

FoG Submission instructions (2021)

Internationally collected, standardized dataset on changes in glaciers (length, area, volume, mass) based on in-situ and remotely sensed observations, as well as on reconstructions.

Consider the following steps when preparing a data submission:

1. Check if the glacier already exists in the `GLACIER` table. If so, note its `WGMS_ID`, and if not, add a row to `GLACIER` with a new `WGMS_ID` (that may later be reassigned by the WGMS). Use this `WGMS_ID` in all other tables to refer back to this glacier.
2. When submitting a new glacier, use `GLACIER_ID_LUT` if you know the glacier's identifier in other databases. This table is completed as needed by the WGMS, but any help is appreciated.
3. For standalone observations of glacier length, area, or elevation, use `STATE`.
4. For changes in glacier thickness, area, or volume (typically from geodetic surveys), use `CHANGE`.
5. Length changes go in one of two places, depending on the method used:
 - For direct measurements, use `FRONT_VARIATION`.
 - For reconstructions from historic records or geologic dating:
 - Add a row to `RECONSTRUCTION_SERIES` for each glacier series with a temporary `REC_SERIES_ID` (that may later be reassigned by the WGMS).
 - Add rows to `RECONSTRUCTION_FRONT_VARIATION`, using the `REC_SERIES_ID` of the corresponding `RECONSTRUCTION_SERIES`.
6. Mass balance (measured only by the direct glaciological method) is split across three tables:
 - Add a row to `MASS_BALANCE_OVERVIEW` for each glacier (`WGMS_ID`) and year (`YEAR`).
 - Add rows to `MASS_BALANCE_POINT` for point measurements and/or `MASS_BALANCE` for mass balance by elevation band, using the `WGMS_ID` and `YEAR` of the corresponding `MASS_BALANCE_OVERVIEW`.
7. For extraordinary events concerning glaciers, use `SPECIAL_EVENT`.

Tables: `GLACIER` | `GLACIER_ID_LUT` | `STATE` | `CHANGE` | `FRONT_VARIATION` | `MASS_BALANCE_OVERVIEW` | `MASS_BALANCE` | `MASS_BALANCE_POINT` | `SPECIAL_EVENT` | `RECONSTRUCTION_SERIES` | `RECONSTRUCTION_FRONT_VARIATION`

GLACIER

General (and presumably static) information about each glacier.

When submitting a new glacier, assign a temporary `WGMS_ID` and use this as the `WGMS_ID` in all other table rows that correspond to this glacier. For existing information about the glacier, consider checking the World Glacier Inventory (http://nsidc.org/data/glacier_inventory) or GLIMS (<http://www.glims.org>).

Columns: `WGMS_ID` | `NAME` | `POLITICAL_UNIT` | `GEN_LOCATION` | `SPEC_LOCATION` | `LATITUDE` | `LONGITUDE` | `PRIM_CLASSIFIC` | `FORM` | `FRONTAL_CHARS` | `EXPOS_ACC_AREA` | `EXPOS_ABL_AREA` | `PARENT_GLACIER` | `REMARKS`

`WGMS_ID` Glacier identifier

- description** 5-digit key identifying glaciers in the Fluctuations of Glaciers (FoG) database. For new glacier entries, this key is assigned by the WGMS.
- example** 389
- type** integer
- constraints**
 - required** True
 - minimum** 0
 - maximum** 99999
 - unique** True

`NAME` Glacier name

- description** The name of the glacier, written in capital letters (A-Z).

In order to ensure global interoperability of our dataset, glacier names should only contain the following characters: A-Z (A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z), 0-9 (0, 1, 2, 3, 4, 5, 6, 7, 8, 9), - (dash), . (period), : (colon), () (parentheses), / (forward slash), ' (apostrophe), and (space). Characters which do not fall into the given range should be transliterated. If no Latin name exists, use the International Organization for Standardization (ISO) standards for transliteration (<https://www.iso.org/ics/01.140.10/x/>). If the Latin name contains accents, apply the following rules (Å → AA, Æ → AE, Ä → AE, ð → D, Ø → OE, œ → OE, Ö → OE, ß → SS, þ → TH, Ü → UE) and neglect any remaining accents.

If a name is too long, a meaningful abbreviation should be used. In this case, the full name should be listed in `REMARKS` .

- example** FINDELEN
- type** string
- constraints**
 - required** True
 - maxLength** 60
 - pattern** `[0-9A-Z\-\.\:\(\)\/'\+&,*=_]+([0-9A-Z\-\.\:\(\)\/'\+&,*=_]+)*`

`POLITICAL_UNIT` Glacier country

- description** Two-character code (ISO 3166 Alpha-2) of the country in which the glacier is located. A list of codes is available at <https://www.iso.org/obp/ui/#search/code>.
- example** CH
- type** string
- constraints**
 - required** True

- `enum` ['AF', 'AX', 'AL', 'DZ', 'AS', 'AD', 'AO', 'AI', 'AQ', 'AG', 'AR', 'AM', 'AW', 'AU', 'AT', 'AZ', 'BS', 'BH', 'BD', 'BB', 'BY', 'BE', 'BZ', 'BJ', 'BM', 'BT', 'BO', 'BQ', 'BA', 'BW', 'BV', 'BR', 'IO', 'BN', 'BG', 'BF', 'BI', 'CV', 'KH', 'CM', 'CA', 'KY', 'CF', 'TD', 'CL', 'CN', 'CX', 'CC', 'CO', 'KM', 'CD', 'CG', 'CK', 'CR', 'CI', 'HR', 'CU', 'CW', 'CY', 'CZ', 'DK', 'DJ', 'DM', 'DO', 'EC', 'EG', 'SV', 'GQ', 'ER', 'EE', 'SZ', 'ET', 'FK', 'FO', 'FJ', 'FI', 'FR', 'GF', 'PF', 'TF', 'GA', 'GM', 'GE', 'DE', 'GH', 'GI', 'GR', 'GL', 'GD', 'GP', 'GU', 'GT', 'GG', 'GN', 'GW', 'GY', 'HT', 'HM', 'VA', 'HN', 'HK', 'HU', 'IS', 'IN', 'ID', 'IR', 'IQ', 'IE', 'IM', 'IL', 'IT', 'JM', 'JP', 'JE', 'JO', 'KZ', 'KE', 'KI', 'KP', 'KR', 'KW', 'KG', 'LA', 'LV', 'LB', 'LS', 'LR', 'LY', 'LI', 'LT', 'LU', 'MO', 'MK', 'MG', 'MW', 'MY', 'MV', 'ML', 'MT', 'MH', 'MQ', 'MR', 'MU', 'YT', 'MX', 'FM', 'MD', 'MC', 'MN', 'ME', 'MS', 'MA', 'MZ', 'MM', 'NA', 'NR', 'NP', 'NL', 'NC', 'NZ', 'NI', 'NE', 'NG', 'NU', 'NF', 'MP', 'NO', 'OM', 'PK', 'PW', 'PS', 'PA', 'PG', 'PY', 'PE', 'PH', 'PN', 'PL', 'PT', 'PR', 'QA', 'RE', 'RO', 'RU', 'RW', 'BL', 'SH', 'KN', 'LC', 'MF', 'PM', 'VC', 'WS', 'SM', 'ST', 'SA', 'SN', 'RS', 'SC', 'SL', 'SG', 'SX', 'SK', 'SI', 'SB', 'SO', 'ZA', 'GS', 'SS', 'ES', 'LK', 'SD', 'SR', 'SJ', 'SE', 'CH', 'SY', 'TW', 'TJ', 'TZ', 'TH', 'TL', 'TG', 'TK', 'TO', 'TT', 'TN', 'TR', 'TM', 'TC', 'TV', 'UG', 'UA', 'AE', 'GB', 'UM', 'US', 'UY', 'UZ', 'VU', 'VE', 'VN', 'VG', 'VI', 'WF', 'EH', 'YE', 'ZM', 'ZW']

GEN_LOCATION General geographic location

- `description` Refers to a large geographic entity (e.g. a large mountain range or large political subdivision) which gives a rough idea of the location of the glacier, without requiring the use of a map or an atlas. Cannot contain leading (' '), *trailing* (' '), or consecutive (***) spaces.
- `example` Western Alps
- `type` string
- `constraints`
 - `maxLength` 30
 - `pattern` `[\s]+([\s]+)*`

SPEC_LOCATION Specific geographic location

- `description` Refers to a more specific geographic location (e.g. a drainage basin or mountain subrange), which can be found easily on a small scale map of the country. Cannot contain leading (' '), *trailing* (' '), or consecutive (***) spaces.
- `example` Rhone Basin
- `type` string
- `constraints`
 - `maxLength` 30
 - `pattern` `[\s]+([\s]+)*`

LATITUDE Glacier latitude (°, WGS 84)

- `description` Latitude in decimal degrees (°, WGS 84). Positive values indicate the northern hemisphere and negative values indicate the southern hemisphere. The point (`LATITUDE` , `LONGITUDE`) should be in the main channel in the upper part of the glacier ablation area.
- `example` 45.9926
- `type` number
- `constraints`
 - `required` True
 - `minimum` -90
 - `maximum` 90

LONGITUDE Glacier longitude (°, WGS 84)

- **description** Longitude in decimal degrees (°, WGS 84). Positive values indicate east of the zero meridian and negative values indicate west of the zero meridian. The point (**LATITUDE** , **LONGITUDE**) should be in the main channel in the upper part of the glacier ablation area.
- **example** 7.8803
- **type** number
- **constraints**
 - **required** True
 - **minimum** -180
 - **maximum** 180

PRIM_CLASSIFIC Primary classification

- **description** Glacier primary classification per [Perennial ice and snow masses \(UNESCO/IAHS, 1970\)](#):
 - 0 (Other): Any type not listed below (please explain in **REMARKS**).
 - 1 (Continental ice sheet): Inundates areas of continental size.
 - 2 (Icefield): Ice masses of sheet or blanket type of a thickness that is insufficient to obscure the subsurface topography.
 - 3 (Ice cap): Dome-shaped ice masses with radial flow.
 - 4 (Outlet glacier): Drains an ice sheet, icefield or ice cap, usually of valley glacier form. The catchment area may not be easily defined.
 - 5 (Valley glacier): Flows down a valley. The catchment area is well defined.
 - 6 (Mountain glacier): Cirque, niche or crater type, hanging glacier. Includes ice aprons and groups of small units.
 - 7 (Glacieret and snowfield): Small ice masses of indefinite shape in hollows, river beds and on protected slopes, which has developed from snow drifting, avalanching, and/or particularly heavy accumulation in certain years. Usually no marked flow pattern is visible. In existence for at least two consecutive years.
 - 8 (Ice shelf): Floating ice sheet of considerable thickness attached to a coast nourished by a glacier(s). Snow accumulation on its surface or bottom freezing.
 - 9 (Rock glacier): Lava-stream-like debris mass containing ice in several possible forms and moving slowly downslope.

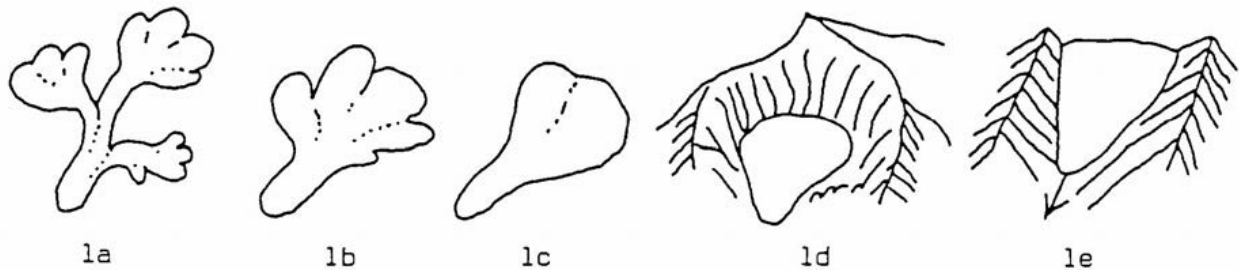
Note: **PARENT_GLACIER** can be used to classify complex glacier systems – for example, ice caps with outlet glaciers and glaciers splitting into multiple glaciers over time.

- **example** 5
- **type** integer
- **constraints**
 - **enum** [0, 1, 2, 3, 4, 5, 6, 7, 8, 9]

FORM Form

- **description** Glacier form per [Perennial ice and snow masses \(UNESCO/IAHS, 1970\)](#):
 - 0 (Other): Any type not listed below (please explain in **REMARKS**).
 - 1 (Compound basins): Two or more individual valley glaciers issuing from tributary valleys and coalescing (Fig. 1a).
 - 2 (Compound basin): Two or more individual accumulation basins feeding one glacier system (Fig. 1b).
 - 3 (Simple basin): Single accumulation area (Fig. 1c).
 - 4 (Cirque): Occupies a separate, rounded, steep-walled recess which it has formed on a mountain side (Fig. 1d).

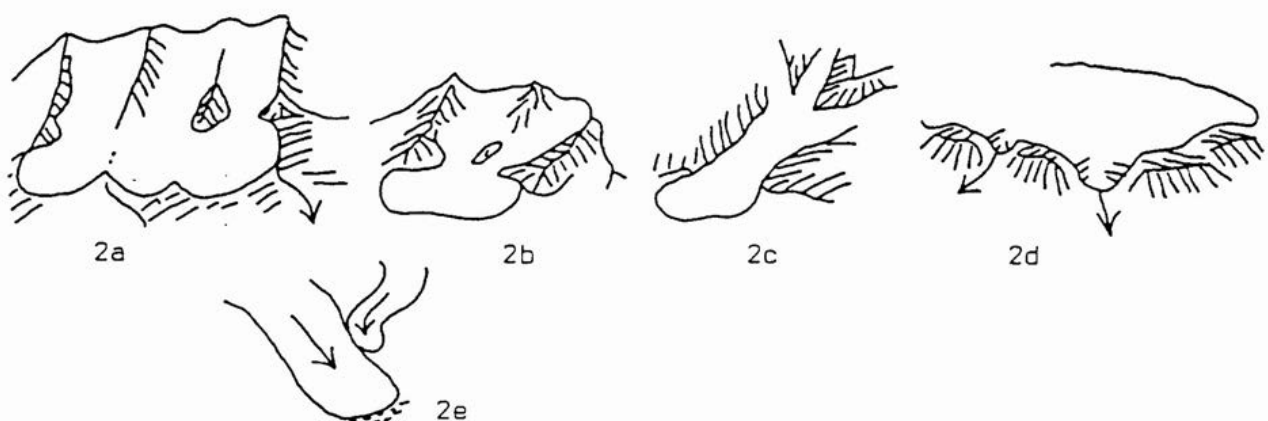
- 5 (Niche): Small glacier in a V-shaped gully or depression on a mountain slope (Fig. 1e). More common than a further-developed cirque glacier.
- 6 (Crater): Occurring in extinct or dormant volcanic craters.
- 7 (Ice apron): Irregular, usually thin ice mass which adheres to a mountain slope or ridge.
- 8 (Group): A number of similar ice masses occurring in close proximity and too small to be assessed individually.
- 9 (Remnant): Inactive, usually small ice masses left by a receding glacier.



- example 1
- type integer
- constraints
 - enum [0, 1, 2, 3, 4, 5, 6, 7, 8, 9]

FRONTAL_CHARS Frontal characteristics

- description Glacier front characteristics per [Perennial ice and snow masses \(UNESCO/IAHS, 1970\)](#):
 - 0 (Other): Any type not listed below (please explain in REMARKS).
 - 1 (Piedmont): Icefield formed on a lowland area by lateral expansion of one or a coalescence of several glaciers (Fig. 2a, 2b).
 - 2 (Expanded foot): Lobe or fan formed where the lower portion of the glacier leaves the confining wall of a valley and extends onto a less restrictive and more level surface (Fig. 2c).
 - 3 (Lobed): Ice sheet or ice cap outlet glacier lacking a calving terminus (Fig. 2d).
 - 4 (Calving): Terminus of a glacier sufficiently extended into sea or lake water to produce icebergs. Includes - for this inventory - dry land calving which would be recognisable from the “lowest glacier elevation”.
 - 5: Coalescing, non-contributing (Fig. 2e).
 - 6: Irregular, mainly clean ice (mountain or valley glaciers).
 - 7: Irregular, debris-covered (mountain or valley glaciers).
 - 8: Single lobe, mainly clean ice (mountain or valley glaciers).
 - 9: Single lobe, debris-covered (mountain or valley glaciers).



- `example` 6
- `type` integer
- `constraints`
 - `enum` [0, 1, 2, 3, 4, 5, 6, 7, 8, 9]

EXPOS_ACC_AREA Exposure (aspect) of accumulation area

- `description` Main orientation of the accumulation area using an 8-point compass.
- `example` NW
- `type` string
- `constraints`
 - `enum` ['N', 'NE', 'E', 'SE', 'S', 'SW', 'W', 'NW']

EXPOS_ABL_AREA Exposure (aspect) of ablation area

- `description` Main orientation of the ablation area using an 8-point compass.
- `example` W
- `type` string
- `constraints`
 - `enum` ['N', 'NE', 'E', 'SE', 'S', 'SW', 'W', 'NW']

PARENT_GLACIER Parent glacier identifier

- `description` Parent glacier `WGMS_ID` . Used to link glaciers to their (former) parent glacier.
- `example` 789
- `type` integer
- `constraints`
 - `minimum` 0
 - `maximum` 99999

REMARKS Remarks

- `description` Any important information or comments not included elsewhere. Cannot contain leading ('), *trailing* (' '), or consecutive (***) spaces.
- `example` Example data. Should not be used for science.
- `type` string
- `constraints`
 - `pattern` `[\s]+([\s]+)*`

GLACIER_ID_LUT

Links glaciers in this database (`GLACIER.WGMS_ID`) to glacier identifiers in other databases.

Columns: `WGMS_ID` | `NAME` | `POLITICAL_UNIT` | `PSFG_ID` | `WGI_ID` | `GLIMS_ID` | `RGI_ID` | `REMARKS`

WGMS_ID Glacier identifier

- **description** 5-digit key identifying glaciers in the Fluctuations of Glaciers (FoG) database. For new glacier entries, this key is assigned by the WGMS.
- **example** 389
- **type** integer
- **constraints**
 - **required** True
 - **minimum** 0
 - **maximum** 99999
 - **unique** True

NAME Glacier name

- **description** The name of the glacier. Must match `GLACIER.NAME` for the corresponding `WGMS_ID` .
- **example** FINDELEN
- **type** string
- **constraints**
 - **required** True

POLITICAL_UNIT Glacier country

- **description** Two-character code (ISO 3166 Alpha-2) of the country in which the glacier is located. Must match `GLACIER.POLITICAL_UNIT` for the corresponding `WGMS_ID` .
- **example** CH
- **type** string
- **constraints**
 - **required** True

PSFG_ID Permanent Service for the Fluctuations of Glaciers (PSFG) ID

- **description** Glacier ID in the publications of the Permanent Service for the Fluctuations of Glaciers (PSFG), a predecessor of the WGMS. The ID was assigned by the national correspondents following existing glacier inventories. It consists of 6-7 characters: a 2-character political unit, a 4-character zero-padded integer, and an optional tag.
- **example** CH0016
- **type** string
- **constraints**
 - **minLength** 6
 - **maxLength** 7
 - **pattern** `[A-Z]{2}[0-9]{4}[0-9A-Z]?`

WGI_ID World Glacier Inventory (WGI) ID

- **description** Glacier ID in the World Glacier Inventory

(<https://nsidc.org/data/g01130/versions/1/documentation>). The ID is constructed from the following elements:

- 2-character political unit
- 1-character continent code
- 4-character drainage code
- 2-character free position code
- 3-character local glacier code
- `example` CH4N01356003
- `type` string
- `constraints`
 - `minLength` 12
 - `maxLength` 12
 - `pattern` `[A-Z]{2}[1-7][0-9A-Z]{9}`

GLIMS_ID Global Land Ice Measurements from Space (GLIMS) ID

- `description` Glacier ID in the Global Land Ice Measurements from Space database (<http://www.glims.org/MapsAndDocs>). The ID has the format `GxxxxxxEyyyyyθ`, where `xxxxxx` is longitude east of the Greenwich meridian in millidegrees, `yyyyy` is north or south latitude in millidegrees, and `θ` is N or S depending on the hemisphere.
- `example` G007880E45990N
- `type` string
- `constraints`
 - `minLength` 14
 - `maxLength` 14
 - `pattern` `G[0-9]{6}E[0-9]{5}[NS]`

RGI_ID Randolph Glacier Inventory (RGI) ID

- `description` Glacier ID in the Randolph Glacier Inventory (<http://www.glims.org/RGI>). The ID has the format `RGIvv-rr.nnnnn`, where `vv` is the RGI version, `rr` is the first-order region (zero-padded), and `nnnnn` is an arbitrary numeric code (which is not necessarily the same across RGI versions).
- `example` RGI60-11.02773
- `type` string
- `constraints`
 - `minLength` 14
 - `maxLength` 14
 - `pattern` `RGI[4-6][0]-[0-1][0-9].[0-9]{5}`

REMARKS Remarks

- `description` Any important information or comments not included elsewhere. Cannot contain leading ('), *trailing* (' '), or consecutive ('*') spaces.
- `example` Example data. Should not be used for science.
- `type` string
- `constraints`
 - `pattern` `[\s]+([\s]+)*`

STATE

Glacier length, area, and elevation range.

Columns: `WGMS_ID` | `NAME` | `POLITICAL_UNIT` | `SURVEY_DATE` | `HIGHEST_ELEVATION` | `MEDIAN_ELEVATION` | `LOWEST_ELEVATION` | `ELEVATION UNC` | `LENGTH` | `LENGTH UNC` | `AREA` | `AREA UNC` | `SURVEY_PLATFORM_METHOD` | `INVESTIGATOR` | `SPONS_AGENCY` | `REFERENCE` | `REMARKS`

`WGMS_ID` Glacier identifier

- **description** 5-digit key identifying glaciers in the Fluctuations of Glaciers (FoG) database. For new glacier entries, this key is assigned by the WGMS.
- **example** 389
- **type** integer
- **constraints**
 - **required** True
 - **minimum** 0
 - **maximum** 99999

`NAME` Glacier name

- **description** The name of the glacier. Must match `GLACIER.NAME` for the corresponding `WGMS_ID`.
- **example** FINDELEN
- **type** string
- **constraints**
 - **required** True

`POLITICAL_UNIT` Glacier country

- **description** Two-character code (ISO 3166 Alpha-2) of the country in which the glacier is located. Must match `GLACIER.POLITICAL_UNIT` for the corresponding `WGMS_ID`.
- **example** CH
- **type** string
- **constraints**
 - **required** True

`SURVEY_DATE` Survey date

- **description** Date formatted as YYYYMMDD (4-digit year, 2-digit month, and 2-digit day). Use '99' to designate unknown day or month (e.g. 20100199, 20109999) and make a note in `REMARKS`.
- **example** 19940906
- **type** string
- **constraints**
 - **pattern** `(1[0-9]{3}|20[0-1][0-9]|202[0-1])(0[1-9]|1[0-2]|99)(0[1-9]|[1-2][0-9]|3[0-1]|99)`

`HIGHEST_ELEVATION` Highest glacier elevation (m)

- **description** Highest elevation on the glacier (m).
- **example** 3370
- **type** integer
- **constraints**

- minimum 0
- maximum 9000

MEDIAN_ELEVATION Median elevation of glacier (m)

- description Elevation of the contour line (m) which cuts the glacier into two parts of equal area.
- example 2920
- type integer
- constraints
 - minimum 0
 - maximum 9000

LOWEST_ELEVATION Lowest glacier elevation (m)

- description Lowest elevation on the glacier (m).
- example 2370
- type integer
- constraints
 - minimum 0
 - maximum 9000

ELEVATION_UNC Elevation uncertainty (m)

- description Estimated random error of reported elevations (m).
- example 10
- type number
- constraints
 - minimum 0

LENGTH Glacier length (km)

- description Maximum length of glacier (km) measured along the main flowline.
- example 6.2
- type number
- constraints
 - minimum 0

LENGTH_UNC Length uncertainty (km)

- description Estimated random error of reported length (km).
- example 0.005
- type number
- constraints
 - minimum 0

AREA Glacier area (km²)

- description Glacier area (km²).
- example 2.55
- type number
- constraints

- `minimum` 0

AREA_UNC Area uncertainty (km²)

- `description` Estimated random error of reported area (km²).
- `example` 0.01
- `type` number
- `constraints`
 - `minimum` 0

SURVEY_PLATFORM_METHOD Survey platform & method

- `description` Survey platform (first digit, lowercase):
 - t: Terrestrial
 - a: Airborne
 - s: Spaceborne
 - c: Combined (explain in `REMARKS`)
 - x: Unknown or other (explain in `REMARKS`)

Survey method (second digit, uppercase):

- R: Reconstructed (e.g. historical sources, geomorphic evidence, dating of moraines)
- M: Derived from maps
- G: Ground survey (e.g. GPS, tachymetry, tape measure)
- P: Photogrammetry
- L: Laser altimetry or scanning
- Z: Radar altimetry or interferometry
- C: Combined (explain in `REMARKS`)
- X: Unknown of other (explain in `REMARKS`)
- `example` aP
- `type` string
- `constraints`
 - `enum` ['tR', 'tM', 'tG', 'tP', 'tL', 'tZ', 'tC', 'tX', 'aR', 'aM', 'aG', 'aP', 'aL', 'aZ', 'aC', 'aX', 'sR', 'sM', 'sG', 'sP', 'sL', 'sZ', 'sC', 'sX', 'cR', 'cM', 'cG', 'cP', 'cL', 'cZ', 'cC', 'cX', 'xR', 'xM', 'xG', 'xP', 'xL', 'xZ', 'xC', 'xX']

INVESTIGATOR Investigators

- `description` Names of the persons or agencies that performed the survey or processed the data. Cannot contain leading (' '), *trailing* (' '), or consecutive ('* *') spaces.
- `example` Michael Zemp
- `type` string
- `constraints`
 - `maxLength` 255
 - `pattern` `[^\s]+([^\s]+)*`

SPONS_AGENCY Sponsoring agencies

- `description` Full name, abbreviation and address of the agencies that sponsored the survey or archived the data. Cannot contain leading (' '), *trailing* (' '), or consecutive ('* *') spaces.

- **example** World Glacier Monitoring Service (WGMS), University of Zurich, Wintherthurerstr. 190, 8057 Zurich, Switzerland
- **type** string
- **constraints**
 - **maxLength** 255
 - **pattern** `[\s]+([\s]+)*`

REFERENCE References

- **description** References to publications related to the data or methods. Use a short format such as Author et al. YYYY (URL) if a canonical URL is available (e.g. <https://doi.org/DOI>). Cannot contain leading ('), *trailing* (' '), or consecutive (***) spaces.
- **example** Author et al. YYYY (<https://doi.org/DOI>)
- **type** string
- **constraints**
 - **maxLength** 255
 - **pattern** `[\s]+([\s]+)*`

REMARKS Remarks

- **description** Any important information or comments not included elsewhere. Cannot contain leading ('), *trailing* (' '), or consecutive (***) spaces.
- **example** Example data. Should not be used for science.
- **type** string
- **constraints**
 - **pattern** `[\s]+([\s]+)*`

CHANGE

Change in glacier thickness, area, and/or volume – typically from geodetic surveys.

Columns: `WGMS_ID` | `NAME` | `POLITICAL_UNIT` | `SURVEY_ID` | `SURVEY_DATE` | `REFERENCE_DATE` | `LOWER_BOUND` | `UPPER_BOUND` | `AREA_SURVEY_YEAR` | `AREA_CHANGE` | `AREA_CHANGE_UNC` | `THICKNESS_CHG` | `THICKNESS_CHG_UNC` | `VOLUME_CHANGE` | `VOLUME_CHANGE_UNC` | `SD_PLATFORM_METHOD` | `RD_PLATFORM_METHOD` | `INVESTIGATOR` | `SPONS_AGENCY` | `REFERENCE` | `REMARKS`

`WGMS_ID` Glacier identifier

- **description** 5-digit key identifying glaciers in the Fluctuations of Glaciers (FoG) database. For new glacier entries, this key is assigned by the WGMS.
- **example** 389
- **type** integer
- **constraints**
 - **required** True
 - **minimum** 0
 - **maximum** 99999

`NAME` Glacier name

- **description** The name of the glacier. Must match `GLACIER.NAME` for the corresponding `WGMS_ID`.
- **example** FINDELEN
- **type** string
- **constraints**
 - **required** True

`POLITICAL_UNIT` Glacier country

- **description** Two-character code (ISO 3166 Alpha-2) of the country in which the glacier is located. Must match `GLACIER.POLITICAL_UNIT` for the corresponding `WGMS_ID`.
- **example** CH
- **type** string
- **constraints**
 - **required** True

`SURVEY_ID` Survey ID

- **description** Numeric key identifying data records related to a specific glacier survey. This key is assigned by the WGMS in order to distinguish results from different surveys (and sources) for the same glacier and survey period.
- **example** 288
- **type** integer
- **constraints**
 - **minimum** 1

`SURVEY_DATE` Survey date

- **description** Date formatted as YYYYMMDD (4-digit year, 2-digit month, and 2-digit day). Use '99' to designate unknown day or month (e.g. 20100199, 20109999) and make a note in `REMARKS`.

- `example` 19940906
- `type` string
- `constraints`
 - `pattern` `(1[0-9]{3}|20[0-1][0-9]|202[0-1])(0[1-9]|1[0-2]|99)(0[1-9]|1[1-2][0-9]|3[0-1]|99)`

REFERENCE_DATE Reference survey date

- `description` Date formatted as YYYYMMDD (4-digit year, 2-digit month, and 2-digit day). Use '99' to designate unknown day or month (e.g. 20100199, 20109999) and make a note in `REMARKS` .
- `example` 19931002
- `type` string
- `constraints`
 - `pattern` `(1[0-9]{3}|20[0-1][0-9]|202[0-1])(0[1-9]|1[0-2]|99)(0[1-9]|1[1-2][0-9]|3[0-1]|99)`

LOWER_BOUND Lower elevation bound (m)

- `description` Lower boundary of the surface elevation band (m), or 9999 if referring to the entire glacier.
- `example` 2500
- `type` integer
- `constraints`
 - `minimum` 0
 - `maximum` 9999

UPPER_BOUND Upper elevation bound (m)

- `description` Upper boundary of the surface elevation band (m), or 9999 if referring to the entire glacier.
- `example` 2600
- `type` integer
- `constraints`
 - `minimum` 0
 - `maximum` 9999

AREA_SURVEY_YEAR Glacier area (km²)

- `description` Glacier area (km²) of the elevation band at the time of `SURVEY_DATE` .
- `example` 0.071
- `type` number
- `constraints`
 - `minimum` 0

AREA_CHANGE Area change (1000 m²)

- `description` Change in area (1000 m²) for the elevation band.
- `example` -19
- `type` number

AREA_CHANGE_UNC Area change uncertainty (1000 m²)

- `description` Estimated random error of `AREA_CHANGE` (1000 m²).
- `example` 0.1
- `type` number

- `constraints`
 - `minimum` 0

`THICKNESS_CHG` Thickness change (mm)

- `description` Mean change in ice thickness (mm) for the elevation band.
- `example` -5976
- `type` number

`THICKNESS_CHG_UNC` Thickness change uncertainty (mm)

- `description` Estimated random error of `THICKNESS_CHG` (mm).
- `example` 10
- `type` number
- `constraints`
 - `minimum` 0

`VOLUME_CHANGE` Volume change (1000 m³)

- `description` Change in ice volume (1000 m³) for the elevation band.
- `example` -424
- `type` number

`VOLUME_CHANGE_UNC` Volume change uncertainty (1000 m³)

- `description` Estimated random error of `VOLUME_CHANGE` (1000 m³).
- `example` 5
- `type` number
- `constraints`
 - `minimum` 0

`SD_PLATFORM_METHOD` Survey platform & method

- `description` Survey platform (first digit, lowercase):
 - t: Terrestrial
 - a: Airborne
 - s: Spaceborne
 - c: Combined (explain in `REMARKS`)
 - x: Unknown or other (explain in `REMARKS`)

Survey method (second digit, uppercase):

- R: Reconstructed (e.g. historical sources, geomorphic evidence, dating of moraines)
- M: Derived from maps
- G: Ground survey (e.g. GPS, tachymetry, tape measure)
- P: Photogrammetry
- L: Laser altimetry or scanning
- Z: Radar altimetry or interferometry
- C: Combined (explain in `REMARKS`)
- X: Unknown of other (explain in `REMARKS`)

- `example` aP
- `type` string
- `constraints`
 - `enum` ['tR', 'tM', 'tG', 'tP', 'tL', 'tZ', 'tC', 'tX', 'aR', 'aM', 'aG', 'aP', 'aL', 'aZ', 'aC', 'aX', 'sR', 'sM', 'sG', 'sP', 'sL', 'sZ', 'sC', 'sX', 'cR', 'cM', 'cG', 'cP', 'cL', 'cZ', 'cC', 'cX', 'xR', 'xM', 'xG', 'xP', 'xL', 'xZ', 'xC', 'xX']

RD_PLATFORM_METHOD Reference survey platform & method

- `description` Survey platform (first digit, lowercase):
 - t: Terrestrial
 - a: Airborne
 - s: Spaceborne
 - c: Combined (explain in `REMARKS`)
 - x: Unknown or other (explain in `REMARKS`)

Survey method (second digit, uppercase):

- R: Reconstructed (e.g. historical sources, geomorphic evidence, dating of moraines)
- M: Derived from maps
- G: Ground survey (e.g. GPS, tachymetry, tape measure)
- P: Photogrammetry
- L: Laser altimetry or scanning
- Z: Radar altimetry or interferometry
- C: Combined (explain in `REMARKS`)
- X: Unknown of other (explain in `REMARKS`)
- `example` tG
- `type` string
- `constraints`
 - `enum` ['tR', 'tM', 'tG', 'tP', 'tL', 'tZ', 'tC', 'tX', 'aR', 'aM', 'aG', 'aP', 'aL', 'aZ', 'aC', 'aX', 'sR', 'sM', 'sG', 'sP', 'sL', 'sZ', 'sC', 'sX', 'cR', 'cM', 'cG', 'cP', 'cL', 'cZ', 'cC', 'cX', 'xR', 'xM', 'xG', 'xP', 'xL', 'xZ', 'xC', 'xX']

INVESTIGATOR Investigators

- `description` Names of the persons or agencies that performed the survey or processed the data. Cannot contain leading (' '), *trailing* (' '), or consecutive ('* *') spaces.
- `example` Michael Zemp
- `type` string
- `constraints`
 - `maxLength` 255
 - `pattern` `[\s]+([\s]+)*`

SPONS_AGENCY Sponsoring agencies

- `description` Full name, abbreviation and address of the agencies that sponsored the survey or archived the data. Cannot contain leading (' '), *trailing* (' '), or consecutive ('* *') spaces.
- `example` World Glacier Monitoring Service (WGMS), University of Zurich, Wintherthurerstr. 190, 8057 Zurich, Switzerland
- `type` string

- **constraints**
 - **maxLength** 255
 - **pattern** `[\s]+([\s]+)*`

REFERENCE References

- **description** References to publications related to the data or methods. Use a short format such as Author et al. YYYY (URL) if a canonical URL is available (e.g. <https://doi.org/DOI>). Cannot contain leading ('), *trailing* (' '), or consecutive (***) spaces.
- **example** Author et al. YYYY (<https://doi.org/DOI>)
- **type** string
- **constraints**
 - **maxLength** 255
 - **pattern** `[\s]+([\s]+)*`

REMARKS Remarks

- **description** Any important information or comments not included elsewhere. Cannot contain leading ('), *trailing* (' '), or consecutive (***) spaces.
- **example** Example data. Should not be used for science.
- **type** string
- **constraints**
 - **pattern** `[\s]+([\s]+)*`

FRONT_VARIATION

Glacier length changes from in-situ and remote sensing measurements.

Columns: WGMS_ID | NAME | POLITICAL_UNIT | SURVEY_DATE | REFERENCE_DATE | FRONT_VARIATION | FRONT_VAR_UNC | QUALITATIVE_VARIATION | SURVEY_PLATFORM_METHOD | INVESTIGATOR | SPONS_AGENCY | REFERENCE | REMARKS

WGMS_ID Glacier identifier

- **description** 5-digit key identifying glaciers in the Fluctuations of Glaciers (FoG) database. For new glacier entries, this key is assigned by the WGMS.
- **example** 389
- **type** integer
- **constraints**
 - **required** True
 - **minimum** 0
 - **maximum** 99999

NAME Glacier name

- **description** The name of the glacier. Must match `GLACIER.NAME` for the corresponding `WGMS_ID`.
- **example** FINDELEN
- **type** string
- **constraints**
 - **required** True

POLITICAL_UNIT Glacier country

- **description** Two-character code (ISO 3166 Alpha-2) of the country in which the glacier is located. Must match `GLACIER.POLITICAL_UNIT` for the corresponding `WGMS_ID`.
- **example** CH
- **type** string
- **constraints**
 - **required** True

SURVEY_DATE Survey date

- **description** Date formatted as YYYYMMDD (4-digit year, 2-digit month, and 2-digit day). Use '99' to designate unknown day or month (e.g. 20100199, 20109999) and make a note in `REMARKS`.
- **example** 19940906
- **type** string
- **constraints**
 - **pattern** `(1[0-9]{3}|20[0-1][0-9]|202[0-1])(0[1-9]|1[0-2]|99)(0[1-9]|[1-2][0-9]|3[0-1]|99)`

REFERENCE_DATE Reference survey date

- **description** Date formatted as YYYYMMDD (4-digit year, 2-digit month, and 2-digit day). Use '99' to designate unknown day or month (e.g. 20100199, 20109999) and make a note in `REMARKS`.
- **example** 19931002
- **type** string

- **constraints**
 - **pattern** (1[0-9]{3}|20[0-1][0-9]|202[0-1])(0[1-9]|1[0-2]|99)(0[1-9]|1[1-2][0-9]|3[0-1]|99)

FRONT_VARIATION Front variation (m)

- **description** Variation in the position of the glacier front (m) between **REFERENCE_DATE** and **SURVEY_DATE** (positive: advance, negative: retreat).
- **example** -17
- **type** number

FRONT_VAR_UNC Front variation uncertainty (m)

- **description** Estimated random error of reported front variation (m).
- **example** 1
- **type** number
- **constraints**
 - **minimum** 0

QUALITATIVE_VARIATION Qualitative front variation

- **description** Qualitative front variation (in the absence of a quantitative measurement) between **REFERENCE_DATE** and **SURVEY_DATE** .
 - X: Glacier in advance
 - -X: Glacier in retreat
 - ST: Glacier stationary
 - SN: Glacier front covered by snow making survey impossible
- **example** -X
- **type** string
- **constraints**
 - **enum** ['X', '-X', 'ST', 'SN']

SURVEY_PLATFORM_METHOD Survey platform & method

- **description** Survey platform (first digit, lowercase):
 - t: Terrestrial
 - a: Airborne
 - s: Spaceborne
 - c: Combined (explain in **REMARKS**)
 - x: Unknown or other (explain in **REMARKS**)

Survey method (second digit, uppercase):

- R: Reconstructed (e.g. historical sources, geomorphic evidence, dating of moraines)
- M: Derived from maps
- G: Ground survey (e.g. GPS, tachymetry, tape measure)
- P: Photogrammetry
- L: Laser altimetry or scanning
- Z: Radar altimetry or interferometry
- C: Combined (explain in **REMARKS**)
- X: Unknown of other (explain in **REMARKS**)

- `example` aP
- `type` string
- `constraints`
 - `enum` ['tR', 'tM', 'tG', 'tP', 'tL', 'tZ', 'tC', 'tX', 'aR', 'aM', 'aG', 'aP', 'aL', 'aZ', 'aC', 'aX', 'sR', 'sM', 'sG', 'sP', 'sL', 'sZ', 'sC', 'sX', 'cR', 'cM', 'cG', 'cP', 'cL', 'cZ', 'cC', 'cX', 'xR', 'xM', 'xG', 'xP', 'xL', 'xZ', 'xC', 'xX']

INVESTIGATOR Investigators

- `description` Names of the persons or agencies that performed the survey or processed the data. Cannot contain leading (' '), *trailing* (' '), or consecutive ('*') spaces.
- `example` Michael Zemp
- `type` string
- `constraints`
 - `maxLength` 255
 - `pattern` `[\s]+([\s]+)*`

SPONS_AGENCY Sponsoring agencies

- `description` Full name, abbreviation and address of the agencies that sponsored the survey or archived the data. Cannot contain leading (' '), *trailing* (' '), or consecutive ('*') spaces.
- `example` World Glacier Monitoring Service (WGMS), University of Zurich, Wintherturerstr. 190, 8057 Zurich, Switzerland
- `type` string
- `constraints`
 - `maxLength` 255
 - `pattern` `[\s]+([\s]+)*`

REFERENCE References

- `description` References to publications related to the data or methods. Use a short format such as Author et al. YYYY (URL) if a canonical URL is available (e.g. <https://doi.org/DOI>). Cannot contain leading (' '), *trailing* (' '), or consecutive ('*') spaces.
- `example` Author et al. YYYY (<https://doi.org/DOI>)
- `type` string
- `constraints`
 - `maxLength` 255
 - `pattern` `[\s]+([\s]+)*`

REMARKS Remarks

- `description` Any important information or comments not included elsewhere. Cannot contain leading (' '), *trailing* (' '), or consecutive ('*') spaces.
- `example` Example data. Should not be used for science.
- `type` string
- `constraints`
 - `pattern` `[\s]+([\s]+)*`

MASS_BALANCE_OVERVIEW

Overview of glacier mass balance surveys.

When submitting a mass balance survey, ensure that the corresponding rows in `MASS_BALANCE` and `MASS_BALANCE_POINT` have the same `WGMS_ID` and `YEAR` as the survey.

Columns: `WGMS_ID` | `NAME` | `POLITICAL_UNIT` | `YEAR` | `TIME_SYSTEM` | `BEGIN_PERIOD` | `END_WINTER` | `END_PERIOD` | `ELA_PREFIX` | `ELA` | `ELA_UNC` | `MIN_SITES_ACC` | `MAX_SITES_ACC` | `MIN_SITES_ABL` | `MAX_SITES_ABL` | `ACC_AREA` | `ACC_AREA_UNC` | `ABL_AREA` | `ABL_AREA_UNC` | `AAR` | `INVESTIGATOR` | `SPONS_AGENCY` | `REFERENCE` | `REMARKS`

WGMS_ID Glacier identifier

- **description** 5-digit key identifying glaciers in the Fluctuations of Glaciers (FoG) database. For new glacier entries, this key is assigned by the WGMS.
- **example** 389
- **type** integer
- **constraints**
 - **required** True
 - **minimum** 0
 - **maximum** 99999

NAME Glacier name

- **description** The name of the glacier. Must match `GLACIER.NAME` for the corresponding `WGMS_ID`.
- **example** FINDELEN
- **type** string
- **constraints**
 - **required** True

POLITICAL_UNIT Glacier country

- **description** Two-character code (ISO 3166 Alpha-2) of the country in which the glacier is located. Must match `GLACIER.POLITICAL_UNIT` for the corresponding `WGMS_ID`.
- **example** CH
- **type** string
- **constraints**
 - **required** True

YEAR Year

- **description** Survey year.
- **example** 2004
- **type** year
- **constraints**
 - **required** True
 - **maximum** 2021

TIME_SYSTEM Time measurement system

- **description** Time measurement system for the measurement of annual mass balance:

- FLO: Floating-date
- FXD: Fixed-date
- STR: Stratigraphic
- COM: Combined - usually STR and FXD per Mayo et al. 1972 (<https://doi.org/10.3189/S0022143000022449>)
- OTH: Other - please explain in `REMARKS`

See Cogley et al. 2011 (<https://doi.org/10.5167/uzh-53475>) for details on the above time measurement systems. Please give floating dates for `BEGIN_PERIOD`, `END_PERIOD` and `END_WINTER` regardless of system and explain methodological details (e.g. fixed dates and correction methods) in `REMARKS`.

Note that FLO was only introduced in 2011, so earlier mass balances based on the floating-date system are (at least theoretically) reported as OTH.

- `example` FLO
- `type` string
- `constraints`
 - `enum` ['FLO', 'FXD', 'STR', 'COM', 'OTH']

`BEGIN_PERIOD` Start date of survey

- `description` Date formatted as YYYYMMDD (4-digit year, 2-digit month, and 2-digit day). Use '99' to designate unknown day or month (e.g. 20100199, 20109999) and make a note in `REMARKS`.
- `example` 19930925
- `type` string
- `constraints`
 - `pattern` (1[0-9]{3}|20[0-1][0-9]|202[0-1])(0[1-9]|1[0-2]|99)(0[1-9]|[1-2][0-9]|3[0-1]|99)

`END_WINTER` End date of winter

- `description` Date formatted as YYYYMMDD (4-digit year, 2-digit month, and 2-digit day). Use '99' to designate unknown day or month (e.g. 20100199, 20109999) and make a note in `REMARKS`.
- `example` 19940513
- `type` string
- `constraints`
 - `pattern` (1[0-9]{3}|20[0-1][0-9]|202[0-1])(0[1-9]|1[0-2]|99)(0[1-9]|[1-2][0-9]|3[0-1]|99)

`END_PERIOD` End date of survey

- `description` Date formatted as YYYYMMDD (4-digit year, 2-digit month, and 2-digit day). Use '99' to designate unknown day or month (e.g. 20100199, 20109999) and make a note in `REMARKS`.
- `example` 19940929
- `type` string
- `constraints`
 - `pattern` (1[0-9]{3}|20[0-1][0-9]|202[0-1])(0[1-9]|1[0-2]|99)(0[1-9]|[1-2][0-9]|3[0-1]|99)

`ELA_PREFIX` Relative position of equilibrium line altitude (ELA)

- `description` Whether the equilibrium line altitude (ELA) was below ('<'), on (blank), or above ('>') the glacier.
- `type` string
- `constraints`
 - `enum` ['<', '>']

ELA Equilibrium line altitude (ELA) (m)

- **description** Mean elevation (m), averaged over the glacier, of the end-of-mass-balance-year equilibrium line. This should be the glacier minimum or maximum elevation if the ELA was below or above the glacier, respectively.
- **example** 2673
- **type** integer
- **constraints**
 - **minimum** 0
 - **maximum** 9000

ELA_UNC Equilibrium line altitude (ELA) uncertainty (m)

- **description** Estimated random error of ELA (m).
- **example** 10
- **type** number
- **constraints**
 - **minimum** 0

MIN_SITES_ACC Minimum number of measurement sites in the accumulation area

- **description** Minimum number of sites at which measurements were taken in the accumulation area. Minimum and maximum values can be used to indicate that different numbers of measurements were carried out for winter and annual mass balance surveys or for different measurement types (e.g. snow pits versus snow probings).
- **example** 5
- **type** integer
- **constraints**
 - **minimum** 0

MAX_SITES_ACC Maximum number of measurement sites in the accumulation area

- **description** Maximum number of sites at which measurements were taken in the accumulation area. Minimum and maximum values can be used to indicate that different numbers of measurements were carried out for winter and annual mass balance surveys or for different measurement types (e.g. snow pits versus snow probings).
- **example** 41
- **type** integer
- **constraints**
 - **minimum** 0

MIN_SITES_ABL Minimum number of measurement sites in the ablation area

- **description** Minimum number of measurement sites in the ablation area used for either the winter or annual mass balance surveys.
- **example** 17
- **type** integer
- **constraints**
 - **minimum** 0

MAX_SITES_ABL Maximum number of measurement sites in the ablation area

- **description** Maximum number of measurement sites in the ablation area used for either the winter or annual mass balance surveys.
- **example** 71
- **type** integer
- **constraints**
 - **minimum** 0

ACC_AREA Accumulation area (km²)

- **description** Accumulation area (km²).
- **example** 5.112
- **type** number
- **constraints**
 - **minimum** 0

ACC_AREA_UNC Accumulation area uncertainty (km²)

- **description** Estimated random error of ACC_AREA (km²).
- **example** 0.01
- **type** number
- **constraints**
 - **minimum** 0

ABL_AREA Ablation area (km²)

- **description** Ablation area (km²).
- **example** 1.218
- **type** number
- **constraints**
 - **minimum** 0

ABL_AREA_UNC Ablation area uncertainty (km²)

- **description** Estimated random error of ABL_AREA (km²).
- **example** 0.01
- **type** number
- **constraints**
 - **minimum** 0

AAR Accumulation area ratio (AAR) (%)

- **description** Accumulation area divided by the total glacier area, multiplied by 100 (%).
- **example** 81
- **type** integer
- **constraints**
 - **minimum** 0
 - **maximum** 100

INVESTIGATOR Investigators

- **description** Names of the persons or agencies that performed the survey or processed the data. Cannot

contain leading (' '), *trailing* (' '), or consecutive ('* ') spaces.

- **example** Michael Zemp
- **type** string
- **constraints**
 - **maxLength** 255
 - **pattern** `[\s]+([\s]+)*`

SPONS_AGENCY Sponsoring agencies

- **description** Full name, abbreviation and address of the agencies that sponsored the survey or archived the data. Cannot contain leading (' '), *trailing* (' '), or consecutive ('* ') spaces.
- **example** World Glacier Monitoring Service (WGMS), University of Zurich, Wintherthurerstr. 190, 8057 Zurich, Switzerland
- **type** string
- **constraints**
 - **maxLength** 255
 - **pattern** `[\s]+([\s]+)*`

REFERENCE References

- **description** References to publications related to the data or methods. Use a short format such as Author et al. YYYY (URL) if a canonical URL is available (e.g. <https://doi.org/DOI>). Cannot contain leading (' '), *trailing* (' '), or consecutive ('* ') spaces.
- **example** Author et al. YYYY (<https://doi.org/DOI>)
- **type** string
- **constraints**
 - **maxLength** 255
 - **pattern** `[\s]+([\s]+)*`

REMARKS Remarks

- **description** Any important information or comments not included elsewhere. Cannot contain leading (' '), *trailing* (' '), or consecutive ('* ') spaces.
- **example** Example data. Should not be used for science.
- **type** string
- **constraints**
 - **pattern** `[\s]+([\s]+)*`

MASS_BALANCE

Glacier mass balance measurements by elevation band.

Columns: `WGMS_ID` | `YEAR` | `NAME` | `POLITICAL_UNIT` | `LOWER_BOUND` | `UPPER_BOUND` | `AREA` | `WINTER_BALANCE` | `WINTER_BALANCE_UNC` | `SUMMER_BALANCE` | `SUMMER_BALANCE_UNC` | `ANNUAL_BALANCE` | `ANNUAL_BALANCE_UNC` | `REMARKS`

`WGMS_ID` Glacier identifier

- `description` 5-digit key identifying glaciers in the Fluctuations of Glaciers (FoG) database. For new glacier entries, this key is assigned by the WGMS.
- `example` 389
- `type` integer
- `constraints`
 - `required` True
 - `minimum` 0
 - `maximum` 99999

`YEAR` Year

- `description` Survey year.
- `example` 2004
- `type` year
- `constraints`
 - `required` True
 - `maximum` 2021

`NAME` Glacier name

- `description` The name of the glacier. Must match `GLACIER.NAME` for the corresponding `WGMS_ID` .
- `example` FINDELEN
- `type` string
- `constraints`
 - `required` True

`POLITICAL_UNIT` Glacier country

- `description` Two-character code (ISO 3166 Alpha-2) of the country in which the glacier is located. Must match `GLACIER.POLITICAL_UNIT` for the corresponding `WGMS_ID` .
- `example` CH
- `type` string
- `constraints`
 - `required` True

`LOWER_BOUND` Lower elevation bound (m)

- `description` Lower boundary of the surface elevation band (m), or 9999 if referring to the entire glacier.
- `example` 2500
- `type` integer
- `constraints`

- `minimum` 0
- `maximum` 9999

UPPER_BOUND Upper elevation bound (m)

- `description` Upper boundary of the surface elevation band (m), or 9999 if referring to the entire glacier.
- `example` 2600
- `type` integer
- `constraints`
 - `minimum` 0
 - `maximum` 9999

AREA Area (km²)

- `description` Area of the elevation band (km²).
- `example` 0.608
- `type` number
- `constraints`
 - `minimum` 0

WINTER_BALANCE Specific winter balance (mm m⁻² w.e.)

- `description` Area-normalized (“specific”) winter balance (mm m⁻² w.e.).
- `example` 1050
- `type` integer

WINTER_BALANCE_UNC Specific winter balance uncertainty (mm m⁻² w.e.)

- `description` Estimated random error of `WINTER_BALANCE` (mm m⁻² w.e.).
- `example` 50
- `type` integer
- `constraints`
 - `minimum` 0

SUMMER_BALANCE Specific summer balance (mm m⁻² w.e.)

- `description` Area-normalized (“specific”) summer balance (mm m⁻² w.e.).
- `example` -1920
- `type` integer

SUMMER_BALANCE_UNC Specific summer balance uncertainty (mm m⁻² w.e.)

- `description` Estimated random error of `SUMMER_BALANCE` (mm m⁻² w.e.).
- `example` 20
- `type` integer
- `constraints`
 - `minimum` 0

ANNUAL_BALANCE Specific annual balance (mm m⁻² w.e.)

- `description` Area-normalized (“specific”) annual balance (mm m⁻² w.e.).

- `example` -870
- `type` integer

`ANNUAL_BALANCE_UNC` Specific annual balance uncertainty (mm m⁻² w.e.)

- `description` Estimated random error of `ANNUAL_BALANCE` (mm m⁻² w.e.).
- `example` 30
- `type` integer
- `constraints`
 - `minimum` 0

`REMARKS` Remarks

- `description` Any important information or comments not included elsewhere. Cannot contain leading (' '), *trailing* (' '), or consecutive ('*') spaces.
- `example` Example data. Should not be used for science.
- `type` string
- `constraints`
 - `pattern` `[\s]+([\s]+)*`

MASS_BALANCE_POINT

Glacier mass balance measured at specific points (e.g. stakes or pits).

Columns: `WGMS_ID` | `YEAR` | `NAME` | `POLITICAL_UNIT` | `POINT_ID` | `FROM_DATE` | `TO_DATE` | `POINT_LAT` | `POINT_LON` | `POINT_ELEVATION` | `POINT_BALANCE` | `POINT_BALANCE_UNCERTAINTY` | `DENSITY` | `DENSITY_UNCERTAINTY` | `BALANCE_CODE` | `REMARKS`

WGMS_ID Glacier identifier

- **description** 5-digit key identifying glaciers in the Fluctuations of Glaciers (FoG) database. For new glacier entries, this key is assigned by the WGMS.
- **example** 389
- **type** integer
- **constraints**
 - **required** True
 - **minimum** 0
 - **maximum** 99999

YEAR Year

- **description** Survey year.
- **example** 2004
- **type** year
- **constraints**
 - **required** True
 - **maximum** 2021

NAME Glacier name

- **description** The name of the glacier. Must match `GLACIER.NAME` for the corresponding `WGMS_ID`.
- **example** FINDELEN
- **type** string
- **constraints**
 - **required** True

POLITICAL_UNIT Glacier country

- **description** Two-character code (ISO 3166 Alpha-2) of the country in which the glacier is located. Must match `GLACIER.POLITICAL_UNIT` for the corresponding `WGMS_ID`.
- **example** CH
- **type** string
- **constraints**
 - **required** True

POINT_ID Original identifier

- **description** Identifier used for the point in the original study.
- **example** P123
- **type** string
- **constraints**

- `maxLength` 10

FROM_DATE Start date of survey

- `description` Date formatted as YYYYMMDD (4-digit year, 2-digit month, and 2-digit day). Use '99' to designate unknown day or month (e.g. 20100199, 20109999) and make a note in `REMARKS` .
- `example` 20030925
- `type` string
- `constraints`
 - `required` True
 - `pattern` `(1[0-9]{3}|20[0-1][0-9]|202[0-1])(0[1-9]|1[0-2]|99)(0[1-9]|1[1-2][0-9]|3[0-1]|99)`

TO_DATE End date of survey

- `description` Date formatted as YYYYMMDD (4-digit year, 2-digit month, and 2-digit day). Use '99' to designate unknown day or month (e.g. 20100199, 20109999) and make a note in `REMARKS` .
- `example` 20040515
- `type` string
- `constraints`
 - `required` True
 - `pattern` `(1[0-9]{3}|20[0-1][0-9]|202[0-1])(0[1-9]|1[0-2]|99)(0[1-9]|1[1-2][0-9]|3[0-1]|99)`

POINT_LAT Latitude (°, WGS 84)

- `description` Latitude in decimal degrees (°, WGS 84). Positive values indicate the northern hemisphere and negative values indicate the southern hemisphere.
- `example` 46.8709
- `type` number
- `constraints`
 - `minimum` -90
 - `maximum` 90

POINT_LON Longitude (°, WGS 84)

- `description` Longitude in decimal degrees (°, WGS 84). Positive values indicate east of the zero meridian and negative values indicate west of the zero meridian.
- `example` 10.8261
- `type` number
- `constraints`
 - `minimum` -180
 - `maximum` 180

POINT_ELEVATION Elevation (m)

- `description` Glacier surface elevation (m).
- `example` 2550
- `type` integer

POINT_BALANCE Mass balance (mm w.e.)

- `description` Mass balance between `FROM_DATE` and `TO_DATE` .

- `example` 3500
- `type` integer

POINT_BALANCE_UNCERTAINTY Mass balance uncertainty (mm w.e.)

- `description` Estimate random error of `POINT_BALANCE` (mm w.e.).
- `example` 100
- `type` integer
- `constraints`
 - `minimum` 0

DENSITY Density (kg m⁻³)

- `description` Mean (measured or estimated) glacier density (kg m⁻³) used to convert thickness change (mm) to mass balance (mm w.e.). If multiple density values were used (e.g. for snow and ice), they should be described in `REMARKS` .
- `example` 400
- `type` integer
- `constraints`
 - `minimum` 0
 - `maximum` 1000

DENSITY_UNCERTAINTY Density uncertainty (kg m⁻³)

- `description` Estimated random error of `DENSITY` (kg m⁻³).
- `example` 100
- `type` integer
- `constraints`
 - `minimum` 0
 - `maximum` 1000

BALANCE_CODE Balance code

- `description` Whether and how the point balance was used in the calculation of glacier-wide balances:
 - BW: Winter balance (`MASS_BALANCE.WINTER_BALANCE`)
 - BS: Summer balance (`MASS_BALANCE.SUMMER_BALANCE`)
 - BA: Annual balance (`MASS_BALANCE.ANNUAL_BALANCE`)
 - IN: Index point not used for glacier-wide balance calculations
- `example` BW
- `type` string
- `constraints`
 - `enum` ['BW', 'BS', 'BA', 'IN']

REMARKS Remarks

- `description` Any important information or comments not included elsewhere. Cannot contain leading (' '), *trailing* (' '), or consecutive (***) spaces.
- `example` Example data. Should not be used for science.
- `type` string
- `constraints`

- `pattern` `[\s]+([\s]+)*`

SPECIAL_EVENT

Extraordinary events concerning glacier hazards and dramatic glacier changes.

Columns: `WGMS_ID` | `NAME` | `POLITICAL_UNIT` | `EVENT_ID` | `EVENT_DATE` | `ET_SURGE` | `ET_CALVING` | `ET_FLOOD` | `ET_AVALANCHE` | `ET_TECTONIC` | `ET_OTHER` | `EVENT_DESCRIPTION` | `INVESTIGATOR` | `SPONS_AGENCY` | `REFERENCE` | `REMARKS`

WGMS_ID Glacier identifier

- **description** 5-digit key identifying glaciers in the Fluctuations of Glaciers (FoG) database. For new glacier entries, this key is assigned by the WGMS.
- **example** 389
- **type** integer
- **constraints**
 - **required** True
 - **minimum** 0
 - **maximum** 99999

NAME Glacier name

- **description** The name of the glacier. Must match `GLACIER.NAME` for the corresponding `WGMS_ID` .
- **example** FINDELEN
- **type** string
- **constraints**
 - **required** True

POLITICAL_UNIT Glacier country

- **description** Two-character code (ISO 3166 Alpha-2) of the country in which the glacier is located. Must match `GLACIER.POLITICAL_UNIT` for the corresponding `WGMS_ID` .
- **example** CH
- **type** string
- **constraints**
 - **required** True

EVENT_ID Unique identifier

- **description** Unique identifier (assigned by the WGMS).
- **example** 123
- **type** integer
- **constraints**
 - **minimum** 1

EVENT_DATE Date

- **description** Date formatted as YYYYMMDD (4-digit year, 2-digit month, and 2-digit day). Use '99' to designate unknown day or month (e.g. 20100199, 20109999) and make a note in `EVENT_DESCRIPTION` .

For events spanning multiple days, the date of the main event should be given and the sequence of events further described in `EVENT_DESCRIPTION` .

- **example** 20000908

- `type` string
- `constraints`
 - `pattern` (1[0-9]{3}|20[0-1][0-9]|202[0-1])(0[1-9]|1[0-2]|99)(0[1-9]|[1-2][0-9]|3[0-1]|99)

ET_SURGE Surge

- `description` Whether a surge was involved.
- `type` boolean

ET_CALVING Calving

- `description` Whether calving was involved.
- `type` boolean

ET_FLOOD Surge

- `description` Whether a flood (e.g. glacial-lake outburst flood, debris flow) was involved.
- `type` boolean

ET_AVALANCHE Avalanche

- `description` Whether an ice avalanche was involved.
- `type` boolean

ET_TECTONIC Tectonics

- `description` Whether tectonics (e.g. earthquake, volcanic eruption) were involved.
- `type` boolean

ET_OTHER Other

- `description` Whether any other event types were involved.
- `type` boolean

EVENT_DESCRIPTION Description

- `description` Summary description of the event sequence - including for example the type and scale of the damage, measures taken to mitigate glacier hazards, and studies carried out in connection with the event. Quantitative information should be included whenever possible.
 - Surge: Date and location of onset, duration, flow velocity, discharge anomalies and periodicity
 - Calving: Rate of retreat, iceberg discharge, flow velocity and water depth at calving front
 - Flood: Volume, mechanism, peak discharge, sediment load, reach and propagation velocity of flood wave or flow front
 - Ice avalanche: Volume, runout distance, overall slope (ratio of vertical drop height to horizontal runout distance) of path
 - Tectonics: Volumes, runout distances and overall slopes (ratio of vertical drop height to horizontal runout distance) of rockfall on glacier surface, amount of geothermal melting in craters, etc.
- `example` On 8 September 2000, a rock fall of about 0.1 million m³ started from 2000–2200 m on the west face of Mättenberg, above Findelen Glacier. The rockfall reached and destroyed the trail leading to the Schreckhornhütte.
- `type` string

INVESTIGATOR Investigators

- **description** Names of the persons or agencies that performed the survey or processed the data. Cannot contain leading (' '), *trailing* (' '), or consecutive ('* ') spaces.
- **example** Michael Zemp
- **type** string
- **constraints**
 - **maxLength** 255
 - **pattern** `[\s]+([\s]+)*`

SPONS_AGENCY Sponsoring agencies

- **description** Full name, abbreviation and address of the agencies that sponsored the survey or archived the data. Cannot contain leading (' '), *trailing* (' '), or consecutive ('* ') spaces.
- **example** World Glacier Monitoring Service (WGMS), University of Zurich, Wintherthurerstr. 190, 8057 Zurich, Switzerland
- **type** string
- **constraints**
 - **maxLength** 255
 - **pattern** `[\s]+([\s]+)*`

REFERENCE References

- **description** References to publications related to the data or methods. Use a short format such as **Author et al. YYYY (URL)** if a canonical URL is available (e.g. <https://doi.org/DOI>). Cannot contain leading (' '), *trailing* (' '), or consecutive ('* ') spaces.
- **example** Author et al. YYYY (<https://doi.org/DOI>)
- **type** string
- **constraints**
 - **maxLength** 255
 - **pattern** `[\s]+([\s]+)*`

REMARKS Remarks

- **description** Any important information or comments not included elsewhere. Cannot contain leading (' '), *trailing* (' '), or consecutive ('* ') spaces.
- **example** Example data. Should not be used for science.
- **type** string
- **constraints**
 - **pattern** `[\s]+([\s]+)*`

RECONSTRUCTION_SERIES

Overview of reconstructed glacier length change series.

When submitting a new series, assign a temporary `REC_SERIES_ID` and use this as the `REC_SERIES_ID` for all corresponding entries in `RECONSTRUCTION_FRONT_VARIATION`.

Columns: `WGMS_ID` | `NAME` | `POLITICAL_UNIT` | `REC_SERIES_ID` | `INVESTIGATOR` | `SPONS_AGENCY` | `REFERENCE` | `REMARKS`

WGMS_ID Glacier identifier

- **description** 5-digit key identifying glaciers in the Fluctuations of Glaciers (FoG) database. For new glacier entries, this key is assigned by the WGMS.
- **example** 389
- **type** integer
- **constraints**
 - **required** True
 - **minimum** 0
 - **maximum** 99999

NAME Glacier name

- **description** The name of the glacier. Must match `GLACIER.NAME` for the corresponding `WGMS_ID`.
- **example** FINDELEN
- **type** string
- **constraints**
 - **required** True

POLITICAL_UNIT Glacier country

- **description** Two-character code (ISO 3166 Alpha-2) of the country in which the glacier is located. Must match `GLACIER.POLITICAL_UNIT` for the corresponding `WGMS_ID`.
- **example** CH
- **type** string
- **constraints**
 - **required** True

REC_SERIES_ID Reconstruction series identifier

- **description** Reconstruction series identifier (assigned by the WGMS).
- **example** 42
- **type** integer
- **constraints**
 - **required** True
 - **minimum** 1

INVESTIGATOR Investigators

- **description** Names of the persons or agencies that performed the survey or processed the data. Cannot contain leading (' '), *trailing* (' '), or consecutive ('* *') spaces.
- **example** Michael Zemp

- `type` string
- `constraints`
 - `maxLength` 255
 - `pattern` `[\s]+([\s]+)*`

SPONS_AGENCY Sponsoring agencies

- `description` Full name, abbreviation and address of the agencies that sponsored the survey or archived the data. Cannot contain leading (' '), *trailing* (' '), or consecutive (***) spaces.
- `example` World Glacier Monitoring Service (WGMS), University of Zurich, Wintherthurerstr. 190, 8057 Zurich, Switzerland
- `type` string
- `constraints`
 - `maxLength` 255
 - `pattern` `[\s]+([\s]+)*`

REFERENCE References

- `description` References to publications related to the data or methods. Use a short format such as Author et al. YYYY (URL) if a canonical URL is available (e.g. <https://doi.org/DOI>). Cannot contain leading (' '), *trailing* (' '), or consecutive (***) spaces.
- `example` Author et al. YYYY (<https://doi.org/DOI>)
- `type` string
- `constraints`
 - `maxLength` 255
 - `pattern` `[\s]+([\s]+)*`

REMARKS Remarks

- `description` Any important information or comments not included elsewhere. Cannot contain leading (' '), *trailing* (' '), or consecutive (***) spaces.
- `example` Example data. Should not be used for science.
- `type` string
- `constraints`
 - `pattern` `[\s]+([\s]+)*`

RECONSTRUCTION_FRONT_VARIATION

Glacier length changes reconstructed from historic records and geologic dating.

Columns: `WGMS_ID` | `REC_SERIES_ID` | `NAME` | `POLITICAL_UNIT` | `YEAR` | `YEAR_UNC` | `REFERENCE_YEAR` | `REF_YEAR_UNC` | `FRONT_VARIATION` | `QUALITATIVE_VARIATION` | `FRONT_VAR_POS_UNC` | `FRONT_VAR_NEG_UNC` | `LOWEST_ELEVATION` | `HIGHEST_ELEVATION` | `ELEVATION_UNC` | `MORAINE_DEFINED_MAX` | `METHOD_CODE` | `METHOD_REMARKS` | `REMARKS`

`WGMS_ID` Glacier identifier

- `description` 5-digit key identifying glaciers in the Fluctuations of Glaciers (FoG) database. For new glacier entries, this key is assigned by the WGMS.
- `example` 389
- `type` integer
- `constraints`
 - `required` True
 - `minimum` 0
 - `maximum` 99999

`REC_SERIES_ID` Reconstruction series identifier

- `description` Reconstruction series identifier (assigned by the WGMS).
- `example` 42
- `type` integer
- `constraints`
 - `required` True
 - `minimum` 1

`NAME` Glacier name

- `description` The name of the glacier. Must match `GLACIER.NAME` for the corresponding `WGMS_ID` .
- `example` FINDELEN
- `type` string
- `constraints`
 - `required` True

`POLITICAL_UNIT` Glacier country

- `description` Two-character code (ISO 3166 Alpha-2) of the country in which the glacier is located. Must match `GLACIER.POLITICAL_UNIT` for the corresponding `WGMS_ID` .
- `example` CH
- `type` string
- `constraints`
 - `required` True

`YEAR` Year

- `description` Survey year.
- `example` 2004
- `type` year

- `constraints`
 - `required` True
 - `maximum` 2021

`YEAR_UNC` Year uncertainty (years)

- `description` Estimated random error of `YEAR` (years).
- `type` integer
- `constraints`
 - `minimum` 0

`REFERENCE_YEAR` Reference year

- `description` Reference year.
- `example` 1904
- `type` year
- `constraints`
 - `maximum` 2021

`REF_YEAR_UNC` Reference year uncertainty (years)

- `description` Estimated maximum error of `REFERENCE_YEAR` (years).
- `example` 3
- `type` integer
- `constraints`
 - `minimum` 0

`FRONT_VARIATION` Front variation (m)

- `description` Variation in the position of the glacier front (m) from `REFERENCE_YEAR` to `YEAR` (positive: advance, negative: retreat).
- `example` -230
- `type` number
- `constraints`
 - `required` True

`QUALITATIVE_VARIATION` Qualitative front variation

- `description` Qualitative front variation (in the absence of a quantitative measurement) between `REFERENCE_DATE` and `SURVEY_DATE` .
 - X: Glacier in advance
 - -X: Glacier in retreat
 - ST: Glacier stationary
 - SN: Glacier front covered by snow making survey impossible
- `example` -X
- `type` string
- `constraints`
 - `enum` ['X', '-X', 'ST', 'SN']

`FRONT_VAR_POS_UNC` Positive front variation uncertainty (m)

- `description` Estimated maximum positive error for `FRONT_VARIATION` (m). `FRONT_VARIATION` plus `FRONT_VAR_POS_UNC` should mark the maximum possible front variation.
- `example` 10
- `type` integer
- `constraints`
 - `minimum` 0

`FRONT_VAR_NEG_UNC` Negative front variation uncertainty (m)

- `description` Estimated maximum negative error for `FRONT_VARIATION` (m). `FRONT_VARIATION` plus `FRONT_VAR_NEG_UNC` should mark the minimum possible front variation.
- `example` 10
- `type` integer
- `constraints`
 - `minimum` 0

`LOWEST_ELEVATION` Lowest glacier elevation (m)

- `description` Lowest elevation on the glacier (m).
- `example` 2370
- `type` integer
- `constraints`
 - `minimum` 0
 - `maximum` 9000

`HIGHEST_ELEVATION` Highest glacier elevation (m)

- `description` Highest elevation on the glacier (m).
- `example` 3370
- `type` integer
- `constraints`
 - `minimum` 0
 - `maximum` 9000

`ELEVATION_UNC` Elevation uncertainty (m)

- `description` Estimated random error of reported elevations (m).
- `type` integer
- `constraints`
 - `minimum` 0

`MORAINE_DEFINED_MAX` Moraine condition

- `description` Condition of the moraine used to determine maximum glacier length.
 - MMP: Moraine mainly preserved
 - MPE: Moraine partly eroded
 - MME: Moraine mainly eroded

If another object was used (e.g. a large boulder or a building), the condition codes can be used but the object should be described in `REMARKS` .

- `example` MPE
- `type` string
- `constraints`
 - `enum` ['MMP', 'MPE', 'MME']

METHOD_CODE Method

- `description` Method(s) used to reconstruct glacier length in `YEAR` .
 - PAI: Oil painting
 - DRA: Drawing
 - PRT: Print
 - PHO: Photograph
 - MAP: Map
 - WRS: Written source
 - HIS: Other historical source (specify in `METHOD_REMARKS`)
 - RAD: Radiocarbon date
 - DEN: Dendrochronology
 - EXD: Exposure date
 - REL: Relative date
 - COM: Combination of multiple methods (specify in `METHOD_REMARKS`)
 - OTH: Other (specify in `METHOD_REMARKS`)
- `example` COM
- `type` string
- `constraints`
 - `enum` ['PAI', 'DRA', 'PRT', 'PHO', 'MAP', 'WRS', 'HIS', 'RAD', 'DEN', 'EXD', 'REL', 'COM', 'OTH']

METHOD_REMARKS Method details

- `description` Description of the method(s) used, e.g. relative date (REL) using weathering rind thickness, lichenometry or Schmidt hammer rebound.
- `example` PHO & WRS
- `type` string

REMARKS Remarks

- `description` Any important information or comments not included elsewhere. Cannot contain leading (' '), *trailing* (' '), or consecutive (***) spaces.
- `example` Example data. Should not be used for science.
- `type` string
- `constraints`
 - `pattern` `[\s]+([\s]+)*`