# Assessment report-sourced surface sediment geochemistry database: Data update

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**Front Cover:**
Sampling subglacial till. **Photo by Travis Ferbey.**

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**Abstract**

ARIS (Assessment Report Index System) is a collection of more than 40,000 reports that detail results from mineral exploration and development programs. Submitted by the exploration and mining industry to comply with Mineral Tenure Act Regulations and maintain titles in good standing, the reports become an open resource after a one-year confidentiality period. Although containing a wealth of information, the assessment reports are typically submitted in a form (e.g., paper or PDF file) that makes working with the data cumbersome. To address this problem, we are developing databases that contain information extracted and digitized from assessment reports and releasing data in formats that are amenable to evaluation using geospatial and analytical software. This release builds on the initial surface sediment geochemistry database released in 2019, which contained data from about 120 assessment reports from the Interior Plateau, and contains nearly 800 assessment reports from across the province. The data structure from the first release was modified slightly for added clarity and consistency with a drillhole database also being developed.

**Keywords:** Geochemical data, assessment reports, surface sediment samples, digitization, compilation, database, data access, analytical methods, chemical element abundance, ARIS

## 1. Introduction

The British Columbia Geological Survey (BCGS) Assessment Report Indexing System (ARIS) is a collection of reports documenting mineral exploration and development work in the province dating back to 1947. Assessment reports provide results of geological, geochemical and geophysical studies and become an open resource for planning mineral exploration, investment, research, land use, and resource management. To date, ARIS contains more than 40,000 reports representing nearly $4 billion of reported exploration expenditures. Newly available assessment reports are released through the BCGS website monthly.

Although containing a wealth of information, the assessment reports are typically submitted in a form (e.g., paper or PDF file) that renders working with the data cumbersome. Specific data, such as sample location, sampling parameters, certificate metadata and analytical results, must be extracted into formats that are useable for detailed analysis and interpretation. To improve the usability of these data, the BCGS is creating open access databases by extracting and digitizing information from assessment reports. Norris and Fortin (2019) released surface-sediment geochemistry data derived from about 120 Interior Plateau assessment reports; Fortin and Silva (2025) released assessment report-derived drillhole data. Herein we present an update to the Norris and Fortin (2019) surface sediment geochemistry database. It includes sample locations, sampling parameters, and geochemical assay certificates, and results from nearly 800 assessment reports across the province (Fig. 1). Results are from more than 180,000 samples and include more than 7 million determinations from 1900 assay certificates (Table 1). We provide digital data as a GeoPackage (BCGS_GF2026-02.zip), which can be imported directly into most GIS.

## 2. Database structure

The data model (Fig. 2) modifies the original data structure in Norris and Fortin (2019) to align with the assessment report drillhole database in Fortin and Silva (2025). The database consists of 14 tables (Tables 2-15). The tables are of two types: 1) those containing sample and geochemical data extracted from assessment reports, which include discrete attributes following a standardized nomenclature; 2) those prefixed by ‘code’ containing expanded information and metadata regarding the various discrete attributes captured. The use of integer codes for discrete categories minimizes the file size and enhances computational efficiency. The most important changes were renaming the tables and columns to ensure consistency between the surface-sediment and drillhole databases, the addition of a cert_ar_number field in the cert table to introduce disambiguation where the same lab certificate is referenced in more than one assessment report, and the introduction of the code_decomposition and code_instrument tables, which enable the grouping of similar assay methods.

The sample table (Table 2) is the central table of the database; it contains sample locations and metadata. The code_epsg table (Table 3) links to sample through the epsg_srid and contains details on the original geodetic datum. The code_sample_type

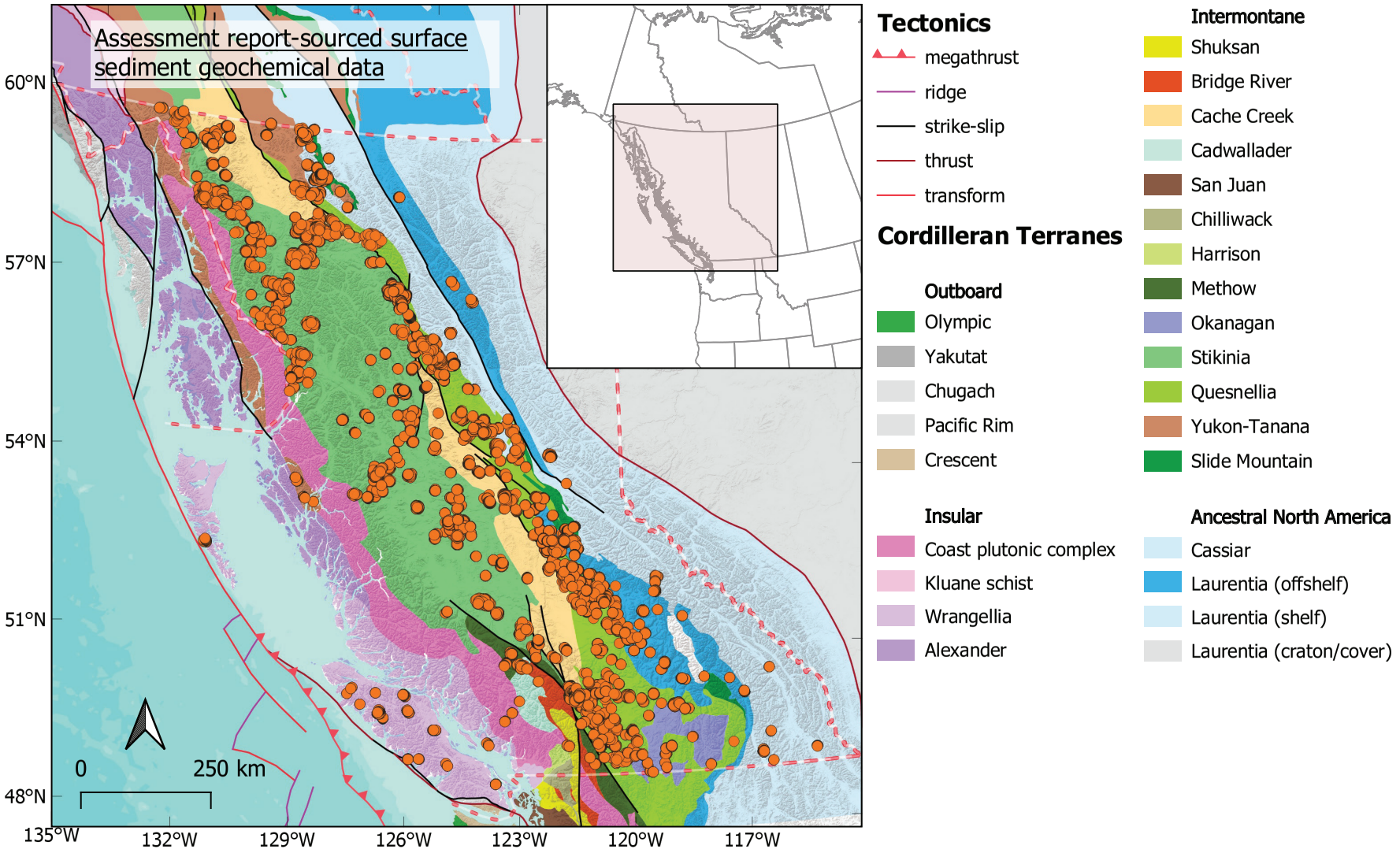


**Fig. 1.** Locations of ARIS reports with surface-sediment geochemical data included in this update. Terranes modified after Colpron (2020).

**Table 1.** Number of entries for each data type in this update.

| Data Type | Entries |
|---|---|
| Assessment reports | 776 |
| Samples | 184,459 |
| Certificates | 1,909 |
| Determinations | 7,227,771 |

**Fig. 2.** Database structure.

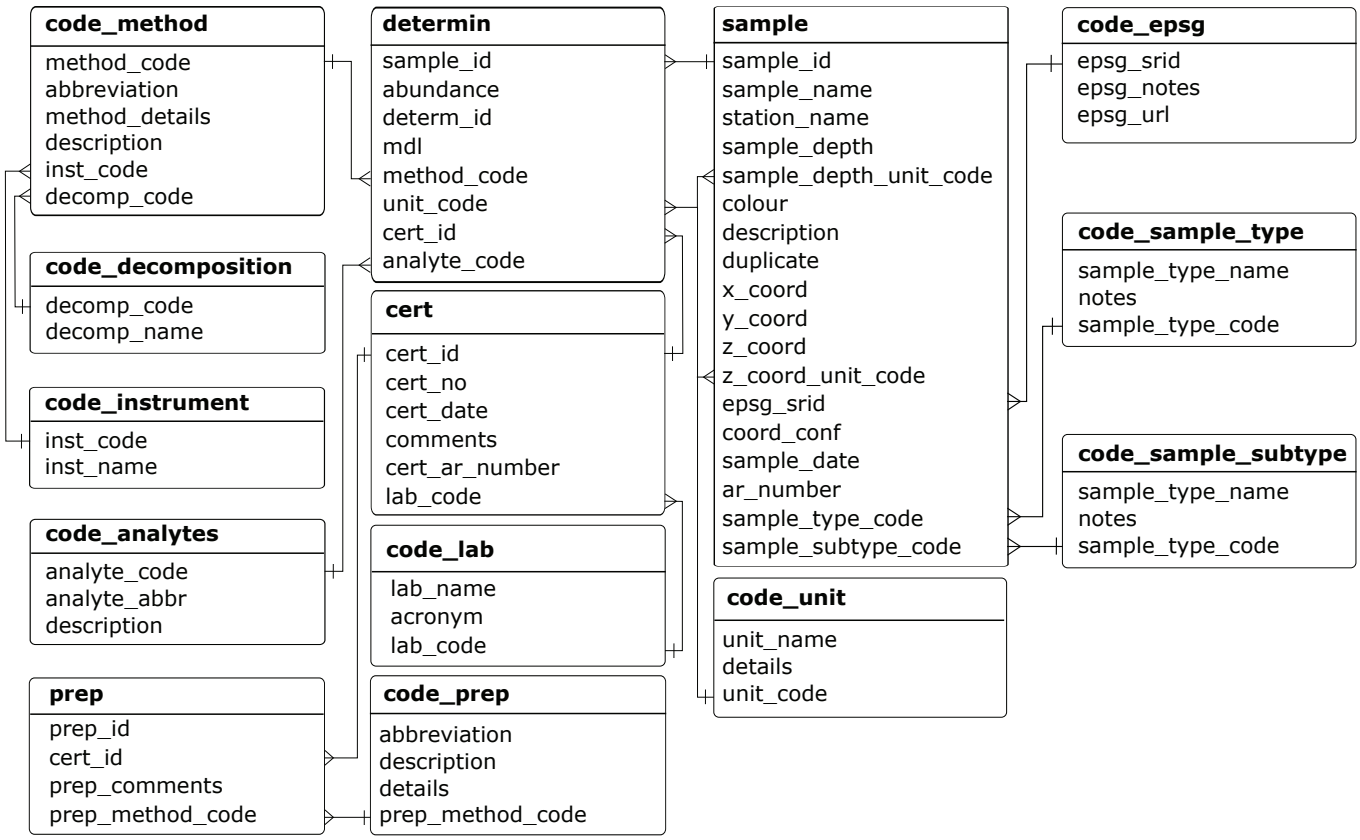


**Table 2.** Table containing location and metadata for each sample (sample).

| Field Name | Type | Description |
|---|---|---|
| epsg_srid | bigint | Unique EPSG (European Petroleum Survey Group) code of geodetic datum for the drillhole location original coordinates |
| epsg_notes | varchar | Name of EPSG of geodetic datum for the drillhole location original coordinates |
| epsg_url | varchar | Spatial reference URL of EPSG of geodetic datum for the drillhole location original coordinates |

**Table 3.** code_epsg: drillhole location original geodetic datum list.

| Field Name | Type | Description |
|---|---|---|
| epsg_srid | bigint | Unique EPSG (European Petroleum Survey Group) code of geodetic datum for the drillhole location original coordinates |
| epsg_notes | varchar | Name of EPSG of geodetic datum for the drillhole location original coordinates |
| epsg_url | varchar | Spatial reference URL of EPSG of geodetic datum for the drillhole location original coordinates |

**Table 4.** code_sample_type: sample types list.

| Field Name | Type | Description |
|---|---|---|
| sample_type_name | bigint | Media sampled (e.g. soil, till, etc.), as reported. |
| notes | varchar | Additional details on type of media sampled |
| sample_type_code | bigint | Unique code for type of sample |

**Table 5.** code_sample_subtype: sample subtypes list.

| Field Name | Type | Description |
|---|---|---|
| sample_subtype_name | bigint | Additional details on sampled media (e.g. A Horizon, B Horizon, etc.). |
| notes | varchar | Additional details on subtype of media sampled |
| sample_subtype _code | bigint | Unique code for type of sample |

**Table 6.** determin: geochemical assay determinations metadata.

| Field Name | Type | Description |
|---|---|---|
| abundance | varchar | Concentration of analyte in specified unit |
| mdl | varchar | Minimum detection limit for the specified analyte and method |
| sample_id | bigint | Sequential unique identifier for every sample from every assessment report |
| cert_id | bigint | Sequential unique identifier for every geochemical assay certificate from every assessment report |
| determ_id | bigint | Sequential unique identifier for every assay determination from every assessment report |
| method_code | bigint | Unique code for every geochemical assay method |
| analyte_code | bigint | Unique code for analyte type |
| unit_code | bigint | Unique code for drilling method used in drillhole |

**Table 7.** code_analytes: geochemical assay analytes list.

| Field Name | Type | Description |
|---|---|---|
| analyte_abbr | text | Abbreviation of analyte |
| analyte_code | bigint | Unique code for analyte type |
| description | text | Description of analyte |

**Table 8.** code_method: geochemical assay methods list.

| Field Name | Type | Description |
|---|---|---|
| abbreviation | varchar | Abbreviation of geochemical assay method |
| description | varchar | Description of geochemical assay method |
| group_details | varchar | Geochemical assay method group description |
| method_details | text | Name of geochemical assay method |
| method_group | varchar | Geochemical assay method group abbreviation |
| method_code | bigint | Unique code for every geochemical assay method |

**Table 9.** code_decomposition: sample decomposition techniques list.

| Field Name | Type | Description |
|---|---|---|
| decomp_code | bigint | Unique code for every sample decomposition technique |
| decomp_name | varchar | Name of sample decomposition technique |

**Table 10.** code_instrument: analysis instrumentation techniques list.

| Field Name | Type | Description |
|---|---|---|
| inst_code | bigint | Unique code for every analysis instrumentation technique |
| inst_name | varchar | Name of analysis instrumentation technique |

**Table 11.** cert: geochemical assay certificate metadata.

| Field Name | Type | Description |
|---|---|---|
| cert_id | bigint | Sequential unique identifier for every geochemical assay certificate from every assay certificate |
| cert_no | varchar | Certificate number of geochemical assay report |
| cert_date | date | Date of geochemical assay report certificate |
| comments | text | Remarks on the geochemical assay report certificate |
| lab_code | bigint | Unique code for geochemical assay laboratory |
| cert_ar_number | bigint | Number of assessment report in ARIS to which each instance of certificate number belongs to; used as a disambiguation criterion for certificates containing samples from more than one assessment report |

**Table 12.** code_lab: geochemical assay laboratories list.

| Field Name | Type | Description |
|---|---|---|
| lab_name | varchar | Name of geochemical assay laboratory |
| acronym | varchar | Acronym of geochemical assay laboratory |
| lab_code | bigint | Unique code for geochemical assay laboratory |

**Table 13.** prep: geochemical assay preparation method information.

| Field Name | Type | Description |
|---|---|---|
| prep_id | bigint | Sequential unique identifier for every sample preparation routine used |
| cert_id | bigint | Sequential unique identifier for every geochemical assay certificate from every assay report |
| prep_comments | text | Additional remarks on the method of sample preparation |
| prep_method_code | bigint | Unique code for type of sample preparation method |

**Table 14.** code_prep: geochemical assay preparation method list.

| Field Name | Type | Description |
|---|---|---|
| abbreviation | varchar | Abbreviation of sample preparation method |
| description | varchar | Additional notes on lab preparation method |
| details | text | Desciption of lab preparation method |
| prep_method_code | bigint | Unique code for type of sample preparation method |

**Table 15.** code_unit: measurement units list.

| Field Name | Type | Description |
|---|---|---|
| unit_name | varchar | Abbreviation of measurement unit |
| details | text | Name of measurement unit |
| unit_code | bigint | Unique code for unit type |

table (Table 4) links to sample through the sample_type_code and contains details on the sample type. The code_sample_subtype table (Table 5) links to sample through the sample_subtype _code and contains details on the sample subtype.

The determin (Table 6) table links to sample through the sample_id and contains the results of geochemical assays. The code_analytes table (Table 7) links to determin through the analytes_code and contains details on the measured analyte. The code_method table (Table 8) links to determinations through the method_code and contains details on the assaying method. The code_decomposition table (Table 9) links to code_method through the decomp_code and contains details on the method of sample decomposition used in the assay. The code_instrument table (Table 10) links to code_method through the inst_code and contains details on the instrumentation technique used in the assay. The cert table (Table 11) links to determinations through the cert_id and contains details on the assay certificate. The code_lab table (Table 12) links to cert through the lab_code and contains details on the assay laboratory. The prep table (Table 13) links to cert through the cert_id and contains information about sample preparation methods. The code_prep table (Table 14) links to prep through the prep_method_code and contains details on sample preparation methods.

The code_unit table (Table 15) links to determinations through the unit_id and contains details on the measurement unit. The code_unit column in the code_unit table also links to the sample_depth_unit_code and the z_coord_unit_code columns in the sample table.

## 3. Data compilation process description

Data compilation follows the same process to that reported in Norris and Fortin (2019) and Fortin and Silva (2025), consisting of three steps: 1) data extraction; 2) data screening (QA/QC); and 3) data loading. The only difference is that additional validation steps were added to the verification check scripts (QA/QC; Tables 16-18) to improve accuracy and ensure consistency of the database.

## 4. Data 'product' description

Data products were generated from the database using SQL queries. The GeoPackage contains three spatial tables, which are SQL views generated by joining the various data and code tables. Most field names were kept consistent with the original tables, whereas others were slightly modified by spelling out abbreviations for clarity and disambiguation. The vw_samples_sp_ll83 view is hard-coded in the GeoPackage and only contains a geometry field with sample location and the sample_id from the sample table. The vw_samples_sp_ll83 and the vw_determin_sp_ll83 are dynamically generated. The former contains all the sample metadata, and the latter contains all of the analytical data, including determinations, certificate and methods, in addition to sample metadata. These can be brought directly into most GIS applications. These views may be filtered according to specific needs (e.g., assessment report, geographic areas, sample type, analyte). The tables containing raw data and the corresponding codes can be joined in different ways, through sample_id in the vw_samples_sp_ll83 view, which contains a geometry field with sample locations. Using record attributes or locations, samples may also be linked to other BCGS databases.

**Table 16.** sample data checks.

| Field(s) | Check |
|---|---|
| sample_name, x_coord, y_coord, epsg_srid, sample_date | Must not be null |
| x_coord, y_coord, z_coord | Must be numeric |
| epsg_srid | Must be an acceptable datum code |
| x_coord, y_coord, epsg_srid | Must fall within the provincial boundaries |
| x_coord, y_coord, epsg_srid | Generally, sample locations should be within a 10 km radius from the ARIS source report location, unless there is a documented reason for which this is not the case |
| z_coord, z_coord_unit_code | Must be numeric, positive, be within 50% of the digital elevation model value at the location, and contain units |
| sample_type_code | Must be an acceptable sample type |
| sample_subtype_code | Must be an acceptable sample subtype |
| sample_depth, sample_depth_unit_code | Must be either a number or a range of numbers, and contain units |
| sample_name | Must be unique for each assessment report |
| sample_date | Must be a valid date |

**Table 17.** cert and prep data checks.

| | |
|---|---|
| lab_code, prep_method code, cert_date | Must not be null |
| lab_code | Must be an acceptable laboratory code |
| prep_method code | Must be an acceptable preparation method, unless it is not specified in the original report |
| cert_date | Must be a valid date |
| cert_no | Table certificate number must match the value in the file name |

**Table 18.** determin data checks.

| Field(s) | Check |
|---|---|
| cert_no | Table certificate number must match the value in the file name |
| analyte | Must be an acceptable analyte name |
| unit_code | Must be an acceptable unit |
| method_code | Must not be null |
| mdl | Must be numeric |
| method_code | Must be an acceptable method |
| abundance | Must be numeric and positive, except for less and greater than symbols |
| abundance | For less and greater than, value must be numeric, positive; for less than, value should be equal to detection limit |
| abundance | Must not amount to more than 100% in accordance with its respective measurement unit |
| sample_name | Must be unique for each assessment report, unless sample is split among more than one certificate, as well as correspond to an entry in the sample table |

## 5. Conclusion

This data release expands and supersedes the previously released surface sediment geochemistry database, making accessible additional information that was locked in PDF or paper copy reports. Data extracted and digitized from these reports are released as a GeoPackage (BCGS_GF2026-02.zip), which can be imported directly into most GIS. The database continues to grow as more data from additional assessment reports are compiled and validated. The BCGS invites submission of data in raw and tabular format to ARIS.digital@gov.bc.ca. We would appreciate being notified of errors in the database.

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