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ICDP Operational Dataset – Explanatory Remarks

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Drilling Overdeepened Alpine Valleys (DOVE) - Explanatory remarks on the operational dataset

DOVE-Phase 1 Scientific Team, Anselmetti, F. S., Beraus, S., Buechi, M. W., Buness, H., Burschil, T., Fiebig, M., Firla, G., Gabriel, G., Gegg, L., Grelle, T., Heeschen, K., Kroemer, E., Lehne, C., Lüthgens, C., Neuhuber, S., Preusser, F., Schaller, S., Schmalfuss, C., Schuster, B., Tanner, D. C., Thomas, C., Tomonaga, Y., Wieland-Schuster, U., and Wonik, T.

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Operational Report

DOVE-Phase 1 Scientific Team, Anselmetti, F. S., Beraus, S., Buechi, M. W., Buness, H., Burschil, T., Fiebig, M., Firla, G., Gabriel, G., Gegg, L., Grelle, T., Heeschen, K., Kroemer, E., Lehne, C., Lüthgens, C., Neuhuber, S., Preusser, F., Schaller, S., Schmalfuss, C., Schuster, B., Tanner, D. C., Thomas, C., Tomonaga, Y., Wieland-Schuster, U., and Wonik, T. (2023) Drilling Overdeepened Alpine Valleys (DOVE) – Operational Report of Phase 1. ICDP Operational Reports. GFZ German Research Centre for Geosciences. https://doi.org/10.48440/ICDP.5068.001

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ICDP Project DOVE – Explanatory remarks on the operational dataset

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Abstract

All datasets provided in the operational dataset (DOVE-Phase 1 Scientific Team et al., 2023b) of the ICDP project DOVE phase 1 (ICDP 5068) consist of metadata, data and/or images. Here, we summarize explanations on the tables, data and images exported from the database of the project (mDIS DOVE) as well as some basic explanations on identifiers used in ICDP, depths corrections and measurements that are integrated into the dataset.

Supplementary Material

DOVE-Phase 1 Scientific Team et al. (2023a) Drilling Overdeepened Alpine Valleys (DOVE) - Operational Report of Phase 1, https://doi.org/10.48440/ICDP.5068.001

DOVE-Phase 1 Scientific Team et al. (2023b) Drilling Overdeepened Alpine Valleys (DOVE) - Operational Dataset of Phase 1, https://doi.org/10.5880/ICDP.5068.001

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Boreholes:

Borehole Combined-ID	Borehole IGSN https://doi.org/10.60510/	Latitude decimal WG 84	Longitude decimal WG 84	Year of Operational Phase	Cored length [m]
5068_1_A	ICDP5068EH50001	47.9998028	9.7486417	2021	0
5068_1_B	ICDP5068EH60001	47.9995528	9.7486111	2021	0
5068_1_C	ICDP5068EH70001	47.9995500	9.7490139	2021	164.25
5068_2_A	ICDP5068EH40001	47.6480956	8.7532566	2021	252
5068_3_A	ICDP5068EHC0001	47.9710190	11.460135	2017	198.8
5068_4_A	ICDP5068EHD0001	47.8628920	12.909791	2009	136
5068_5_A	ICDP5068EHE0001	47.6069711	13.7741043	1998	880
5068_6_A	ICDP5068EHG0001	47.8880460	9.7112920	2016	144

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1. Introduction

1.1 ICDP Combined_ID

The ICDP naming convention uses the hierarchical relation of a sample taken from a section split of a core run retrieved from a drill hole (Fig. 1). The convention uses relative depth, which is preferable because it will remain constant even after depth corrections possibly applied at a later stage. Deviating from the usual ICDP combine_ID, the DOVE project added an abbreviation for the analysis to the sample combined_ ID, e.g.: ICDP_5068_1_A_550_3_WR_52-68:NOBE. See Chapter 2.

The ICDP expedition code for the DOVE project is 5068. At the time of this report (May 2023), the DOVE project has 6 sites with 1 hole each, except for site 1 (Tannwald) where holes A – B were drilled and only hole C was cored.

Core runs varied in length but the common length of a core section, which a core was cut into, is 1 m for better handling purposes. While only a few samples are taken on the full cylindrical core material (wholeround, WR) most of the sampling and description was done after the section was split vertically into a working (W) and archive (A) half, with the latter commonly being used for nondestructive sampling only. The top and bottom of the sample (= interval) is expressed as the distance to the top of the section. An example for a combined_id of a cutting is: 5068_1_A_21_CUT, which is cutting (CUT) collected between 20 – 21 m from borehole 5068_1_A. An example of the combined _id of a borehole-expansion-sample is: 5068_2_A_1_BES, with 5068_2_A being the hole, _1 being the bottom depth and BES indicating the sample type.

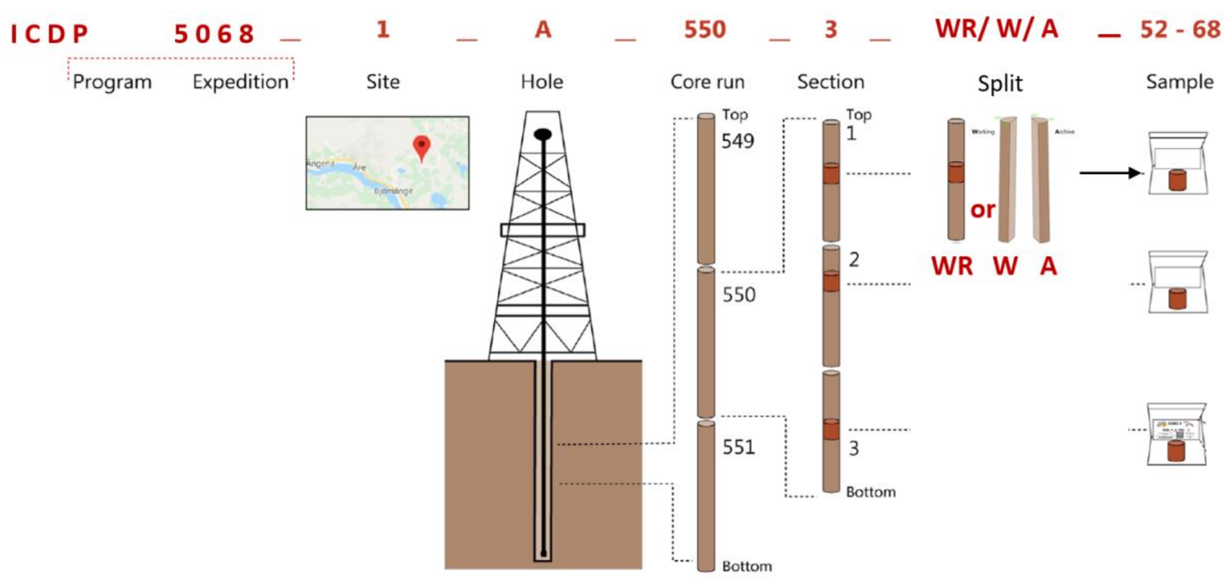


Figure 1 : Example for the common naming convention used in ICDP. The combined_id is used in ICDP to name any site, hole and drilled or cored material.

For legacy drill cores from sites 3 to 6, the original core length and core run number is unknown. Here each section is equivalent to a core run or vice versa there is only one section to each core run for all legacy.

1.2 IGSN

Following the FAIR data principle, each hole, core, section split, sample and cutting has a unique identifier, the so called International Generic Sample Number (IGSN). This number is registered through an agent and allows for the sample to be findable via the IGSN data base. For details on the ICDP – IGSN please see Conze et al. (2017) and https://www.igsn.org/ (last visited 06/02/2023).

1.3 Depths: drillers depth and depths corrections

During the drilling operations, only driller's depth is documented. In the DOVE project, the drillers use the ground surface as their reference height, and no further depth correction has been made at the time of publication of the data set (August 2023). If you have to refer to total depth, use the depth given in column *mcd_depth*.

- In all depth-related datasets, usually, two or three different depths are stored:
  - The original driller's depth
  - Top and bottom depths, which are equivalent to the driller’s depth corrected only by any difference between drillers reference height and surface (= 0 meter below surface (mbs))
  - Relative depth (to top of core or to top of section)
  - Corrected depth (=mcd_depth = meter corrected depths)

Throughout all datasets with measured values the metric unit system is used. It is recommended to use the MCD depth for any evaluation or visualization.

In the DOVE project an integrative depth matching between downhole logs and MSCL data show no significant differences in depth distribution. Thus, a depth correction based on downhole logging data will not be performed for any of the sites. A correction of the section lengths to match MSCL data and sample depths was performed for sites 5068_1 and 5068_2 but does not exceed 7 cm (see paragraphs on “Sections” for details).

1.4 mDIS data base scheme

The mobile Drilling Information System (mDIS) is a database management application developed by ICDP, using a MySQL relational data base in the backend. The relations of the separate tables often are hierarchical and set up to represent the combined_id (Fig. 2). mDIS uses so called “pseudo” fields, particularly helping to keep track of any depth changes. Apart from the driller’s depth and any measured lengths, all depth information is calculated when data are called upon but is not stored in the database.

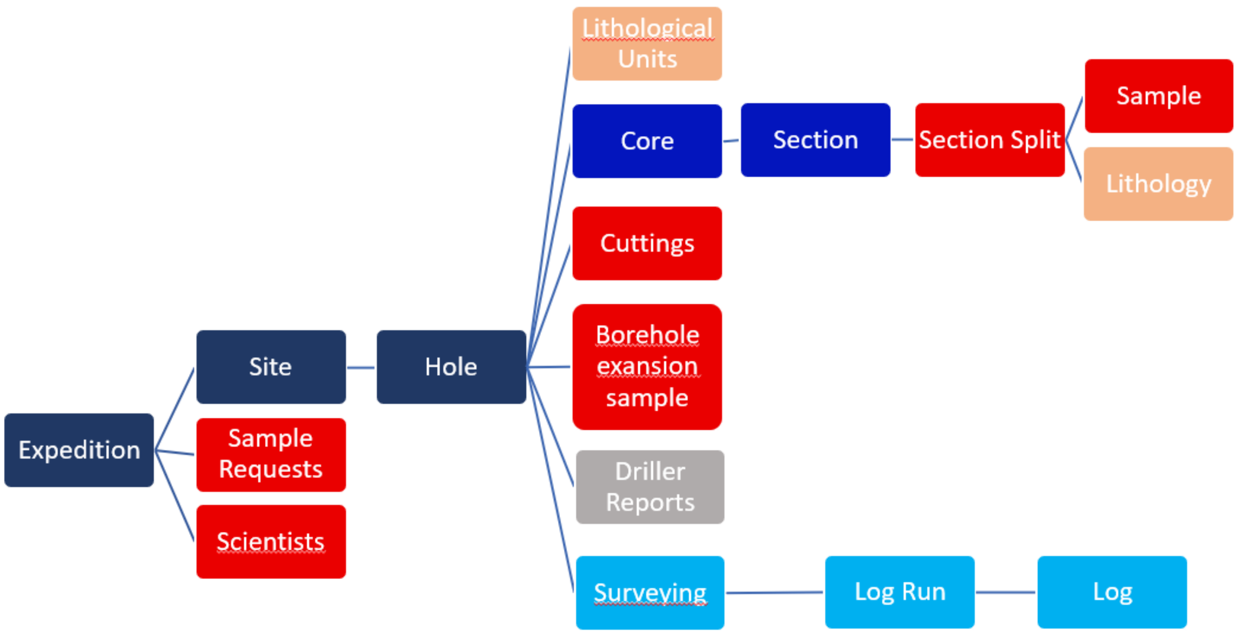


Figure 2: mDIS database relational hierarchy.

2 Available data files

The DOVE_5068 Dataset folder contains the curational datasets and 3 additional folders for files originating from borehole_logging, data measurements and imaging of the core material. Note that the data & images of the operational dataset are work in progress and will be updated at least two more time from now on (October, 2023) for the legacy drill sites.

DOVE_5068_Dataset

- Borehole_logging
- Data
- Images

Table 1: Available file containing reports & data from the DOVE Project Phase 1. Light gray files are still to come in a follow up version of the operational dataset once the data & reports are being produced.

	DATA	Description or Related Lists (pdf files)	DOVE Locations (xlsx, csv, zip)
1	All Data		All Data
2	Expedition		Expedition
3	Site Information		All Sites
4	Hole Information		All Holes
5	Cuttings (5068_1) & Borehole Expansion samples (5068_2_A)		5068_1_A 5068_1_B 5068_1_C 5068_2_A

6	Cores	CoreSection-Report_5068_1_C CoreSection-Report_5068_2_A CoreSection-Report_5068_3_A CoreSection-Report_5068_4_A CoreSection-Report_5068_5_A CoreSection-Report_5068_6_A	5068_1_C 5068_2_A 5068_3_A 5068_4_A 5068_5_A 5068_6_A
7	Core Sections		5068_1_C 5068_2_A 5068_3_A 5068_4_A 5068_5_A 5068_6_A
8	Section Splits		5068_1_C 5068_2_A 5068_3_A 5068_4_A 5068_5_A 5068_6_A
9	Samples	List of all Samples taken from Site 1 – 5 until 17 Aug 2023	5068_All Samples
10	Sample Request	All Requests for Samples taken in the field and during 1st sampling party	5068_Sample Requests
11	Lithological Description of Section Units (Visual Section Logs)	this includes: • mDIS records on lithology • Table on Lithological Units • Visual Core Description (VCD) Logs per Section (pdf)	5068_1_C 5068_2_A 5068_3_A 5068_4_A 5068_5_A 5068_6_A Lithological Units SectionLogs_VCD Hole 1C SectionLogs_VCD Hole 2A SectionLogs_VCD Hole 3A SectionLogs_VCD Hole 4A SectionLogs_VCD Hole 5A SectionLogs_VCD Hole 6A
12	Driller Reports	Daily Drillers reports exported from mDIS Data Tables & scans of written reports for 5068_2_A	5068_1_A 5068_1_B 5068_1_C 5068_2_A
13	Borehole Logging Data	Borehole Logging Data, Meta Data on Runs & Logs (csv) and Composite Logs (combined in 1 zip file for each hole); composite logs also as separate files	5068_1_BL_All Data 5068_2_BL_All Data 5068_3_BL_All Data 5068_4_BL_All Data

			5068_1_BL_CompositeLogs 5068_2_A_BL_CompositeLog 5068_3_A_BL_CompositeLog 5068_4_A_BL_CompositeLog Logging Tools
14	Vertical Seismic Profile	All VSP Data Site 1 (zip file incl Read me)	5068_1_VSP
15	Auxiliary Tables	Sites 1 & 2	Borehole Diameter Casing Diameter
16	MSCL Data	Data Files Site 1 and 2 (zip) Calibration File (xlsx) (also see Explanatory Remarks)	5068_1_C 5068_2_A MSCL Calibration File
17	Additional Data	Carbon, Nitrogen, Sulfur, Water, Uniaxial Shear and Compressive Strength (files: CCOM, Watercontent, POCK, VANE,	5068_1_C 5068_2_A
18	Exp	External Link	https://doi.org/10.48440/ICDP.5068.002

Available images include

Table 2: Available image files from the DOVE Project Phase 1. Light gray files are still to come.

	DATA	Description	Locations/Holes
1	Hole Overview Reports	Image Hole Overview (pdf files)	5068_1_C 5068_2_A
2	Section Images	Slabbed Section Overviews (zip)	5068_1_C 5068_2_A
3	Cutting Images	Images (zip file with .jpg)	5068_1_B 5068_1_C
4	Core Overview	Image Core Overviews (pdf files)	5068_1_C 5068_2_A

1) **Section images** were taken from the archive half once the core was opened at the University of Bern (Sites 5068-1 & 2). Image file names begin with the abbreviation CS followed by the combined_id of the sections and are available in JPEG format.
2) **Cuttings images** taken at the drill site (Site 5068-1). The file names start with the abbreviation CU followed by the combined_id and are available in JPEG format
3) **Hole overview** reports showing images of all sections taken sorted after depths (exported from mDIS)
4) **Core overview** were taken from the archive half once the core was opened at the University of Bern (Sites 5068-1 & 2). Image file names begin with the abbreviation CS followed by the combined_id of the sections and are available in JPEG format.

3 Meta Data Files (mDIS)

3.1 All Data

This file contains all metadata exported from the mDIS database as described below

- Throughout all datasets the common naming convention used is Expedition, Site, Hole (the Expedition ID 5068 is used for DOVE)
- Throughout all datasets the common date and time format used is Year Month Day (Hours:Minutes:Seconds). Time is given in UTC.

3.2 Expedition

mDIS Table (1 File)

Name	**Expedition**
ParentModel	ProjectProgram

Column name	Data type	Column Label	Description
id	integer	Id	id (data base id)
program_id	integer	Program Id	parent id (database id)
name	string	Expedition Name	
expedition	string	Expedition Code	(ICDP: 4-digit number)
acr	string	Acronym	Abbreviation of project
chief_scientist	string_multiple	Chief Scientists	Name of Principle Investigators
start_date	dateTime	Start of Expedition	
end_date	dateTime	End of Expedition	
comment	string	Additional Information	
country	string_multiple	Country	Country in which the Drilling Takes Place
rock_classification	string_multiple	Rock Classification	Drilled Rock Types
geological_age	string_multiple	Geological Age	Age of Drilled Rocks
location_description	string	Location Description	
funding_agency	string	Funding Agency for Drilling	
name_alternative	string	Alternative name for expedition	
scientist_contact	string	Email chief scientist	
objectives	text	Objectives	Objectives listed in proposal
keywords	string_multiple	Keywords	Keywords other than geological age

3.3 Sites

mDIS Table Site (1 File)

Name	**Site**
ParentModel	ProjectExpedition

Column name	Data type	Column Label	Description
id	integer	SKEY	id (data base id)
expedition_id	integer	Expedition Id	parent id (database id)
combined_id	string	Combined Id	
site	string	Site Number	
name	string	Name of Site	(if any)
comment	string	Additional Information	
location_type	string	Location Type	e.g. land, sea, lake
description	string	Description of site	
city	string	City nearby drill site	
state	integer	State	
county	string	County	
country	string	Country	

3.4 Holes

mDIS Table Hole (1 File)

The coordinate system for decimal latitude and longitude is WGS84. The platform type "R" stands for land-based drilling rig.

Name	**Hole**
ParentModel	ProjectSite

Name	Type	Label	Description
id	integer	SKEY	id (data base id)
site_id	integer	Site Id	parent id (database id)

hole	string	Hole	Hole Identifier (one character A - Z)
combined_id	string	Combined Id	
latitude_dec	double	Latitude (decimal degrees)	
longitude_dec	double	Longitude (decimal degrees)	
coordinate_system	string	Coordinate System	WGS84
ground_level	double	Ground Level [m]	Height above Sea Level
depth_water	double	Water Depth [m]	below sea surface
elevation_rig	double	Elevation of Rig Floor [m]	Reference height for drillers depth
direction	string	Direction of Inclination	
inclination	double	Inclination [degree]	Degree of Inclination
start_date	dateTime	Start Date	Start of Drilling Operations
end_date	dateTime	End Date	End of Drilling Operations
comments	string	Additional Information	
drilling_depth_dsf	double	Drilled Depth Below Surface [mbs]	mbs = meter below surface; > 0
core_length	double	Core Length [m]	
comments_2	string	Additional Information	
igsn	string	IGSN	International Generic Sample Number
methods_in_hole	string_multiple	Methods In Hole	Measurements done in Hole
gear	string_multiple	Gear	Equipment Info; not applicable
comments_3	string_multiple	Comments 3	
drilling_method	string	Drilling Method	
platform_name	integer	Name of Platform	
platform_description	string	Description of Platform	
platform_type	string	Platform Type	
platform_operator	string	Platform Operator	
repository_name	string_multiple	Name of Repository	
repository_contact	string	Repository Contact	
moratorium_start	date	Start of Moratorium	
moratorium_end	date	End of Moratorium	
comment_4	string	Additional Information Repository	

3.5 Driller Reports

Metadata and scanned reports of the driller reports as written/filled in by the drillers are available for sites 5068_1 and 5068_2. The list is based on the most information given for one borehole – they vary considerably between different drilling companies.

Files: For each hole of sites 1 and 2, there is one .csv file exported from the mDIS table & a zip file containing the scans of the original – paper – drillers report. There is one zip file for each of the legacy drill sites where there are data available.

mDIS Driller Reports table

Name	DailyReport
ParentModel	ProjectHole

Name	Type	Label
id	integer	ID
hole_id	integer	Hole
report	integer	Report
date	date	Date
comission	string	Comission
site_manager	string	Site Manager
drill_manager	string	Drill Manager
drilling_rig	string	Drilling Rig
staff	integer	Staff
drilling_tool_typ	string	Drilling Tool Typ
drilling_tool_diameter	string	Drilling Tool Diameter [mm, inch]
water_level	double	Water Level [m]
last_depth	double	Last Depth [m]
daily_depth	double	Daily Depth [m]
completed_drilling_depth	double	Completed Drilling Depth [m]
casing_diameter	integer	Casing Diameter [mm]
casing_from	double	Casing from [m]
casing_to	double	Casing to [m]
comment_casing	string	Comment Casing
comment_drilling	string	Additional Comments by Drillers
fluid_content_1	string	Fluid Content 1
fluid_content_1_amount	integer	Fluid Content 1 [kg]
fluid_content_2	string	Fluid Content 2
fluid_content_2_amount	integer	Fluid Content 2 [kg]
density_drill_mud	double	Density of Drill Mud [kg/l]
az_raz	string	az/raz [sec]
temperature	double	Temperature of drilling fluid [°C]
conductivity	integer	Conductivity of drilling fluid [mS]
waz	double	WAZ [min]
ph	double	pH of drilling fluid
formation_1	string	Formation 1
formation_1_top	double	Formation 1 Top
formation_1_bottom	double	Formation 1 Bottom
formation_2	string	Formation 2
formation_2_top	double	Formation 2 Top
formation_2_bottom	double	Formation 2 Bottom

formation_3	string	Formation 3
formation_3_top	double	Formation 3 Top
formation_3_bottom	double	Formation 3 Bottom
formation_4	string	Formation 4
formation_4_top	double	Top of Formation 4
formation_4_bottom	double	Formation 4 Bottom
formation_5	string	Formation 5
formation_5_top	double	Top of Formation 5
formation_5_bottom	double	Bottom of Formation 5
formation_6	string	Formation 6
formation_6_top	double	Top of Formation 6
formation_6_bottom	double	Bottom of Formation 6
casing_2	integer	Diameter Casing 2 [mm]
casing_2_top	double	Top of Casing 2 [m]
casing_2_bottom	integer	Bottom of Casing 2 [m]
casing_3	integer	Diameter Casing 3 [mm]
casing_3_top	integer	Top of Casing 3 [m]
casing_3_bottom	integer	Bottom of Casing 3 [m]

3.6 Cores

A core or core-run is the complete geological material recovered from a single core barrel. The top depth of each core is the depth given by the drillers, not a cumulative depth of curated sections.

mDIS Table Core (one table for each hole)

Name	**Core**
ParentModel	ProjectHole

Name	**Type**	**Label**	**Description**
id	integer	SKEY	id (data base id)
hole_id	integer	Hole Id	parent id (database id)
core	integer	Core	core identifier
combined_id	string	Combined Id	
analyst	string	Curator	Initials of Data Curator
core_ondeck	dateTime	Core on Deck (CoD)	
core_type	string	Core Type	Method of Drilling; R = Rotary Core Barrel (RCB); S = Ramming Drill Hammer, T = Triple Tube Core Barrel (TIR)
drillers_depth	double	Drillers Depth [mbrf]	Depth below Drillers Ref. Point (DOVE = ground surface = mbs)

drilled_length	double	Drilled Core Length [m]	
drillers_bottom_depth	pseudo	Drillers Bottom Depth [mbrf]	
top_depth	pseudo	Top Core Depth below surface [mbs]	mbs = meter below surface
bottom_depth	pseudo	Bottom Core Depth [mbs]	mbs = meter below surface
core_recovery	double	Core Recovery [m]	Length of Recovered Core
core_recovery_pc	double	Core Recovery (%)	= ([core_recovery] * 100) / (ABS([bottom_depth] - [top_depth]))
core_loss_reason	string	Core Loss Reason	
continuity	string	Continuity	Continuity Between Cores or Sections
last_section	integer	Section Count	Number of Core Sections
core_diameter	string	Core Diameter [mm]	
oriented	boolean	Core Oriented?	1 = yes
rqd_abundance	string	RQD Abundance	RQD = Rock Quality Designation
comments	string	Additional Information	
igsn	string	IGSN	
fluid_type	string	Drilling Fluid Type	
bit_type	string	Bit Type	
barrel_length	double	Barrel Length [m]	
comments_2	string	Additional Information	
comments_3	string multiple	Comments 3	
comment_igsn	string	Comment IGSN	
core_splits	pseudo	Do splits exist?	Do Archive and/or Working Halves exist? (1 = yes)

3.7 Sections

The core is cut into sections that fit a corebox slot and can be handled in the laboratory. Since in the DOVE project each section is in a separate core box with a single slog, no core corebox information is needed.

The individual section depths are calculated based on the top depth of the core, the length of the individual sections, and the cumulative length of the sections of one core. The top of the first section of a core always corresponds to the top depth of the core. All following section tops are calculated using *core top depth [mbs] + section length [m]* of the preceding sections of the same core. Bottom depths are calculated from *section top depth [m] + section length [m].* There is a very good depth correlation between the core logs and borehole logging data for Sites 5068_1 or 5068_2. All MCD offsets are zero.

In case of a difference between section length and curated length, commonly < 5 cm, small depth adjustment was carried out to plot MSCL logging data and lithology logs of the sections. As the liners were pre-cut to 1m length (+/- 1 cm), and the core catchers were pushed back into the liners, the length of a full liner was considered 1 m at the drill site. Only in the few cases when liners had to be cut, the length was measured by the driller (precision +/- 1 cm). Section overlengths of < 3 cm were accommodated using the endcaps and were ignored for the section length but noted down in the curated length using MSCL logs and photos. In the few cases with a clear overlength (> 3 cm) a separate core catcher section was stored but considered as artificial overlength/ expansion/ backfall. These sections were not logged. Any curated overlength occurring in logs or sample depth was recalculated to fit the section lengths. For sites 1 and 2 a nominal section length is mentioned in the data files, which is the precut length of the black liners used in the field and closed immediately without inspection of the true cored length (recovery).

nominal section length = curated length, right

mDIS Table Section (1 file for each hole)

Name	**Section**
ParentModel	CoreCore

Name	**Type**	**Label**	**Description**
id	integer	Id	id (data base id)
core_id	integer	Core Id	parent id (database id)
section	integer	Section	Section number
combined_id	string	Combined Id	
top_depth	pseudo	Section Top Depth [mbs]	mbs = meter below surface
section_length	double	Section Length [m]	
bottom_depth	pseudo	Section Bottom Depth [mbs]	mbs = meter below surface
analyst	string	Curator	Initials of Data Curator
section_condition	string	Section Condition	Broken, whole...
curated_length	double	Curated Length [cm]	can differ from section length, e.g. due to sampling the whole round or degassing
comment	string	Additional Information	
mcd_top_depth	pseudo	Corrected Top Depth/MCD Top Depth [mbs]	mcd = meter corrected depth
mcd_offset	double	MCD offset for depth correction [m]	
core_catcher	boolean	Core Catcher	Is this section a core catcher? (yes = 1)
core_splitted	pseudo	Do Splits Exist?	
weight	double	Weight of section [kg]	including liner
filling_estimate	double	Estimate for filling of liner [%]	calculated using bulk density
pushed_cc	boolean	CC pushed back in section	yes = 1
noble_gas_sampling	boolean	Noble Gas Sampling	yes = 1
microbio_sampling	boolean	Deep Biosphere Sampling	yes = 1
onsite_split	boolean	Section splitted onsite	
bulk_density	double	Bulk Density [kg/m3]	Estimated Bulk Density of recovered Sediment

core_recovery	integer	Core Recovery (after opening) [%]	
onsite_lithology	string_multiple	Onsite Lithology	
comment_noblegas	string	Comment on Noble gas sampling	
comment_biosphere	string	Comment on deep biosphere sampling	
light_exposed	string	Light exposed	

3.8 Core Section Reports

The core section reports list all cores, including the related sections for the given borehole, their depths, length, comments and core recovery. There is one report for each hole.

3.9 Split

In mDIS a section is equivalent to a wholeround section split (WR). The IGSN of the WR is inherited by the archive half (A) once the wholeround is split into working (W) and archive (A) half. The working half gets a new IGSN assigned to it. All samples and lithological descriptions are related to the one of the splits WR, W or A in the database.

mDIS Table SectionSplit (1 file for each hole)

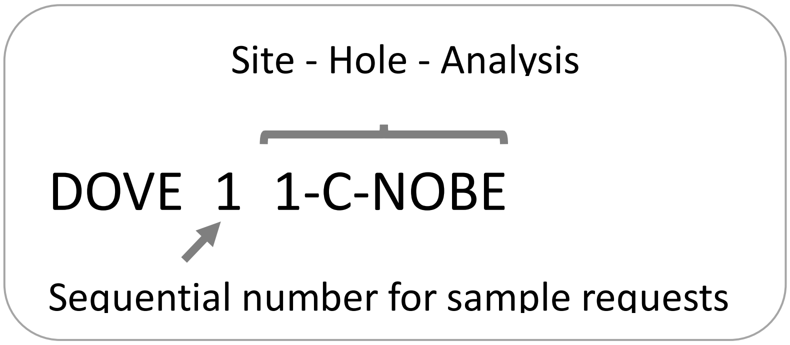
Name	**SectionSplit**
ParentModel	CoreSection

Name	**Type**	**Label**	**Description**
id	integer	ID	id (data base id)
section_id	integer	Section	parent id (database id)
origin_split_id	integer	Origin Split Id	Data base ID of the split before (further) splitting; usually the WR
origin_split_type	pseudo	Origin Split Type	
type	string	Type	Whole, Archive, Working (WR; W, A)
combined_id	string	Combined ID	
percent	integer	Percent [%]	Volume [%] of the original section
still_exists	boolean	Still exists	1 = yes
sampleable	boolean	Sampleable	Can samples be taken? 1 = yes
curated_length	pseudo	Curated Length [cm]	
curator	string	Curator	
mcd_top_depth	pseudo	MCD/Corrected Top Depth [mbs]	Top Depth + MCD offset
mcd_bottom_depth	pseudo	MCD/Corrected Bottom Depth [mbs]	= MCD_Top Depth + Section Length
comments	string	Additional information	
igsn	string	IGSN	Section IGSN needs to be new for working half

3.10 Sample Requests

Before sampling, a sample request needs to be approved by the principal investigators. The table contains all sample request_IDs collected before the publication of the basic data set. To find out who has the samples/who applied for a sample request, please contact the chief scientist of the expedition. Any personal data were deleted from the list, however, in the database every sample is assigned to a scientist/group of scientists by a sample request_IDs.

Sample Request Combined_ID



mDIS Table SampleRequests (1 file)

Name	**SampleRequest**		
ParentModel	ProjectExpedition		
Name	Type	Label	Description
id	integer	ID	id (data base id)
expedition_id	integer	Expedition	parent id (database id)
request_no	integer	Request No	
request_complete	string	Request Complete	Combined_ID of sample request
request_type	string	Request Type	Type of Sampling
purpose	string	Purpose	Purpose of sampling
request_date	date	Request Date	
approval_date	date	Approval Date	Date of Request Approval by PIs
completion_date	date	Completion Date	Date of Sampling
approved_by	string	Approved By	
comments	string	Additional Information	
sample_material	string	Sample Material	Kind of Sample Material
sample_size	double	Sample Size	Number only
sample_unit	string	Sample Unit	Unit of size of sample requested
amount_requested	double	Sample Volume Requested	Fraction of split section being requested [%]
number_samples	integer	Number of Samples requested	
destructive	boolean	Destructive	1 = yes; 0 = no
curator	string	Curator	
comments_2	string	Comments 2	

3.11 Samples

The main stock of cored material is described under Lithology and Cuttings. Some samples have already been taken on-site, mainly for microbiological and noble gas investigations. Samples taken from the legacy holes before the DOVE project are not included in the mDIS nor in the exported file.

Deviating from the usual ICDP combine_ID, the DOVE project added an abbreviation for the analysis to the sample combined_ ID naming the split and the sampled depth interval, e.g., ICDP_5068_1_A_550_3_WR_52-68:NOBE.

Table on Analysis & Abbreviation

Abbreviation	Analysis
CCOM	Carbonate/organic matter analysis with CNS elemental analyzer of fine-grained lithologies
CLAS	Clast samples
COSM	Cosmo-samples, sand preferred
COTO	Computerized tomography (CT) scan
GEOT	Geotechnical samples for oedometer or other geotechnical analyses
GRSZ	Grain size analysis of mainly fine sections
GSPE	Gamma spectroscopy
LUMI	Luminescence dating
MBIO	Analysis of Microbiology in fine-grained lithologies
NOBE	Noble-gas porre water analysis of bulk sediment samples
PMAG	Paleomagnetic
PMEV	Paleomagnetic „Lachamps“ and „Blake“ Events
POCK	Pocket penetrometer measurements
POLL	Pollen screening in fine-grained lithologies
SMSL	Smear slide
VANE	Vane-shear measurements
WACO	Water content
XRFS	XRF-scanning

mDIS Table Sample (one file for all holes)

Name	**Sample**
ParentModel	CurationSectionSplit

Name	**Type**	**Label**	**Description**
id	integer	ID	id (database id)
section_split_id	integer	SectionSplit	parent id (database id)
sample_combined_id	string	DOVE Sample Combined ID	
sample	string	Sample number	
igsn	string	IGSN	
sample_date	date	Sample Date	
top	double	Sample Top Depth [cm]	Distance from Section Top Depth [cm]

interval	double	Sample Interval [cm]	Length of sampled area
bottom	pseudo	Sample Bottom Depth [cm]	Distance from Section Top Depth [cm]
curator	string	Curator/Analyst	
sample_material	string	Sample Material	
sample_size	double	Sample Size	Number only
sample_unit	string	Sample Unit	
fraction_of_split_taken [%]	double	Volume Taken	
request_no	string	Request No	Sample request number
scientist	String	Requesting scientist	
analysis	string	Analysis	Abbreviation for Analysis the sample was requested for; see Sample Requests, Table on Analysis & Abbreviation
sample_top_mbsf	pseudo	MCD/Corrected Sample Top Depth [mbs]	
sample_bottom_mbsf	pseudo	MCD/Corrected Sample Bottom Depth [mbs]	
comment	string	Additional Information	

3.12 Cutting

Cuttings were taken every meter during flush drilling at Site 5068_1_A and 5068_1_B and used to develop a crude lithological profile for these holes where there no coring took place. For details on the sampling please see the Operational Report of the DOVE Phase 1 project (DOVE-Phase 1 Scientific Team et al., 2023a).

mDIS Table Cuttings (1 file for each hole)

Name	**Cuttings**
ParentModel	ProjectHole

Name	Type	Label	Description
id	integer	ID	id (database id)
hole_id	integer	Hole	parent id (database id)
cuttings	string	Cuttings Complete ID	
cuttings_id	integer	Cuttings ID#	
igsn	string	IGSN	
curator	string	Curator	
sampling_datetime	dateTime	Sampling Date_time	
depth	double	Depth [mbs]	Average depth below surface
drillers_sieve	double	Drillers Sieve [mm]	Mesh width for mud sampling by drillers
comments_drillers	string	Comments Drillers	

sample_weight	integer	Sample Weight [g]	
ratio_rock_clasts	integer	Ratio Rock Clasts [%]	
ratio_mud_clasts	integer	Ratio Mud Clasts [%]	
max_diameter_rock_clasts	double	Max Diameter Rock Clasts [mm]	
max_diameter_mud_clasts	double	Max Diameter Mud Clasts [mm]	
sorting	string_multiple	Sorting	
comments_sample	string	Comments Sample	
petrography_coarse	string_multiple	Petrography Coarse	
fossiles_coarse	string_multiple	Fossils Coarse	
plant_remains_coarse	string	Plant Remains Coarse	
petrography_fine	string_multiple	Petrography Fine	
fossiles_fine	string_multiple	Fossils Fine	
plant_remains_fine	string	Plant Remains Fine	
accessory_minerals_fine	string_multiple	Accessory Minerals Fine	
internal_structures	string_multiple	Internal Structures	
smear_slide	boolean	Smear Slide	
consistency	string_multiple	Consistency	
inferred_lithology	string_multiple	Inferred Lithology	
clasts_roundness	string_multiple	Clasts Roundness	
fine_grains_roundness	string_multiple	Fine Grains Roundness	
colour_munsell	string_multiple	Color (Munsell chart)	
shape_clasts_coarse	string_multiple	Shape of Clasts	
surfacetexture_coarse	string_multiple	Surface Texture of Clasts	

3.13 Borehole Expansion Samples

Borehole expansion samples were taken at site 5068_2_A during the percussion drilling phase of the drilling operation from the excess material recovered after the casing had been advanced to the bottom depth of the previous core run. This excess material is a disturbed mix of the last core/casing interval, but the components are relatively original. They were stored in standard 5 l buckets as backup/additional bulk samples.

mDIS Table Borehole Expansion Samples (1 file)

Name	**BoreholeExpensionSamples**		
ParentModel	ProjectHole		

Name	**Type**	**Label**	**Description**
id	integer	ID	id (database id)
hole_id	integer	Hole	parent id (database id)

sample_number	integer	Expansion Sample Number	
combined_id	string	Borehole Expansion Sample Combined ID	
igsn	string	IGSN	International Generic Sample Number
top_depth_mbs	integer	Top Depth [mbs]	
bottom_depth_mbs	integer	Bottom Depth [mbs]	
weight	double	Weight [kg]	
sampling_date_time	dateTime	Sampling Date-Time	
lithology	string	Lithology	
curator	string	Curator	
comment	string	Additional Information	

4 Borehole Measurements

Chapters 3.1 and 3.2 describe in detail how the pre-processing of the DOVE data of the four measurement campaigns was done at Site 1 and Site 2. This includes, among other things, the matching of the depths of the individual measurements, the elimination of false measurement data, the splicing of measurement curves etc. With this knowledge it can be understood how to get from the raw data to the respective composite data set, which is e.g. the basis for the presentation of the measurements in respective PDF files.

For data files and details on the measurements please see the Operational Report of the DOVE Phase 1 project (DOVE-Phase 1 Scientific Team et al., 2023a). Not included in the preprocessing are BHTV and VSP data. The VSP data files for 5068_1 and 5068_2 are available as .segy files, .jpg files for a better overview, coordinates in files for GIS software, a map as pdf and .txt files with the following columns: Source ID (SID), X, Y as can also be found in the .segy header. There are no picks for VSP_Z_5068_1_B as they could cause confusion.

4.1 Preprocessing Site 1 (5068_1)

The following procedure was used to compile the raw data, which was mostly measured in two/three depth sections, into a composite file.

3.1.1 Campaign 1: 5068_1_A

Step 1:

Reference depth is the depth of the first measurement on 10.05.2021. If there is a risk of a borehole collapsing due to unconsolidated sediments, we start the logging program with the SGR probe in the drill pipe and/or casing. SGR (143-0 m) => GR = master curve for the depth!

This results in the following depth shifts for the remaining measurements by means of optical determination:

CAL = -0.3 m, DLL = 0 m, NN = -0.4 m, PE = -0.3 m, SGR (130-160 m) = 0.5 m, SONIC = 0.5 m, SUSZ+GR = 0.5 m, TEMPSAL+GR = 2.7 m.

Since the SUSZ and TEMPSAL probes also carried a GR sensor with each measurement, the depth difference between the respective measurements can be determined by comparing the SGR master curve and this data.

Step 2:

SGR in CH (cased hole) -> SGR in OH (open hole): Influence of drill string considered by factor 1.3 between 143 m and 43 m depth. Above 43 m depth, the SGR sonde measured through both the drill string and a casing. Therefore, a factor of 1.8 had to be applied here to eliminate the influence of both steel pipes.

Step 3:

Based on the cable tension (Tension curve) it can be determined when the probe lifted off from the lowest point of the borehole. Data registered before that are discarded.

Step 4:

Data that are affected by the casing are not used in the composite file (and in the figure). Examples: The SUSZ tool reacts to the piping approx. 1 m before it. Due to the design of the DLL probe, the drill string up to several metres disturbs resistivities before the tool reaches the drill bit/casing shoe.

The same applies to parameters that can only measure in liquid-filled boreholes: Data above the water level are not used (e.g., SALTEMP).

Step 5:

Determination of vp from SONIC data: The first insertions of the two receivers near and far are picked in the full wave field display (dlis-file). From the time difference (far-near), the velocity vp can be determined from the fixed distance between the two receivers (0.5 m for the LIAG SONIC probe).

Step 6:

Smoothing the porosity- and the vp-curves with a 10 points average filter.

Step 7:

Determine splice points between each measurement of a parameter (optical determination):

SGR: 133 m.

3.1.2 Campaign 2: 5068_1_C

Step 1:

Reference depth is the depth of the first measurement on 11.11.2021. If there is a risk of a borehole collapsing due to unconsolidated sediments, we start the logging program with the SGR probe in the drill pipe. SGR => GR = master curve for the depth!

This results in the following depth shifts for the remaining measurements by means of optical determination:

DIP+GR = 0.4 m, DLL = -0.4 m, NN = -0.2 m, PE = -0.6 m, SONIC = -0.4 m, SUSZ+GR = 0.4 m, TEMPSAL+GR = 0.2 m.

Since for the DIP, SUSZ and TEMPSAL probes the same GR sensor was additionally included in the measurements, a comparison between the master SGR curve and these data can be used to determine the depth difference between the respective measurements.

Step 2:

SGR in CH (cased hole) -> SGR in OH (open hole): Influence of drill string considered by factor 1.3 between 164 m and 0 m depth.

Step 3:

Based on the cable tension (Tension curve) it can be determined when a probe lifted off from the lowest point of the borehole. Data registered before that are discarded.

Step 4:

Data that are affected by the casing/drill string are not used in the file (and in the figure).

Examples: The SUSZ tool reacts to the steel piping approx. 1 m before reaching it. Due to the design of the DLL probe, the drill string up to several metres disturbs resistivities before it reaches the drill bit.

The same applies to measurement parameters that can only measure in liquid-filled boreholes: Data above the water level are not used (e.g., SALTEMP, PE).

Step 5:

Determination of vp from SONIC data: The first insertions of the two receivers near and far are picked in the full wave field display (dlis-file). From the time difference (far-near), the velocity vp can be determined from the fixed distance between the two receivers (0.5 m for the LIAG SONIC probe).

Step 6:

Smoothing the porosity- and the vp-curves with a 10 points average filter.

3.1.3 Campaign 3: 5068_1_A

Step 1:

Reference depth is the depth of the first measurement on 09.03.2022. We start the logging program with the SGR probe. SGR => GR = master curve for the depth!

This results in the following depth shifts for the remaining measurements by means of optical determination:

AIND+GR (0-97 m) = 0 m, AIND+GR (95-155 m) = -0.1 m, SONIC+GR = 0 m, SUSZ+GR = 0 m.

Since a GR sensor was also used in the measurements for the AIND, SONIC, and SUSZ probes, an additional comparison between the SGR master curve and this data is used to determine the depth difference between the respective measurements.

Step 2:

Based on the cable tension (Tension curve) it can be determined when a probe lifted off from the lowest point of the borehole. Data registered before that are discarded.

Step 3:

Data that are affected by the non-presence of liquid-filled boreholes are not used in the file (and in the figure), e.g., SONIC.

Step 4:

Determination of vp from SONIC data: The first insertions of the two receivers near and far are picked in the full wave field display (dlis-file). From the time difference (far-near), the velocity vp can be determined from the fixed distance between the two receivers (0.5 m for the LIAG SONIC probe).

Step 5:

Since the AIND probe of the LIAG can only measure resistivities up to a maximum of several hundred Ωm, only values up to 200 Ωm are shown in the corresponding pdf file.

Step 6:

Smoothing the vp-curve with a 10 points average filter.

3.1.4 Campaign 3: 5068_1_B

Step 1:

Reference depth is the depth of the first measurement on 10.03.2022. We start the logging program with the SGR probe. SGR => GR = master curve for the depth!

This results in the following depth shifts for the remaining measurements by means of optical determination:

AIND+GR = 0.2 m, SONIC+GR = 0 m, SUSZ+GR = 0.2 m.

Since a GR sensor was also used in the measurements for the AIND, SONIC, and SUSZ probes, an additional comparison between the SGR master curve and this data is used to determine the depth difference between the respective measurements.

Step 2:

Based on the cable tension (Tension curve) it can be determined when a probe lifted off from the lowest point of the borehole. Data registered before that are discarded.

Step 3:

Data that are affected by the non-presence of liquid-filled boreholes are not used in the file (and in the figure), e.g., SONIC.

Step 4:

Determination of vp from SONIC data: The first insertions of the two receivers near and far are picked in the full wave field display (dlis-file). From the time difference (far-near), the velocity vp can be determined from the fixed distance between the two receivers (0.5 m for the LIAG SONIC probe).

Step 5:

Since the AIND probe of the LIAG can only measure resistivities up to a maximum of several hundred Ωm, only values up to 500 Ωm are shown in the corresponding pdf file.

Step 6:

Smoothing the vp-curve with a 10 points average filter.

3.1.5 Campaign 3: 5068_1_C

Step 1:

Reference depth is the depth of the first measurement on 09.03.2022. We start the logging program with the SGR probe. SGR => GR = master curve for the depth!

This results in the following depth shifts for the remaining measurements by means of optical determination:

AIND+GR = 0 m, PE = 0 m, SONIC+GR = 0.4 m, SUSZ+GR = 0 m.

Since a GR sensor was also used in the measurements for the AIND, SONIC, and SUSZ probes, an additional comparison between the SGR master curve and this data is used to determine the depth difference between the respective measurements.

Step 2:

Based on the cable tension (Tension curve) it can be determined when a probe lifted off from the lowest point of the borehole. Data registered before that are discarded.

Step 3:

Data that are affected by the non-presence of liquid-filled boreholes are not used in the file (and in the figure), e.g., SONIC.

Step 4:

Determination of vp from SONIC data: The first insertions of the two receivers near and far are picked in the full wave field display (dlis-file). From the time difference (far-near), the velocity vp can be determined from the fixed distance between the two receivers (0.5 m for the LIAG SONIC probe).

Step 5:

Since the AIND probe of the LIAG can only measure resistivities up to a maximum of several hundred Ωm, only values up to 200 Ωm are shown in the corresponding pdf file.

Step 6:

Smoothing the vp-curve with a 10 points average filter.

4.2 Preprocessing Site 2 (5068_2)

Step 1:

The data are corrected for depth on a daily basis. Reference is the depth of the first measurement on 26.10.2021.

26.10.2021: First measurement: SUSZ measurement incl. Gamma Ray => GR = master curve for the depth! This results in the following depth shifts for the remaining measurements by means of optical determination:

SUSZ = 0 m, SGR = -0.3 m, DLL = -1.3 m, PE = 0.2 m, NN = -1.0 m, CAL = -0.9 m, EBS = -0.5 m, SONIC = 0 m.

27.10.2021: SUSZ = -0.3 m, SGR = 0.1 m, DLL = -0.5 m, NN = 0.2 m, SONIC = 0 m.

28.10.2021: SUSZ = -0.3 m.

29.10.2021: SGR = 0 m, PE = -0.3 m, NN = 0.1 m, CAL= 2.6 m, SONIC = 0 m.

Step 2:

SGR in CH (cased hole) -> SGR in OH (open hole): Influence of steel piping considered by factor 1.3 above 104 m depth.

Step 3:

Based on the cable tension (tension curve) it can be determined when a probe lifted off from the lowest point of the borehole. Data registered before that are discarded.

Step 4:

Data that are affected by the casing are not used in the composite file and in the figure. Examples: The Susz curve reacts to the piping approx. 1 m before reaching it. Due to the design of the DLL probe, resistivities are disturbed by the pipe/drill string up to several metres before it reaches the pipe shoe.

Step 5:

Determination of vp from SONIC data: The first insertions of the two receivers near and far are picked in the full wave field display. From the time difference, the velocity vp can be determined from the fixed distance between near and far (0.5 m for the LIAG sonic probe).

Step 6:

Determine splice points between each measurement of a parameter (optical determination):

SGR: 122.1 m and 180 m, DLL: 180 m, PE: 177 m, Susz: 120 m and 180 m, NN: 121.5 m and 176.5 m, CAL: 177 m, Sonic: 119.4 m and 178.1 m.

For EBS only one measurement exists, because the probe showed a defect after the first measurement.

4.3 Borehole Logging Files

- The recorded field data are stored in ASCII files. The exception is the non-line data generated with the BHTV, Sonic and VSP probes. The extensive ultrasonic images of the borehole wall registered by the BHTV sonde are stored as TFD files for use e.g. with the WellCAD software. The complete wavefields registered by the SONIC sonde are stored as DLIS files. The VSP data are given in SGY format. All data are checked and edited.
- The preprocessed line data for each hole and campaign are summarized in a composite file (ASCII).
- Additionally, composite log plots (1:1000) are prepared as PDF documents to give a quick overview over the line data.

4.4 Borehole measurements available from the legacy Sites 3 through 6

Work in progess

5 Data Tables

5.1 Lithological Units and Core Description

The macroscopic lithological description (Visual Core Description VCD) is based on section units. Each core section has been described separately and the respective lithological sections units have been assigned to predefined LITHO_UNITs. These LITHO_UNITS have been defined within the DOVE project based on the encountered lithologies and a modified version of the definitions used by Krüger and Kjær (1999). This applies to all core material of DOVE Phase 1.

Files related to the lithological description comprise:

- list of LITHO_UNITS (1 file; csv)
- tables summarizing the depth distribution of the LITHO_UNITS for each section of a cored hole (csv; 1 for each hole)
- digitalized protocols of the VCD logs (zip file for each hole)
- a summarizing visual lithological column for each borehole (pdf)

5.2 Multi Sensor Core Logging (Sites 1 & 2)

For Site 1 (5068_1), p-wave velocity, wet bulk density, and magnetic susceptibility were measured on each core section using the GEOTEK-multi-sensor-core-logger (MSCL) (Geotek Limited, Daventry, Northants, UK) at the University of Bern. At Site 2 (5068_2) natural gamma radiation including K, Th, and U-Log was also measured. Here, the core sections were measured in the field laboratory using ICDP's GEOTEK-MSCL. The resolution was 5 mm. The same data processing was applied for both sites.

Before the first core was measured, all sensors were calibrated according to the instructions from Geotek, and a background measurement of the natural gamma radiation was done. Each measurement session started with calibration by measuring standards consisting of a mixture of aluminum and deionized H_2O (see construction scheme for further details, Fig. 3). The following table summarizes all parameters used to calibrate the raw log data, except the depth. The calibration was done with the integrated Geotek software for further information (see Geotek MSCL manual). Only the baseline correction of the magnetic susceptibility data was done during a separate step (see MSCL-data processing iv). The slope (B) and intercept (C) used for the gamma density processing was calculated with an external excel-file (5068_mscl_cal_density_file.xls). Due to a malfunction of the laser distance sensor pair for Site 2 cores, the core-diameter variation could not be detected for 5056_2, and a constant core diameter of 104 mm had to be assumed. For both sites, the p-wave data were of very poor quality, likely due to bad coupling between sensors, liner, and sediment. Therefore, the data were discarded.

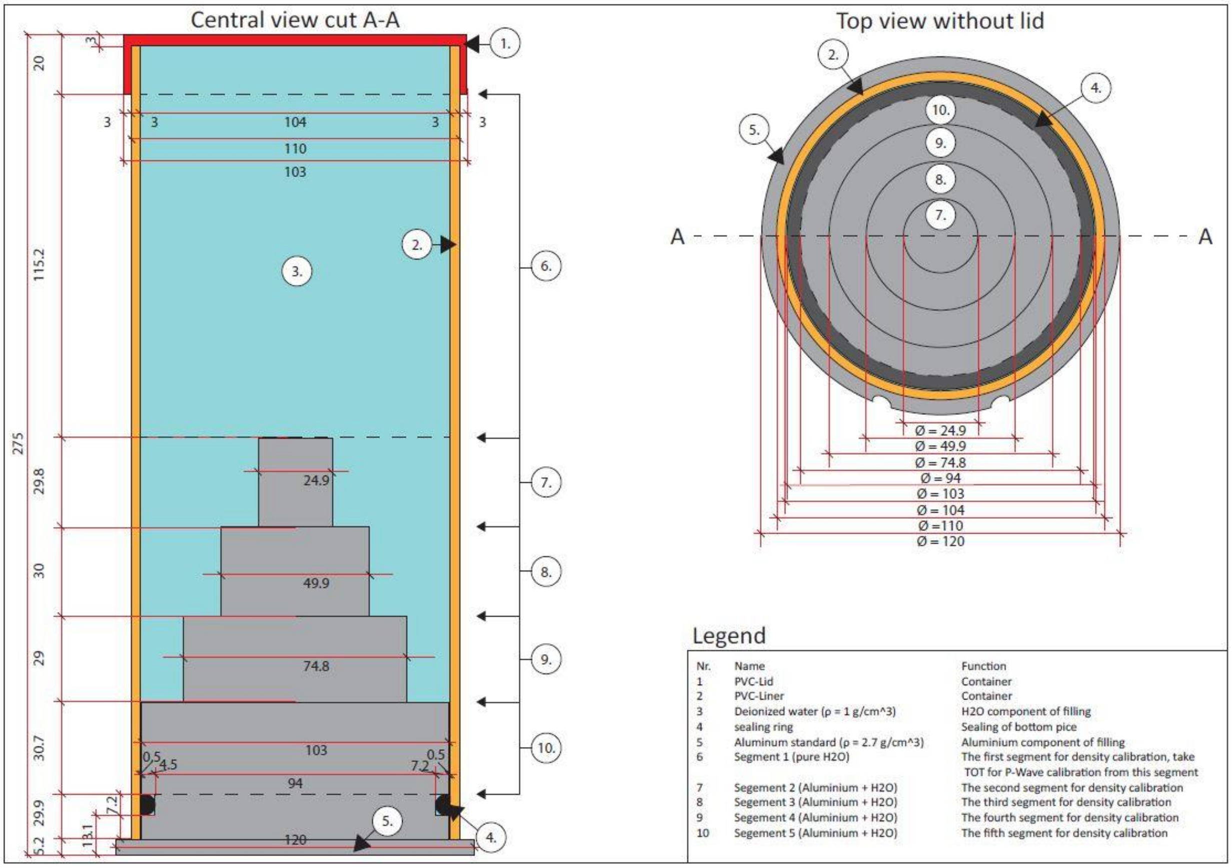


Figure 3: The construction scheme of the MSCL calibration piece was measured at the beginning of each measurement session.

- MSCL-calibration input parameter file: 5068_2_A_mscl_calibration_input_parameters.csv.
- Not described additional calibration file: 5068_mscl_cal_densety_file.xls (Slop and intercept of Gamma density)
-

Log	**Parameter**	**Unit**	**mscl explanation**
measurement ID	mes_id	/	Identifier of measurement/calibration cycle
Core Thickness (CT)	RCT [cm]	[cm]	Core diameter (input for 5068_mscl_cal_densety_file.xls)
	W [cm]	[cm]	Thickness of liner walls (2x thickness of wall, input for 5068_mscl_cal_densety_file.xls)
Gamma Density (Den1)	Segment 1 [cps]	[cps]	Intensity (average gamma counts from calibration section segment 1, raw calibration data, input for 5068_mscl_cal_densety_file.xls)
	Segment 2 [cps]	[cps]	Intensity (average gamma counts from calibration section segment 2, raw calibration data, input for 5068_mscl_cal_densety_file.xls)

	Segment 3 [cps]	[cps]	Intensity (average gamma counts from calibration section segment 3, raw calibration data, input for 5068_mscl_cal_densety_file.xls)
	Segment 4 [cps]	[cps]	Intensity (average gamma counts from calibration section segment 4, raw calibration data, input for 5068_mscl_cal_densety_pwave_file.xls)
	Segment 5 [cps]	[cps]	Intensity (average gamma counts from calibration section segment 5, raw calibration data, input for 5068_mscl_cal_densety_pwave_file.xls)
	A	/	Slope (if a correction second degree (ax^2+bx+c), is selected, default = 0)
	B	/	Slope (for a linear correction, calculated in an additional file: 5068_mscl_cal_densety_file.xls)
	C	/	Intercept (for linear correction, calculated in an additional file: 5068_mscl_cal_densety_file.xls)
Magnetic susceptibility (MS1)	A	/	Slope (for a linear correction, default = 1)
	B	/	Intercept (for linear correction, default = 0)
	Den	/	If set to 1, converted to mass-specific values; if set to 0, no mass conversion is applied; default = 0
	LD [cm]	[cm]	Diameter of the used Loop-sensor, if set to 0, no volume conversion is applied.
	bslc cal [Six10^-5]	[Six10^-5]	Calculated baseline correction
	bslc app [Six10^-5]	[Six10^-5]	Applied baseline correction value
	bslc orig	/	Explains the origin of the correction value: calculated from the calibration section 0-15 cm; manual input; calculation was < -0.5, converted to 0
Natural Gamma (NGAM)	B	[cps]	Background, gets subtracted from raw data
	Scale	/	Slope of conversion equation (since no conversion is applied, default = 1)
	Offset	/	Intercept of conversion equation (since no conversion is applied, default = 0)
k	Scale	/	Slope of conversion equation, [cps] -> [%], calculated by internal calibration of software/sensors
	Offset	/	Intercept of conversion equation
u	Scale	/	Slope of conversion equation, [cps] -> [ppm], calculated by internal calibration of software/sensors
	Offset	/	Intercept of conversion equation
Th	Scale	/	Slope of conversion equation, [cps] -> [ppm], calculated by internal calibration of software/sensors
	Offset	/	Intercept of conversion equation

5.2.1 MSCL data processing:

i) Individual data files were loaded, and a measurement id was added to each measurement point. Calibration and measurement data were separated and combined in two separate files, and additionally, a core section id was added to each measurement point of the non-calibration data;
ii) a quality class was appointed to each data point (0 = good; 1= possibly weakly disturbed; 2 = heavily disturbed; 3 = core loss; 4 = placeholder/core ends; 5 = artificial overlength);
iii) data of empty sections of liners, representing core loss, were removed;
iv) a baseline correction was applied to the corresponding magnetic susceptibility data to correct potential systematic shifts in the data (subtraction of the average of the calibration data between 0.5 and 15 cm of each measurement cycle, or by a manual set input);
v) low-density data (<1.5 g/cm^3), considered heavily disturbed sections, were excluded from the density log;
vi) The overall data quality of the p-wave-data was very poor and the log excluded from data set;
vii) the depth of the cleaned MSCL-logs was corrected based on the driller's depth. The corresponding driller depth served as the depth of the top data point, increasing by 0.5 cm with each further data point of the section. If the section is longer than the nominal section length, the data-point spacing is adjusted to meet the nominal section length. Such overlengths were considered as artificial/expansion;
viii) the data from the upper- and lowermost cm in each section was considered likely disturbed; thus, the logs were excluded (converted to NaN's). This also prevented possible overlapping issues at the core ends.

There are two files available: i) File *data_cal* contains the combined data from the calibration section of all measurements; ii) File *data* contains the processed and cleaned data sets Filename:

- 5068_1_C_Combined_MSCL_data_cal.csv and 5068_1_C_Combined_MSCL_data.csv
- 5068_2_A_Combined_MSCL_data_cal.csv and 5068_2_A_Combined_MSCL_data.csv

Column name	**Unit**	**Description**
Composite_depth [cm]	cm	Corrected composited total depth
Rescaled SECT_DEPTH [cm]	cm	Corrected/rescaled in-section depth
SECT_NUM_MC	/	The number of measured sections starts at 1 at the beginning of each measurement session.
SECT_DEPTH [cm]	cm	Unaltered in-section depth
CT [cm]	cm	Core thickness
Dens [g/cc]	g/cm^3	Wet bulk density log (unfiltered)
Dens [g/cc] (pw and dens filtered)	g/cm^3	Wet bulk density log (filtered, <1.5 g/cm^3 removed)
Mag_Sus	SI x 10^{-5}	Magnetic susceptibility log (uncorrected)
Mag_Sus BS_cor	SI x 10^{-5}	Magnetic susceptibility log (baseline corrected)
Nat_Gamma [cps]	cps	Natural gamma radiation log (sum of K, U, and Th logs)
K [%]	%	Potassium log
U [ppm]	ppm	Uranium log

Th [ppm]	ppm	Thorium log
core_quality	/	Quality of recovered sediment (0 = good; 1 = possibly disturbed; 2 = heavily disturbed; 3 = core loss/backfall; 4 = place holder/core ends; 5 = artificial overlength)
mes_ID	/	Measurement session id (the link between actual data and the corresponding calibration section)
section_ID	/	Measured core section

MSCL_data_cal file

Column name	**Unit**	**Description**
SECT_NUM_MC	/	The number of measured sections starts at 1 at the beginning of each measurement session.
SECT_DEPTH [cm]	cm	Unaltered in-section depth
CT [cm]	cm	Core thickness
Dens [g/cc]	g/cm^3	Wet bulk density log (unfiltered)
Mag_Sus [SI x 10^{-5}]	SI x 10^{-5}	Magnetic susceptibility log (uncorrected)
Mag_Sus BS_cor [SI x 10^{-5}]	SI x 10^{-5}	Magnetic susceptibility log (baseline corrected)
Nat_Gamma [cps]	cps	Natural gamma radiation log (sum of K, U, and Th logs)
K [%]	%	Potassium log
U [ppm]	ppm	Uranium log
Th [ppm]	ppm	Thorium log
mes_ID	/	Measurement session id (the link between actual data and the corresponding calibration section)

5.3 Water-content measurements (WACO) (Site 1 and 2)

Samples, with a sample length of 4 cm, were taken every 50 cm on sections from holes 1-C and 2-A whenever possible. Each sample was divided into three sub-samples for analyses: CCOM-, GRSZ-, and WACO-samples. All sub-samples were freeze-dried, and mean water content was derived from the three subsamples using the difference between wet and dry weight according to ISO 11465. A standard weight of 8.052 g was assumed for the empty container.

$$\frac{Bruttowetmass - Bruttodrymass}{Bruttodrymass - Massofemptycontainer} * 100$$

Data files for Water content (WACO)

Column name	Unit	Description
Section ID	/	Core section of origin
IGSN CCOM	/	IGSN of CCOM-subsample
IGSN WACO	/	IGSN of WACO-subsample
IGSN GRSZ	/	IGSN of GRSZ-subsample
Center Sample Depth [mcd bs]	m	Center of sample interval in composite depth
Distance from section top Depth [cm]	cm	Distance between the center of the sample interval and top of the core section
WC mean [Wt%]	wt%	Mean water content based on the water content of the three sub-samples
WC std [Wt%]	wt%	Mean water content standard deviation

5.4 Carbon, Nitrogen and Sulfur Data (TNSC, ITC and Carbonate Content; CCOM) (Sites 1-6)

Total carbon (TC), total nitrogen (TN), total sulfur (TS), and total inorganic carbon (TIC) were analyzed from the fine fraction (<63 µm) of the CCOM-subsamples. Total organic carbon (TOC) was derived as the differences between TC and TIC. The weight percent [wt%] of total carbonate (TCA; $CaCO_3$) and total organic matter (TOM) were calculated using a stoichiometrically simplified approach (TCA = TIC x 8.3; TOM = TOC x 1.8; Meyers and Teranes, 2001)

Available data files are *Filename: 5068_2_A_CCOM,*

Data Files: CCOM

Column name	Unit	Description
Sample ID	/	CCOM-sample-ID
IGSN	/	IGSN of CCOM sample
Center Sample Depth [mcd bs]	m	Center of sample interval in composite depth
Distance from section top Depth [cm]	cm	Distance between the center of the sample interval and top of the core section
TN [w%]	wt%	Total nitrogen content
TC [wt%]	wt%	Total carbon content
TS [wt%]	wt%	Total sulfur content
TOC [wt%]	wt%	Total organic carbon content
TIC [wt%]	wt%	Total inorganic carbon content
TOM [wt%]	wt%	Total organic matter content
TCA [wt%]	wt%	Total carbonate content

5.5 Undrained uniaxial compressive strength (POCK) and uniaxial shear strength (VANE) measurements

Where applicable, undrained shear strength (c_u') and undrained uniaxial compressive strength(q_u') were measured at 25, 50, and 75 cm section depth with a pocket vane shear tester (Eijkelkamp, Model 14.10) and a pocket penetrometer (Impact Test Equipment Ltd, Model SL131). The measurements were executed according to the Swiss Norm: VSS 70 350a.

Filename: 5068_2_A_POCK

Column name	Unit	Description
Sample ID	/	POCK-sample-ID
IGSN	/	IGSN of POCK measurement
Center Sample Depth [mcd bs]	m	Center of sample interval in composite depth
Distance from section top Depth [cm]	cm	Distance between the center of the sample interval and top of the core section
Qu[kPa]	[kPa]	uniaxial shear strength (qu')
Quality	/	Quality of measurement: 0 = good; 1 = invalid; 2 = out of scale but valid

Filename: 5068_2_A_VANE

Column name	Unit	Description
Sample ID	/	POCK-sample-ID
IGSN	/	IGSN of POCK measurement
Center Sample Depth [mcd bs]	m	Center of sample interval in composite depth
Distance from section top Depth [cm]	cm	Distance between the center of the sample interval and top of the core section
Cu[kPa]	[kPa]	undrained shear strength (c_u')
Quality	/	Quality of measurement: 0 = good; 1 = invalid; 2 = out of scale but valid

6 Images

- Digital images of section splits are available for holes 5068_1_C and 5068_2_A (jpg files)
- For all cored holes, hole overview reports are available. They contain all section images of one core (pdf).
- Selected images of CT-scans, used in Schaller et al. 2023 are available (jpg files).
- Where applicable, images of the cuttings (Holes 5068_1_A, 5068_1_B) are available (jpg).

7 References

Conze, R., Lorenz, H., Ulbricht, D., Elger, K., & Gorgas, T. (2017). Utilizing the International Geo Sample Number Concept in Continental Scientific Drilling During ICDP Expedition COSC-1. In Data Science Journal (Vol. 16). Ubiquity Press, Ltd. https://doi.org/10.5334/dsj-2017-002

DOVE - Phase 1 Scientific Team; Beraus, S., Buechi, M. W., Buness, H., Burschil, T., Fiebig, M., Firla, G., Gabriel, G., Gegg, L., Grelle, T., Heeschen, K., Kroemer, E., Lehne, C., Lüthgens, C., Neuhuber, S., Preusser, F., Schaller, S., Schmalfuss, C., Schuster, B., Tanner, D. C., Thomas, C., Tomonaga, Y., Wieland-Schuster, U., and Wonik, T.: Drilling Overdeepened Alpine Valleys (DOVE) - Operational Dataset of DOVE Phase 1. GFZ Data Services. https://doi.org/10.5880/ICDP.5068.001, 2023

DOVE-Phase 1 Scientific Team, Anselmetti, F. S., Beraus, S., Buechi, M. W., Buness, H., Burschil, T., Fiebig, M., Firla, G., Gabriel, G., Gegg, L., Grelle, T., Heeschen, K., Kroemer, E., Lehne, C., Lüthgens, C., Neuhuber, S., Preusser, F., Schaller, S., Schmalfuss, C., Schuster, B., Tanner, D. C., Thomas, C., Tomonaga, Y., Wieland-Schuster, U., and Wonik, T.: Drilling Overdeepened Alpine Valleys (DOVE) – Operational Report of Phase 1. ICDP Operational Re-ports. GFZ German Research Centre for Geosciences. https://doi.org/10.48440/ICDP.5068.001, 2023

Krüger, J. and Kjær, K. H.: A data chart for field description and genetic interpretation of glacial diamicts and associated sediments - with examples from Greenland, Iceland, and Denmark, Boreas, 28, 386–402, https://doi.org/10.1111/j.1502-3885.1999.tb00228.x, 1999.

Meyers, P. A. and Teranes, J. L.: Sediment Organic Matter, in: Tracking Environmental Change Using Lake 474 Sediments: Physical and Geochemical Methods, edited by: Last, W. M. and Smol, J. P., Springer Netherlands, 475 Dordrecht, 239–269, https://doi.org/10.1007/0-306-47670-3_9, 2001.

Schaller, S., Buechi, M. W., Schuster, B. and Anselmetti, F. S. (2023). Drilling into a deep buried valley: A 252 m long sediment succession from a glacial overdeepening in northwestern Switzerland, Scientific Drilling, 32, https://doi.org/10.5194/sd-32-27-2023