

Drilling Core Database

This note gives a high-level overview of the EARTHSEQUENCING effort to provide a self-consistent database of ocean drilling data and drill-core meta data.

Rationale

As part of the EARTHSEQUENCING project, we are developing a set of databases that facilitate the processing, analysis and linking of various ocean drilling related data and information.

The main aim is to make it possible to quickly and consistently obtain data that are otherwise slow to access, and scattered across various existing databases.

The databases contain

- Information about DSDP/ODP/IODP Expeditions, Sites, Holes, Cores, Sections and related meta-data
- Actual selected, and mainly multi-sensor track related, data aggregated by Hole and Analysis (partly accessible as data grid on <https://paloz.marum.de/database> or via a dedicated viewer [DBViewer](#)).
- Selected processed digital image data, allowing fast generation of Site overviews, including core-correlation and splice visualisation ([IODPCoreImage](#)).
- Information about some publicly available core-offset and splice tables (Core Affine Table, Splice Interval Table).

Eventually, further data, for example biostratigraphic occurrences, magnetostratigraphy, age models etc. can be linked into this structure. Here we give an overview about the Scientific Ocean Drilling core information part of the database, not the specific scientific measurements themselves (for that, see for example [database overview](#)).

Most data come from archived [DSDP data](#), the old [ODP Janus database](#), and the current [IODP LIMS](#) database, merged into a consistent format.

This project benefitted from the DFG funded PetaByte Storage Cluster (DFG Grant [405693605](#)).

Overall Technical Infrastructure

The database system is not directly accessible externally due to security and "denial of service" considerations, but hooks are provided for human and machine readable access via web endpoints.

The databases are contained in a relational and filestore database system ([Couchbase](#), [Minio](#) and several others). Public access is via an intermediary REST endpoint ([Loopback](#)).

Currently (February 2022), the database contains information about all DSDP/ODP/IODP expeditions conducted on the Glomar Challenger or Joides Resolution upto Expedition 385 (post-moratorium). Eventually MSP and Chikyu data might be added.

In detail, the database entities consist of

- (Drilling) Platform, e.g. *Glomar Challenger*, *Joides Resolution*, *Chikyu*, *MSP*
- Project (e.g. DSDP, ODP, IODP etc.)
- Expedition
- Site
- Hole
- Hole Occupation (e.g. Holes can be re-occupied)
- Core
- Core Section
- Section Half
- GeoLocation (to store co-ordinates of Holes)
- TimeStamp
- Person (e.g. CoChief Scientist, Expedition Project Manager)
- CoreAffineTable
- CoreAffineValue
- SpliceIntervalTable
- SpliceIntervalEntry

For the actual data storage, we use the two entities

- AnalysisMapping (providing meta-information of data formats and import locations)
- AnalysisHeader (per Hole, per Analysis compressed data and meta-data)

Data access

There are various ways to access these data, but as mentioned before, direct access is not available outside the private network for security reasons.

1. For an overview of measurement data available, consult <https://paloz.marum.de/database>. This is suitable for human download of text tables for individual holes and measurements.
2. Various REST endpoints are available for machine-readable access. Please contact H. Pälke for further information, also to ensure overloading the current server. See below for a few examples of how this could be accessed:
3. A current snapshot of the database (for OFFLINE viewing) is available as a macOS Application (see XXX).
4. A number of pre-built applications allow access to these data also, for example DBViewer, IODPCoreImage.

Programmatic access is available via REST endpoints, for example

- To get a list of all Expeditions, only returning the database ID and Expedition name, ordered by expedition number:
[https://paloz.marum.de/database/api/Expeditions?filter={\"fields\":{\"id\":true,\"expeditionName\":true},\"order\":\"expeditionNumber ASC\"}](https://paloz.marum.de/database/api/Expeditions?filter={\)
- To then get a specific Expedition by ID:
<https://paloz.marum.de/database/api/Expeditions/29D5ACB9-4A40-499F-A20E-B3978C6B1B3B-74499-0002C851BF3992F4>
- or to get a list of all Site data for a given Expedition:
<https://paloz.marum.de/database/api/Expeditions/29D5ACB9-4A40-499F-A20E-B3978C6B1B3B-74499-0002C851BF3992F4/Sites> etc. ..

A full list can be seen here:

[REST endpoints](#)

Offline Snapshot Viewer

A software for macOS only (sorry!) to view an offline snapshot of the database is available here:

[CoreDataEditor-ODPDATA](#)

Prior to running, this requires the installation of a database file into "~/Library/Application Support/" by unzipping the ~1GB file stored here: [DATABASE](#).

Example:

The screenshot shows the CoreDataEditor-ODPDATA application interface. On the left, there is a sidebar with a list of entities and their counts: Analysis (208), Analysis H... (12826), Analysis Mapp... (70), Core (76208), Core Affine T... (290), Core Affin... (20493), Expedition (306), Geo Location (5370), Hole (3750), Hole Occup... (3781), Meta (16), Parameters (0), Person (570), Platform (12), Port (3686), Project (18), Sample (0), Sample Request (0), Section (379933), and Section Half (0). The main area displays a table of entities with columns: Object ID, CBLIS _ Rev, Expedition Area, Expedition Name, Expedition Nu..., Expedition Suffix, and Objective. The table lists various expeditions and their details. Below the main table, there is a section for 'RELATIONSHIPS' with columns: Object ID, CBLIS _ Rev, Advanced _m, Comment, Core Label, Core Number, Core Type, Curated _m, and Current Af. This section shows relationships between objects, such as 'Belongs To...', 'Co Chief Sci...', 'Cores', 'Hole Occu...', 'Holes', 'Logging Sta...', 'Meta', 'Port Begin', 'Port End', 'Sites', 'Staff Scienti...', 'Time Stamp', and 'Uses Platform'.

Object ID	CBLIS _ Rev	Expedition Area	Expedition Name	Expedition Nu...	Expedition Suffix	Objective
pCBLB8AA41...	1-3ba5d71...		314	314	nil	NanTroSEIZE Stage 1: LWD Transect
pCBL76DED6...	1-7688952...		315	315	nil	NanTroSEIZE Stage 1: Megasplay Riser Pilot
pCBLB8CF6B...	1-42581a9...		316	316	nil	NanTroSEIZE Stage 1: Shallow Megasplay and Frontal Thru...
pCBL14B5B2...	562-9e0e...		317	317	nil	Canterbury Basin Sea Level
pCBL75DA1A...	333-9b2e...		318	318	nil	Wilkes Land Glacial History
pCBLA4C0D7...	1-4176f6c...		319	319	nil	NanTroSEIZE Stage 2: Riser/Riserless Observatory 1
pCBL60C1C6...	425-c6287...		320	320	nil	Pacific Equatorial Age Transect I
pCBLD92365...	14-3e09fe...		320T	320	nil	USIO Sea Trials and Assessment of Readiness Transit (STA...
pCBLB5A75E...	298-8d1c6...		321	321	nil	Pacific Equatorial Age Transect II / Juan de Fuca
pCBL5E8C5C...	1-91c730f1...		322	322	nil	NanTroSEIZE Stage 2: Subduction Input
pCBL2783BC...	674-35ea8...		323	323	nil	Bering Sea Paleocceanography
pCBLF4BDB8...	114-8aa53...		324	324	nil	Shatsky Rise Formation
pCBL99B707...	1-a8ac8c8...		325	325	nil	Great Barrier Reef Environmental Changes

Object ID	CBLIS _ Rev	Advanced _m	Comment	Core Label	Core Number	Core Type	Curated _m	Current Af
pCBL1A557B...	9-1194b35...	5.2	Shot Time:...	320-U1331A-1_H	1	H	5.19	0
pCBL700E61E...	9-e4b6edc...	9.5	Shot Time:...	320-U1331A-2_H	2	H	9.87	1.5
pCBL72D5F...	9-08240a...	9.5	20:45	320-U1331A-3_H	3	H	9.69	2.91
pCBL8BE16A...	9-d65438...	9.5	22:05	320-U1331A-4_H	4	H	9.99	3.26
pCBL386B3F...	9-0734ac9...	9.5	23:35	320-U1331A-5_H	5	H	9.32	5.25
pCBL7111CD1...	9-89bbfdc...	9.5	01:05	320-U1331A-6_H	6	H	9.45	7.16
pCBLCA03D...	9-d61a50c...	9.5	02:20	320-U1331A-7_H	7	H	9.95	9.81

Data Model Graph:



DataModel.pdf



Related articles

- [Drilling Core Database](#)
- [IODPImageSplicer](#)