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Moored Instrument Data Set

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The OMEX I moored instrument data set includes data from conventional moorings and benthic landers that were left on the sea floor for periods from a couple of weeks to a year.

The data are subdivided into two groups. The first of these are conventional time series where the instrument sampled at pre-set regular intervals of the order of several minutes to an hour. The second are burst recorded data where the instrument sampled at high frequency for a period of several minutes followed by a period of inactivity. This latter category is confined to a single deployment of the STABLE II lander on cruise Charles Darwin CD84.

Conventional Time Series Data

The conventional time series data may be found in the MOORINGS directory, together with a spreadsheet in ASCII comma separated variable format and *Excel* 5.0 format (MOORINV.CSV and MOORINV.XLS) that provides an index to the data files. The data filenames are of the form Bnnnnnnn.LST, where nnnnnnnn is the BODC series reference number. This number is used to refer to the data in the file throughout the data documentation and may also be found in the MOORINDX table in the OMEX I database. It is well worth making a note of it when using the data.

Each data file is in a simple ASCII format, termed BODC Request Format Version 1.0. This format will be familiar to users who have received data from the BODC National Oceanographic Database.

These data have been through the standard BODC moored instrument quality control procedures, during which data documentation has been compiled. This describes the instrumentation and data processing procedures applied to the data by the originators and BODC. The documentation also describes any problems or abnormalities with the data reported by the originator or detected by BODC quality control. In some cases, vital information, such as the relative heights of sensors, may only be found in the data documentation. **Therefore, ignore this document at your peril.**

Burst Recorded Data

Introduction

The STABLE II lander was deployed once during OMEX I during Charles Darwin cruise CD84 from 20 January 1994 until 31 January 1994 on the Goban Spur transect in approximately 880 m of water.

The instrument was fitted with a range of sensors and two data loggers. The mean data logger stored a cycle of averaged data once a minute. The data from this are included as part of the conventional time series data set on the CD-ROM. The second data logger collected 9600 scans at a frequency of 8 Hz once an hour. These data are documented here.

Prior to the STABLE deployment, the POL bed-hop camera was deployed to provide bottom photographs. These are included on the CD-ROM as part of the OMEX Images object.

Data File Location

The burst recorded data files may be found in the CD-ROM directory MOORINGS\STABURST. Please note that due to space constraints this directory has been located on the installation disk and not the data disk.

There are 251 files here named from BURST001.TXT to BURST251.TXT. Each contains the data from a single burst.

Data Storage Format

The data are stored in a simple ASCII format. Each burst file has a header that appears thus:

```
Rig:                    POP-UP STABLE2

Burst Number:                 001

Start Date:             20:01:1994

Start Time ( GMT):          22:00:01

Deployment reference:       OMEX-CD84

Logging Frequency:          8Hz


Column information:
Columns 1 to 12 contain data for the Electromagnetic Current Meters
```

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and give velocity in meters per second.

Column            EMCM Array              Head Flow component

  1                     A                 Port  Horizontal
  2                     A                 Port  Vertical
  3                     A                 Stbd  Horizontal
  4                     A                 Stbd  Vertical
  5                     B                 Port  Horizontal
  6                     B                 Port  Vertical
  7                     B                 Stbd  Horizontal
  8                     B                 Stbd  Vertical
  9                     C                 Port  Horizontal
  10                    C                 Port  Vertical
  11                    C                 Stbd  Horizontal
  12                    C                 Stbd  Vertical

Column 13 contains wave induced pressure information in Bars.
```

This is both clear and self-explanatory and requires no further documentation here.

The header is followed by 9600 records, each containing 13 decimal numbers separated by at least one blank (usually two). The meanings of these numbers are defined in the header. The meaning of 'ECM Array' is defined below. Vertical currents are positive when flowing from the bottom of the head to the top. Horizontal currents are positive when flowing from left to right (viewing the sensor from the front).

Data Documentation

STABLE II lander consisted of a large aluminium frame standing on tripod legs fitted with syntactic foam buoyancy, two Benthos transponding releases, mechanical releases and disposable ballast.

The frame carried a large number of sensors (Humphrey aand Moores, 1994a) measuring three-dimensional currents, acoustic backscatter, temperature and pressure.

The following sensors on the STABLE II platform were logged in burst mode:

Three electromagnetic current meter arrays (Valeport 800 series), termed Array A (300 mm above sea bed), Array B (602 mm above sea bed) and Array C (899 mm above sea bed). Each array comprised two heads mounted on Y-shaped arms with a horizontal separation of 230 mm. The arrays were mounted such that the heads were at identical angles to port and starboard of the lander centre line facing its bow (the reference point on the lander for the heading channel in the mean data set).

A Digiquartz pressure sensor (serial number SN36626) capable of operating at depths of up to 1400 m. This was mounted 1950 mm above the sea floor. Note that the mean data logger uses a separate sensor.

The current sensors were calibrated prior to deployment (18 November 1993) in the high-velocity recirculating flume at the Liverpool University Mechanical Engineering Department that was capable of producing virtually non-turbulent flow. The instruments were calibrated for both horizontal and vertical currents. Due to flume size constraints, each sensor array was calibrated separately.

The originators report the following that should be taken into account by users of the data. First, the vertical separation of the sensors was insufficient to guarantee freedom from electrical interference between sensors. The expected manifestation of this was an output offset that was unaccounted for during the individual sensor calibration. The originators state that this may require a correction during data analysis. Secondly, the possibility of offset drift between calibration and deployment was reported and they suggested averaging all burst readings for a sensor to compute a corrected offset.

The pressure sensor was calibrated using a dead-weight tester whilst held at a steady temperature in a water bath. The coefficients for a temperature compensation equation were also derived. As no temperature sensor was included in the burst-logged package, the mean temperature determined by the temperature sensor in the mean-logged package (9.5 °C) was used to compute the temperature correction. The reading from the calibrated instrument is an absolute pressure measurement that includes an atmospheric pressure component. Any computation of absolute water depth should therefore take this into account together with the height of the instrument above the sea bed.

Further details of the instrumentation and sensor calibrations may be found in Humphrey and Moores (1994b).

The originators reported the following that should be taken into account by users of the data:

STABLE was on deck during burst 001 and for most of burst 002. The instrument was deployed during burst 002.

The current meters developed a fault during burst 218 that manifested itself as the appearance of spikes in the data. This got progressively worse. The current meter data from burst 218 to 251 should therefore be used with caution.

The pressure channel in each burst includes about 15 noise-generated spikes. These have not been flagged but may be readily identified as the good data occupy a relatively narrow pressure band.

References

Humphery, J.D. and Moores, S.P., 1994a. STABLE II - An improved benthic lander for the study of turbulent wave-current-bed interactions and associated sediment transport. p170-174 *in* ***Sixth International Conference on Electronic Engineering in Oceanography***, 19-21 July 1994, Cambridge, UK. London: Institute of Electrical Engineers. 188 pp.

Humphery, J.D. and Moores, S.P., 1994b. Description and interpretation of data recorded by STABLE II during RRS Charles Darwin cruise 84, OMEX, Goban Spur, January, 1994. ***Proudman Oceanographic Laboratory Report***, 37, 45 pp.

BODC Request Format
Version 1.0

This is a generalised output format to handle most types of data held in the BODC National Oceanographic Database.

The following is an example of a file listed in the format:

```
BODC Request Format Std. V1.0           Headers=  15 Data Cycles=   1247 BODC QC (a)
Series:   12050 Inv: CMD  1008           Produced:1993/07/07                     (b)
Id:   048/0           United Kingdom    Scottish Office Agric. & Fisheries Dept. (c)
 57d18.1mN001d54.6mW                     Start:19700831095800 End:19701022075800 (d)
Depth: floor  22.0  sensor  18.0         Nom. sample int.:   3600        secs    (e)
    2 Parameters included:                                                      (f)
Parameter  f  P  Q     Absent Data Value  Minimum Value  Maximum Value     Units
LCDAEL01   Y 30 37                 -1.00           0.00         359.70     deg T (g)
Horizontal Current Direction             Eulerian method
LCSAEL01   Y 40 47                 -1.00           0.14          72.07    cm/sec
Horizontal Current Speed                 Eulerian method
    1 FORTRAN format record:                                                    (h)
(I7,A20,A1,1X,F8.2,A1,1X,F8.2,A1)
  Cycle    Date      Time    LCDAEL01  LCSAEL01                                 (i)
 Number yyyy mm dd hh mi ssf         f         f
      1 1970/08/31 09.58.00    228.26     18.63                                (j)
      2 1970/08/31 10.58.00    209.69     36.14
      3 1970/08/31 11.58.00    206.74     44.23
      4 1970/08/31 12.58.00    204.33     40.06
      5 1970/08/31 13.58.00    207.48     27.95
```

Notes:

(a) The first record contains general information regarding the file. Std. indicates Standard format and V1.0 indicates version 1.0 of the format. Headers and Data Cycles are counts of the number of header records and data cycles in the file. BODC QC indicates that the data has been through BODC quality control procedures; this field is blank if this is not the case.

(b) Record two indicates the BODC series reference number and any inventory reference numbers by which the series is also known (in this case the inventory is the Moored Time Series Inventory that was originally known as the Current Meter Inventory: hence the mnemonic). A reference to a second inventory may occur on this line. If a series has not yet been allocated a BODC reference number this record will start with 'File:' followed by the full BODC file name. This record also indicates the date on which the output was produced (yyyy/mm/dd).

(c) Record three gives the data originator's identifier for the series, the source country and the source laboratory. If this information is not available the record will state 'Series header information not available' and the next two records will be blank.

(d) This record specifies one or two geographic positions; if a second position is given its purpose will be described in the accompanying documentation. Start date and

end date (if available) are given in the format yyyymmddhhmiss (24 hour clock and GMT). If time is unavailable hhmiss will be blank.

(e) This record gives the sea floor depth and the sensor depth. If a second (greater) sensor depth is given the two sensor depths specify the range of depths over which measurements were made. The second half of this record gives the nominal sampling interval and units.

(f) This record and the following title record start the parameter section. There are two records per parameter present.

(g) The parameter information record gives the BODC parameter name, whether the channel has been flagged with quality control indicators (Y/N), byte pointers (P and Q) to the start and end of the parameter within each datacycle record, the absent data value, minimum and maximum values of the parameter within the series and parameter storage units. The next record gives the full parameter name and the sampling method.

(h) This line indicates the number of following records which together form the FORTRAN format used to write each data cycle record.

(i) This and the next record are the data cycle title lines. 'f' indicates a flag channel.

(j) Data cycles are listed one per line. The first seven characters are always a data cycle count. One of the following quality control flags may appear against an individual data value (if the remark 'BODC QC' is present in record 1, then a blank flag indicates that the value is good):

Flag	Description
	Unqualified
<	Below detection limit
>	In excess of quoted value
B	Beginning of CTD downcast
D	Thermometric depth
E	End of CTD downcast
K	Uncertain/suspect value
L	Improbable value - originator's quality control
M	Improbable value - BODC quality control
N	Null value
P	Trace/calm
Q	Indeterminate
R	Replacement value
S	Estimated value
T	Interpolated value
W	Control value
X	Excessive difference