OMEX II Project Database Structure

Introduction

A relational database is made up from tables. Each table contains one or more fields. Some of these fields, termed key fields, are contained in more than one table and provide the mechanism for linking tables, and hence the data that they contain, together. If a key field occurs once in each of two tables, then a one to one relationship between the tables is established. If the key field occurs once in one table and many times in the other, then a one-to-many relationship exists between the tables.

The OMEX II Project database is a relational database that has been built for the specific task of storing project data in a way where it may easily be found when required. The end result is an effective, if not elegant, design. Simple structures exist that match the data. These structures are extended in response to data sets supplied. However, as the databases have developed, certain patterns have been recognised in the data. In response to this, fully normalised structures (i.e. the type that conventional database designers desire) have been developed. The advantage of these normalised structures is that, providing the rules of their underlying data model are obeyed by the data, their scope may be expanded with no maintenance overheads. Their disadvantage is that significantly more work is required getting data in and getting data out.

We therefore have a situation in practice where simple and fully normalised structures exist side by side. Any spare resource is directed towards converting the simple structures into normalised structures, providing a clear advantage can be seen in doing the work. The structure of the database is therefore dynamic but it is supported by 'soft' documentation that can evolve in parallel.

Table Types

The database may be considered as containing five types of table. The database is built on an event-based data model. In other words, something has to happen to generate the data stored. The primary information in the database therefore has to describe what these events were, where they happened and when they happened. This information is stored in the database primary index tables. In the following table definitions, the hot links to these tables are coloured red.

The data model assumes that the events are related to the data they generate by one-to-many relationships. These relationships are implemented in the database by one or more secondary index tables. These tables also provide storage for metadata

that are specific to a single type of event. The hot links to these tables in the table definition index are coloured green.

The third type of table is the fully normalised data table. These may be regarded as stable, long-term entities within the database. Because the structures are normalised, it is not possible to obtain the sort of cross-tabulated output most users require using simple SQL queries. Consequently, data access tools are provided by BODC. The hot links to these tables in the table definition index are coloured blue.

The normalised data tables are supported by a series of code tables, such as the parameter dictionary, which are termed the dictionary tables. The hot links to these tables in the table definition index are coloured 'dark yellow'.

Finally, there are the simple-structured data tables. These may be effectively interrogated by simple SQL queries. However, they should be regarded as transient entities that may disappear from subsequent database releases. Obviously, if they do disappear, the data they contained will have been transferred to a fully normalised structure within the database. The hot links to these tables in the table definition index are coloured magenta (pale purple).

The Parameter Dictionary

The parameter dictionary is an essential feature of the normalised data storage tables. The identification of parameters is based on 8-byte codes. These have been designed using a hierarchical model. The first four bytes may be considered as the 'parent'. This provides information on the parameter at a low level of detail. This parent has one or more 'child' 8-byte codes, each of which is related to the parent but is differentiated through more detailed criteria.

This relationship is exploited in different ways. For example, chemical parameters have a parent field identifying the basic parameter with the children identifying different measurement protocols. Thus 'CPHL' is chlorophyll-a, but CPHLHPP1 is chlorophyll-a measured by reverse-phase HPLC on an acetone extract from a GF/F filter. For biological species codes the parent specifies a high-level taxonomic grouping and the children a lower level.

There are a large number (thousands) of parameters coded in the database. Finding out what a given code means is straightforward. A query matching on field CPMUSG of table ZUSG will provide the answer.

However, specifying the parameter code for data retrievals requires some thought. The secret lies in the use of wild cards which any database management system can incorporate into query searches. The recommended technique is to use table ZUPM to identify the parent code of the parameter you require. A wild card may then be set up to include as many of the child codes as required. One word of warning. Always check the meanings of all codes covered by a wild card as there are traps for the unwary. For example, the wild card CORG% covers both CORGCAP1 ("POC") and CORGCOD1 (DOC) which should not be merged into a single data set!

Documentation Structure

This document contains two main sections. These are:

Table Definitions: A description of the fields contained in each table of the database.

Linkage Definitions: Documentation that describes how the tables of the database are linked together through their key fields.

TIP If you are looking for a particular type of data and don't know which tables you require, looking through the linkage definitions will provide a quick and easy way of finding out what you need to know.

Database Table Definitions

This section provides a field level description of all the user-accessible tables in the OMEX II database.

Table ADCP

This table contains the current velocity and returned signal amplitude profiles measured by shipboard Acoustic Doppler Current Profilers (ADCPs).

Table ADCPINDX

This table is the ADCP profile inventory and stores relevant metadata.

Table ARGOS

This table contains Lagrangian current data in the form of the tracks of drifting buoys.

Table BOTDATA

This table contains analytical data on water samples. A very wide range of parameters is stored here.

Table BOTTLE

This table provides an inventory of the water samples, collected by a variety of methods, held in the database. Vital information, particularly the depth from which the sample was taken, is held in the table.

Table BOTYPINDX

This is a code table that defines a bottle type mnemonic used in table BOTTLE.

Table C14DAT

This table contains ^{14}C uptake (primary production) data from long period (generally 24 hour) on-deck and in-situ incubations, including size-fractionated data. The table may also be used to store non-parameterised P:I profiles.

Table C14HDR

This table provides an inventory of the ^{14}C uptake (primary production) experiments held in the database. Vital metadata fields are included. The table also provides storage for column integrated data.

Table CAL_COEFFS

This table holds the coefficients of the calibrations that have been applied to the CTD data during BODC processing.

Table CAL_COMM

This table holds plain language comments pertaining to the calibrations that have been applied to the CTD data during BODC processing.

Table CAL_DESC

This table holds plain language descriptions of the form of the calibrations that have been applied to the CTD data during BODC processing.

Table CAL_INDEX

This table holds formalised information on the form of the calibrations that have been applied to the CTD data during BODC processing.

Table CAL_PARMS

This table specifies the input parameters required for each calibrated output channel.

Table CAL_RIG_BEN

This table holds the geometrical correction codes (defined in CAL_RIG_GEOMETRY) used when relating CTD sensor data to water bottle data.

Table CAL_RIG_GEOMETRY

This table defines the codes used for geometrical corrections.

Table CAL_TYPE_REF

This table provides the linkage between the CTD calibrations applied (specified as codes in CTD_PARMS) and their definitions in the calibration dictionary (tables CAL_COEFFS, CAL_COMM, CAL_DESC, CAL_INDEX and CAL_PARMS).

Table COREINDX

This table provides an inventory of cores. Note that an event can generate several cores through the use of multiple corers or the taking of sub-cores.

Table COREPROF

This table contains the data from along-core profiles. One record is stored for each parameter measured on each point/sample in each profile. A wide range of parameters is stored.

Table CORESAMP

This table contains the independent variables for the core profiles stored in table COREPROF.

Table CORETOT

This table contains whole core sample data. These are either analyses undertaken on bulk core/grab samples of unknown depth extent or parameters derived from core profiles such as flux determinations.

Table CPR_COLOUR

This table contains the silk colour data (an indication of the chlorophyll concentration) from Continuous Plankton Recorder tows.

Table CPR_PHYTO

This table contains phytoplankton taxonomic data from Continuous Plankton Recorder tows.

Table CPR_ZOO

This table contains zooplankton taxonomic data from Continuous Plankton Recorder tows.

Table CRSINDX

This table provides metadata for project cruises.

Table CTD_DATA_BIN

This table holds the fully calibrated CTD datacycles.

Table CTD_LINK_BIN

This table links the CTD datacycles in CTD_DATA_BIN to BODC Event Numbers.

Table CTD_PARMS

This table defines the parameter set for each CTD profile. Note that there may be parameters present in CTD_PARMS that are not present in CTD_DATA_BIN. These are common derived parameters (such as sigma-theta) that may be calculated by retrieval software from the stored parameters if desired.

Table CTD_SS_INDEX

This table provides an inventory of the CTD casts and CTD/UOR profiles held in the database together with metadata fields.

Table CTDTYP

This is a code table that supports table CTDINDX by defining the mnemonics used to identify CTD instrument types.

Table EVENT

An event is defined as any activity that results in the collection of data that are stored in the database. Table EVENT contains information on what the event was and where and when it occurred. It could therefore be considered as the most important table in the database and should certainly be involved at the start of any search for data.

Table EVENT_COMM

This is an extension of the EVENT table that carries a plain language comment field. This is only separated to make the EVENT table less cumbersome to list.

Table G_CODE

G_CODE is a simple code table that defines the gear codes used in table EVENT.

Table INTBOT

This table contains column-integrated water sample data.

Table MEGADAT

Table MEGADAT contains data on benthic megafauna, subdivided into the principal taxonomic groups.

Table MEGAHEAD

This table provides an inventory of the benthic megafauna samples present in the database. However, its primary purpose is to store data parameters pertaining to the whole catch rather than individual taxonomic groups.

Table MEIODAT

Table MEIODAT contains benthic meiofauna taxonomic abundance data. Some nematode biomass data are also included.

Table MEIOHDR

This table provides the independent variables for the data held in table MEIODAT.

Table MFDAT

Table MFDAT contains data on benthic macrofauna.

Table MFHEAD

This table provides an inventory of the benthic macrofauna samples held in the database. Storage is also provided for species diversity data.

Table MOORINDX

This table provides an inventory of the data series (generally individual instruments) pertaining to each mooring event.

Table N15DAT

This table contains ^{15}N uptake (new and regenerated production) data from long period (generally 24-hour) on-deck and in-situ incubations, including size-fractionated data.

Table N15HDR

This table provides an inventory of the ^{15}N uptake (new and regenerated production) uptake experiments held in the database. Vital metadata fields are included. The table also provides storage for column integrated data.

Table NETDATA

This table stores the data from net hauls and the results of experiments carried out on animals caught in net hauls.

Table NETINDX

This table provides an inventory of individual net catches and allows for the 'one-to-many' relationship between catches and events. The table also provides storage for net haul metadata parameters.

Table ORGCODE

Table ORGCODE is a code table defining the data originator codes used in the database.

Table P33DARK

P33DARK contains the results of phosphorus radioisotope uptake experiment dark control experiments.

Table P33DAT

This table contains the data from radioactive phosphorus uptake experiments at varying light intensities.

Table P33HDR

This table provides an inventory of the radioactive phosphate uptake experiments. Storage is provided for vital metadata and column-integrated data.

Table PRDATA

This table provides storage for generalised profile data. This is a flexible structure that may be used for any type of profiling instrument. In the OMEX II database it is used for XBT, profiling radiometer and turbulent kinetic energy dissipation profiler (FLY probe) data.

Table PRINDEX

This table provides an index to the profiles held in PRDATA and provides storage for metadata parameters.

Table PRLINK

This table provides the linkage necessary for the one-to-many relationship between PRINDEX and PRDATA.

Table PRTOTAL

This table provides storage for parameters that are derived from, or pertain to, an entire profile. For example, it may be used to store extinction coefficients derived from a radiometer profile.

Table PUPVPO4

This table contains the data from Menten-Michaelis kinetics experiments, in which the uptake rate of a species by the particulate phase is measured as a function of the concentration of that species in the dissolved phase. During OMEX II these measurements were made for phosphate.

Table PUPVPO4_LINK

This table identifies the water sample used for any given experiment held in PUPVPO4. It is simply a link between the experiment reference and the BODC water sample identifier.

Table STINDX

This table provides an inventory of sediment trap samples stored in the database and implements the 'one-to-many' relationship between a sediment trap deployment and the individual samples. These result from either traps at multiple depths and/or traps with multiple cups. Metadata parameters are also stored.

Table TRAPDATA

Table TRAPDATA provides storage within a fully normalised schema for sediment trap analytical data and fluxes.

Table ZUCT

This table is part of the parameter dictionary. Its function is to group the 4-byte 'parent' parameter codes into categories to enable them to be interrogated more easily.

Table ZUNT

This table is part of the parameter dictionary. It is a code table that defines the codes used to represent parameter units.

Table ZUPM

This table is part of the parameter dictionary. It contains the definitions of the 4-byte 'parent' parameter codes (i.e. the first four bytes of the parameter code).

Table ZUSG

This is the main table of the parameter dictionary, containing definitions of the full 8-byte parameter codes.

Table ADCP

Field Definitions

BEN	NUMBER(6)	BODC Event Number
BINDPTH	NUMBER(7,1)	Depth of the ADCP data bin (m)
PGOOD	NUMBER(4,1)	Percentage of good data returned for the bin
FPGOOD	CHAR(1)	Quality control flag on PGOOD
AMPL	NUMBER(7,3)	Amplitude of the signal returned (dB)
FAMPL	CHAR(1)	Quality control flag on AMPL
ERRVEL	NUMBER(7,3)	Velocity error (cm/s)
FERRVEL	CHAR(1)	Quality control flag on ERRVEL
VERT	NUMBER(7,3)	Vertical velocity (cm/s)
FVERT	CHAR(1)	Quality control flag on VERT
RELEW	NUMBER(7,3)	Relative E-W velocity (cm/s)
FRELEW	CHAR(1)	Quality control flag on RELEW
RELNS	NUMBER(7,3)	Relative N-S velocity (cm/s)
FRELNS	CHAR(1)	Quality control flag on RELNS
SHPEW	NUMBER(7,3)	Ship's velocity E-W (cm/s)
FSHPEW	CHAR(1)	Quality control flag on SHPEW
SHPNS	NUMBER(7,3)	Ship's velocity N-S (cm/s)
FSHPNS	CHAR(1)	Quality control flag on SHPNS
ABSEW	NUMBER(7,3)	Absolute E-W velocity (cm/s)
FABSEW	CHAR(1)	Quality control flag on ABSEW
ABSNS	NUMBER(7,3)	Absolute N-S velocity (cm/s)
FABSNS	CHAR(1)	Quality control flag on ABSNS

Notes

The convention used for the quality control flags is:

K	Uncertain/suspect value (source of quality control unknown).
L	Uncertain/suspect value (data originator's quality control).
M	Uncertain/suspect value (BODC quality control).
O	Uncertain/suspect value (user quality control).

The flag channel is set blank for good data.

If bottom track velocities are available then these will be stored as the ship’s velocities with an appropriate entry in the ADCPINDX table.

Table ADCPINDX

Field Definitions

BEN	NUMBER(6)	BODC event number
SHPFLG	CHAR(1)	Platform velocity correction method flag
HEAD	NUMBER(8,4)	Correction factor applied to the ADCP data for differences between the ship's gyro and the ADCP heading
HDFLG	CHAR(1)	Flag to specify whether HEAD has been applied to the data
AMP	NUMBER(8,4)	Scaling factor applied to the ADCP velocities
AMPFLG	CHAR(1)	Flag to specify whether AMP has been applied to the data
TIMINT	NUMBER(4,2)	Time interval over which data were gridded (min)
BININT	NUMBER(4,1)	Depth interval over which data were gridded (m)
BINCOM	CHAR(40)	A comment on what the BINDPTH (bin depth) signifies
VELCOM	CHAR(40)	A comment on what the ADCP velocities represent
COM	CHAR(40)	Any other comments on the data

Notes

The platform velocity correction method flag is set to ‘S’ if the ship’s velocity was computed from navigation or ‘B’ if it was directly measured by ADCP bottom tracking. The latter is more accurate and more reliable but is only possible in relatively shallow water. Do **not** confuse these with the data quality control flags.

The misalignment angle (HEAD) and scaling factor AMP are obtained by the ADCP calibration protocols developed by Southampton Oceanography Centre (Pollard and Read, 1989).

If it is known that the corrections HEAD and AMP have been applied then the flag fields HDFLG and AMPFLG are set to ‘Y’. Otherwise they are set to ‘N’. If the values for HEAD and AMP are known then they are stored. Otherwise HEAD and AMP are set to 0 and 1 respectively.

The time interval is stored in decimal minutes (15 minutes 30 seconds stored as 15.5).

BINCOM contains a plain language definition of the bin depth (e.g. 'bin depth specifies the bottom of depth interval').

VELCOM contains information on the method used to determine the binned current velocities (e.g. 'velocity is averaged over the bin depth').

Reference

Pollard, R.T. and Read, J.F. (1989). A Method for Calibrating Ship-mounted Acoustic Doppler Profilers and the Limitations of Gyro Compasses. ***Journal of Atmospheric and Oceanic Technology***, 6, 859-865.

Table ARGOS

Field Definitions

BEN	NUMBER(6)	BODC Event Number
DATIM	DATE	Date and time of position fix
LAT	NUMBER(8,5)	Latitude of position fix (°+ve N)
LON	NUMBER(8,5)	Longitude of position fix (°+ve E)
SST	NUMBER(5,3)	Sea surface temperature (°C)
SST_F	CHAR(1)	Temperature quality control flag

Notes

Please refer to the data documentation to obtain the drogue depths.

The convention used for the quality control flags is:

K	Uncertain/suspect value (source of quality control unknown).
L	Uncertain/suspect value (data originator's quality control).
M	Uncertain/suspect value (BODC quality control).
O	Uncertain/suspect value (user quality control).

The flag channel is set blank for good data.

Table BOTDATA

Field Definitions

IBTTLE	NUMBER(6)	BODC bottle/sample identifier
CPCODE	CHAR(8)	Parameter code
FPVAL	NUMBER	Parameter value
CPFLAG	CHAR(1)	Parameter quality control flag
IORGRF	NUMBER(6)	Originator's reference
IDOCRF	NUMBER(8)	Document reference
CILOAD	CHAR(6)	Record creation date (yymmdd)
TSGMOD	DATE	Last modification time stamp

Notes

The primary key is formed from the three fields, IBTTLE, CPCODE and IORGRF. In other words, the table contains one row for each parameter measurement on each sample by a given data originator.

The parameter code consists of 8 bytes, which describe the parameter measured in some detail. The parameter code definitions are stored in the Parameter Dictionary (see the table names starting with 'Z').

The parameter flag field serves two purposes. First, it identifies parameter values identified as problems during quality control procedures. Different codes are used to differentiate between originator, BODC and user quality control. Secondly, it is used to identify samples where the measured parameter was either below detection limit or saturated the measuring apparatus. In these cases the data values are set to the detection limit (zero if no detection limit was specified) or the saturation value respectively. If no flag value has been assigned (signifying good data), the CPFLAG field is blank.

The flag values that may be encountered are:

K	Uncertain/suspect value (source of quality control unknown).
L	Uncertain/suspect value (data originator's quality control).
M	Uncertain/suspect value (BODC quality control).
O	Uncertain/suspect value (user quality control)
T	Nearest value to bottle firing depth
<	Below detection limit.
>	In excess of stated value.

The 'T' flag is only found on records created for water bottle samples from CTD profile data. It means that no data were found at the bottle firing depth. Instead, the

nearest data value has been taken, providing this was within 2 m of the required depth.

The originator's reference field allows the suppliers of individual data values to be identified. The objective when allocating these linkages is to provide a point of contact for users of the data to approach when initiating collaboration that will endure beyond the end of a project. Consequently, linkages have been assigned at the PI level and do not necessarily specify the individual who actually did the analysis. If we've got anything wrong, please don't bear a grudge: just let us know and we'll fix it. The meanings of the codes used are stored in table ORGCODE.

Document references have not yet been implemented so the IDOCRF field is currently always set null.

Table BOTTLE

Field Definitions

BEN	NUMBER(6)	BODC event number
IBTTLE	NUMBER(6)	A unique identifier assigned by BODC to each sample
MINP	NUMBER(5,1)	Minimum pressure for the sample (db)
MAXP	NUMBER(5,1)	Maximum pressure for the sample (db)
DEPTH	NUMBER(6,2)	Sampling depth (m)
BOTYP	CHAR(4)	Bottle/sample type identifier
FLAG	CHAR(1)	Problem indicator flag

Notes

Table BOTTLE was originally conceived for the management of water bottle data. However, as the BODC databases developed, it was realised that the table could be utilised for other data types. Data currently held include pumped air and water samples, stand-alone pump (SAP) samples, bucket samples and air bottle samples.

The most important function of this table is to implement the 'one-to-many' relationship that may exist between samples and events. The table contains one row per sampling depth (multiple samples at a single depth are considered as one). Each record in EVENT can 'own' as many records as it likes in BOTTLE through the foreign key field BEN. Hence each EVENT can include many sampling depths.

The relationship between MINP, MAXP and DEPTH requires some explanation.

MINP and MAXP only have relevance to bottles on a CTD rosette. In this case, bottle 'depths' are frequently logged as pressure ranges during CTD screening and loaded into BOTTLE. Subsequently, DEPTH (the distance from the surface to the midpoint of the bottle) is computed by applying a pressure calibration to MINP and MAXP, correcting for CTD frame geometry and applying the standard conversion from pressure to depth. In order to allow for pressure calibration drift, the minimum DEPTH value is constrained at 0.5 metres. The fields MINP and MAXP provide a direct linkage between BOTTLE and the CTD data, which is why they are retained. Note that any pressure calibration applied by BODC to the CTD data has not been applied to MINP and MAXP.

For other sample types, DEPTH is assigned a value from reports or logs and MINP and MAXP are left null. Note that air samples have negative depths to indicate height above sea level.

The BOTYP field specifies how the sample was collected. The codes used are defined in the table BOTYPINDX.

The FLAG field is used to indicate known problems. The coding convention used is:

B	Filter burst (SAP samples)
L	Contamination through leakage suspected
M	No sample obtained
O	Bottles fired in incorrect order

The 'O' flag requires a little more explanation. This is used to flag stations where there was obvious confusion from the sample data set about which bottle was fired at which depth. These problems have been resolved during data load, but the flag is included to remind users that there may be problems with data from that station obtained outside the database.

Table BOTYPINDX

Field Definitions

BOTYP	CHAR(4)	Bottle type code
DESCRIPTION	CHAR(20)	Plain Language field describing BOTYP

Notes

This table identifies the type of water bottle used or the sampling method.

Table C14DAT

Field Definitions

EXPREF	CHAR(12)	BODC experiment reference
IBTTLE	NUMBER(6)	BODC bottle reference number
DEPTH	NUMBER(4,1)	Depth (or depth equivalent) at which the sample was incubated
LIGHT	NUMBER(4,1)	Fraction of available light illuminating the sample (%)
FLIGHT	NUMBER(5,1)	Light level in a PvI profile ($\mu E/m^2/s$)
PPMIC	NUMBER(6,3)	Microplankton production (mg C/m^3/incubation duration)
PPMICF	CHAR(1)	Microplankton production quality control flag
SPPMIC	NUMBER(5,3)	Standard deviation of microplankton production (mg C/m^3/ incubation duration)
PPNAN	NUMBER(6,3)	Nanoplankton production (mg C/m^3/ incubation duration)
PPNANF	CHAR(1)	Nanoplankton production quality control flag
SPPNAN	NUMBER(5,3)	Standard deviation of nanoplankton production (mg C/m^3/ incubation duration)
PPPIC	NUMBER(6,3)	Picoplankton production (mg C/m^3/ incubation duration)
PPPICF	CHAR(1)	Picoplankton production quality control flag
SPPPIC	NUMBER(5,3)	Standard deviation of picoplankton production (mg C/m^3/ incubation duration)
PPTOT	NUMBER(6,3)	Total production (mg C/m^3/ incubation duration)
PPTOTF	CHAR(1)	Total production quality control flag
SPPTOT	NUMBER(5,2)	Standard deviation of total production (mg C/m3/ incubation duration)

Notes

The IBTTLE field provides a link to the source of the water used in the production experiment. Note that it is possible to collect water from a single source and incubate it under a variety of conditions. In such cases, the bottle reference number will be repeated on several C14DAT records.

The terms 'microplankton', 'nanoplankton' and 'picoplankton' are loose descriptions and their precise meaning may vary from one production experiment to the next. Precise definitions are held in C14HDR.

The fields DEPTH and LIGHT are provided as alternative indicators of the conditions under which the sample was incubated. For in-situ incubations, LIGHT will generally

be null and DEPTH represents the actual depth of incubation. For on-deck experiments, LIGHT represents the percentage of ambient light reaching the sample: i.e. the light transmission of the incubation screen. DEPTH, where present, is computed from this using either CTD downwelling irradiance or beam attenuance data.

The field PPTOT is either the result of a non size-fractionated experiment or the summation of size fraction data. If the size fractions have been summed the standard deviation for the total field has been set to the square root of the sum of the squares of the size fraction standard deviations. As a general rule, if the size fraction columns are non-null then the total uptake values have been computed and not individually measured.

The units of uptake are per incubation duration as specified in the INCDUR field of table C14HDR. For in-situ and on-deck incubations this will normally, **but not always**, be 24 hours. In the case of light gradient incubations, where the light intensity is constant throughout the incubation, it is usual for the uptake rate to be quoted per hour. In these cases, the incubation duration has been set to 1, even though it is probable that the samples were actually incubated for longer than this.

The quality control flags serve two purposes. First, they indicate problems identified during quality control procedures. Different codes are used to differentiate between originator, BODC and user quality control. Secondly, they are used to identify samples where the measured parameter was either below detection limit or saturated the measuring apparatus. In these cases the data values are set to the detection limit or the saturation value respectively. If no flag value has been assigned (signifying good data), the CPFLAG field is blank.

The flag values that may be encountered are:

K	Uncertain/suspect value (source of quality control unknown).
L	Uncertain/suspect value (data originator's quality control).
M	Uncertain/suspect value (BODC quality control).
O	Uncertain/suspect value (user quality control)
<	Below detection limit.
>	In excess of stated value.

Table C14HDR

Field Definitions

EXPREF	CHAR(12)	Experiment reference (assigned by BODC)
TYPE	CHAR(2)	Experiment type code (OD for on deck incubations, IS for in-situ experiments, PI for PvI experiments)
BENCOL	NUMBER(6)	BODC event number of the water collection event
BEN	NUMBER(6)	BODC event number of associated production rig deployment
SDATE	DATE	Date and time of the start of the incubation
INCDUR	NUMBER(3,1)	Incubation duration in hours
COMM	CHAR(30)	Plain language comment field
DEPINT	NUMBER(4,1)	Depth to which the integrated production was calculated
INTMIC	NUMBER(6,2)	Integrated productivity for the microplankton fraction (mg C/m^2/day)
INTNAN	NUMBER(6,2)	Integrated productivity for the nanoplankton fraction (mg C/m^2/day)
INTPIC	NUMBER(6,2)	Integrated productivity for the picoplankton fraction (mg C/m^2/day)
INTTOT	NUMBER(6,2)	Total integrated productivity (mg C/m^2/day)
MICDEF	CHAR(8)	Microplankton definition
NANDEF	CHAR(8)	Nanoplankton definition
PICDEF	CHAR(8)	Picoplankton definition

Notes

Fields BENCOL and BEN require some explanation as the presence of two BODC event numbers in a single table may at first sight seem confusing. BENCOL specifies where the water used in the production experiment came from. In some ways it is superfluous because the same information may be derived from the IBTTLE field in C14DAT. However, it is included to simplify the task of linking integrated production data held in table C14HDR to the place and time to which they relate.

BEN is a reference given to some production experiments. This invariably relates to in-situ experiments where a rig has been cast adrift from the ship. On-deck incubations have never been considered as events. The reason for this is more historical than logical: the event entries are drawn up from ship’s logs and whilst a rig being deployed has often (but not always) merited a log entry, the placing of samples in an on-deck incubator has not.

Integrated production data are only included if they were computed and supplied by the data originator. They are not routinely determined by BODC.

Table CAL_COEFFS

Field Definitions

ICALRF	NUMBER(6)	BODC CTD calibration reference
NSEQ	NUMBER(6)	Coefficient sequence number
COEFF	NUMBER	Coefficient value

Notes

This table is the coefficient repository, which forms part of the CTD calibration system. Note that all calibrations held in the calibration system have **already** been applied to the data in CTD_DATA_BIN.

Table CAL_COMM

Field Definitions

ICALRF	NUMBER(6)	BODC calibration reference number
NSEQ	NUMBER(4)	Comment record sequence number
CALCOM	CHAR(80)	Plain-language comment record

Notes

The comments stored in CAL_COMM are notes made by the data scientist who entered the calibration into the CTD calibration system. Note that all calibrations held in the calibration system have **already** been applied to the data in CTD_DATA_BIN.

Table CAL_DESC

Field Definitions

CALTYP	CHAR(10)	Calibration type mnemonic
NSEQ	NUMBER(4)	Comment record sequence number
CALCOM	CHAR(80)	Comment record describing the calibration type

Notes

This table contains plain language records describing a particular CTD calibration system methodology. Note that all calibrations held in the calibration system have **already** been applied to the data in CTD_DATA_BIN.

Table CAL_INDEX

Field Definitions

CALTYP	CHAR(10)	Calibration type mnemonic
NUM_COEFF	NUMBER(6)	Number of coefficients required by calibration type
NUM_PARM	NUMBER(6)	Number of input parameters required by calibration type
CALTTL	CHAR(80)	Title of calibration type
ICLCHK	NUMBER(6)	Calibration type check code

Notes

This table is the primary index of the calibration types supported by the CTD calibration system. The ICLCHK field controls data integrity checks performed by the calibration system software. Note that all calibrations held in the calibration system have **already** been applied to the data in CTD_DATA_BIN.

Table CAL_PARMS

Field Definitions

ICALRF	NUMBER(6)	BODC calibration reference number
NSEQ	NUMBER(6)	Parameter sequence number
CPCODE_IN	CHAR(8)	Parameter code

Notes

This table defines the input data channels required for a given calibration within the CTD calibration system. The parameter codes used are defined in the Parameter Dictionary (see tables ZUCT/ZUNT/ZUPM/ZUSG). Note that all calibrations held in the calibration system have **already** been applied to the data in CTD_DATA_BIN.

Table CAL_RIG_BEN

Field Definitions

IRIGNO	NUMBER(6)	BODC rig geometry reference number
BEN	NUMBER(8)	BODC Event Number

Notes

This table indicates the rig geometry corrections that have been applied to a particular CTD cast when extracting calibration data from the profile or computing the DEPTH field in table BOTTLE. The rig geometry definitions are defined in table CAL_RIG_GEOMETRY.

Table CAL_RIG_GEOMETRY

Field Definition

IRIGNO	NUMBER(6)	BODC rig geometry reference number
RIGCOM	CHAR(80)	Plain language description of the rig geometry
FBASOF	NUMBER(5,2)	Distance between CTD pressure sensor and the base of the water bottle (m)
FTOPOF	NUMBER(5,2)	Distance between CTD pressure sensor and the top of the water bottle (m)
FTEMOF	NUMBER(5,2)	Distance between CTD pressure sensor and the reversing thermometer (m)

Notes

This is the code table for CTD rosette geometrical configurations.

Table CAL_TYPE_REF

Field Definitions

CALTYP	CHAR(10)	Calibration type mnemonic
ICALRF	NUMBER(6)	BODC calibration reference number

Notes

This table defines the calibration type (i.e. the algorithm that is to be applied) for each calibration in the CTD calibration system. Note that all calibrations held in the calibration system have **already** been applied to the data in CTD_DATA_BIN.

Table COREINDX

Field Definitions

ICORE	NUMBER(6)	BODC core identifier
BEN	NUMBER(6)	BODC event number for the coring event
ORGREF	CHAR(16)	Identifier given to the core on the cruise
FLAG	CHAR(1)	Flag

Notes

It may come as something of a surprise that this table has a 'one-to-many' relationship to manage. However, the multicorer produces (ideally!) up to 12 cores from a single deployment, which may be used for different purposes or for replicate analyses. Another possible 'one-to-many' relationship is the case where a series of sub-cores is taken from a box-core sample.

The flag is set to 'F' if the corer failed to return a sample or to 'S' if the corer obtained stones and no sediment. Otherwise it is left null

Table COREPROF

Field Definitions

ICSAMP	NUMBER(6)	BODC core sample reference number
CPCODE	CHAR(8)	Parameter code
FPVAL	NUMBER	Parameter value
CPFLAG	CHAR(1)	Parameter quality control flag
IORGRF	NUMBER(6)	Originator's reference
IDOCRF	NUMBER(6)	Document reference
CILOAD	CHAR(6)	Record creation date (yymmdd)
TSGMOD	DATE	Last modification time stamp

Notes

The primary key is formed from the three fields, ICSAMP, CPCODE and IORGRF. In other words, the table contains one row for each parameter measurement on each profile point by a given data originator.

The parameter code consists of 8 bytes, which describes the parameter measured in some detail. The parameter code definitions are stored in the parameter dictionary (see the table names starting with 'Z').

The parameter flag field serves two purposes. First, it identifies parameter values identified as problems during quality control procedures. Different codes are used to differentiate between originator, BODC and user quality control. Secondly, it is used to identify samples where the measured parameter was either below detection limit or saturated the measuring apparatus. In these cases the data values are set to the detection limit or the saturation value respectively. If no flag value has been assigned (signifying good data), the CPFLAG field is blank.

The flag values that may be encountered are:

K	Uncertain/suspect value (source of quality control unknown).
L	Uncertain/suspect value (data originator's quality control).
M	Uncertain/suspect value (BODC quality control).
O	Uncertain/suspect value (user quality control)
<	Below detection limit.
>	In excess of stated value.

The originator's reference field allows the suppliers of individual data values to be identified. The objective when allocating these linkages is to provide a point of contact for users of the data to approach when initiating collaboration that will endure beyond the end of a project. Consequently, linkages have been assigned at

the PI level and do not necessarily specify the individual who actually did the analysis. If we've got anything wrong, please don't bear a grudge: just let us know and we'll fix it. Likewise, anyone who feels aggrieved for any reason concerning these code allocations should discuss it with us so that any problems may be quickly rectified.

Codes are used to eliminate potential problems with misspellings and the like. The codes used are documented in the table ORGCODE.

Document references have not yet been implemented so the IDOCRF field is currently always null.

Table CORESAMP

Field Definitions

ICSAMP	NUMBER(6)	BODC core sample reference number
ICORE	NUMBER(6)	BODC core reference number
DIST	NUMBER(7,3)	Distance from the top of the core to the mid-point of the sample (cm)
SEGLEN	NUMBER(4,2)	Thickness of the sample segment (cm)

Notes

This table provides the independent variable for core profiles. This is defined as the distance from the top of the core to the mid-point of the sample. Thus for instrumental profiles it will be the distance of the probe tip from the top of the core. For cores sectioned into slabs, it will be the distance from the middle of the slab to the top of the core. Negative values are possible and indicate samples of, or in, the water overlying the core.

The table also includes a resolution parameter, SEGLEN. This gives the slab thickness for sectioned cores. For probe profiles it is either set zero or to the size of the probe tip if known.

Table CORETOT

Field Definitions

ICORE	NUMBER(6)	BODC core reference number
CPCODE	CHAR(8)	Parameter code
FPVAL	NUMBER	Parameter value
CPFLAG	CHAR(1)	Parameter quality control flag
IORGRF	NUMBER(6)	Originator's reference
IDOCRF	NUMBER(6)	Document reference
CILOAD	CHAR(6)	Record creation date (yymmdd)
TSGMOD	DATE	Last modification time stamp

Notes

The primary key is formed from the two fields, ICORE and CPCODE. In other words, the table contains one row for each parameter measurement on the whole core or grab sample.

The parameter code consists of 8 bytes, which describe the parameter measured in some detail. The parameter code definitions are stored in the parameter dictionary (see the table names starting with 'Z').

The parameter flag field serves two purposes. First, it identifies parameter values identified as problems during quality control procedures. Different codes are used to differentiate between originator, BODC and user quality control. Secondly, it is used to identify samples where the measured parameter was either below detection limit or saturated the measuring apparatus. In these cases the data values are set to the detection limit or the saturation value respectively. If no flag value has been assigned (signifying good data), the CPFLAG field is blank.

The flag values that may be encountered are:

K	Uncertain/suspect value (source of quality control unknown).
L	Uncertain/suspect value (data originator's quality control).
M	Uncertain/suspect value (BODC quality control).
O	Uncertain/suspect value (user quality control)
<	Below detection limit.
>	In excess of stated value.

The originator's reference field allows the suppliers of individual data values to be identified. The objective when allocating these linkages is to provide a point of contact for users of the data to approach when initiating collaboration that will endure beyond the end of a project. Consequently, linkages have been assigned at

the PI level and do not necessarily specify the individual who actually did the analysis. If we've got anything wrong, please don't bear a grudge: just let us know and we'll fix it. The codes used are documented in the table ORGCODE.

Document references have not yet been implemented so the IDOCRF field is currently always null.

Table CPR_COLOUR

Field Definitions

BEN	NUMBER(6)	BODC event number
COL_INDEX	NUMBER(5,1)	Sample colour index (arbitrary units)

Notes

The colour index is a visual estimate of how 'green' the silk appears. The higher the value, the higher the chlorophyll concentration in the water sampled.

Table CPR_PHYTO

Field Definitions

BEN	NUMBER(6)	BODC event number
TAXON	CHAR(40)	Name of taxon or group of taxa
TOTABUND	NUMBER	Estimated abundance of taxon or group of taxa in the total sample

Notes

The estimated abundance is the 'accepted value' for the CPR quantification class divided by the fraction of the sample counted. For phytoplankton, the quantification class definitions are as follows:

Accepted value	Class Limits
0	Presence
1.5	1-2
3.5	3-4
6.5	6-7
9.5	9-10
13	12-14
17	16-18
22.5	21-24
30	28-32
42	38-46
75	60-90

Table CPR_ZOO

Field Definitions

BEN	NUMBER(6)	BODC event number
TAXON	CHAR(40)	Name of taxon or group of taxa
TOTABUND	NUMBER	Estimated abundance of taxon or group of taxa in the total sample

Notes

The estimated abundance is the 'accepted value' for the CPR quantification class divided by the fraction of the sample counted. For zooplankton, the quantification class definitions are as follows:

Accepted value	Class Limits
0	Presence
1	1-1
2	2-2
3	3-3
6	4-11
17	12-25
35	26-50
75	51-125
160	126-250
310	251-500
640	501-1000
1300	1001-2000
2690	2001-4000

Table CRSINDX

Field Definitions

CRUISE	CHAR(8)	BODC cruise mnemonic
PROJECT	CHAR(12)	Mnemonic of the project with which the cruise was associated
PSO	CHAR(20)	Cruise chief scientist
COUNTRY	CHAR(20)	Country responsible for organising the cruise
TBEGNS	DATE	Date the cruise sailed
TENDS	DATE	Date the cruise docked
LOCATION	CHAR(80)	Plain language description of the area studied
COMM	CHAR(60)	Plain language comment field

Notes

This table allows events associated with a particular project to be identified as well as providing some background information on cruises.

Table CTD_DATA_BIN

Field Definitions

LINK	NUMBER(8)	CTD datacycle reference number
CPCODE	CHAR(8)	Parameter code
FPVAL	NUMBER	Parameter value
CPFLAG	CHAR(1)	Parameter quality control flag

Notes

This table contains one record for each parameter measured on each CTD datacycle. The data volume has been controlled by binning according to SCOR recommendations (2 db or 1 db for casts shallower than 100 m).

The parameter codes are defined in the Parameter Dictionary (tables ZUCT/ZUNT/ZUPM/ZUSG).

The following flag values may be encountered:

K	Uncertain/suspect value (source of quality control unknown).
L	Uncertain/suspect value (data originator's quality control).
M	Uncertain/suspect value (BODC quality control).
O	Uncertain/suspect value (user quality control)
T	Value interpolated during binning

Most flags are blank, indicating that there is no known problem with the data value.

Table CTD_LINK_BIN

Field Definitions

BEN	NUMBER(8)	BODC Event Number
LINK	NUMBER(8)	CTD datacycle reference number

Notes

This table links together all the cycles for a given CTD cast.

Table CTD_PARMS

Field Definitions

BEN	NUMBER(8)	BODC Event Number
CPCODE_OUT	CHAR(8)	CTD channel parameter code
CALTYP	CHAR(10)	CTD calibration type mnemonic
ICALRF	NUMBER(6)	CTD calibration reference number
IORGRF	NUMBER(6)	Originator identifier code
IDOCRF	NUMBER(6)	Document reference number

Notes

This table contains one record for each parameter contained in the CTD datacycle.

Parameter codes are defined in the Parameter Dictionary (tables ZUCT/ZUNT/ZUPM/ZUSG).

The data originator codes are defined in table ORGCODE.

Documentation linkages have yet to be implemented. Consequently, IDOCRF is currently set null.

Table CTD_SS_INDX

Field Definitions

BEN	NUMBER(6)	BODC Event Number
CTD_SS	CHAR(1)	Profile type indicator
BMPNTR	NUMBER(5)	Underway data linkage pointer
TBEGNC	DATE	Date/time of the start of the profile
TENDC	DATE	Date/time of the end of the profile
MINP	NUMBER(5,1)	Minimum pressure in the profile (db)
MAXP	NUMBER(5,1)	Maximum pressure in the profile (db)
FMAXP	CHAR(1)	Set to '*' if the BODC pressure calibration has been applied to MINP and MAXP.
EXTCO	NUMBER(5,3)	Downwelling irradiance extinction coefficient
MLD	NUMBER(3,1)	Mixed layer depth (m)
EZD	NUMBER(4,1)	Depth to the base of the euphotic zone (m)
TYPE	CHAR(3)	Type code of the CTD used

Notes

The profile type indicator is set to ‘C’ for a conventional vertical profile or to ‘S’ for a pseudo-profile derived from undulator data.

The underway data linkage pointer is used by BODC system software to link between undulator pseudo-profiles and the navigation data held in the underway file. It need be of no concern to database users.

MINP is only stored for undulator pseudo-profiles as it is assumed that vertical profiles start at the surface.

The fields EXTCO, MLD and EZD were set up for the BOFS programme. In practice, it has been found that providing universally acceptable algorithms for their computation is an impossible task. Consequently, current practice is to leave the fields null unless the scientific community provides agreed values.

The mnemonics used for TYPE are defined in table CTDTYP.

Table CTDTYP

Field Definitions

TYPE	CHAR(3)	CTD type code mnemonic
DESCR	CHAR(30)	Plain language definition of the mnemonic

Table EVENT

Field Definitions

BEN	NUMBER(6)	BODC Event Number
OID	CHAR(12)	Originator's identifier for the event
GCODE	CHAR(8)	Event gear code
TBEGNS	DATE	Event start date/time (UT)
TENDS	DATE	Event end date/time (UT)
LAT	NUMBER(7,5)	Average latitude for event (°+ve North).
LON	NUMBER(7,5)	Average longitude for deployment (°+ve East).
VARLAT	NUMBER(7,5)	Maximum deviation of latitude from mean during event.
VARLON	NUMBER(7,5)	Maximum deviation of longitude from mean during event.
WDEPTH	NUMBER(5,1)	Average bathymetric depth for the event (m).
LATS	NUMBER(7,5)	Latitude at time TBEGNS (°+ve North).
LONS	NUMBER(7,5)	Longitude at time TBEGNS (°+ve East).
LATE	NUMBER(7,5)	Latitude at time TENDS (°+ve North).
LONE	NUMBER(7,5)	Longitude at time TENDS (°+ve East).
CRUISE	CHAR(8)	Cruise mnemonic.
SITE	CHAR(12)	Fixed station name.

Notes

This table has been built from the best available information from cruise reports, log sheets and information accompanying data. Automatically logged navigation has been used to match times and positions wherever possible.

There are two types of event: point events and traverse events.

Point events may be considered as those events that effectively happen at a fixed position. Their positions are stored in the fields LAT, LON, VARLAT and VARLON. The other four position fields are left null.

Traverse events, such as tows and trawls, involve the ship steaming a significant distance. In this case, the start and end positions are stored in LATS, LONS, LATE and LONE. Note that some traverse events have data entered into the point event position fields and may have water depths defined if the depth range during the event was acceptably small. This allows traverse events to be located by simple spatial searches on EVENT.

Wherever possible, the fields LAT and LON are derived by averaging the data from the ship's navigation log over the event duration. VARLAT and VARLON are the

maximum deviation of the data set from the mean. If VARLAT and VARLON are null then the data in LAT and LON have been take from logs or reports.

Obviously, the averaged ship's positions are not used for moorings. If VARLAT and VARLON are set then the information has been derived from the difference of the recorded positions on deployment and recovery.

The BODC Event Number (BEN) provides a unique event identifier, no matter how many cruises are loaded. Data elsewhere in the database, resulting from a specified event, will either be labelled directly, or via a linkage record to its BEN.

OID, the originator's identifier, is the label that was assigned to the event during the cruise. For example, for Discovery cruises, it is based on the 'Discovery number' such as 11869#1. In a few cases, usually non-toxic samples or XBT drops, no identifier was assigned during the cruise and suitable naming schemes have been devised by BODC.

Start and end times bracket the event. Thus, for a CTD cast, the time span is from the instrument leaving the deck until its return. Some events are regarded as instantaneous, for example non-toxic samples. In these cases, the end times are set null. Wherever possible, cores are regarded as instantaneous events at the time when the corer reached the bottom.

The gear codes are mnemonics used to describe the data collection activity or the equipment used. The codes have been chosen to convey as much meaning as possible, but a plain language description of each code is provided in table G_CODE.

The cruise identifiers are made up from a ship code concatenated with the cruise identifier. For example, 'BG' is used for Belgica and 'CD' for Charles Darwin and a typical cruise would be labelled BG9714C or CD114A.

Table EVENT_COMM

Field Definitions

BEN	NUMBER(6)	The BODC Event Number
COMM	CHAR(100)	Plain language comment field

Notes

This table provides a mechanism for documenting EVENT records without encumbering EVENT listings with a large text field.

Table G_CODE

Field Definitions

GCODE	CHAR(8)	Standardised gear code
DESCR	CHAR(60)	Plain language description of the gear described by GCODE

Table INTBOT

Field Definitions

BEN	NUMBER(6)	BODC Event Number
CPCODE	CHAR(8)	Parameter code
FPVAL	NUMBER	Parameter value
CPFLAG	CHAR(1)	Parameter quality control flag
IORGRF	NUMBER(6)	Data originator code
IDOCRF	NUMBER(6)	Document reference
CILOAD	CHAR(6)	Record creation date (yymmdd)
TSGMOD	DATE	Last modification time stamp

Notes

The parameter code consists of 8 bytes, which describe the parameter measured in some detail. The parameter code definitions are stored in the Parameter Dictionary (see the table names starting with 'Z').

The parameter flag field serves two purposes. First, it identifies parameter values identified as problems during quality control procedures. Different codes are used to differentiate between originator, BODC and user quality control. Secondly, it is used to identify samples where the measured parameter was below detection In this case the data values are set to the detection limit (zero if no detection limit was specified). If no flag value has been assigned (signifying good data), the CPFLAG field is blank.

The flag values that may be encountered are:

K	Uncertain/suspect value (source of quality control unknown).
L	Uncertain/suspect value (data originator's quality control).
M	Uncertain/suspect value (BODC quality control).
O	Uncertain/suspect value (user quality control)
<	Below detection limit.

The originator's reference field allows the suppliers of individual data values to be identified. The objective when allocating these linkages is to provide a point of contact for users of the data to approach when initiating collaboration that will endure beyond the end of a project. Consequently, linkages have been assigned at the PI level and do not necessarily specify the individual who actually did the analysis. If we've got anything wrong, please don't bear a grudge: just let us know and we'll fix it. The meanings of the codes used are stored in table ORGCODE.

Document references have not yet been implemented so the IDOCRF field is currently always set null.

Integrated data are only stored when they are supplied as part of a data set. They are not routinely computed by BODC. Integrated data may also be found in tables C14HDR, N15HDR and P33HDR.

Table MEGADAT

Field Definitions

BEN	NUMBER(6)	BODC event number of the epibenthic trawl
GROOP	CHAR(15)	Taxonomic group
KOUNT	NUMBER(4)	Taxonomic group abundance (number/1000 m^2)
BIOM	NUMBER(4)	Taxonomic group biomass (g wet weight/1000 m^2)

Notes

The individual taxonomic groups included are the principal megafaunal groups. Consequently, the total values given can exceed the sums of the individual taxonomic groups.

Values of zero in the KOUNT and BIOM fields signify values between zero and 0.5.

Table MEGAHEAD

Field Definitions

BEN	NUMBER(6)	BODC event number of the epibenthic trawl
SPECBIOM	NUMBER(3,1)	Biomass of characteristic taxa (mg C/m^2)
OTHERBIOM	NUMBER(3,1)	Biomass of non-characteristic taxa (mg C/m^2)
AVGWW	NUMBER(4,1)	Average individual specimen wet weight (g)
CARNBIOM	NUMBER(3,1)	Proportion of carnivores in the catch by biomass (%)
FFBIOM	NUMBER(3,1)	Proportion of filter feeders in the catch by biomass (%)
DFBIOM	NUMBER(3,1)	Proportion of detritus feeders in the catch by biomass (%)
CARNDENS	NUMBER(3,1)	Proportion of carnivores in the catch by abundance (%)
FFDENS	NUMBER(3,1)	Proportion of filter feeders in the catch by abundance (%)
DFDENS	NUMBER(3,1)	Proportion of detritus feeders in the catch by abundance (%)

Notes

The characteristic taxa are the principal megafaunal groups that have been quantified in table MEGADAT.

Table MEIODAT

Field Definitions

ISAMP	NUMBER(6)	BODC sample reference
GROOP	CHAR(16)	Taxonomic group
TAXA	CHAR(25)	Specific taxon
BIOM	NUMBER(7,4)	Specific taxon dry weight biomass (mg/m^2)
KOUNT	NUMBER(6)	Specific taxon abundance (number/m^2)
CBIOM	NUMBER(7,4)	Specific taxon biomass as carbon (mg C/m^2)

Notes

The usage of the fields GROOP and TAXA requires some explanation.

If the GROOP field is set to 'Total' and the TAXA field is null, then the record holds the total meiofaunal abundance for the segment to which it is linked. If the GROOP field is defined and the TAXA field is set to 'Total' then the record holds the total abundance and biomass of that taxonomic group for the core segment to which it is linked.

If TAXA is not null and not set to 'Total', then the record contains the abundance of the specified taxon (differentiated at the genus level). This level of detail is only provided for nematodes.

The field CBIOM was added for OMEX II.

Table MEIOHDR

Field Definitions

ICORE	NUMBER(6)	BODC core reference number
ISAMP	NUMBER(6)	BODC sample reference
COREDEP	NUMBER(6,3)	Distance from the top of the core to the mid-point of the sample (cm)
SEGLEN	NUMBER(6,3)	Thickness of the sample (cm)

Table MFDAT

Field Definitions

ISAMP	NUMBER(6)	Core sample reference
GROOP	CHAR(16)	Taxonomic group name
TAXA	CHAR(16)	Taxon name
BIOM	NUMBER(8,4)	Biomass (g/m^2 wet weight)
KOUNT	NUMBER(5,1)	Abundance (number per m^2)

Notes

Data were either provided at the group or taxon level. Where the data were supplied at group level, the TAXA field is set to 'Undifferentiated'.

Table MFHEAD

Field Definitions

ICORE	NUMBER(6)	BODC core reference
ISAMP	NUMBER(6)	Core sample reference (a link to MFDAT)
COREDEP	NUMBER(4,1)	Distance along core to mid-point of segment (cm)
SEGLEN	NUMBER(3,1)	Core segment length (cm)
MF	NUMBER(6)	Total macrofauna abundance (number per m^2)
IORGRF	NUMBER(6)	Originator identification reference
DIVPOLY	NUMBER(2)	Number of polychaete taxa in the sample
DIVALL	NUMBER(2)	Total number of taxa in the sample

Notes

The originator's reference field allows the suppliers of individual data values to be identified. The objective when allocating these linkages is to provide a point of contact for users of the data to approach when initiating collaboration that will endure beyond the end of a project. Consequently, linkages have been assigned at the PI level and do not necessarily specify the individual who actually did the analysis. The codes used are defined in table ORGCODE.

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Table MOORINDX

Field Definitions

BEN	NUMBER(6)	BODC Event Number for the mooring
ISHREF	NUMBER(6)	BODC NODB identifier for the data series
METER_TYPE	CHAR(50)	Description of the instrument measuring the data series
PARAM_CODES	CHAR(8)	Parameters included in the data series
MINDEP	NUMBER(9,2)	Minimum depth sampled (m)
MAXDEP	NUMBER(9,2)	Maximum depth sampled (m)

Notes

The parameters included are identified by concatenated one-byte codes that are defined thus:

A	Attenuance / Transmittance / Turbidity
C	Salinity / Conductivity
D	Current Direction
E	Relative Humidity
F	Chlorophyll / Fluorescence
G	Velocity Gradient
H	Radiation
I	Wind Speed
J	Wind Direction
K	Air Temperature
L	Air Pressure
M	Wind Velocity (Speed And Direction)
N	Nutrient Concentration
O	Dissolved Oxygen
P	Pressure
R	Temperature Gradient
S	Current Speed
T	Temperature
U	Waves
V	Horizontal Current Velocity (Speed and Direction)
W	Vertical Component of Current Velocity

Table N15DAT

Field Definitions

EXPREF	CHAR(12)	BODC experiment reference
IBTTLE	NUMBER(6)	BODC bottle reference number
DEPTH	NUMBER(4,1)	Depth (or depth equivalent) at which sample was incubated
LIGHT	NUMBER(4,1)	Fraction of available light illuminating the sample (%)
TNO3	NUMBER(6,4)	Total $^{15}NO_3$ uptake (μM/day)
STNO3	NUMBER(6,4)	Standard deviation of TNO3 (μM/day)
TNO3F	CHAR(1)	Total $^{15}NO_3$ uptake quality control flag
TNH4	NUMBER(6,4)	Total $^{15}NH_4$ uptake (μM/day)
STNH4	NUMBER(6,4)	Standard deviation of TNH4 (μM/day)
TNH4F	CHAR(1)	Total $^{15}NH_4$ uptake quality control flag
TUREA	NUMBER(6,4)	Total ^{15}N urea uptake (μM/day)
STUREA	NUMBER(6,4)	Total ^{15}N urea uptake standard deviation (μM/day)
TUREAF	CHAR(1)	Total ^{15}N urea uptake quality control flag
TSNO3	NUMBER(6,4)	$^{15}NO_3$ uptake in nanoplankton fraction (μM/day)
TSNO3F	CHAR(1)	$^{15}NO_3$ uptake in nanoplankton fraction quality control flag
TLNO3	NUMBER(6,4)	$^{15}NO_3$ uptake in microplankton fraction (μM/day)
TLNO3F	CHAR(1)	$^{15}NO_3$ uptake in microplankton fraction quality control flag
TSNH4	NUMBER(6,4)	$^{15}NH_4$ uptake in nanoplankton (μM/day)
TSNH4F	CHAR(1)	$^{15}NH_4$ uptake in nanoplankton quality control flag
TLNH4	NUMBER(6,4)	$^{15}NH_4$ uptake in microplankton (μM/day)
TLNH4F	CHAR(1)	$^{15}NH_4$ uptake in microplankton quality control flag

Notes

The experiment reference provides a linkage between the metadata held in table N15HDR and the individual uptake measurements held in N15DAT. The source (position and depth) of the incubated water may be identified through IBTTLE. Note that IBTTLE will not be unique for every record in cases where a common water sample was incubated at several depths.

The fields DEPTH and LIGHT are provided as alternative indicators of the conditions under which the sample was incubated. For in-situ incubations, LIGHT will generally be null and DEPTH represents the actual depth of incubation. For on-deck experiments, LIGHT represents the percentage of ambient light reaching the sample: i.e. the light transmission of the incubation screen. DEPTH is computed from this using either CTD downwelling irradiance or beam attenuance data.

The definitions of micro and nanoplankton vary from time to time depending on the filters used in the experiment. The definitions for a given experiment are given in the N15HDR record.

The fields TNO_3, and TNH_4 are either the result of a non size-fractionated experiment or the summation of size fraction data. As a general rule, if the size fraction columns are non-null then the total uptake values have been computed and not individually measured.

Note that the units are quoted in terms of uptake **per day**. This is a loose definition. Strictly speaking, the uptake is quoted over the period of the incubation duration. Normally this is approximately 24 hours but users are advised to check the duration in the appropriate field of N15HDR.

The quality control flags serve two purposes. First, they indicate problems identified during quality control procedures. Different codes are used to differentiate between originator, BODC and user quality control. Secondly, they are used to identify samples where the measured parameter was either below detection limit or saturated the measuring apparatus. In these cases the data values are set to the detection limit or the saturation value respectively. If no flag value has been assigned (signifying good data), the CPFLAG field is blank.

The flag values that may be encountered are:

K	Uncertain/suspect value (source of quality control unknown).
L	Uncertain/suspect value (data originator's quality control).
M	Uncertain/suspect value (BODC quality control).
O	Uncertain/suspect value (user quality control)
<	Below detection limit.
>	In excess of stated value.

Table N15HDR

Field Definitions

EXPREF	CHAR(12)	BODC experiment reference
TYPE	CHAR(2)	Experiment type code. (OD for on deck experiments, IS for in-situ experiments)
BENCOL	NUMBER(6)	BODC event number of the water collection event.
BEN	NUMBER(6)	BODC event number assigned to the incubation
SDATE	DATE	Date and time of the start of the incubation
INCDUR	NUMBER(3,1)	Incubation duration (hours)
COMM	CHAR(30)	Plain language comment field.
DEPINT	NUMBER(4,1)	Depth over which the integrated production was calculated
INTNO3	NUMBER(5,2)	Integrated $^{15}NO3$ uptake (mmol/m^2/day)
INTNH4	NUMBER(5,2)	Integrated $^{15}NH4$ uptake (mmol/m^2/day)
MICDEF	CHAR(8)	Microplankton definition
NANDEF	CHAR(8)	Nanoplankton definition
PICDEF	CHAR(8)	Picoplankton definition

Notes

Fields BENCOL and BEN require some explanation. BENCOL specifies where the water used in the production experiment came from. In some ways it is superfluous because the same information may be derived from the IBTTLE field in N15DAT. However, it is included to simplify the task of linking integrated production data held in table N15HDR to the place and time to which they relate.

BEN is a reference given to some production experiments. This invariably relates to in-situ experiments where a rig has been cast adrift from the ship. On-deck incubations have never been considered as events. The reason for this is more historical than logical: the event entries are drawn up from ship's logs and whilst a rig being deployed has often (but not always) merited a log entry, the placing of samples in an on-deck incubator has not.

Note that the units are quoted in terms of uptake **per day**. This is a loose definition. Strictly speaking, the uptake is quoted over the period of the incubation duration. Normally this is approximately 24 hours but users are advised to check the duration in INCDUR.

Integrated production data are only included if they were computed and supplied by the data originator. They are not routinely determined by BODC.

Table NETDATA

Field Definitions

INET	NUMBER(6)	BODC net sample reference number
CPCODE	CHAR(8)	Parameter code
FPVAL	NUMBER	Parameter value
CPFLAG	CHAR(1)	Parameter quality control flag
IORGRF	NUMBER(6)	Data originator code
IDOCRF	NUMBER(6)	Document reference.
CILOAD	CHAR(6)	Record creation date (yymmdd).
TSGMOD	DATE	Last modification time stamp.

Notes

The primary key is formed from the three fields, INET, CPCODE and IORGRF. In other words, the table contains one row for each parameter measurement on each sample by a given data originator.

The parameter code consists of 8 bytes, which describe the parameter measured in some detail. The parameter code definitions are stored in the Parameter Dictionary (see the table names starting with 'Z').

The parameter flag field serves two purposes. First, it identifies parameter values identified as problems during quality control procedures. Different codes are used to differentiate between originator, BODC and user quality control. Secondly, it is used to identify samples where the measured parameter was either below detection limit or saturated the measuring apparatus. In these cases the data values are set to the detection limit (zero if no detection limit was specified) or the saturation value respectively. If no flag value has been assigned (signifying good data), the CPFLAG field is blank.

The flag values that may be encountered are:

K	Uncertain/suspect value (source of quality control unknown).
L	Uncertain/suspect value (data originator's quality control).
M	Uncertain/suspect value (BODC quality control).
O	Uncertain/suspect value (user quality control)
<	Below detection limit.
>	In excess of stated value.

The originator's reference field allows the suppliers of individual data values to be identified. The objective when allocating these linkages is to provide a point of contact for users of the data to approach when initiating collaboration that will

endure beyond the end of a project. Consequently, linkages have been assigned at the PI level and do not necessarily specify the individual who actually did the analysis. If we've got anything wrong, please don't bear a grudge: just let us know and we'll fix it. The meanings of the codes used are stored in table ORGCODE.

Document references have not yet been implemented so the IDOCRF field is currently always set null.

Table NETINDX

Field Definitions

BEN	NUMBER(6)	BODC event number
INET	NUMBER(6)	Unique identifier assigned to the net haul/catch
MINDEP	NUMBER(5,1)	Minimum depth associated with net haul
MAXDEP	NUMBER(5,1)	Maximum depth associated with the net haul
GCODE	CHAR(8)	Net type description using the conventions defined in table G_CODE
HTYPE	CHAR(1)	Haul type. Set to 'V' for vertical, 'O' for oblique or stepped and 'H' for horizontal
FLOW	NUMBER(5,1)	Flow meter reading
MESH	NUMBER(4)	Net mesh size (μm)
AREA	NUMBER(5,2)	Area of the net mouth (m^2)
EFF	NUMBER(3)	Filtering efficiency
TOWLEN	NUMBER(5)	Length of tow (m)
VFILT	NUMBER(6,2)	Volume swept by the net (m^3)
SPEED	NUMBER(3,1)	Approximate speed of tow (knots)
FLDN	CHAR(1)	Day and night discriminator. Set to 'D' for day, 'N' for night or 'C' for crepuscular
VOLSMPD	NUMBER(5,2)	Catch volume integrated over the length of the tow, i.e. volume of sample in cod end (ml)
NORVOL	NUMBER(9,3)	Normalised displacement volume (ml/1000 m^3)
INTBIO	NUMBER(7,3)	Depth-integrated biomass (mg C/m^2)
TEMP	NUMBER(4,2)	In-situ temperature (°C)
SAL	NUMBER(4,2)	Salinity (PSU)
COMM	CHAR(40)	Plain language comment field for qualifying information

Notes

The two depth fields MINDEP and MAXDEP are provided to allow for both horizontal tows and vertical or oblique net hauls. In the former case both fields will be set to the same value.

Table ORGCODE

Field Definitions

IORGRF	NUMBER(6)	Originator's reference code.
CORGNM	CHAR(20)	Originator's name.
CORGO	CHAR(40)	Originator's organisation.

Table P33DARK

Field Definitions

EXPREF	CHAR(10)	BODC experiment reference
IBTTLE	NUMBER(6)	BODC bottle reference number
DEPTH	NUMBER(3,1)	Depth (or depth equivalent) at which the sample was incubated
UPMIC	NUMBER(6,3)	Microplankton uptake (nM P/incubation duration)
UPNAN	NUMBER(6,3)	Nanoplankton uptake (M P/ incubation duration)
UPPIC	NUMBER(6,3)	Picoplankton uptake (nM P/ incubation duration)
UPTOT	NUMBER(6,3)	Total uptake (nM P/ incubation duration)
SUPMIC	NUMBER(5,3)	Standard deviation of microplankton uptake (nM P/ incubation duration)
SUPNAN	NUMBER(5,3)	Standard deviation of nanoplankton uptake (nM P/ incubation duration)
SUPPIC	NUMBER(5,3)	Standard deviation of picoplankton uptake (nM P/ incubation duration)

Notes

This table contains the results from the control bottles, incubated in total darkness. Note that this table contains data from both ^{32}P and ^{33}P labelled experiments as indicated in the P33HDR field TRACER.

The definitions of micro, nano and picoplankton vary from time to time depending on the filters used in the experiment. The definitions for a given experiment are stored in the P33HDR record.

The UPTOT field is either the result of a non size-fractionated experiment or the summation of size fraction data. If the size fractions have been summed the standard deviation for the total field has been set to the square root of the sum of the squares of the size fraction standard deviations. As a general rule, if the size fraction columns are non-null then the total uptake values have been computed and not individually measured.

NB. The units of uptake are per incubation duration as specified in the INCDUR field of table P33HDR. For in-situ and on-deck incubations this will normally, **but not always**, be 24 hours.

Table P33DAT

Field Definitions

EXPREF	CHAR(10)	BODC experiment reference
IBTTLE	NUMBER(6)	BODC bottle reference number
DEPTH	NUMBER(3,1)	Depth (or depth equivalent) at which the sample was incubated
LIGHT	NUMBER(4,1)	Fraction of available light illuminating the sample (%)
FLIGHT	NUMBER(5,1)	Light level in a PvI profile ($\mu E/m^2/s$)
UPMIC	NUMBER(6,3)	Microplankton uptake (nM P/incubation duration)
UPNAN	NUMBER(6,3)	Nanoplankton uptake (nM P/incubation duration)
UPPIC	NUMBER(6,3)	Picoplankton uptake (nM P/incubation duration)
UPTOT	NUMBER(6,3)	Total uptake (nM P/incubation duration)
SUPMIC	NUMBER(5,3)	Standard deviation of microplankton uptake (nM P/ incubation duration)
SUPNAN	NUMBER(5,3)	Standard deviation of nanoplankton uptake (nM P/ incubation duration)
SUPPIC	NUMBER(5,3)	Standard deviation of picoplankton uptake (nM P/ incubation duration.
SUPTOT	NUMBER(6,3)	Standard deviation of the total uptake (nM P/ incubation duration)

Notes

The experiment reference provides a linkage between the metadata held in table P33HDR and the individual uptake measurements held in P33DAT. The source (position and depth) of the incubated water may be identified through IBTTLE. Note that IBTTLE will not be unique for every record in cases where a common water sample was incubated at several depths.

The fields DEPTH and LIGHT are provided as alternative indicators of the conditions under which the sample was incubated. For in-situ incubations, LIGHT will generally be set null and DEPTH represents the actual depth of incubation. For on-deck experiments, LIGHT represents the percentage of ambient light reaching the sample: i.e. the light transmission of the incubation screen. DEPTH is computed from this using either CTD downwelling irradiance or beam attenuance data.

The definitions of micro, nano and picoplankton vary from time to time depending on the filters used in the experiment. The definitions for a given experiment are stored in the P33HDR record.

The UPTOT field is either the result of a non size-fractionated experiment or the summation of size fraction data. If the size fractions have been summed the standard deviation for the total field has been set to the square root of the sum of the squares of the size fraction standard deviations. As a general rule, if the size fraction columns are non-null then the total uptake values have been computed and not individually measured.

NB. The units of uptake are per incubation duration as specified in the INCDUR field of table P33HDR. For in-situ and on-deck incubations this will normally, **but not always**, be 24 hours. In the case of light gradient incubations, where the light intensity is constant throughout the incubation, it is usual for the uptake rate to be quoted per hour. In these cases, the incubation duration has been set to 1 event though it is probable that the samples were actually incubated for longer than this.

Table P33HDR

Field Definitions

EXPREF	CHAR(10)	BODC experiment reference code
TYPE	CHAR(2)	Experiment type code. (OD for on deck incubations, IS for in-situ experiments and PI for PvI experiments)
BENCOL	NUMBER(6)	BODC event number for the water collection event
BEN	NUMBER(6)	BODC event number (where assigned) for the incubation
SDATE	DATE	Date and time of the start of the incubation
INCDUR	NUMBER(3,1)	Incubation duration (hours)
COMM	CHAR(30)	Plain language comment field
DEPINT	NUMBER(4,1)	Depth to which productivity has been integrated
INTMIC	NUMBER(6,2)	Integrated uptake for the microplankton fraction (µmol P/m^2/day)
INTNAN	NUMBER(6,2)	Integrated uptake for the nanoplankton fraction (µmol P/m^2/day)
INTPIC	NUMBER(6,2)	Integrated uptake for the picoplankton fraction (µmol P/m^2/day)
INTTOT	NUMBER(6,2)	Total integrated uptake (µmol P/m^2/day)
MICDEF	CHAR(8)	Microplankton definition
NANDEF	CHAR(8)	Nanoplankton definition
PICDEF	CHAR(8)	Picoplankton definition
TRACER	CHAR(3)	Tracer used (32P or 33P)

Notes

Fields BENCOL and BEN require some explanation. BENCOL specifies where the water used in the production experiment came from. In some ways it is superfluous because the same information may be derived from the IBTTLE field in P33DAT. However, it is included to simplify the task of linking integrated production data held in table P33HDR to the place and time to which they relate.

BEN is a reference given to some production experiments. This invariably relates to in-situ experiments where a rig has been cast adrift from the ship. On-deck incubations have never been considered as events. The reason for this is more historical than logical: the event entries are drawn up from ship's logs and whilst a rig being deployed has often (but not always) merited a log entry, the placing of samples in an on-deck incubator has not.

Integrated production data are only included if they were computed and supplied by the data originator. They are not routinely determined by BODC.

Table PRDATA

Field Definitions

IMREF	NUMBER(9)	BODC measurement reference
CPCODE	CHAR(8)	Parameter code
FPVAL	NUMBER	Parameter value
CPFLAG	CHAR(1)	Parameter quality control flag

Notes

This table is used for the storage of water column profile datacycles from a range of oceanographic instruments.

The parameter code consists of 8 bytes, which describe the parameter measured in some detail. The parameter code definitions are stored in the Parameter Dictionary (see the table names starting with 'Z').

The parameter flag field serves two purposes. First, it identifies parameter values identified as problems during quality control procedures. Different codes are used to differentiate between originator, BODC and user quality control. Secondly, it is used to identify samples where the measured parameter was either below detection limit or saturated the measuring apparatus. In these cases the data values are set to the detection limit (zero if no detection limit was specified) or the saturation value respectively. If no flag value has been assigned (signifying good data), the CPFLAG field is blank.

The flag values that may be encountered are:

K	Uncertain/suspect value (source of quality control unknown).
L	Uncertain/suspect value (data originator's quality control).
M	Uncertain/suspect value (BODC quality control).
O	Uncertain/suspect value (user quality control)
<	Below detection limit.
>	In excess of stated value.

Table PRINDEX

Field Definitions

BEN	NUMBER(6)	BODC Event Number.
MAXDPTH	NUMBER(5,1)	Maximum depth reached (m)
IDOCRF	NUMBER(3)	Documentation reference code
IORGRF	NUMBER(3)	Originator reference code
TYPE	CHAR(3)	Instrument type mnemonic

Notes

This table is the miscellaneous water column profile index.

Documentation references have yet to be implemented in the database. Currently, the field IDOCRF is always set null.

The originator's reference field allows the suppliers of individual data values to be identified. The objective when allocating these linkages is to provide a point of contact for users of the data to approach when initiating collaboration that will endure beyond the end of a project. Consequently, linkages have been assigned at the PI level and do not necessarily specify the individual who actually did the analysis. If we've got anything wrong, please don't bear a grudge: just let us know and we'll fix it. The meanings of the codes used are stored in table ORGCODE.

The instrument type mnemonics are defined in table CTDTYP.

Table PRLINK

Field Definitions

BEN	NUMBER(6)	BODC Event Number
CYCLE	NUMBER(6)	Profile cycle number.
IMREF	NUMBER(9)	BODC measurement reference

Notes

This table links together all the measurements that make up a particular profile.

The CYCLE field gives the time ordering of the measurements within the profile. This is essential if any sense is to be made of profiles containing both up and down casts.

Table PRTOTAL

Field Definitions

BEN	NUMBER(6)	BODC Event Number
CPCODE	CHAR(8)	Parameter code
FPVAL	NUMBER	Parameter value
CPFLAG	CHAR(1)	Parameter quality control flag

Notes

This table provides storage for parameters that are derived from, or that pertain to, an entire profile.

The parameter code consists of 8 bytes, which describe the parameter measured in some detail. The parameter code definitions are stored in the Parameter Dictionary (see the table names starting with 'Z').

The parameter flag field serves two purposes. First, it identifies parameter values identified as problems during quality control procedures. Different codes are used to differentiate between originator, BODC and user quality control. Secondly, it is used to identify samples where the measured parameter was either below detection limit or saturated the measuring apparatus. In these cases the data values are set to the detection limit (zero if no detection limit was specified) or the saturation value respectively. If no flag value has been assigned (signifying good data), the CPFLAG field is blank.

The flag values that may be encountered are:

K	Uncertain/suspect value (source of quality control unknown).
L	Uncertain/suspect value (data originator's quality control).
M	Uncertain/suspect value (BODC quality control).
O	Uncertain/suspect value (user quality control)
<	Below detection limit.
>	In excess of stated value.

Table PUPVPO4

Field Definitions

IUPTAKE	NUMBER(6)	BODC uptake experiment reference
CPCODE	CHAR(8)	Parameter code
FPVAL	NUMBER	Parameter value
CPFLAG	CHAR(1)	Parameter quality control flag
IORGRF	NUMBER(6)	Originator's reference
IDOCRF	NUMBER(6)	Documentation reference (not implemented)
CILOAD	CHAR(6)	Date record was loaded to the database
TSGMOD	DATE	Date/time record was last modified

Notes

The data from each uptake experiment consists of one or more phosphate uptake rates (depending upon whether the data were size-fractionated) plus the phosphate concentration at which the uptake occurred. PUPVPO4 contains one record for each parameter recorded in an experiment, including the phosphate concentration.

The parameter flag field serves two purposes. First, it identifies parameter values identified as problems during quality control procedures. Different codes are used to differentiate between originator, BODC and user quality control. Secondly, it is used to identify samples where the measured parameter was either below detection limit or saturated the measuring apparatus. In these cases the data values are set to the detection limit or the saturation value respectively. If no flag value has been assigned (signifying good data), the CPFLAG field is blank.

The flag values that may be encountered are:

K	Uncertain/suspect value (source of quality control unknown).
L	Uncertain/suspect value (data originator's quality control).
M	Uncertain/suspect value (BODC quality control).
O	Uncertain/suspect value (user quality control)
<	Below detection limit.
>	In excess of stated value.

The originator's reference is defined in table ORGCODE.

Table PUPVPO4_LINK

Field Definitions

IBTTLE	NUMBER(6)	BODC water sample reference
IUPTAKE	NUMBER(6)	BODC uptake experiment reference

Notes

This table provides a linkage between PUPVPO4 and the index table BOTTLE. There are several uptake experiments for each water sample.

Table STINDX

Field Definitions

BEN	NUMBER(6)	BODC Event Number
ISAMP	NUMBER(6)	BODC sediment trap sample reference
SAMP	CHAR(17)	Originator's sample reference
DEPTH	NUMBER(5)	Depth below surface of sediment trap (m)
SDATE	DATE	Date of start of sample collection
EDATE	DATE	Date of end of sample collection
SAMPINT	NUMBER(6,3)	Sample collection time (days)

Notes

The SAMPINT field is included to allow for the trap being recovered for maintenance and then re-deployed without the removal of the current sample. Under normal circumstances, SAMPINT will be equal to the difference between SDATE and EDATE. If SAMPINT is set null, then this difference may be used instead.

Table TRAPDATA

Field Definitions

ISAMP	NUMBER(6)	BODC trap sample identifier
CPCODE	CHAR(8)	Parameter code
FPVAL	NUMBER	Parameter value
CPFLAG	CHAR(1)	Parameter quality control flag
IORGRF	NUMBER(6)	Originator's reference
IDOCRF	NUMBER(8)	Document reference
CILOAD	CHAR(6)	Record creation date (yymmdd)
TSGMOD	DATE	Last modification time stamp

Notes

The primary key is formed from the three fields, ISAMP, CPCODE and IORGRF. In other words, the table contains one row for each parameter measurement on each trap sample by a given data originator.

The parameter code consists of 8 bytes, which describes the parameter measured in some detail. The parameter code definitions are stored in the parameter dictionary (see the table names starting with 'Z').

The parameter flag field serves two purposes. First, it identifies parameter values identified as problems during quality control procedures. Different codes are used to differentiate between originator, BODC and user quality control. Secondly, it is used to identify samples where the measured parameter was either below detection limit or saturated the measuring apparatus. In these cases the data values are set to the detection limit or the saturation value respectively. If no flag value has been assigned (signifying good data), the CPFLAG field is blank.

The flag values that may be encountered are:

K	Uncertain/suspect value (source of quality control unknown).
L	Uncertain/suspect value (data originator's quality control).
M	Uncertain/suspect value (BODC quality control).
O	Uncertain/suspect value (user quality control)
<	Below detection limit.
>	In excess of stated value.

The originator's reference field allows the suppliers of individual data values to be identified. The objective when allocating these linkages is to provide a point of contact for users of the data to approach when initiating collaboration that will endure beyond the end of a project. Consequently, linkages have been assigned at

the PI level and do not necessarily specify the individual who actually did the analysis. If we've got anything wrong, please don't bear a grudge: just let us know and we'll fix it. Codes are used to eliminate potential problems with misspellings and the like. The codes used are documented in the table ORGCODE.

Document references have not yet been implemented so the IDOCRF field is currently always set null.

Table ZUCT

Field Definitions

CCTREF	CHAR(4)	Category code
CCTFUL	CHAR(40)	Category description in plain language
CILOAD	CHAR(6)	Date of record creation (yymmdd)
TCTMOD	DATE	Record modification time stamp

Notes

The category codes are designed to group parameters into logical subgroups according to general operational practices. However, there will inevitably be parameters that could be fitted into more than one category depending upon one's point of view. This should be borne in mind when searching the dictionary. Always check out all possible categories.

Table ZUNT

Field Definitions

CPUREF	CHAR(4)	Unit code
CPUABB	CHAR(10)	Abbreviated unit description
CPUFUL	CHAR(40)	Full unit description
CILOAD	CHAR(6)	Date record was created (yymmdd)
TPUMOD	DATE	Last modification time stamp

Table ZUPM

Field Definitions

CPMCAT	CHAR(4)	Category code
CPMREF	CHAR(4)	4-byte code for the parameter name
CPMABB	CHAR(20)	Abbreviated parameter name
CPMFUL	CHAR(80)	Full parameter name
CPMUNT	CHAR(4)	Parameter storage unit code
FABSNT	NUMBER	Absent data value
FPMINM	NUMBER	Minimum value for parameter
FPMAXM	NUMBER	Maximum value for parameter
CINVER	CHAR(1)	Plot inversion flag
CILOAD	CHAR(6)	Date of record creation (yymmdd)
TPMMOD	DATE	Date and time of last modification

Notes

Most of the fields in this table are of more interest to BODC personnel than to database users. The exceptions are CPMCAT, CPMREF, CPMFUL and CPMUNT.

The category code (CPMCAT) provides the linkage to table ZUCT and hence identifies which generalised parameter descriptions belong to which category.

CPMFUL contains the parameter description in plain language and provides the hook by which users can recognise just what is meant by a particular code.

The field CPMUNT specifies the units in which the parameter is stored in the database. This is present as a code (to prevent problems arising from differing descriptions being given to the same unit e.g. degrees, deg. and the like) which may be translated using table ZUNT.

Table ZUSG

Field Definitions

CPMREF	CHAR(4)	Parameter name code (bytes 1-4)
CSGREF	CHAR(2)	Parameter subgroup code (bytes 5-6)
CDSREF	CHAR(2)	Parameter discriminator code (bytes 7-8)
CPMUSG	CHAR(8)	Full 8-byte parameter code
IPMBEF	NUMBER(1)	Number of digits before the decimal point
IPMAFT	NUMBER(1)	Number of digits after the decimal point
CSGABB	CHAR(20)	Abbreviated parameter code description
CSGFUL	CHAR(100)	Full parameter code description
CSGMTH	CHAR(100)	Methodology description
ISGREF	NUMBER(8)	Narrative document reference
CILOAD	CHAR(6)	Date record was created (yymmdd)
TSGMOD	DATE	Record modification time stamp

Notes

The complete parameter code (CPMUSG) is constructed by concatenation of the parameter name, parameter subgroup and parameter discriminator codes.

The fields IPMBEF and IPMAFT are included to allow software to format data sensibly. Note that the data covered by the parameter codes are stored to a precision of some 16 decimal places. IPMAFT indicates how many of these have significance.

The meaning of a given code is specified in plain language by the fields CSGFUL and CSGMTH. These fields are designed to give a user-friendly reference to the full parameter code. If they don’t, please let us know. All the details that make the parameter unique (including filtration details where appropriate) are included.

The ISGREF field allows a linkage point for data documentation. It is designed to allow general methodology description documents to be linked to a parameter code. This on-line documentation is not currently implemented and the field is set null.

Database Linkage Definitions

The tables in this section of the document show the linkages that exist between the database tables. The linkage chains run along the rows of the table and always start with table EVENT. The type of linkage is shown by bolding the text. A linkage from normal text to bold text is a 'one to many' relationship. Links from normal text to normal text or bold text to bold text are 'one to one' relationships.

For simplicity, linkages to code tables have been omitted.

ADCP Data

EVENT	ADCPINDX	ADCP
BEN	BEN	**BEN**

Drifting Buoy Data

EVENT	ARGOS
BEN	**BEN**

CTD and SeaSoar Data

EVENT	CTD_SS_INDEX	CTD_LINK_BIN	CTD_DATA_BIN
BEN	BEN	**BEN**	
	TYPE		
		LINK	**LINK**

CTD Calibration System

EVENT	CTD_PARMS	CAL_INDEX	CAL_DESC	CAL_TYPE_REF
BEN	**BEN**			
	ICALRF			ICALRF
	CALTYP	CALTYP	**CALTYP**	**CALTYP**

CAL_TYPE_REF	CAL_COEFFS	CAL_PARMS	CAL_COMM
ICALRF	**ICALRF**	**ICALRF**	**ICALRF**

EVENT	CAL_RIG_BEN
BEN	BEN

Water Sample Data

EVENT	BOTTLE	BOTDATA
BEN	**BEN**	
	IBTTLE	**IBTTLE**

EVENT	INTBOT
BEN	**BEN**

^{14}C Production Data

EVENT	BOTTLE	C14DAT	C14HDR
BEN	**BEN**		
	IBTTLE	**IBTTLE**	
		EXPREF	EXPREF
BEN			BENCOL

Benthic Profile Data

EVENT	COREINDX	CORESAMP	COREPROF
BEN	**BEN**		
	ICORE	**ICORE**	
		ICSAMP	**ICSAMP**

Benthic Whole Core Data

EVENT	COREINDX	CORETOT
BEN	**BEN**	
	ICORE	**ICORE**

Benthic Data (Simple Structures)

EVENT	MEGAHEAD	MEGADAT
BEN	BEN	**BEN**

EVENT	COREINDX	MEIOHDR	MEIODAT
BEN	**BEN**		
	ICORE	**ICORE**	
		ISAMP	**ISAMP**

EVENT	COREINDX	MFHEAD	MFDAT
	ICORE	**ICORE**	
		ISAMP	**ISAMP**

CPR Phytoplankton Data

EVENT	CPR_COLOUR	CPR_PHYTO
BEN	BEN	**BEN**

CPR Zooplankton Data

EVENT	CPR_ZOO
BEN	**BEN**

Primary Index

CRSINDX	EVENT	EVENT_COMM	G_CODE
	BEN	BEN	
	GCODE		GCODE
CRUISE	**CRUISE**		

^{15}N Production Data

EVENT	BOTTLE	N15DAT	N15HDR
BEN	**BEN**		
	IBTTLE	**IBTTLE**	
		EXPREF	EXPREF
BEN			BENCOL

Phosphorus Uptake Data

EVENT	BOTTLE	P33DAT	P33DARK	P33HDR
BEN	**BEN**			
	IBTTLE	**IBTTLE**	**IBTTLE**	
		EXPREF	**EXPREF**	EXPREF
BEN				BENCOL

EVENT	BOTTLE	PUPVPO4_LINK	PUPVPO4
BEN	**BEN**		
	IBTTLE	**IBTTLE**	
		IUPTAKE	**IUPTAKE**

Moored Instrument Data

EVENT	MOORINDX
BEN	**BEN**

Water Column Profiles

EVENT	PRINDEX	PRLINK	PRDATA	PRTOTAL
BEN	BEN	**BEN**		
		IMREF	**IMREF**	
BEN				**BEN**

Sediment Trap Data

EVENT	STINDX	TRAPDATA
BEN	**BEN**	
	ISAMP	**ISAMP**

Parameter Dictionary

ZUCT	ZUPM	ZUNT	ZUSG
CCTREF	**CPMCAT**		
	CPMUNT	CPMUNT	
	CPMREF		**CPMREF**