Directory Reference: Understanding OET/Nautilus Data Files

June 16 2016

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> processed

> capture_highlights – Best of the underwater captures, organized by date

> capture_pngs – All captures from the raw directory, but converted into png files from the larger .tiff format

> dive_plans – An archive of dive plans, as sent out by the expedition leader during the cruise

> dive_reports – Documents providing general time-stamped dive summaries and per-dive processed data for QC and plotting. For ROV dives, details include: dive number, location, dates, launch and recovery times and coordinates in decimal minutes, average depth, depth on and off bottom, and the main objective. The summary section includes a breakdown of Eventlog notes taken during operations.

dives-summary.tsv:
This file contains summary statistics of every dive of the cruise, calculated and compiled automatically by the dive report scripts

$dive/$dive-summary.tsv
Calculated status for $dive

$dive/$dive-summary.html
Generated dive report summary with stats and sample/image links (by time)

$dive/$dive.kml
Generated KML from dive data with vehicle tracks and observations rendered in 3D

$dive/$dive.CTD-temp-anomaly.kml
Generated KML from on-bottom CTD temperature spikes observations rendered in 3D

$dive/$dive.pdf
Data Manager's summary report of science activity

$dive/trimmed/
Directory contains datalog files trimmed to dive interval and converted to TSV, payload fields same order, format as raw

$dive/sampled/
Directory contains trimmed files filtered and re-sampled to 1-sec intervals

$dive/merged/
Directory contains sampled data merged with navigation

$dive/graphs/
Directory contains QC graphs for merged or sampled data

> eventlog – text record of observations and other expedition events,

as recorded by watchstanders. Records are split out by day as well as by dive, and then further by type of record (audio/video, deployments, observations, samples, etc)

> herc_mapping – Products derived from herc_mapping raw data is archived here

> profiles – Products derived from CTD or XBT raw data is archived here

> processed_multibeam – Products derived from multibeam raw data is archived here

> processed_subbottom – Products derived from sub-bottom raw data is archived here

> samples

> NAXXX-XXX/ - One directory per sampleID, which includes:

> labphotos – photos from wetlab processing

> vidcaps – photos from video stream

> *.NAV.tsv – merged sensor/nav readings from sample timestamp

> NA0XXX-XXX.summary.tsv – summary of sample from above sensors and eventlog information

> samples-summary.tsv – automatically generated tab-separated text file of sample information, complied from similar records inside each sample's subdirectory. Importable to spreadsheet programs.

> logs – pdfs of handwritten logs, spreadsheets of sample information

> shipping – shipping information

> topside_photos – wet lab photographs, organized by sample number

> underwater_photos – photographs of sample selection from captures

> SitReps – An archive of situational reports, as sent out by the expedition leader during the cruise

> trackline_plots – automated daily kml plots of all three vehicles and hypack waypoints. Current day is updated several times an hour

>video_highlights – any video highlights that may have been produced during a cruise are archived here

> RAW

> acoustics

> blueview

> edgetech_sidescan – Side-scan sonar data is gathered using the Edgetech system and can then be processed using CARIS HIPS and SIPS. There are five types of files stored in the Edgetech folder. data>edgetech>edgetech_yymmdd>

> edgetech_"date"

> _.JSF - these files are 601 MB files of recorded sidescan data. These can be used for creating tracklines and mosaics of when the sidescan equipment was recording in the water. The files are collected as soon as the 601MB space has been filled, then it rolls onto the next file.

Data received from the sonar is recorded to disk in native EdgeTech format without any of the user's run time display processing options applied. The only user settings which unavoidably affect the recorded data are those implemented by the sonar system such as range settings, pulse power levels and pulse selection.

> _.HTM - Opens the captured target in an internet window. The file displays the target name, target latitude, target longitude, heading, ground range, speed, file, length and width. Many of these details will only be included in the file if the responsible scientist inputs it at the time of collection.

> _.JPG - Similar to the *.htm file, but only contains the image.

> _.TGT - Contains the same information as the previous two, in a different format.

> _.Data.txt - This is a spread sheet that contains the specs for all targets. The columns are as follows: Tgt ID, Target Lon, Target Lat, Date & Time, Channel, Length, Width, Area, Height, Shdw Len, Shdw Rng, Altitude, G Range, Heading, Speed, Nav Lon, Nav Lat, S Range, Ping Num, W spd, Pitch, Roll, Hd Off, P Off, R Off, Aft Off, Stb Off, File Name, and Remarks. Note that there is not information for every column for every target, just what people logged.

> knudsen

> MBES

> capture- The files in the capture folder are created by the person using the CAPTURE computer. The image can be from either Hercules' or Argus' HD camera. Each file is a 5.9 MB .tif that is named with the date and time when the was photo taken.

> datalog - The OET vehicle system generates an array ASCII data in the form of serial and network streams. Many of these streams are only useful

to other systems but some of the streams pertain to data sets worth recording. The DataLogger resides on the Capture/Logger computer in the control van. Data files are tab-separated, one record per line. Headers applied are:

1 = 'type'
2 = 'date/time' in ISO-8601 compatible format
3 = 'source'
4 = payload – may be tab, comma, or space separated (or other)

Subtypes are documented below. Where columns are described, they are numbered by their position in the payload, not the entire line. So column 1 of the payload will be at the start of column 5 in the overall line.

>"YYYYMMDD_HHMM" - *start time of file*

> .CTD- used when only Herc+Argus are in the water. The Conductivity, Temperature and Depth Sensor is a Seabird FastCat 49Plus. Columns 5,6,7,8 have commas at the end which need to be eliminated. Note that the Paroscientific depth sensor is several orders of magnitude more accurate in deep water than the CTD's depth calculations.
>datalog>datalog_yymmdd>*.CTD

Columns are as follows:

1 = "CTD"
2 = 'date/time' in ISO-8601 compatible format
3 = CTD Identifier (HERC)
4 = Temperature (Celsius, ITS-90)
5 = Conductivity (S/m)
6 = Pressure (decibars, gauge pressure-- very approximately meters)
7 = Salinity (psu, calculated by probe)
8 = Sound Velocity (m/s, calculated by probe via Chen and Millero)

> _.DNV - used when either Argus or Herc+Argus are in the water. These are files which contain data from the Doppler Navigation
>datalog>datalog_yymmdd>*.DNV

> _.HER - used when either Argus or Herc+Argus are in the water. Contains information such as: date, time, vehicle, lat, lon, eastings, northings, roll, pitch, heading, depth, altitude, elapsed time, tether wraps, and detectable oxygen.
>datalog>datalog_yymmdd>*.HER

Hercules:

OCT = Octans, a fiber optic gyroscope, most reliably reports Herc's heading and attitude
TCM2 = TCM2 Magnetic compass which reports vehicle's heading and attitude (backup)
DEP = Paroscientific depth. Depth in meters is in the column

after time/date and “HERC” identifier. This depth is calculated using a latitude-dependent pressure to depth conversion with latitude fixed to 30°.

The raw pressure (PSI relative to vacuum) is given in the final column with the format: *0001<pressure in PSI relative to vacuum>

DVZ = Herc's altitude, only returned when within 30m of floor by the DVL (doppler velocity logger)
JDS = replications of all Herc's root sensor data: date, time, vehicle, lat, lon, eastings, northings, roll, pitch, heading, depth, altitude, elapsed time, tether wraps
O2S = detecable oxygen in frame of Herc
Collected by an Anderra 3830 O2 Sensor. Payload fields are:
O2 Concentration (micro-molar)
O2 Saturation (%)

Argus:

ALT2 = Arg's Benthos single beam echosounder for altitude
XBW = Arg's compass sensor, Crossbow AHRS, providing corrected headings (TCM2 is backup like with Herc)
DEP2 = Arg's uses same Paroscientific depth sensor
APAS = like Herc JDS string - all key nav data

> *.HYP* – Legacy file formerly logging from Hypack. Now deprecated (2014) in favor of more reliable nav described below.

> .NAV – integrated nav solution from best-available GPS nav (usually Seapath) plus ouputs for vehicles when USBL is available. Source is 'navcook', a layer of indirection between input GPSs, USBL, and consumers. This is the best source of NMEA-0183-compatible GPS nav for the vehicles. All payloads are standard NMEA-0183 format. Please use standard references for the payload formats.

1 = vehicle

$PVGGA = Primary vessel (ship) global positioning system fix data
$M1GGA = Mobile 1 (HERC) USBL fix data
$M2GGA = Mobile 2 (ARG) USBL fix data
$M3GGA = Mobile 3 (ECHO/Utility) USBL fix data
$PVHDG = ship's heading
$PVHDT = ship's heading

> .INNAV - integrated, filtered navigation solution for the ship from the Seapath navigation system. Use standard NMEA-0183 references for payload formats. Sentences may include:

$INGGA = Vessel position
$INHDT = Vessel true (non-magnetic) headings
$INZDA = time
$INVTG = course made good

>.BNAV – Navigation solution from the bridge, currently the PRAXIS DP system. This is typically less reliable than the Seapath (.INNAV) above. Payload formats are NMEA-0183. Sentences may include:

$DPGGA = Vessel position
$DPVTG = course made good
$DPHDT = vessel heading
$DPMWV = wind speed and direction
$DPROT = rate of turn

>.USBL – 3D range and bearing measurements from the USBL vehicle transponder system. Used as input to Navcook (.NAV). Format is the standard TP2 USBL format, with fields as:

Field	ID	Time	Reserved	Bearing	Slant Range	x	y	z
Position	1	3-11	12-15	16-21	22-29	30-38	39-47	48-55
Units		H:M:S		Degree	m	m	m	m
Example	1	05:00:29	0	182.5	131.1	-1.9	-43.3	123.7

There may be additional reserved fields at the end of the string.

IDs are generally 1 for Herc, 2 for Argus, and something else for Echo / Utility. All bearing / slant range, etc are given in the coordinate frame of the USBL transciever. On nautilus, these positions are roll / pitch corrected but are otherwise ship-relative.

>.EVENT – Records from the EventLog software, logged via dslog. Payload is tab-separted, and fields is self-describing.

>.CHAT – Recording of all the shared chatroom traffic

Fields:
1 = epoch time
2 = ?
3 = human-readable date
4 = time
5 = CHAT
6 = username
7 = message in html

>.LGS - logfiles for the dslog software itself. For internal debugging

only, ignorable by users.

>.CPU - Load average and internal temperatures of various servers. For internal debugging only, ignorable by users.

>.WNCH - Winch tension and cable payout
RD,–TTTTT.TT,–SSSS.SSS,–PPP.PPPP,CCCC
Where:
T* is Tension
S* is Speed
P* is Payout
C* is ASCII Checksum

>.ENV - Shipboard environmental monitors. For internal debugging only, ignorable by users.
>.WTHR – Mast-mounted weather station. Valid data begins 2016-06-10T18:00:00. True wind not correct, lacks heading input until this message is revised with starting date of good true wind data. Use ISO time prefix, not embedded payload time.
Payload fields:

Unit ID
Date
Time
Wind Speed (True) (5min Running AVG) (Kts)
Wind Speed (True) (5min Running AVG) (M/S)
Wind Direction (True) (5min Running AVG) (Deg)
Ship Heading (Deg)
Wind Speed (Rel_To_Ship) (1min Vector AVG) (Kts)
Wind Speed (Rel_To_Ship) (1min Vector AVG) (M/S)
Wind Direction (Rel_To_Ship) (1min Vector AVG) (Deg)
Speed Over Ground (Kts)
Course Over Ground
Battery Voltage (Vdc)
Air Temp (C)
Air Temp (F)
Relative Humidity (%)
Barometric Pressure (mb)
Satellite Hits
Universal Time
Latitude
Longitude

> eventlog - The EventLog is a text file of notes written by the science team during dives. There are three methods of entering event data into this file: text box, button and drop-down menu. The standardization the buttons and drop-down menus provides "searchable" terms for anyone reading the eventlogs.

These files are intended to help scientists find key events post-dive that can then be located in the capture and video files. The giant text files are summarized post-dive into Dive Reports by the data loggers.

> herc_mapping – Raw data collected from herc mapping operations are archived here

> nav

> dvlnav - DVLNAV is a navigational software package that takes position data from the Hypack software and combines it with position data from the Doppler Velocity Log (DVL) mounted on the Hercules vehicle data to calculate a high-resolution vehicle position reference.

It is important to note that the doppler velocity log (DVL) is highly dependent on altitude; if the vehicle is too close to (<1m) or too far above (>10m), the DVL can read bad measurements that will result in the apparent 'drifting' of vehicles, even if they are not moving. The navigator pays close attention to the DVLNav track and how it relates to the USBL fixes. If the two seem to diverging significantly, then DVLNav is reset to match up with the USBL by resetting the LBL.

For further information on data string revisions and meanings, refer to Jon Howland's text "dvlanv_data_formats_rev_57"

> _.CSV - Comma-delimited data files log time-stamped naivgation and sensor data in 1 second intervals. The data is readable in any spreadsheet program. These files are created daily or whenever DVLNAV computer is started. This is a source for Target information that the Navigator has manually entered into the computer.
>dvlnav>dvlnav_yymmdd>*.CSV

> _.DAT- DVLNav integrates DVL navigation with the USBL system for high-resolution vehicle positioning found in *.DAT files. These files record all sorts of position data in .001 intervals. They require AWK/GREP or MATLAB to process and support planned renavigation capability. These files are written hourly and can be very large.
>dvlnav>dvlnav_yymmdd>*.DAT

For further details, refer to Jon Howland document "dvlnav_data_format_rev_57"

HST = stands for the history of prepended data

OCT = Octans, a fiber optic gyroscope, most reliably reports Herc's heading and altitude

VIS = data from the Seabird SBE37 Conductivity/Temperature/Depth instrument

CPU = shows "CPU <DATE AND TIME> <CPU usage in Percent> <DISK used in Percent>"

> _.DLVNAV_INI.M - contains navigation parameters plus outline definitions for the ship and vehicles. These files record the current DVLNAV configuration data and are updated for each dive:

- Latitude and Longitude of the XY coordinate system

- Dive Number
- UTM zone of local XY origin
- Time zone of site
- Local magnetic variation in decimal degrees, positive=E, negative=W
- salinity at site
- sound velocity at site
- expected site depth in meters
- outline definitions for ship and vehicles, defined in millimeters
- target information

> hypack - Hypack is a navigational software package that takes position data gathered from the Ultra Short Baseline (USBL), Long Baseline (LBL), ship's gyroscope and ship's Global Positioning System (GPS) and produces real-world coordinates (Latitude/Longitude) for the underwater vehicles.

> _.raw -

TND 23:38:55 09/21/2010 0 = time and date when file began
LNN # = the number is the unknown beginning header for the file name, followed by the time of construction
USR "Institute for Exploration" "HYPACK Inc." 0x2 15681582 = license for use granted to IFE

In these files, the columns are as follows:
1 = Header for the information
2 = the channel (ship or vehicle) where, 0 = ship; 1 = Herc; 2 = Argus; and, 3 = Echo
3 = Time (second of the day since midnight)

POS 0 85137.218 265489.957 3981646.263 = ship/vehicle position, where:
1 2 3 4 5
4 = LBL X position in UTM coordinates
5 = LBL Y position in UTM coordinates
GYR = ship's gyroscope, where column 4 = ship's heading
RAW = GPS, where the columns are:
4 = numeral "4"
5 = Latitude of ship (N positive, S negative)
6 = Longitude of ship (E positive, W negative)
7 = UTM zone +1. We don't know why it is off by one zone.
EC1 = ship ecosounder, where column 4 = depth under ship (m)
FIX = event number, where the columns are:
1 = Hypack-generated event log
2 = internal channel

3 = time in second of day
4 = event number

>_.tgt - Target files list the position, time, date and depth of each target dropped in Hypack. Depth, distance, bearing, quality and orientation must be manually input by the Navigator*.

GPT = Target file header, where the columns are:
2 = Target name
3 = easting
4 = northing
5 = depth (m)*
6 = latitude
7 = longitude
8 = time
9 = date
10 = distance*
11 = bearing*
12 = code
13 = event
14 = quality*
15 = orientation*

> _.LNW - Line files define number of waypoints for tracklines; each point is as an Easting and Northing.

> navest
> SeaPath

> profiles
> UCTD
> XBT
> XCTD