Frequently Asked Questions (FAQs) about dbSEABED and usSEABED *in*: Reid, J.A., Reid, J.M., Jenkins, C.J., Zimmermann, M., Williams, S.J., and Field, M.E., 2006, usSEABED: Pacific Coast (California, Oregon, Washington) offshore surficial-sediment data release: U.S. Geological Survey Data Series 182, version 1.0. Online at http://pubs.usgs.gov/ds/2006/182/

Frequently Asked Questions (FAQs) about dbSEABED and usSEABED

About dbSEABED

What is dbSEABED?

- dbSEABED makes a single integrated data set from seabed sample information that has been collected over many years by ocean expeditions and research programs.
- dbSEABED is an "information processing" system that produces outputs that are compatible with Geographic Information System (GIS), relational database (RDB), and several other highly useful kinds of outputs. The outputs can be used in many end-user software applications.

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What kind of outputs does dbSEABED produce?

- For mapping in Geographic Information Systems (GIS), dbSEABED produces a number of flat files that are comma delimited. Those files give the 20 most useful parameters and information on grain types and sedimentary features. These outputs can be enhanced in various ways, for instance by combining analytical and descriptive outputs, assigning gridded water depth values where not present and rearranging the data by their position within the sea floor.
- For use in relational database systems like Oracle™, MySQL™ or Microsoft™ Access®, dbSEABED produces a set of tables that are linked at the levels of sea-floor site or sample using a system of numeric keys.

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What quality control measures are in place for dbSEABED?

Quality control is practiced at many stages in dbSEABED:

- Initially by the selection of which data sets to enter;
- By personnel scrutinizing the data at time of import, virtually item by item, for such things as implausible values and positions not conforming to a report's survey pattern on a map; in some cases special filtering programs are written, for example, to detect implausible ship speeds between stations;
- By testing in programs whether the data entries are text (string), numeric, or a special formatted code as specified in the data model;
- In programs, testing if values lie within their plausible ranges, for example, between -8 and 12 phi for grain sizes;
- By comparing site locations to land areas;
- In a more sophisticated way, comparing reported site water depths to a regional or global topography (such as etopo2);

- Screening the program output values, also using plausibility filters; and
- By having end-users of the data report any problems and having them fixed at source; this is exercising or working the datasets.

As each new data set is entered, it is tested in programs of dbSEABED to seek errors, and so on. The program detections of problems are highlighted on screens during run time and are also reported to logs. As errors are detected, edits are made in the structured data files, complete with metadata explaining the edits. In some cases data will be deactivated (flagged out), again with metadata explaining the process.

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Output files

What is the source file (SRC) output?

The source file (SRC) gives basic information on the survey and data set that a sample belongs to, such as the collector and institution, confidentialities, number of samples, dates, and region.

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What is the function of the output component (CMP) and facies (FAC) files?

The component (CMP) file provides information on the abundances (or prominence) of grain types, sedimentary features, and other components of the sea floor, for example, of *Halimeda* algal grains, of ripples, and of hydrogen sulfide odor.

The facies (FAC) file synthesizes these data by applying a fuzzy-set operator and creating a superset across a selection of components/features–a geologic facies. For example, a calcareous pelagic facies is defined as the fuzzy-set theory (FST) membership across samples that show nannoplankton, planktic foraminifera, or pteropod remains, or are described as calcareous ooze.

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What is the component (CMP) file output for?

- Geologists and others frequently describe the presence and abundance of components in sediment, such as shell debris, quartz, and (or) heavy minerals, for example. They do this by grain counts or descriptions. dbSEABED assesses the abundances of these components and outputs some of them in the CMP file. Users of the software are able to say which components will be output. Counting grains (and gauging their volumes or weights) is not an accurate process, and neither is conveying the abundance of a component in a description. The results in the CMP file are therefore only an approximate guide to abundances.
- The CMP file also carries fuzzy membership values for some features of the seabed, like odors (H_2S) and bioturbation and ripples.

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What is the meaning of the data in the facies (FAC) output file?

Once the Memberships (Abundances) of components are calculated, they can be combined into an assessment of the membership a sample shows to a range of sedimentary, rock, or ecologic facies. Each facies is typified by components Af,Bf,... with memberships af,bf,..., for example, CalcareousPelagic facies as

"pfrm nan ptr cal_ooz: 1 1 1 1 0 0"

The components are senior synonyms from the parsing dictionary. Given a set of components in a sample As,Bs,... with memberships as,bs,..., the sample membership of each facies is calculated as

MIN(ac,af)+MIN(bc,bf)+...

for each case of a coinciding component.

In fuzzy-set theory, this is a set intersection – an “AND”. See tables 5 and 6 in this publication for lists of components and facies, respectively

Of course, the facies output is possible only from the parsed word-based data. Because not all studies report grain components, it is advisable to plot these results as point symbols only, not areal griddings.

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What do all the “-99”'s mean?

- “-99” is the null value for numeric fields output by dbSEABED. Null values will be found only in the output tables.
- We have to specify null values because otherwise some end-user mapping and analysis applications make decisions about what a blank field in the table represents.
- The value “-99” is used because it almost never occurs in real data. It does for longitudes, however, and for latitude/longitude the null is “-999”. The null for output string (text) data are “-“.

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Why are there negative values for seabed strength and critical shear strength?

These parameters are given in terms of their logarithm (base 10). A negative value implies a strength or shear stress less than 1.

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Compared to values given in some scientific papers, the output values from dbSEABED are quite rounded. Why?

Studies of uncertainty show that accuracies on most sediment parameters are of order 1 to 3 percent of the total parameter range even under favorable laboratory conditions. The significant figures in dbSEABED outputs reflect the observed uncertainties.

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What is the "Rock" membership?

Many observations of the sea floor report the presence of rock, both loose and as bedrock. This output statistic is meant to convey the degree of exposure of rock that is coarser than cobble (-8 phi). Loose rocks and bedrock that are partly covered by sediment give memberships of less than 100 percent.

Terms that have rock memberships include: basalt, granite, limestone, rock, boulders, lithified, hard, hard bottom, reef, rock platform, and greywacke, if they occur in the lithology (LTH) or sea-floor type (SFT) data themes (see table 1 in this publication), that is, are not part of a grain-type description as in a petrographic analysis (PET, table 1) data theme line. For output data on specific rock types like basalt, refer to the component (CMP) output file

Note that samples which have only loose sediments recorded are given a value of zero rock membership in calculated (CLC) outputs.

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What is the meaning of the SeaBedClass and ClassMembership?

These columns list the facies showing the largest membership value for each sample, and the value of the membership. The memberships are calculated as described on this page about the facies (FAC) file. Output occurs only provided that the membership is greater than or equal to 0.33. Of course, this output is possible only from the parsed word-based data.

top

What is the "Weed" Membership?

Many observations of the sea floor report the presence of soft algae and seagrasses in general terms or specific to a taxon. Depending on the associated abundance terms, such as sparse, abundant, meadows, and scattered, the weed is given a membership that is reported to the parsed (PRS), component (CMP) and (or) facies (FAC) outputs. There are no extracted (EXT) outputs for weed membership. Calcareous algae such as *Halimeda* and *Lithothamnion* are not included.

Terms that have weed memberships include: *Zostera*, seagrass, soft algae, kelp, *Cladophora*, and weed. These data are usually in a sea-floor type (SFT) theme line. For specific data on seagrasses, refer to the component (CMP) output file.

top

Hydrographic Bottom Type (HBT) codes can be output. What do they mean?

Many navies and engineering groups use these codes. The British Admiralty set used here (British Admiralty, 1973) are not very different from U.S. usage within U.S. Coast Guard (USCG) and National Oceanic Atmospheric Administration (NOAA). Some users of dbSEABED will find the codes familiar and helpful. Note that the terms at the front of the code are the most significant (abundant). For the clearest plottings, use the no-overlap options in your GIS and plot only the surficial seabed samples of an area.

The codes output in extracted (EXT) are either passed directly from naval or engineering HBT codings or re-codings of the lithological types that scientists have described in sediment samples. The codes output in calculated (CLC) refer only to the gravel, sand, mud, rock, and weed components present in a sediment or at a site.

Note: Data for Hydrographic Bottom Type have not been included in this publication.

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What does the Roughness code mean?

This is a coded output representing the V:H of the seabed roughness element which is observed with greatest aspect ratio. That feature may be fixed roughness like a cobble, or movable roughness like ripples. The outputs can only report observed roughness elements, so are influenced by the size scales of samplers and observations.

The V and H values are the centimeter values of the height and horizontal dimensions written in integer log 2 (base 2). For example "4:6" represents 16 cm height over length scale of 64 cm. Powers <0 are set to zero (that is, scales <1 cm are not considered). The horizontal length H is the length of expression of a feature, rather than wavelength of repetition. Where a feature is elongated, H is taken normal to elongation (that is, equals ripple wavelength).

top

Why do some points plot on land?

Some source data collections contain data in estuaries, rivers, and lakes; others contain data for coastal dunes, beaches, and even coal mine pits. Sites that are clearly located in error are decommissioned in the data resources files (DRF), but data are kept that known to be on the beach, in rivers, estuaries, and lakes, or are known to be properly located on land.

top

Can the same sample or analysis be represented more than once in the data collection?

Yes, when there is a good reason. For instance, the same sample may be described by two different labs or be reanalyzed years later, or an analysis may be expressed in a different way by later work. These double-up results are all valid and should be included in the database for mapping. (Note that the duplicate analyses may not carry exactly the same sample names.) The USGS attempts to remove obvious data overlaps, choosing the original data, where available, over derived data that are often held in pre-existing data compilations. An example of this latter is the National Geophysical Data Center (NGDC) compilation, Deck 41.

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Why are the kurtosis and skewness not reported from the database?

These higher order moments are not only rarer in data sets, but to be accurately reported require a higher standard of data and calculation than lower moments. Statistical moment and graphical measures are also very difficult to reconcile, exacerbating the shortage of available data on which to base outputs.

top

Linguistic data versus numeric data

How does dbSEABED make word data conformable with numerical data?

dbSEABED software attaches fuzzy-set theory memberships to word terms through a look-up dictionary table. The memberships are summed across a description and the totals are output. Some words like “slightly” only adjust the memberships. Other words adjust the character of another, for instance “fine” in “fine sand”. For more detail, see Jenkins, 1997.

dbSEABED also recognizes if a word is not in its dictionary, if the meaning is unknown. For example: “zyzgy” is not in the dictionary and will be labeled an "unknown". It also recognizes if a word if neutral for a question. For example, “sediment” is neutral on the question of color.

top

What if a user doesn't want to use the text-based data for mappings?

Users have a choice: if only numerical analytical data are required, then the extracted (EXT) form of output should be used; if text data only, then the parsed (PRS) form. Some users will not want to use the calculated (CLC) outputs, which have a higher level of uncertainty than these, which is also possible. If a user wants to integrate these to achieve the best possible coverage in a region, then they can be added or telescoped together using two other formats (ALL and ONE formats, respectively; not included in this publication).

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Which form of data should I trust more, numeric-value analyses or text-based descriptions?

There are several issues that users must consider in deciding which form of data to use:

Issue 1. Descriptive data are more representative of the seabed, the shells, coral, rocks, and other items that will not fit in laboratory bottles or analytical instruments but that have an effect on erodibility, acoustics, and habitat. It is also essential for dealing with sea-floor creatures, burrows and other structures, sediment strength, odors, color, and other features and components.

Issue 2. To get enough data to make a map with a useful number of points, you will have to use word-based data, which accounts for more than 50 percent of all available data in usSEABED.

Issue 3. Analytical data are more precise, often precise as to within two percent of the full parameter range. It is also repeatable, given the same instrument, unlike descriptions, which may vary between observers, even trained ones. However, it may not be accurate for the sea floor, as it usually only deals with the seabed matrix – those materials fine enough to fit inside the instrument tubes and (or) apertures.

top

How do text-based descriptive data relate to numeric-value analytical data?

The values of grain size, percent gravel, carbonate, and other factors that are calculated from text-based data are based on fuzzy set theory calculations. They are memberships, reduced to a single value. An analysis is also a single realized value of the fuzzy set.

Sometimes text-based and numeric-value results are available for the same sample, which allows for an intercalibration of the two forms of output.

top

Grain size

Why are values of grain size only given to one decimal place whereas percent sand and other data only given as integers?

Work in the dbSEABED project has established the typical accuracies on measurements of these parameters. Those accuracies, even for careful work, are of the order of 2 to 5 percent of half the total range of the parameter. The table outputs are designed to be brief to restrict data volumes and make mapping faster and easier and to carry the data at a precision that is appropriate to measurement accuracies.

top

How are the grain sizes extracted from data?

By a simple reporting of the average grain size, median grain size, Inman (1952) mean and Folk (1954) graphic mean grain sizes. A comparison of data sets shows that these reflections of "central" grain size are not significantly different within usual error bounds on sampling then analysis. (On the other hand, sorting values are significantly different and cannot be combined in the same way.)

top

Are detailed grain size analyses used to output textural statistics like mean and sorting?

Yes. The percentages in each fraction are summed to output the percent gravel, sand, mud, and clay.

A weighted average and standard deviation is also calculated, leading to output of central and sorting grain sizes. Standard moment statistics (see Blatt and others, 1980) are used.

top

Why would a sample that is known to have had a detailed grain-size analysis not appear in the output data?

Grain-size analyses are scanned to check that they are in good order, and some are rejected. An analysis with any phi interval is acceptable, provided it is detailed enough to resolve particular fractions. Analyses that have a significant weight percent in the finest and coarsest classes are treated as suspect because this implies that the part of the sediment that was analyzed probably does not represent the whole sediment.

top

How are the outputs for the grain-size fractions gravel, sand, mud extracted?

Many data sets contain these values (based on Wentworth scale), and in those cases, the values are passed through to the extracted (EXT) outputs. In some cases the data are presented in the form of a detailed grain-size analysis – such as at 1/2 phi intervals. dbSEABED assembles grain-size analysis streams into G:S:M fractions by assigning each analysis class to its fraction (or proportioning if the class straddles a fraction boundary).

Note: Many grain-size analyses techniques range only through sand and mud, while gravel is not analyzed. In these cases the database reports the gravel percent as null in outputs.

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Are grain-size scales other than Wentworth used?

Generally no. However, an option does exist for users to report percent mud from values of "engineering" grain size mud (i.e., finer than No. 200 Sieve, 75µm).

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How is one central grain size recovered from diverse data that may present mean, median, and other graphical grain sizes?

The database adopts mean moment grain size as the standard for its measure of a sediment's central grain size. Studies show that the median, Inman (1952) "mean", and Folk (1954) "mean" grain sizes fit this quite well for a wide variety of sediments. However, mode grain sizes do not, and are not included in "central grain size."

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How are the central grain size and sorting estimated in the calculated (CLC) process of the database?

Many sediments have gravel:sand:silt:clay (g:s:s:c) or gravel:sand:mud (g:s:m) ratios reported but are without basic grain-size statistics. Some users of dbSEABED requested that "best estimates" of the statistics be made by modeling grain-size distributions. This is done by creating a weighted mean and standard deviation from the g:s:s:c and g:s:m ratios of the samples.

The class statistics underpinning the modeling were arrived at by examining the most common values for single-phase sediments in USGS data sets (for example, just silt). The values were for central grain sizes g:s:(m):s:c -3.0: 2.0: (7.0): 5.0: 8.0. Typical values of sorting were also applied for g:s:(m):s:c 1.4: .0.9: (2.1): 3.0: 5.8. These values may be adjusted in the future.

top

Data-processing methods

What is Fuzzy Logic and how does it work?

"Fuzzy logic" (more properly "fuzzy set theory" or FST) allows an object to belong partially to a set. In classical "crisp" set theory objects are either in a set or not. FST suits words because they are often partial carriers of meaning. For example, "warm" is partially hot and partially cold. A formal arithmetic for fuzzy sets was discovered by Zadeh (1965). A good reference is Mott and others (1986).

top

What is the method of attributing subbottom depths to samples from cores?

Ideally, a sample from a core will have a subbottom depth assigned in terms of meters below the sediment surface. However, this is not always the case. Although this information may have to be left unknown if not given by the original researchers, some limits can be placed if the sampler type is known. For example a Shipek grab sampler usually has only 5 cm of penetration. Then a subbottom range of 0-0.05 m can be assigned. In cores that may be several meters long, the limitation is less strict.

top

How are the shear strengths derived?

Shear-strength values are obtained either from actual measurements held in the database or are assessed from descriptions that convey lithification or consolidation.

These measures of strength are accepted: hand penetrometer strength, vane shear strength (maximum, unremolded), cohesion values from triaxial and shear box tests, compressive shear strength at low confining pressures, and cone resistances. Obviously, uncertainties arise not only from measurements themselves but by combining different measures like this.

Many descriptions refer to a sediment or rock being "soupy," "loose," "soft," "cohesive" ("firm"), "stiff," "friable," "cemented," "lithified," or "hard". These terms are indications of the mechanical state of the materials and are transferred to a shear-strength value in the parsed (PRS) outputs. They are (respectively): 2, 25, 50, 100, 500, 1000, 5000, 8000, 10000.

top

What is the method for arriving at the Shepard and Folk classes?

The original Shepard (1954) and Folk (1954) ternary classifications had to be modified in a couple of ways for use by dbSEABED: (a) where the silt and clay breakdown of mud is not available, the silt-clay domains in the classifications are merged under one name; and (b) because these schemes refer only to sediments, an extra class "solid" is added for dbSEABED to classify all lithified materials (rock). The aim of (a) is to have a class attached to a greater number of samples. Very few samples in the database have the silt:clay ratio specified.

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What relations are used to estimate the critical shear stress (CSS) values?

Depending on the quality of inputs and nature of the sediment, several relations are used to predict critical shear stresses (CSS). The details and supporting references are given in the onCALCULATION document. The relationships include:

- Where the consolidation is known and substantial, the CSS is set equal to the value of the shear strength.
- For unconsolidated granular sediments, a compilation using hundreds of experimental results from the field and laboratories suggests a linear relationship with phi grain size.
- For unconsolidated fine-grained sediments (>5phi grain size), where there is information on density or porosity, the CSS is based on the density using published relationships.
- For unconsolidated fine-grained sediments without information on density or porosity, a general value is used. No regard to the effects of bioconsolidation or bioturbation is made.

top

How are the porosity values obtained?

First, values that are in the database are passed to the extracted (EXT) outputs. In addition, where bulk or dry densities, void ratios, or moisture contents are present, they are transferred to a porosity value. Where this requires a grain density, this may be available, or is assumed to be 2.5 gm/cm^3, which is suitable for a wide range of materials.

To predict porosities for unconsolidated sediments, we use an empirical relationship between porosity and grain sizes (average grain size AvGrsz) described by Richardson and Briggs (1993):

$$AvGrsz = -4.55 + 0.169*Por$$

with R^2 of 0.81 in the range 0-12 phi.

We use the inverted form:

$$Por = 26.92 + 5.92*AvGrsz$$

These results appear in the calculated (CLC) outputs. Other unpublished relationships of higher accuracy are available.

top

What is the basis for the data on compressional (p-wave) sound speeds?

Although there are some direct measurements of compressional sound speeds for areas of the seabed, they are few and far between. dbSEABED reports any direct measurements in the extracted (EXT) outputs, including the average of those data that recognize velocity anisotropy. One difficulty with sound speeds is that they do depend on the frequency, pressure, and temperature of the measurement. The outputs make no allowance for these factors, though conditions of the original measurements are recorded in the underlying raw data of the database.

Several users of dbSEABED requested that estimated sound speeds be provided wherever possible. This is done as follows.

Where the material is consolidated and a measured porosity is available, then the time average equation is employed (Nafe and Drake, 1960). Consolidation is judged to be when the shear stress based on measurement or a parsing of compaction/cementation is > 50kPa or the porosity is < 33%. The following values for constants were adopted: solids and fluid densities 2,500 and 1,025 kg/m^3, respectively; sound speed of solids and fluids 5,000 and 1,520 m/s, respectively.

Alternatively, where the material is loose sediment, the velocity is calculated based on the relationships of Richardson and Briggs (1993):

$$V_b/V_w=1.18 - 0.034*Mz + 0.0013*Mz^2$$

with an R^2 of 0.82, where V_b/V_w is the ratio of seafloor sediment and bottom water p-wave velocities.

For an absolute output velocity, this result is combined with the bottom water velocity (assumed 1,520 m/s). Other unpublished relationships of higher accuracy are available. The method makes no allowance for the consolidation of sediment within the sea floor, for example in a core.

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How are the sorting values determined?

Values of moment sorting are simply passed through to output. Graphical measures of sorting, such as from Inman (1952) and Folk (1954), are not generally compatible with moment measures and at present do not contribute to outputs.

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How are carbonate and organic-carbon values determined?

Carbonate measurements that have been made on the complete sediment are simply reported in the extracted (EXT) outputs. Many sediments have had carbonate determined on just the sand or mud fractions; those results are not output because they do not represent the whole sediment.

Carbonate values are also output from the parsing process. The carbonate parts of sediment are summed in quantity, as are the noncarbonate and unknown carbonate parts (like "mud"). If the sum of unknowns is less than five percent, then a carbonate membership is reported in parsed (PRS) outputs. The accuracy of this result is not as good as for analytical data.

Organic-carbon (OC) data are treated the same way. However, because OC values are typically small in sediments (~one percent), the accuracies in the parsed (PRS) results are not good and should be treated with caution at this stage.

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Data-import methods

How does dbSEABED hold the basic data?

Datasets for processing are held in structured documents that are called “data resource files” (DRF). They set out data in the form of a written geological core log, in a tree structure that nests the data according to expedition, the sample site, the sample, and finally, the phase inside the material. dbSEABED programs process data in this format to produce Geographic Information (GIS) and (RBD) -compatible formats.

top

Why does dbSEABED hold its underlying data in documents rather than a relational database like Oracle™?

This is one of the most successful features of dbSEABED.

First, it is more efficient to bring in data sets from geologists in the form of written core logs rather than tables, especially as tables and subtables. This is how dbSEABED has been able to quickly absorb a million data sites.

Second, it is not possible (easily, inexpensively) to do some sedimentological operations on the data in software like Oracle™, for example, parsing the word-based descriptions.

Third, in the documents, it is possible to have data obtained at the same time (such as replicates, suites of analyses) to be kept right next to each other. The same is true for the metadata; a person can read the data and the metadata about it easily and at the same time.

Fourth, it keeps the data very faithfully in its original form. Relational databases require that data be shuffled and diced and sets of rules obeyed before the data can be entered. In dbSEABED, data are kept faithful to that of the original observers.

Relational databases are just one type of data structure. In the future, dbSEABED could be used to generate other structures such as extensible markup language (XML), spreadsheets, and geographic information systems (GIS) tables.

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What is involved in importing data sets into dbSEABED?

This depends on the structure and idiosyncrasies of the original data. Many data sets are simple to import into the data resource file (DRF) format. Others have proven to be most difficult. It is usually done by arranging data items by column in Microsoft™ Excel® according to a template that sets out the field locations for each data item (such as latitude, sampler type, phi grain size, and Munsell color code). Different types of data are divided between themes such as geotechnical (GTC), texture (TXR), or color (COL). Some themes allow for a sample to be from the subbottom (in a core). Others such as sea-floor type (SFT), which is dedicated to surficial sediment surveys such as those by divers and remote vehicles, treat only the sea floor surface. See table 1 in this publication for a list of the data themes.

Although dbSEABED tries to hold data as close as possible in its original terms, this is not always possible. In the case of numeric data items, if a simple conversion of units is desirable, for instance from cm into m, then that is done at data import stages. In the case of text descriptions, it would be unwieldy to hold or process the descriptions in original long words, and words are therefore converted to abbreviations. Note that this does not change the terms; it is NOT a reclassification. Terms such as “lithothamnion,” “scattered,” and “low water content” are abbreviated to “lthmn,” “scatrd,” and “lo_watr_cntnt.” This speeds processing, allows importing staff to check the data for spelling errors, allows for use of foreign languages (for example, “sabb(IT) for “sabbiosi”), and permits homonyms to be distinguished (for example, "dens_ab” and “dens” for abundance and geotechnical densities). It also allows the data to be read more easily on computer screens.

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How are metadata treated?

Metadata are treated at several levels.

First, overarching metadata have been compiled for the processed outputs of dbSEABED (see http://instaar.colorado.edu/~jenkinsc/dbseabed/resources/db9_MetadataFGDC.txt).

Second, the USGS has compiled formal FGDC-compliant metadata for individual datasets as they are entered into usSEABED or include original metadata provided by the original data sources for data within the U.S. E.E.Z.

Third, formal FGDC-compliant metadata about the usSEABED output files are written. These latter two groups of metadata files are provided in this publication.

Lastly, descriptions of measurement techniques, features and problems in the data, edits made in usSEABED, who collected and analyzed the data, and other information, are held in direct association with the data in the data resource files (DRF). These most detailed metadata are best viewed in the relational data base (RDB) structure, which also puts out reports when data values are beyond plausible limits, for example, a grain size of 14 phi.

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Why are sediment descriptions and biological names held as abbreviations?

To make the parsing (and dictionary lookup) computationally faster, to make long descriptions shorter and more readable, to give flexibility in handling homonyms, and to better distinguish active data from metadata in the structured documents.

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Color

Where can I find more information on the Munsell color code?

Refer to the Geological Society of America “Color Rock Chart,” or to the company GretagMacbeth, which is the modern-day custodian of Munsell's color technologies.

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How are the Munsell color codes derived?

This process is fully described in Jenkins (2002). Munsell codes are explained in a publication of the Geological Society of America (Goddard and others, 1951). The essential steps in the treatment of color data are as follows:

If data are available in Munsell code form then they are transferred to outputs.

Where a color description like “light greenish gray” is available, then that is parsed by a weighted summing of the hue (color), chroma (color intensity), and value (greyness) of the terms. From these components a Munsell code is formed. The process is calibrated using the GSA scales and others.

Outputs are stepped at intervals of 5 in hue and 3 in chroma and value. Otherwise, the full range of greater than 3240 possible natural codes would not be mappable. This stepping arrangement reduces the number to about 40, as seen in the ready-to-use legend that is available with this publication. That legend was constructed by adjusting the red-green-blue (RGB) values of the symbols to match their Munsell colors as seen on a computer screen.

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How to

How can I map the coded information on Color and Roughness in a GIS?

Load the ArcView® legends “munsell.avl” or “rgh_pt.avl,” which are available with the database. ArcView® legends may be imported into ArcGIS®.

To make your own legends for other applications, employ a classification that uses a “unique value” process.

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How can I use the critical shear stress (CSS) in a practical application?

The critical shear stress (CSS) and grain size are essential components for calculating the Shields criterion of sediment erosion, between the Shields Parameter and the Grain Reynolds Number. Those parameters can be calculated once the flow characteristics, fluid velocities, densities, and other factors are known. See standard textbooks on sediment erosion for more information (for example, Soulsby, 1997).

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Selected References for FAQs

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