



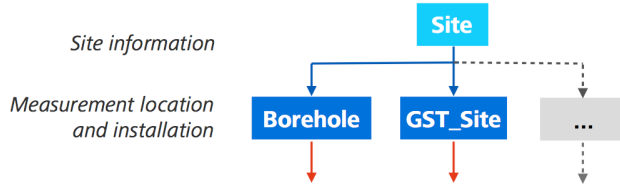
PERMOS Data Base – Table Description

1 Introduction

The PERMOS Data Base is organized in three levels of data. The *Metadata Tables* (cf. Section 2) include all information about the measurement sites and the installations, the *Data Tables* (cf. Section 3) hold the data measured in the field, and the third level includes the so-called *Products* (cf. Section 3). The Product Tables are always directly created from the Data Tables with processing routines and are intended to access processed and standardized versions of the data, such as aggregations, lookup tables for subsets or data exchange. Data with known questionable quality (i.e. with a respective quality flag) are not used to derive the product tables.

The published data (DOI releases) include the products together with the relevant metadata. For example, for borehole temperatures this means the tables Site, Borehole, PI, BHT_Day, BHT_HYear, BHT_Year, ALT (cf. Sections 2 and 4).

Metadata



Data



ID	Borehole_ID	Depth	Time	Temp	PFlag	QFlag	Timestamp
1	3	10	2013-07-11 16:15:00	-1.256	b	1	2013-07-11 16:15:00

Proc. Quality Versioning

Products

Aggregations

hourly | daily | annual | hydr. year | FDD

Standard views

Temps per borehole | gst-site

- ★ performance
- ★ easy access and standard views
- ★ data exchange with predefined data sets
- ★ standard processing

no data manipulation!

Fig. 1: Organisation of tables in the PERMOS Data Base: three hierarchical levels of tables with metadata, data and products tables

2 Metadata Tables

2.1 Site

General information about the measurement sites and data acquisition for all types of measurements

Field	Type	Default	Keys	Indexes	Description
ID	int(5)	auto incr.	primary	unique	Site ID (only used for reference within the database)
Abbr	varchar(3)			unique	Site abbreviation
Name	varchar(50)			unique	Site name
AlterName	varchar(50)	(NULL)			Other frequently used name for the site
Permos	tinyint(1)				Site of the PERMOS network and/or the TEMPS Project? 0: neither PERMOS nor TEMPS site 1: PERMOS site (i.e., it is also a TEMPS site) 2: PERMOS reference site (i.e., it is also a TEMPS site) 3: TEMPS site only
Country	varchar(3)				Country abbreviation
Region	varchar(50)	(NULL)			Region, where the site is situated. For the Swiss sites, the major political regions are used (see Fig. 2)
Landforms	varchar(100)	(NULL)			Observed landform(s) at the site
Lithology	varchar(100)	(NULL)			Lithology (predominant rock type) of the site
X	decimal(10,0)	(NULL)			Approximate location in Swiss national coordinates (LV03), N-S direction) X < Y non-CH sites: -999
Y	decimal(10,0)	(NULL)			Approximate location in Swiss national coordinates (LV03), E-W direction) X < Y non-CH sites: -999
Lat	decimal(9,6)	(NULL)			Geographic coordinates, latitude (decimal degrees)
Lon	decimal(9,6)	(NULL)			Geographic coordinates, longitude (decimal degrees)
Zmin	decimal(10,0)	(NULL)			Approximate altitude range (m a.s.l.) of the measurement installations, min elevation
Zmax	decimal(10,0)	(NULL)			Approximate altitude range (m a.s.l.) of the measurement installations, max elevation
BH	tinyint(1)	(NULL)			Borehole temperatures (1=TRUE, 0=FALSE)
GST	tinyint(1)	(NULL)			Ground surface temperatures (1=TRUE, 0=FALSE)
BTS	tinyint(1)	(NULL)			BTS (1=TRUE, 0=FALSE)
ERT	tinyint(1)	(NULL)			Electrical resistivity tomography profile(s) (1=TRUE, 0=FALSE)
ST	tinyint(1)	(NULL)			Refraction seismic topography (1=TRUE, 0=FALSE)
TGS	tinyint(1)	(NULL)			Terrestrial geodetic survey (1=TRUE, 0=FALSE)
AS	tinyint(1)	(NULL)			Aerial survey (1=TRUE, 0=FALSE)
Meteo	tinyint(1)	(NULL)			Meteorological measurements (1=TRUE, 0=FALSE)
SM	tinyint(1)	(NULL)			Soil moisture (1=TRUE, 0=FALSE)
Comment	varchar(1000)	(NULL)			Additional comments, such as a short site description or a reference to an article describing the site in more detail

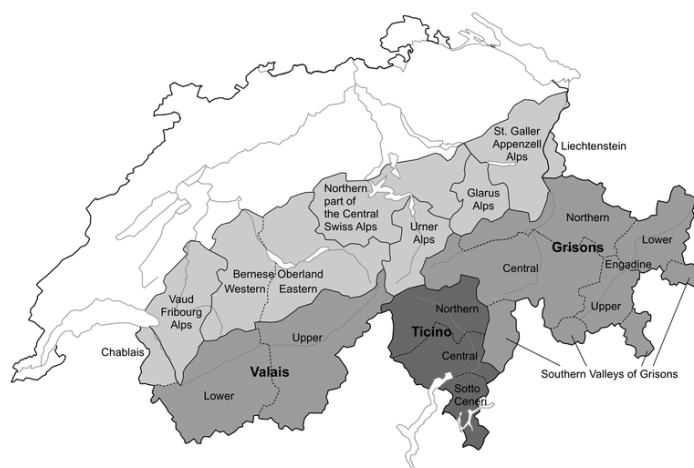


Fig. 2: Political units as used in field «region»:
Picture taken from
http://www.slf.ch/lawineninfo/zusatzinfos/interpretationshilfe/geographische_begriffe/karte_polit_geogr_e.gif.

2.2 Borehole

Information about the individual boreholes and their instrumentation

Field	Type	Default	Keys	Indexes	Notes
ID	int(5)	auto incr.	primary	unique	Borehole ID (only used for reference within the database)
Name	varchar(50)			unique	Borehole name: site abbreviation, underscore, number of the borehole, year drilled, e.g. SCH_5198
AlterName	varchar(50)	(NULL)			Alternative name(s) of the borehole
Site_ID	int(5)		foreign		ID of the corresponding measurement site.
PI_ID	int(5)		foreign		ID of the responsible PI
Year	year(4)	(NULL)			Year, when the borehole was drilled (YYYY)
Active	smallint(4)	(NULL)			Measurements ongoing? Either 1 or the year, when measurements were stopped (YYYY).
Project	varchar(50)	(NULL)			Network / project, the borehole is affiliated with
GTNP_ID	varchar(10)	(NULL)		unique	ID the borehole is addressed within GTN-P (GTN-P Code)
GTNP_DMS_ID	int(10)	(NULL)		unique	ID of the GTN-P data management system (Borehole Code)
CALM_ID	varchar(10)	(NULL)			ID of the borehole within the Circumpolar Active Layer Monitoring CALM
X	decimal(10,1)	(NULL)			Exact location in Swiss national coordinates (LV03 reference frame) X < Y non-CH sites: –999
Y	decimal(10,1)	(NULL)			Exact location in Swiss national coordinates (LV03 reference frame)) X < Y non-CH sites: –999
Z	decimal(10,1)	(NULL)			altitude (m a.s.l.)
Lat	decimal(9,6)	(NULL)			Geographic coordinates, latitude (decimal degrees)
Lon	decimal(9,6)	(NULL)			Geographic coordinates, longitude (decimal degrees)
Depth	decimal(5,2)	(NULL)			Original depth of the borehole, when it was drilled (m)
Inc	decimal(5,0)	(NULL)			Inclination (i.e., deviation from the vertical) of the borehole (°)
Slp	decimal(5,0)	(NULL)			Slope of the borehole site (°). For boreholes all the way through a crest, the information for the slope closest to the «uppermost» sensor is given.
Asp	decimal(5,0)	(NULL)			Aspect of the borehole site (°) For flat locations: –999
Morphology	varchar(50)	(NULL)			Morphology of the measurement location
SurfType	varchar(50)	(NULL)			Surface (material) at the measurement location
PFTThick	varchar(20)	(NULL)			Permafrost thickness at borehole location in m
Class	varchar(10)	(NULL)			Borehole class according to GTN-P: SU: Surface, <10 m SH: Shallow, 10–25 m IB: Intermediate, 25–125 m DB: Deep, >125 m
LowSensor	decimal(5,2)	(NULL)			Depth of the lowest working thermistor (m)
SensorType	varchar(50)	(NULL)			Type of sensor used for the temperature measurements
LogSystem	varchar(50)	(NULL)			Type of logging system used
LastCalib	year(4)	(NULL)			Year of last calibration of the thermistor chain (YYYY)
DataAccess	varchar(50)	(NULL)			Means of data access
Changes	varchar(1000)	(NULL)			Information about major changes to the measurement configuration (not necessarily exhaustive!)
Comment	varchar(1000)	(NULL)			Additional comments and possibly a reference to more detailed documentation of the installation

2.3 PI

Information about the principal investigators (PI) or contact persons for the measurements

Field	Type	Default	Keys	Indexes	Notes
ID	int(5)	auto incr.	primary	unique	PI ID (only used for reference within the database)
Abbr	varchar(3)			unique	Abbreviation used for the PI
Last_Name	varchar(50)			unique	Last name
First_Name	varchar(50)				First name
Institute	varchar(50)	(NULL)			Acronym for the responsible institute
Email	varchar(50)	(NULL)			Email address
Office	varchar(50)	(NULL)			Phone number office
Mobile	varchar(50)	(NULL)			Phone number mobile

2.4 ProcFlag

Flags for indicating the processing carried out on the data in the database. The flag is only used in the data tables.

Field	Type	Default	Keys	Indexes	Notes
ID	varchar(10)		primary		Flag value a no processing b date and/or time corrected for this data entry c value corrected d value deleted e value zero-certain corrected x no processing information available
Description	varchar(50)				Short description of the meaning of the flag value
Comment	varchar(1000)	(NULL)			Additional information about the meaning of the flag value

2.5 QualFlag

Flags for indicating the quality/reason of known questionable quality of the data in the database. The flag is only used in data tables. Only data with a *QualFlag* < 2 is shown in data browsers, processed to derive products or delivered to other databases etc.

Field	Type	Default	Keys	Indexes	Notes
ID	int(10)		primary		Flag value 0 no information about data quality available 1 data quality ok 10 data quality questionable: measurement setup 11 data quality questionable: gap 12 data quality questionable: calibration 13 data quality questionable: drift 14 data quality questionable: water 15 data quality questionable: broken 16 data quality questionable: instabilities 20 data quality questionable: undefined problem
Description	varchar(50)				Short description of the meaning of the flag value
Comment	varchar(1000)	(NULL)			Additional information about the meaning of the flag value

3 Data Tables

3.1 BHT

Borehole temperature data.

Field	Type	Default	Keys	Index	Notes
ID	int(11)	auto incr.	primary		Unambiguous identifier for the data point (primary key)
<i>Borehole_ID</i>	Int(5)		foreign	unique	ID of the corresponding borehole
<i>Time</i>	datetime				Date and time of measurement in Central European Time (UTC+1, YYYY-MM-DD HH:MM:SS)
<i>Depth</i>	decimal(20,2)	(NULL)			Depth of the measurement (m)
Temp	decimal(20,3)	(NULL)			Measured borehole temperature (°C)
ProcFlag	varchar(10)	(NULL)			Flag(s), indicating the processing carried out on the data point
QualFlag	int(5)	(NULL)			Flag(s), indicating the quality/reason of questionable quality of the data point
TimeStamp	timestamp	(CURRENT_TIMESTAMP)			Date and time, when the data was included or updated in the DB (YYYY-MM-DD HH:MM:SS)

4 Products

4.1 Aggregations (of temperature data)

Measured data are stored in the highest available temporal resolution, which typically differs between different installations. Tables with aggregated data are named *DataTable_AggregationLevel*. That is, daily means of borehole temperatures are stored in the table **BHT_Day**, annual means of calendar years are stored in the table **BHT_Year**, and annual means for hydrological years are stored in the table **BHT_HYear**. Daily means are calculated from hourly to daily data.

Available aggregation levels are: *Day, Year, HYear*

Note: Annual means are calculated based on daily data and only for years with a minimum of 350 daily values (96% of the data, cf. attribute *Count*). The time field for tables with annual means is called *Year* and is of type *year(4)*.

Definition of HYear: The hydrological year 2014 lasts from 01.10.2013 to 30.09.2014.

Field	Type	Default	Keys	Indexes	Notes
<i>Borehole_ID</i>	Int(5)		foreign	unique	ID of the corresponding borehole
<i>Time</i>	datetime				Date and time of measurement in Central European Time (UTC+1, YYYY-MM-DD HH:MM:SS)
<i>Depth</i>	decimal(20,5)	(NULL)			Depth of the measurement (m)
<i>Temp</i>	decimal(20,5)	(NULL)			Measured borehole temperature (°C)
<i>Tmin</i>	decimal(20,5)	(NULL)			Minimum borehole temperature in aggregation period (°C)
<i>Tmax</i>	decimal(20,5)	(NULL)			Maximum borehole temperature in aggregation period (°C)
<i>Count</i>	Int(5)	(NULL)			Number of measurements available for the calculation of the aggregated value.

4.2 ALT

The maximum active layer thickness for each year and borehole is calculated manually by linear interpolation between thermistors.

Field	Type	Default	Keys	Indexes	Notes
ID	int(5)	auto incr.	primary		Unambiguous identifier for the data point (primary key)
<i>Borehole_ID</i>	Int(5)		foreign	unique	ID of the corresponding borehole
<i>Year</i>	year				Year
ALT	decimal(20,5)	(NULL)			Maximum active layer thickness (m)
Date	date				Date of the max ALT (YYYY-MM-DD)
Comment	varchar(45)	(NULL)			Additional information about the calculation of the max. ALT
TimeStamp	timestamp	(CURRENT_TIMESTAMP)			Date and time, when the data was included or updated in the DB (YYYY-MM-DD HH:MM:SS)