Data

Measurement	File ID	Collect. Status	Rate	Instrument
Attitude GPS	lash	continuous	1 sec	Ashtec ADU-2
P-Code GPS	lpcd	civilian mode	1 sec	Trimble 20636-00SM
Gyro	lgyr	continuous	0.2 sec	Anschutz Gyro
Trimble GPS	tgps	continuous	1 sec	NT200

Geophysical Data

Measurement	File ID	Collect. Status	Rate	Instrument
Bathymetry	lknu	variable	Varies	Knudsen 320B/R
Net Depth Sensor	Gen1	variable	~1/3 sec	

Oceanographic Data

Measurement	File ID	Collect. Status	Rate	Instrument
Salinity	ltsg	continuous	6 sec	SeaBird 21
Sea S Temperature	ltsg	continuous	6 sec	SeaBird 3-01/S
Fluorometry (analog)	ltsg	continuous	6 sec	Turner 10-AU-005
ADCP	ladc	continuous	1 sec	RD Instruments
Oxygen	loxy	continuous	10 sec	

Data File Names and Structures

RVDAS data is divided into two broad categories, **Underway** and **Navigation**. The groups are abbreviated “uw” and “nav”. Thus, these two tar files, lmguw.tar and lmgnav.tar exist under the top-level rvdas directory. The instruments are broken down as shown. Each data file is g-zipped to save space on the distribution. Not all data types are collected everyday or on every cruise.

RVDAS data files are named following the convention: LMG[FileID].dDDD.

- The FileID is a 4-character code representing the system being logged, for example: lmet (for meteorology)
- DDD is the Julian day of the data collection

Underway Data	File ID	Navigation Data	File ID
Meteorological	lmet	Gyro Compass	lgyr
Knudsen	lknu	P-CODE GPS	lpcd
Thermosalinograph	ltsg	Ashtech ADU2 GPS	lash
ADCP	ladc	Trimble NT2100 GPS	tgps
Sound Velocity Probe	lsvp		
GUV & PUV	lguv		
PCO2 System	lpcd		
Oxygen	loxy		

Data is received by the RVDAS system via RS-232 serial connections. The data files that comprise the rvdas data set are described below. A time tag is added to each line of data received and the data is written to disk.

YY+DDD:HH:MM:SS.SSS [data stream from instrument]

Where, YY: two-digit year, DDD: Julian Day, HH: 2 digit hours, MM: 2 digit minutes SS.SSS: seconds. All times are UTC.

The delimiters used to separate fields in the raw data files are usually spaces and commas, but other delimiters are used (::, =, @) and occasionally there is no delimiter. Care should be taken when reprocessing the data that the fields separations are clearly understood. An example data

lknu

99+099:00:18:19.775 hf,305.2,lf,304.3

Field	Data	Units
1	RVDAS Time Tag	
2	hf – high frequency flag (12 kHz)	
3	high frequency depth	meters
4	lf – low frequency flag (3.5 kHz)	
5	low frequency depth	meters

Gen1

99+099:00:18:19.775 V01 00199.8

Field	Data	Units
1	RVDAS Time Tag	
2	V01 – Sensor 1	
3	Depth	meters

lmet

02+314:23:59:50.067 01.2 047 028 01.3 063 042 0988.8 001.7 084 -000.2192 0000.9358 0025.5875

Field	Data	Units
1	RVDAS Time Tag	
2	Port Wind Speed	m/s
3	Port Wind Direction	deg
4	Port Wind Direction (standard deviation)	deg
5	Starboard Wind Speed	m/s
6	Starboard Wind Direction	deg
7	Starboard Wind Direction (standard deviation)	deg
8	Barometer	millibars
9	Temperature	°C
10	Relative humidity	%
11	PSP (long wave radiometer)	Volts
12	PIR (short wave radiometer)	Volts
13	PAR (photo-synthetically available radiation, 400 - 700 nm)	Volts

Itsg

For further information on this data, check on www.seabird.com on SBE 21 Thermosalinograph

04+321:00:01:23.978 06D572EC1801D8182DE4

04+321:00:01:23.978 ttttccccrrrrrruuuvvv

Field	Data	Units
1	RVDAS Time Tag	
2	Internal water temperature – tttt	Hex Value
3	Conductivity - cccc	Hex Value
4	External water temperature - rrrrrr	Hex Value
5	Fluorometer signal (analog) - uuu	Hex Value
6	Transmissometer signal - vvv	Hex Value

tsgfl

04+321:00:01:23.978 -00.070 -00.089 02.8042 33.75690 0.471306 4.341880

Field	Data	Units
1	RVDAS Time Tag	
2	Internal water temperature	°C
3	External water temperature	°C
4	Conductivity	S/cm
5	Salinity	PSU
6	Fluorometer signal (digital)	Volts
7	Transmissometer signal	Volts

Ipco

For further information on this data, contact Tim Newberger at tnewberg@ldeo.columbia.edu

02+319:23:59:13.748 2002319.99851 7154.27 26.49 1033.6 325.79 6.74 329.3
53.76 0 Equil

Field	Data	Units
1	RVDAS Time Tag	
2	Julian date file string	Julian
3	IR voltage reading	mV
4	Cell temperature	°C
5	Barometer	millibars

Field	Data	Units
6	VCO2	mL
7	Equilibrator temperature	°C
8	PCO2	millibars
9	Gas flow	mL/min
10	Solenoid position ID	number
11	Valve Position ID	number
12	Measured gas	name

Iguv

03+354:15:56:13.346 122003 155612 -.00007 4.632E-4 8.417E-5 1.027E-4 3.824E-2 -4.492E-6 5.196E-4
 5.2E-1 2.793E-3 23.876 -.804 26.812 26.852 -1.238 3.525 .000099 2.581E1 5.058E1 1.442E1 2.73E0
 6.136E1 1.406E-1 6.187E1 39.989

GUV only

Field	Data	Units
1	RVDAS Time Tag	
2	GUV Computer Date	mmddyy
3	GUV Computer Time	hhmmss
4	Ed0Gnd - GUV	Volts
5	Ed0320 - GUV	$\mu\text{W}/\text{cm}^2\text{nm}$
6	Ed0340 - GUV	$\mu\text{W}/\text{cm}^2\text{nm}$
7	Ed0313 - GUV	$\mu\text{W}/\text{cm}^2\text{nm}$
8	Ed0305 - GUV	$\mu\text{W}/\text{cm}^2\text{nm}$
9	Ed0380 - GUV	$\mu\text{W}/\text{cm}^2\text{nm}$
10	Ed0PAR - GUV	$\mu\text{E}/\text{cm}^2\text{sec}$
11	Ed0395 - GUV	$\mu\text{W}/\text{cm}^2\text{nm}$
12	Ed0Temp - GUV	°C

GUV and PUV

Field	Data	Units
1	RVDAS Time Tag	
2	GUV Computer Date	mmddyy
3	GUV Computer Time	hhmmss
4	EdZGnd -PUV	Volts
5	EdZ305 -PUV	$\mu\text{W}/\text{cm}^2\text{nm}$
6	EdZ313 -PUV	$\mu\text{W}/\text{cm}^2\text{nm}$
7	EdZ320 -PUV	$\mu\text{W}/\text{cm}^2\text{nm}$
8	EdZ395 -PUV	$\mu\text{W}/\text{cm}^2\text{nm}$
9	EdZ340 -PUV	$\mu\text{W}/\text{cm}^2\text{nm}$
10	EdZPAR -PUV	$\mu\text{E}/\text{cm}^2\text{sec}$
11	LuZChl -PUV	$\mu\text{E}/\text{srm}^2\text{sec}$
12	EdZ380 -PUV	$\mu\text{W}/\text{cm}^2\text{nm}$
13	WTemp -PUV	°C
14	Depth -PUV	m
15	EdZTemp -PUV	°C
16	LuZTemp -PUV	°C
17	Tilt -PUV	Degrees
18	Roll -PUV	Degrees
19	Ed0Gnd - GUV	Volts
20	Ed0320 - GUV	$\mu\text{W}/\text{cm}^2\text{nm}$
21	Ed0340 - GUV	$\mu\text{W}/\text{cm}^2\text{nm}$
22	Ed0313 - GUV	$\mu\text{W}/\text{cm}^2\text{nm}$
23	Ed0305 - GUV	$\mu\text{W}/\text{cm}^2\text{nm}$
24	Ed0380 - GUV	$\mu\text{W}/\text{cm}^2\text{nm}$
25	Ed0PAR - GUV	$\mu\text{E}/\text{cm}^2\text{sec}$
26	Ed0395 - GUV	$\mu\text{W}/\text{cm}^2\text{nm}$
27	Ed0Temp - GUV	°C

svp1

00+348:01:59:52.128 1539.40

Field	Data	Units
1	RVDAS Time Tag	
2	Sound velocity	m/s

ladc

00+019:23:59:59.099 \$PUHAW,UVH,-1.48,-0.51,250.6

Field	Data	Units
1	RVDAS Time Tag	
2	\$PUHAW	
3	UVH (E-W, N-S, Heading)	
4	Ship Speed relative to reference layer ¹ velocity ² , East vector	knots
5	Ship Speed relative to reference layer ¹ velocity ² , North vector	knots
6	Ship heading	degrees

¹The reference layer is an average velocity measured in a number of depth “bins”. On the LMG, the bins are eight meters deep and bins 3-10 define the reference layer. Hence, the reference layer is the water column from 16-80 meters beneath the ship.

²The speed output is water velocity relative to the ship’s hull and is therefore opposite of the actual movement of the ship. For example, if the ship’s heading is due north, the North/South reference layer velocity is likely to be negative (southerly).

lash**ATTD: Attitude Data**

01+081:00:00:00.806 \$PASHR,ATT,345605.0,165.03,+001.86,-01.96,0.0018,0.0173,0*22

Field	Data	Units
1	RVDAS Time Tag \$PASHR	
2	ATT	
3	GPS Time sec. of the week	seconds
4	heading (rel. to true North)	degrees
5	pitch	degrees
6	roll	degrees
7	Measurement RMS error	meters
8	Baseline RMS error	meters
9	attitude reset flag	

01+081:00:00:00.966 \$GPGGA,235952.00,6051.7937,S,06030.2175,W,1,08,01.0,+00068,M,,M,,*79

Field	Data	Units
1	RVDAS Time Tag \$GPGGA	
2	UTC time at position	hhmmss.ss
3	Latitude	ddmm.mmm
4	North (N) or South (S)	
5	Longitude	ddmm.mmm
6	East (E) or West (W)	
7	GPS quality (1=GPS 2=DGPS)	
8	Number of GPS satellites used	
9	HDOP	
10	Antenna Height	meters
11	M for Meters	
12	Geoidal height	meters
13	M for meters	
14	age of diff. GPS data	sss
15	differential reference station ID	aaaa

lgyr

02+315:23:59:58.194 \$PASVW,00.1,A*1D

02+315:23:59:58.414 \$IIVHW,287.7,T,,M,,N,,K*71

02+315:23:59:58.616 \$HEHDT,287.7,T*25

02+315:23:59:58.821 \$HEROT,001.6,A*2C

02+315:23:59:58.984 \$HCHDT,,T*07

HDT: True Heading

01+083:00:00:02.893 \$HEHDT,246.3,T*2C

Field	Data	Units
1	RVDAS Time Tag \$HEHDT	
2	Heading XXXXX = ddd.d	degrees
3	T flag for true heading, checksum	

ROT: Rate of Turn

01+083:00:00:03.093 \$HEROT,-006.3,A*03

Field	Data	Units
1	RVDAS Time Tag \$HEROT	
2	Rate of turn	degrees/min
3	Status: A = data valid, checksum	

tgps**GGA: Global Positioning Fix Data**

00+040:00:00:00.985 \$GPGGA,000003,6139.961,S,05949.422,W,1,6,001.64,-00036,M,00000,M,,

Field	Data	Units
1	RVDAS Time Tag \$GPGGA	
2	Latitude in degrees with decimal minutes	ddmm.mmm
3	North (N) or South (S)	
4	Longitude in degrees with decimal minutes	ddmm.mmm
5	East (E) or West (W)	
6	GPS quality (1=GPS 2=DGPS)	
7	Number of GPS satellites used	
8	Horizontal dilution of precision (HDOP)	
9	Antenna height above/below mean-sea-level (geoid)	meters
10	Units for antenna height (M = Meters)	
11	Geoidal Separation ¹	
12	Units for Geoidal Separation (M = Meters)	meters
13	Age of differential GPS data, number of seconds since last SC104 Type 1 or 9	
14	Differential reference station ID	

¹Geoidal Separation: the difference between the WGS-84 earth ellipsoid and mean-sea-level (geoid). A negative value represents mean-sea-level below ellipsoid.

GLL: Geographic Position – Latitude/Logitude

00+040:00:00:00.065 \$GPGLL,6139.96,S,05949.42,W,000002,A

Field	Data	Units
1	RVDAS Time Tag \$GPGLL	
2	Latitude	ddmm.mmm
3	North (N) or South (S)	
4	Logitude	ddmm.mmm
5	East (E) or West (W)	
6	UTC of position	hhmmss.ss
7	Status: A = Data Valid	

VTG: Track Made Good and Speed over Ground

00+040:00:00:00.213 \$GPVTG,161,T,149,M,009.6,N,017.8,K

Field	Data	Units
1	RVDAS Time Tag \$GPVTG	
2	Track, degrees true	degrees
3	T flag for True	
4	Track, degrees magnetic	degrees
5	M flag for Magnetic	
6	Speed over Ground	knots
7	N flag for Knots	
8	Speed over Ground	kmhr
9	K flag for km/hr	

VHW: Speed Through Water and Heading

00+040:00:00:00.212 \$GPVHW,246,T,234,M,012.3,N,022.8,K

Field	Data	Units
1	RVDAS Time Tag \$GPVHW	
2	Heading, degrees True	degrees
3	T flag for True	
4	Heading, degrees Magnetic	degrees
5	M flag for Magnetic	
6	Speed through water	knots
7	N flag for Knots	
8	Speed through water	km/hr
9	K flag for km/hr	

ZDA: Time and Date

00+040:00:00:00.285 \$GPZDA,000002,09,02,2000,00,00

Field	Data	Units
1	RVDAS Time Tag \$GPZDA	
2	UTC time	hhmmss.ss
3	Day: 01 – 31	dd
4	Month: 01 – 12	mm
5	Year	yyy
6	Local time zone description ¹ , 00 +/-13 hrs	
7	Local time zone minutes description, same sign as local hours	

¹Zone description is the number of whole hours added to local time to obtain GMT, values are negative for East longitudes.

BWC: Bearing and Distance to Waypoint

00+040:00:00:00.865 \$GPBWC,000003,6209.70,S,05824.00,W,127.2,T,115.3,M,050.1,N,014

Field	Data	Units
1	RVDAS Time Tag \$GPBWC	
2	UTC of bearing	hhmmss.ss
3	Destination waypoint latitude in degrees, decimal minutes	ddmm.mmm
4	Hemisphere Flag: N or S	
5	Destination waypoint longitude in degrees, decimal minutes	ddmm.mmm
6	Hemisphere Flag: E or W	
7	Bearing, degrees true	degrees
8	T flag for True	
9	Bearing, degrees magnetic	degrees
10	M flag for Magnetic	
11	Distance to waypoint in nautical miles	nm
12	N flag for Nautical Miles	
13	Waypoint ID	

lpcd

GGA: GPS Position Fix – Geoid/Ellipsoid

00+019:23:59:59.301 \$GPGGA,235958.409,6849.6944,S,13712.8472,W,1,06,1.2,092.4,M,047.3,M,,*67

Field	Data	Units
1	RVDAS Time Tag \$GPGGA	
2	UTC time at position	hhmmss.sss
3	Latitude	ddmm.mmm
4	North (N) or South (S)	
5	Longitude	ddmm.mmm
6	East (E) or West (W)	
7	GPS quality (1=GPS 2=DGPS 3=P-CODE)	
8	Number of GPS satellites used	
9	HDOP	
10	Antenna Height	meters
11	M for Meters	
12	Geoidal height	meters
13	M for meters	
14	Null field	
15	Checksum	

GLL: GPS Latitude/Longitude

00+019:23:59:59.381 \$GPGLL,6849.6944,S,13712.8472,W,235958.409,A*35

Field	Data	Units
1	RVDAS Time Tag \$GPGLL	
2	Latitude	degrees
3	North or South	
4	Longitude	degrees

Field	Data	Units
5	East or West	
6	UTC of position	hhmmss.sss
7	status of data (A = valid)	
8	Checksum	

VTG: GPS Track and Ground Speed

00+019:23:59:59.382 \$GPVTG,238.7,T,182.3,M,001.8,N,003.3,K*41

Field	Data	Units
1	RVDAS Time Tag \$GPVTG	
2	Heading	degrees
3	degrees True (T)	
4	Heading	degrees
5	degrees magnetic (M)	
6	Ship speed	knots
7	N = knots	
8	Speed	km/hr
9	Checksum	

Ifir

04+107:16:48:02.342 0 5450 :: 4/16/04 09:44:17 = 0.632 (RAW)

Field	Data	Units
1	RVDAS Time Tag	
2	Zero Field	numeric
3	Sample Number	numeric
4	Fluorometer Date	mm/dd/yy
5	Fluorometer Time	hh:mm:ss
6	Digital output of fluorometer	Volts
7	(RAW)	

loxy

For further information on this data, contact Tim Newberger at tnewberg@ldeo.columbia.edu

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04+117:23:57:23.504 MEASUREMENT      3830    380 Oxygen:      309.95    Saturation:
83.48  Temperature:      -1.35    DPhase:      33.41    BPhase:      32.22
      RPhase:      0.00    BAmp:      262.09    BPot:      163.00    RAmp:
0.00  RawTem.:      694.92
04+117:23:58:23.508 MEASUREMENT      3830    380 Oxygen:      309.59    Saturation:
83.38  Temperature:      -1.35    DPhase:      33.43    BPhase:      32.23
      RPhase:      0.00    BAmp:      262.14    BPot:      163.00    RAmp:
0.00  RawTem.:      694.95
04+117:23:59:23.512 MEASUREMENT      3830    380 Oxygen:      309.74    Saturation:
83.43  Temperature:      -1.35    DPhase:      33.42    BPhase:      32.22
      RPhase:      0.00    BAmp:      262.07    BPot:      163.00    RAmp:
0.00  RawTem.:      694.83

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Field	Data	Units
1	RVDAS Time Tag	
2-4	Measurement ID, Model Number, Serial Number	alphanumeric

5	Oxygen heading	text
6	Oxygen Reading	Raw numeric
7	Saturation heading	text
8	Saturation Reading	Raw numeric
9	Temperature heading	text
10	Water Temperature	°C
11	Dphase heading	text
12	Dphase	Raw numeric
13	Bphase heading	text
14	BPhase	Raw numeric
15	Rphase heading	text
16	Rphase	Raw numeric
17	Bamp heading	text
18	Bamp	Raw numeric
19	Bpot heading	text
20	Bpot	Raw numeric
21	Ramp heading	text
22	Ramp	Raw numeric
23	RawTem heading	text
24	RawTemp	Raw numeric

LMG Sensors

Shipboard Sensors

Sensor	Description	Serial #	Cal. Date	Status
Port Anemometer	R.M. Young 105106	WM28394	16-Oct-04	collected
Stbd Anemometer	R.M. Young 105106	WM5708	16-Oct-04	collected
Barometer	R.M. Young 61201	BP01150	26-Feb-03	collected
Humidity/Wet Temp	R.M. Young 41372LC	06133	23-Dec-03	collected
Mast PAR	BSI QSR-240P	6393	12-Dec-03	collected
Pyranometer	Eppley PSP	28933F3	30-Mar-04	collected
Pyrgometer	Eppley PIR	28903F3	30-Mar-04	collected
TSG	SeaBird SBE21	3208	15-Apr-04	collected
TSG Remote Temp	SeaBird 3-01/S	1620	5-May-04	collected
Fluorometer	Turner 10-AU-005 Lamp: daylight 10-045, reference filter: 10-052, emission filter: 10-051, excitation filter: 10-050.	6592RTX	n/a	collected
Transmissometer	WET Labs C-Star 25cm	CST-830DR	31-Jul-04	collected
P-Code GPS	Trimble 20636-00 (SM)	220035265	n/a	collected
Bathymetry	Knudsen 320B/R		n/a	collected

CTD Sensors

Sensor	Description	Serial #	Cal. Date
Pressure Sensor	In Fish s/n 0312	53580	08-Jul-04
Temperature	Primary	2637	29-Jan-04
Temperature	Secondary	2658	29-Jun-04
Conductivity	Primary	350	29-Jun-04
Conductivity	Secondary	0692	4-May-04
Oxygen	Primary – Voltage 2	0200	28-Apr-04
Oxygen	Secondary – Voltage 3	0201	25-Jun-04
PAR	Voltage 7	4561	26-Mar-04
Transmissometer	Voltage 4	407DR	17-May-04
Fluorometer	Voltage 0	88211	12-May-2004

Acquisition and Processing Information

Processing Specifics

Refer to the instrmnt.cof file along with the specific instrument calibration sheets, both located in the Cal/ directory of the data distribution, for information on how the RVDAS data was collected and processed.

Errors and Events

This section lists all significant events and known problems with acquisition during this cruise including instrument failures, data acquisition system failures, and other factors affecting this data set.

Date (Julian)	Time (GMT)	Event	Location
365	12:13	Started DAS, Seawater, Sonar, GPS, and Met Systems	@68W
365	12:21	TSG, Fluorometer on	@68W
365	12:40	ADCP on	@68W
365	12:41	SVP on	@68W
365	13:04	PCO2 on	@68W
365	13:24	Corrected Transmissometer Cal in DAS Vref was 4.811 instead of 4.692	
365	13:32	Restarted DAS to correct Transmissometers Cal	
366	6:50	Turned off Bottom Tracking on ADCP - Got Confused Message – Started new cruise	
001		ADCP Plots not working correctly	
001	4:01	Started Up GUUV	
001	16:09	Changed DAS PAR dark value to Volts instead of mV, restart uwint	
002	21:35	Seawater Off	@ Palmer Station
002	21:37	Fluorometer, and TSG Off	@ Palmer Station
003	14:20	ADCP off	Palmer Station
003	16:18	All Systems, except seawater, turn on to check that loggers work, after installing new xrvdas	Palmer Station
004	15:30	Cleaned Mast Sensors	Palmer Station
004	17:33	ADCP Started – Cruise lmg0501b	Departed Palmer Station
004	17:36	TSG ON	Departed Palmer Station
004	18:03	PCO2 and Seawater ON	Departed Palmer Station
004	18:55	PCO2 computer was found off, reconnected power and restarted system	
005	3:31	Restarted DAS to clear share memory	
022	20:55	Turned off Sonar	@ Rothera
022	20:56	Stopped logging on ADCP	@ Rothera
022		Shutdown PCO2 System	@ Rothera
023		Sonar On	Departed Rothera
023	9:03	PCO2 on	Departed Rothera
023	9:06	ADCP on	Departed Rothera
024	23:11	Checked on Ashtech Status with	

		Ashtech Evaluate Software	
025	21:38	Disconnected Fluorometer from TSG to test loading effects	
027	18:45	Tried to turn on Bottom Track on ADCP. Gentoo Locked up. Shutdown hard.	
027	19:32	Gentoo Backup and logging with Bottom Track On	
029	8:51	Turn on Bottom Track on ADCP – No Problems	
032	2:28	ADCP and Sonar Off for Biofish Calibration	
032	3:15	ADCP and Sonar Back On	
032	11:00	Initiated PCO2 Shutdown	@ Palmer Station
032	11:05	Fluorometer and TSG Offline	@ Palmer Station
032	11:08	Oxygen Logging Stopped	@ Palmer Station
033	13:16	Start TSG	Departed Palmer Station
033	13:18	Started All DAS Loggers	Departed Palmer Station
036	19:52	Shut Das Logger Off	@ 68 West
036	19:55	ADCP Logging Stopped	@ 68 West
036	19:56	TSG and GUV Turned off	@ 68 West
036	19:58	Fluorometer Off, PCO2 Shutdown Initiated	@ 68 West