

ITP Data File Documentation

LEVEL 1 RAW DATA

Level 1 profile data files from each ITP system have been compressed in two forms as files named *itpNrawmat.tar.Z* and *itpNrawmat.zip*, where *N* is the ITP system number. The GPS position data are contained in ascii-format files named *itpNrawlocs.dat*. The top several lines from one GPS position file are given below to document the format:

```
%year day longitude(E+) latitude(N+)
2008 98.00019 17.9608 88.4789
2008 98.04185 17.8826 88.4774
2008 98.08380 17.8091 88.4759
2008 98.12519 17.7439 88.4745
2008 98.16713 17.6856 88.4731
2008 98.20852 17.6264 88.4713
2008 98.25046 17.5659 88.4698
2008 98.29184 17.5018 88.4679
...
2008 120.75017 -6.3590 87.9044
2008 120.79213 -6.3576 87.9042
2008 120.83352 -6.3568 87.9041
2008 120.87517 -6.3558 87.9039
2008 120.91713 -6.3544 87.9037
2008 120.95852 -6.3525 87.9032
%endofdat
```

Time is reported as decimal day in GMT. January 1 at midnight is recorded as day 1.00000. GPS information is acquired by the ITP surface controllers at a pre-programmed rate (presently one fix per hour). These data are uploaded daily and the time and position information are appended to the *itpNrawlocs.dat* file.

The raw sensor and engineering data acquired by the ITP profilers are uploaded after the completion of each one-way traverse. The binary data are unpacked and reformatted into Matlab, one file per profile, called *raw#####.mat*, where ##### is the profile number. (In general, odd numbered profiles are up-going while even numbers are down-going.) All available profile files are compressed as noted above. Each profile file contains the following variables:

- psdate**: profile start date MM/DD/YY
- pedate**: profile end date MM/DD/YY
- pstart**: profile start time HH:MM:SS
- pstop**: profile end time HH:MM:SS
- esnum**: index of the engineering scans
- epres**: engineering pressure in decibars
- ecurr**: motor current in milli-Amps
- evolt**: battery Voltage
- engtime**: time of each engineering scan coded with matlab function datenum.m
- csnum**: index of the CTD scans
- ccond**: conductivity in nominal mmho
- ctemp**: temperature in nominal degrees C
- cpres**: pressure in nominal decibars

LEVEL 2 REAL TIME DATA

This version of ITP data are created from the Level 1 raw data by automated routines. At this level of processing, the location data are filtered and interpolated to the start times of each profile, while the scientific and engineering data are averaged in 2-db bins and salinity is derived from bin-averaged pressure, temperature and conductivity. No sensor response corrections, calibrations or editing are applied at this stage (beyond the internal sensor calibrations applied in the CTD instruments). The Level 2 data are archived in ASCII data files (one file per vertical profile) named *itpNgrd#####.dat*, where *N* indicates ITP number and ##### is profile number. Level 2 data are compressed in two forms as files named *itpNgriddata.tar.Z* and *itpNgriddata.zip*, where *N* is the ITP system number. In addition, the most recently-acquired data from each ITP system are available on the FTP web site under the file name *itpNlast.dat*.

An example of a Level 2 data file is here:

```
%year   day longitude(E+) latitude(N+) ndepts
2004    233.00000 -141.1760 77.1699 371
%year   day pressure(dbar) temperature(C) salinity (pss)
2004    233.03071         10    -1.4853    29.0619
2004    233.03062         12    -1.4790    29.0889
2004    233.03054         14    -1.4681    29.1503
2004    233.03045         16    -1.4648    29.1756
...
2004 233.00039         744     0.2551    34.8497
2004 233.00030         746     0.2505    34.8503
2004 233.00021         748     0.2467    34.8509
2004 233.00013         750     0.2411    34.8510
%endofdat
```

Time is reported in decimal day in GMT, with January 1 at midnight recorded as 1.00000.

LEVEL 3 ARCHIVE DATA

This form of ITP data represent our best estimates of the ocean properties derived from the sensor observations. These data have had sensor response corrections applied, regional conductivity adjustments made based on historical hydrographic data, and edits performed. Level 3 data products are derived for each ITP system after its mission has ended. A full description of the ITP data processing procedure is provided [here](#). Level 3 data are available in two forms. The first are Matlab-format files (one file per profile named *cor#####.mat*) holding corrected data at the basic sensor sample rate. These files are compressed into files named *itpNcormat.tar.Z* and *itpNcormat.zip*.

For each *raw#####.mat* file (where ##### indicates profile number) there is a corresponding *cor#####.mat* file. The data in these files are reported at the same temporal resolution as the Level 1 files, with NaNs filling gaps where bad data were removed. The variables included in the *cor#####.mat* files are:

co_adj	conductivity (mmho) after lags and calibration adjustment
co_cor	conductivity (mmho) after lags applied
itpno	ITP number
latitude	start latitude (N+) of profile
longitude	start longitude (E+) of profile
pedate	profile UTC end date (mm/dd/yy)
pr_filt	low pass filtered pressure (dbar)
psdate	profile UTC start date (mm/dd/yy)
pstart	profile UTC start time (hh:mm:ss)
pstop	profile UTC stop time (hh:mm:ss)
sa_adj	salinity after lags and calibration adjustment
sa_cor	salinity after lags applied
te_adj	temperature (C) in conductivity cell after lags
te_cor	temperature (C) at thermistor after lags applied

The second form of Level 3 data have been pressure-bin-averaged at 1-db vertical resolution. These data are available in two formats. One ASCII-format file is created per profile named *itpNgrd#####.dat*, where *N* is the ITP number and ##### is the profile number. All of the ASCII files for each ITP are grouped in *itpNfinal.zip* and *itpNfinal.tar.Z* files. Following is a sample from *itp1grd0001.dat* to document the file format:

```
%ITP 1, profile 1: year day longitude(E+) latitude(N+) ndepths
2005 228.25001 -150.1313 78.8267 751
%pressure(dbar) temperature(C) salinity nob
  9.7      -1.4637      28.9558  34
 11.0      -1.4608      28.9696   4
...
758.0      0.2420      34.8679   5
759.1      0.2405      34.8681   6
760.1      0.2406      34.8679  26
%endofdat
```

The first line is a header line which includes the ITP and profile numbers and describes the variables included on the second line. The third line describes the profile variables which follow. Time is reported in decimal day in GMT, with January 1 at midnight recorded as 1.00000.

The reported pressure, temperature, and salinity values are derived from the averages of the corNNNN.mat values that lie within +/-0.5 db about the bin center; nobs is the number of individual points in each average. Bins that have both temperature and salinity data reported represent averages of only the points where both variables are not NaNs. In cases where the ITP may have reversed and profiled several times over the same depth range (usually due to encountering an obstruction on the wire), only the first traverse of the depth range is included in the reported average for that bin. Pressure, temperature and conductivity values are averaged before salinity is derived.

The second form of 1-db-binned data is a single MATLAB format file for each ITP named *itpNfinal.mat* (where *N* is ITP number) with the 1-db bin-averaged data for each engineering and CTD variable in a single array (capital letters), and vector series of the other profile information and processing parameters. Specifically, the variables in the final MATLAB-format files are:

E	1-m averaged engineering pressure (dbar)
I	1-m averaged engineering motor current (mA)
J	1-m averaged profile year day
N	number of CTD points in 1-m average
P	1-m averaged pressure (dbar)
S	1-m averaged salinity
T	1-m averaged temperature (°C)
V	1-m averaged engineering voltage (V)
Y	1-m averaged profile year
alph	conductivity thermal mass amplitude correction series
bad.s	profile and index numbers of removed raw salinity points
bad.t	profile and index numbers of removed raw temperature points
cshift	sensor physical separation lag correction series
date	profile start date and time [year month day hour minute second]
di	1-m bin centers
filts	number of filtered temperature (column 1) and salinity (column 2) points per profile
idn	index of down profiles
iup	index of up profiles
jday	start year day of profile
lag	temperature lag correction series (s)
lat	start latitude (N+) of profiles
lon	start longitude (E+) of profiles
n	total number of profiles
prd	down pressure deviations correction series (m)
rat	ratio for conductivity calibration series
stas	index of all profiles
tao	conductivity thermal mass lag correction series (s)