

# TerraLID metadata profile for Lead Isotope Data in Archaeology

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The TerraLID Team gratefully acknowledges the valuable contributions of many other colleagues to the TerraLID metadata profile in discussions and various other formats.

# Introduction

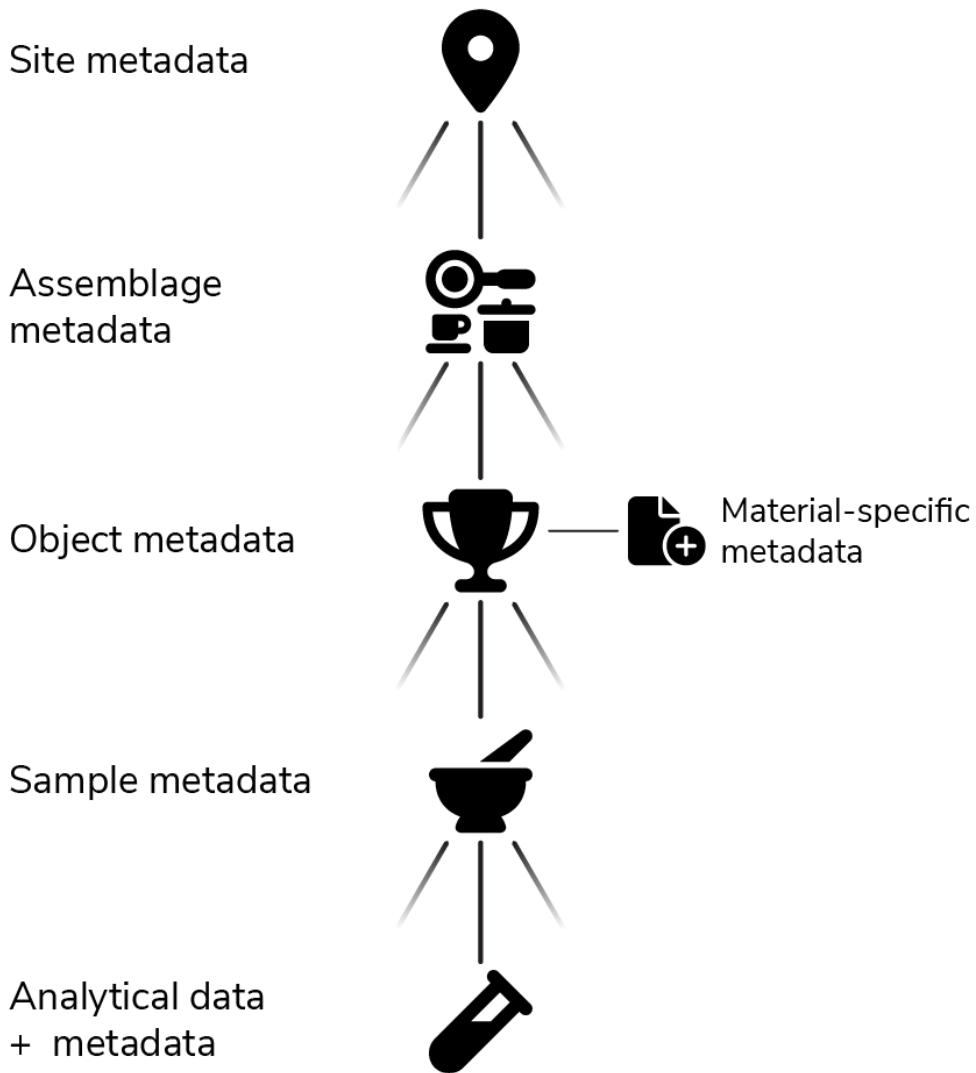
The TerraLID metadata profile comprehensively describes lead isotope data, their analytical background, and their geological and/or archaeological context. It aims to optimise lead isotope data for future reuse regardless of the original motivation for their measurement and the collection of the objects and samples.

In this regard, the TerraLID metadata profile does not only serve as a data model for the TerraLID database but also aims to become a widely agreed upon community-centred reporting format for lead isotope data. When adopted by large parts of the community, the TerraLID metadata profile makes it easy to combine data from different sources, even if they are not included in the TerraLID database.

A particular challenge for the [TerraLID Team](#) during the design of the metadata profile was finding a good balance between the information regarded as essential by modern-day standards and remaining inclusive to old data. To achieve this aim, mandatory metadata was kept to a minimum even though many others might be regarded as pivotal metadata nowadays.

## 1. Structure

Efficient structuring of information as well as easy extensibility were the major technical considerations in the design of the TerraLID metadata profile. As a result, the metadata are organised in modules, which are linked in a series of one-to-many relationships: A site can yield many assemblages, which again can include many objects. Multiple samples can be taken from the same object and each sample can be analysed multiple times.



*The general structure of the TerraLID metadata profile, highlighting the different modules and their relation to each other.*

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While this seems to follow a natural hierarchy, it is possible to e.g. link an object or analysis directly to a site. Similarly, although single objects must be recorded as single-object assemblages to include their stratigraphic information, an object can also be directly linked to a site if e.g. stratigraphic information cannot be provided. An assemblage for the object can be defined at a later stage and serve as link between site and object, for example, when a second object from the same finds complex is added.

The TerraLID metadata profile uses controlled vocabularies wherever sensible to improve searchability of the database and to decrease curation effort. The TerraLID Team is aware that these vocabularies may not yet include all terms relevant for your needs. You are therefore strongly encouraged to [reach out to us](#) with suggestions for additional terms to be included in the vocabularies.

## 2. Extensibility

Another advantage of the modularity is the uncomplicated extensibility of the TerraLID metadata profile. For example, information specific for different materials is recorded in different modules. These material-specific modules extend the information recorded for all objects. Additional modules for other material types can be defined and easily included in the TerraLID metadata profile. The same applies for specific object types made of the same material: For coins, the same information like for all other metal items is recorded in addition to information specific for coins, such as their denomination.

The same applies to analytical data. While lead isotope analyses are currently the only analytical method for which a full set of metadata exists, support for other analytical methods can be easily included in TerraLID through the inclusion of the respective modules.

### 3. Community participation

The initial draft of the TerraLID metadata profile was developed from 2024 to 2025 by the [TerraLID Regional and Material Editors](#) during their monthly meetings with support by the [TerraLID Core Team](#). In accordance with TerraLID's [community-driven development](#), this draft is currently discussed by the entire community. [Learn more about how to join the discussion and provide feedback.](#)

# Sites

## TerraLID ID

**ID and name:** SI0 terralid\_site\_id

**Provided by:** TerraLID system

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The ID of the site in the TerraLID database.

**Allowed values and other constraints:** t.b.d.

**Example:** t.b.d.

## 1. Site name

**ID and name:** SI1 site\_name

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The name of the locality/site or "unknown". Details about the locality should be provided in [SI5.3 Description](#).

If the locality belongs to a cluster and/or site complex, enter its name in [SI9 Keywords](#).

**Allowed values and other constraints:** free text. If the site is unknown, value is "unknown" and [SI2 Project name](#) must be provided.

**Example:** Agrileza

## 2. Project name

**ID and name:** SI2 project\_name

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The name of the project.

**Allowed values and other constraints:** free text. Must be provided if [SI1 Site name](#) has value "unknown".

**Example:** The Dreamland University Archaeometallurgy project.

## 3. Project context

**ID and name:** SI3 project\_context

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** A brief summary of the main aims and objectives of the research (or alternative process). May include a

link e.g. the project's webpage.

**Allowed values and other constraints:** free text

**Example:** Excavation of an ore washing site.

## 4. Site identifier

**ID and name:** SI4 site\_pid

**Provided by:** Data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The site's persistent identifier in one or more of the data infrastructures listed in [SI4.2 Type](#).

*with the two subproperties:*

### 4.1 Value

**ID and name:** SI4.1 site\_pid\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The value of the persistent identifier.

**Allowed values and other constraints:** valid persistent identifier according to the associated data infrastructure in

[SI4.2 Type](#).

**Example:** Q129256661

### 4.2 Type

**ID and name:** SI4.2 site\_pid\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The name of the data infrastructure.

**Allowed values and other constraints:** controlled vocabulary

## 5. Geolocation

**ID and name:** SI5 site\_geolocation

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Information about the (approximate) location of the object or site it was found. All coordinates must be given in the WGS 84 coordinate system and as decimal numbers. If the exact site location is unknown or must not be revealed, a polygon or boundary box must be used to delineate an area of sufficient precision around the site location.

*Subproperties of Geolocation are:*

## 5.1 Point

**ID and name:** SI5.1 site\_geolocation\_point

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** A point location in space.

*with the two subproperties:*

### 5.1.1 Longitude

**ID and name:** SI5.1.1 site\_geolocation\_point\_longitude

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The longitudinal dimension of a point.

**Allowed values and other constraints:** decimal number, between -180 and 180

**Example:** 7.21685

### 5.1.2 Latitude

**ID and name:** SI5.1.2 site\_geolocation\_point\_latitude

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The latitudinal dimension of a point.

**Allowed values and other constraints:** decimal number, between -90 and 90

**Example:** 51.48867

## 5.2 Boundary box

**ID and name:** SI5.2 site\_geolocation\_box

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The spatial limits of a box.

*with the four subproperties:*

### 5.2.1 Western boundary

**ID and name:** SI5.2.1 site\_geolocation\_box\_west

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The western longitudinal dimension of the box.

**Allowed values and other constraints:** decimal number, between -180 and 180

**Example:** 21.02

### 5.2.2 Eastern boundary

**ID and name:** SI5.2.2 site\_geolocation\_box\_east

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The eastern longitudinal dimension of the box.

**Allowed values and other constraints:** decimal number, between -180 and 180

**Example:** 21.05

### 5.2.3 Southern boundary

**ID and name:** SI5.2.3 site\_geolocation\_box\_south

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The southern latitudinal dimension of the box.

**Allowed values and other constraints:** decimal number, between -90 and 90

**Example:** 40.23

### 5.2.4 Northern boundary

**ID and name:** SI5.2.4 site\_geolocation\_box\_north

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The northern latitudinal dimension of the box.

**Allowed values and other constraints:** decimal number, between -90 and 90

**Example:** 40.53

## 5.3 Description

**ID and name:** SI5.3 site\_geolocation\_description

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–1

**Definition:** Further information about the site such as a description. If the site's exact location cannot be given, this must include a reasoning why and information about the level of precision.

**Allowed values and other constraints:** free text

**Example:** Entire valley given to obfuscate exact location of site as protection against illicit excavations; Area of Saudi-Arabia recorded as location because more precise information not available.

## 5.4 Polygon

**ID and name:** SI5.4 site\_geolocation\_polygon

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** A drawn polygon area, defined by a set of points and lines connecting the points in a closed chain. At least four points must be recorded. The last point must be identical with the first point to close the polygon.

*with the subproperty:*

#### 5.4.1 Polygon point data

**ID and name:** SI5.4.1 site\_geolocation\_polygon\_point

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** A point marking an edge of the polygon.

*with the two subproperties*

##### 5.4.1.1 LONGITUDE

**ID and name:** SI5.4.1.1 site\_geolocation\_polygon\_point\_longitude

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The longitudinal dimension of a point.

**Allowed values and other constraints:** decimal number, between -180 and 180

**Example:** 7.21685

##### 5.4.1.2 LATITUDE

**ID and name:** SI5.4.1.2 site\_geolocation\_polygon\_point\_latitude

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The latitudinal dimension of a point.

**Allowed values and other constraints:** decimal number, between -90 and 90

**Example:** 51.48867

## 6. Registry

**ID and name:** SI6 site\_registry

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The entry of the site in the registry of the local authority (e.g., heritage authority, geological survey).

*with the two subproperties:*

## 6.1 Registry ID

**ID and name:** SI6.1 site\_registry\_id

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The site's identifier in the registry of the local authority.

**Allowed values and other constraints:** free text

**Example:** t.b.d.

## 6.2 Registry name

**ID and name:** SI6.2 site\_registry\_name

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The name of the registry of the local authority.

**Allowed values and other constraints:** free text

**Example:** t.b.d.

# 7. Dating

**ID and name:** SI7 site\_date

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The time period represented by the site.

*with the eight subproperties:*

## 7.1 Persistent identifier

**ID and name:** B3.1 date\_pid

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

*with the two subproperties:*

### 7.1.1 VALUE

**ID and name:** B3.1.1 date\_pid\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The value of the persistent identifier.

**Allowed values and other constraints:** The period's persistent identifier in one or more of the data infrastructures listed in B3.1.2 Type .

**Example:** 99152/p0qhb66vvth

#### 7.1.2 TYPE

**ID and name:** B3.1.2 date\_pid\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The name of the data infrastructure.

**Allowed values and other constraints:** controlled vocabulary

### 7.2 Date type

**ID and name:** B3.2 date\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Is this an archaeological or geological age? Archaeological dates must be given in calendar years, with BCE dates as negative values. Geological dates must be given in million years.

**Allowed values and other constraints:** geological, archaeological

**Example:** archaeological

### 7.3 Absolute Date

**ID and name:** B3.3 date\_absolute

**Provided by:** data provider, API

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The absolute date of a point in time or period in years before or after common era. Values in BCE are reported as negative values. If the absolute date is given with an uncertainty such as 450 +/- 50 BC, start and end date mark the lower and upper limit of the date range, i.e. -500 and -400.

*with the four subproperties:*

#### 7.3.1 START

**ID and name:** B3.3.1 date\_absolute\_start

**Provided by:** data provider, API

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The oldest possible date of the period.

**Allowed values and other constraints:** integer

**Example:** -15

#### 7.3.2 END

**ID and name:** B3.3.2 date\_absolute\_end

**Provided by:** data provider, API

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The youngest possible date of the period.

**Allowed values and other constraints:** integer

**Example:** 15

#### 7.3.3 DATING METHOD

**ID and name:** B3.3.3 date\_absolute\_method

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The method used to determine the absolute date.

**Allowed values and other constraints:** controlled vocabulary

#### 7.3.4 UNIT OF DATE

**ID and name:** B3.3.4 date\_absolute\_unit

**Provided by:** TerraLID system

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The unit of the date.

**Allowed values and other constraints:** a, Ma

**Example:** a

### 7.4 Relative Date

**ID and name:** B3.4 date\_relative

**Provided by:** data provider, API

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The relative date of a point in time or period.

*with the two subproperties:*

#### 7.4.1 CHRONOLOGICAL UNIT

**ID and name:** B3.4.1 date\_relative\_period

**Provided by:** data provider, API

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The relative date expressed as a chronological unit.

**Allowed values and other constraints:** controlled vocabulary

#### 7.4.2 DATING METHOD

**ID and name:** B3.4.2 date\_relative\_method

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The method used to determine the relative date.

**Allowed values and other constraints:** controlled vocabulary

## 7.5 Cultural unit

**ID and name:** B3.5 date\_archaeo\_cultural

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** Relevant cultural and user created labels for the relative date of the item.

**Allowed values and other constraints:** free text, only available if B3.2 Date type = "archaeological".

**Example:** Roman

## 7.6 Orogenesis

**ID and name:** B3.6 date\_geol\_orogenesis

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The relative date expressed as anorogenic event.

**Allowed values and other constraints:** controlled vocabulary, only available if B3.2 Date type = "geological".

## 7.7 Definition of chronological unit

**ID and name:** B3.7 date\_relative\_reference

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The reference defining the relative date or period.

*with the five subproperties:*

### 7.7.1 Persistent Identifier

**ID and name:** B5.1 relation\_pid

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The persistent identifier or TerraLID ID associated with a resource or related research output. If referring to another entity in the TerraLID database, the TerraLID identifier must be used.

*with the two subproperties:*

#### # 7.7.1.1 Value

**ID and name:** B5.1.1 relation\_pid\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Value of the persistent identifier or TerraLID ID.

**Allowed values and other constraints:** valid persistent identifier according to the options listed in B5.1.2 Type .

**Example:** 10.60510/ICDP5054ESYI201

#### # 7.7.1.2 Type

**ID and name:** B5.1.2 relation\_pid\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The type of the identifier.

**Allowed values and other constraints:** controlled vocabulary

#### 7.7.2 Full reference

**ID and name:** B5.2 relation\_text

**Provided by:** data provider, API (DOI)

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The full reference of a publication.

**Allowed values and other constraints:** free text

**Example:** Palinkaš, L. A., 1985, Lead isotope patterns in galenas from some selected ore deposits in Croatia and NW Bosnia, Geološki Vjesnik, 38, 175–89.

#### 7.7.3 Kind of relation

**ID and name:** B5.3 relation\_kind

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Relationship between item and the research output.

**Allowed values and other constraints:** controlled vocabulary

#### 7.7.4 Type of resource

**ID and name:** B5.4 relation\_resource

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Type of resource or research output.

**Allowed values and other constraints:** controlled vocabulary

#### 7.7.5 Additional details

**ID and name:** B5.5 relation\_detail

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** Additional information about the relation, e.g., if the related work addresses a specific aspect of the item (e.g., the geological setting).

**Allowed values and other constraints:** free text

**Example:** Information about the dating of the site.

## 8. Site type

**ID and name:** SI8 site\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The type of the site, geological or how it was used by humans.

**Allowed values and other constraints:** controlled vocabulary

## 9. Keywords

**ID and name:** SI9 site\_keywords

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Keywords to further characterise the site. This includes any overarching complexes or clusters the site is part of.

**Allowed values and other constraints:** free text

**Example:** ore beneficiation, Laurion

## 10. Project dates

**ID and name:** SI10 project\_date

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The date of the investigation or project in which the site was/is studied.

*with the two subproperties:*

### 10.1 Start date

**ID and name:** SI10.1 project\_date\_start

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Start date of the investigation or project in which the site was studied and sampled.

**Allowed values and other constraints:** date formatted as YYYY-MM-DD

**Example:** 1980-01-15

### 10.2 End date

**ID and name:** SI10.2 project\_date\_end

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** End date of the investigation or project in which the site was/is studied and sampled, if known. Leave empty if investigation is still ongoing at the time of data entry.

**Allowed values and other constraints:** date formatted as YYYY-MM-DD

**Example:** 2000-04-20

## 11. Relations

**ID and name:** SI11 site\_relation

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Information about related entities, including assemblages belonging to the site, and other research output such as publications providing relevant information about the site. This includes any literature from which information about the site was extracted.

*with the five subproperties:*

### 11.1 Persistent Identifier

**ID and name:** B5.1 relation\_pid

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The persistent identifier or TerraLID ID associated with a resource or related research output. If referring to another entity in the TerraLID database, the TerraLID identifier must be used.

*with the two subproperties:*

#### 11.1.1 VALUE

**ID and name:** B5.1.1 relation\_pid\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Value of the persistent identifier or TerraLID ID.

**Allowed values and other constraints:** valid persistent identifier according to the options listed in B5.1.2 Type .

**Example:** 10.60510/ICDP5054ESYI201

#### 11.1.2 TYPE

**ID and name:** B5.1.2 relation\_pid\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The type of the identifier.

**Allowed values and other constraints:** controlled vocabulary

## 11.2 Full reference

**ID and name:** B5.2 relation\_text

**Provided by:** data provider, API (DOI)

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The full reference of a publication.

**Allowed values and other constraints:** free text

**Example:** Palinkaš, L. A., 1985, Lead isotope patterns in galenas from some selected ore deposits in Croatia and NW Bosnia, Geološki Vjesnik, 38, 175–89.

## 11.3 Kind of relation

**ID and name:** B5.3 relation\_kind

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Relationship between item and the research output.

**Allowed values and other constraints:** controlled vocabulary

## 11.4 Type of resource

**ID and name:** B5.4 relation\_resource

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Type of resource or research output.

**Allowed values and other constraints:** controlled vocabulary

## 11.5 Additional details

**ID and name:** B5.5 relation\_detail

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** Additional information about the relation, e.g., if the related work addresses a specific aspect of the item (e.g., the geological setting).

**Allowed values and other constraints:** free text

**Example:** Information about the dating of the site.

# Assemblages

## TerraLID ID

**ID and name:** AS0 terralid\_assemblage\_id

**Provided by:** TerraLID system

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The ID of the assemblage in the TerraLID database.

**Allowed values and other constraints:** t.b.d.

**Example:** t.b.d.

## 1. Assemblage type

**ID and name:** AS1 assemblage\_type

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The type of assemblage. This can be either a finds complex in an archaeological site (e.g. hoard, workshop, mining gallery) or a geological feature (e.g. gossan, alteration zone, fault zone).

**Allowed values and other constraints:** controlled vocabulary

## 2. Investigation type

**ID and name:** AS2 assemblage\_investigation

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The type of investigation leading to the discovery of the assemblage.

**Allowed values and other constraints:** controlled vocabulary

## 3. Investigation unit

**ID and name:** AS3 assemblage\_investigation\_unit

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** The unit according to the recording system of the investigation in which the assemblage was found.

*with the two subproperties:*

### 3.1 Type

**ID and name:** AS3.1 assemblage\_investigation\_unit\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The type of the unit.

**Allowed values and other constraints:** controlled vocabulary

### 3.2 Identifier

**ID and name:** AS3.2 assemblage\_investigation\_unit\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The identifier of the unit.

**Allowed values and other constraints:** free text

**Example:** 13; A1-B2

## 4. Stratigraphy

**ID and name:** AS4 assemblage\_stratigraphy

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Information about the stratigraphic position of the assemblage within the locality.

*with the four subproperties:*

### 4.1 Unit

**ID and name:** AS4.1 assemblage\_stratigraphy\_unit

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The locality or project-specific identifier of the stratigraphic unit from which the assemblage was collected.

**Allowed values and other constraints:** free text

**Example:** host rock, pit 13

### 4.2 Site diagram

**ID and name:** AS4.2 assemblage\_stratigraphy\_diagram

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–1

**Definition:** Image or drawing of site that makes exact location of assemblage clear.

**Allowed values and other constraints:** file path

**Example:** t.b.d.

## 4.3 Context

**ID and name:** AS4.3 assemblage\_stratigraphy\_context

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Information about whether the material was disturbed during deposition or in a later event.

**Allowed values and other constraints:** controlled vocabulary

## 4.4 Description

**ID and name:** AS4.4 assemblage\_stratigraphy\_description

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–1

**Definition:** Additional information about the stratigraphic context not covered elsewhere.

**Allowed values and other constraints:** free text

**Example:** Traces of extensive rodent activity indicate mixing with material from overlying stratigraphic units.

# 5. Assemblage depth

**ID and name:** AS5 assemblage\_depth

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The relative depth of the assemblage.

*with the three subproperties:*

## 5.1 Reference point

**ID and name:** AS5.1 assemblage\_depth\_reference

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 0–1

**Definition:** The reference point for the depth measurement of the assemblage.

**Allowed values and other constraints:** free text

**Example:** Top of infilling

## 5.2 Value

**ID and name:** AS5.2 assemblage\_depth\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The depth value of the assemblage measured from the reference point.

**Allowed values and other constraints:** decimal number

**Example:** 5.6

## 5.3 Unit

**ID and name:** AS5.3 assemblage\_depth\_unit

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** SI unit of the depth value of the assemblage.

**Allowed values and other constraints:** controlled vocabulary

# 6. Relations

**ID and name:** AS6 assemblage\_relation

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Information about related entities, including the object(s) belonging to the assemblage, and other research output such as publications providing relevant information about the assemblage. This includes any literature from which information about the assemblage was extracted.

*with the five subproperties:*

### 6.1 Persistent Identifier

**ID and name:** B5.1 relation\_pid

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The persistent identifier or TerraLID ID associated with a resource or related research output. If referring to another entity in the TerraLID database, the TerraLID identifier must be used.

*with the two subproperties:*

#### 6.1.1 VALUE

**ID and name:** B5.1.1 relation\_pid\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Value of the persistent identifier or TerraLID ID.

**Allowed values and other constraints:** valid persistent identifier according to the options listed in B5.1.2 Type .

**Example:** 10.60510/ICDP5054ESYI201

#### 6.1.2 TYPE

**ID and name:** B5.1.2 relation\_pid\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The type of the identifier.

**Allowed values and other constraints:** controlled vocabulary

#### 6.2 Full reference

**ID and name:** B5.2 relation\_text

**Provided by:** data provider, API (DOI)

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The full reference of a publication.

**Allowed values and other constraints:** free text

**Example:** Palinkaš, L. A., 1985, Lead isotope patterns in galenas from some selected ore deposits in Croatia and NW Bosnia, Geološki Vjesnik, 38, 175–89.

#### 6.3 Kind of relation

**ID and name:** B5.3 relation\_kind

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Relationship between item and the research output.

**Allowed values and other constraints:** controlled vocabulary

#### 6.4 Type of resource

**ID and name:** B5.4 relation\_resource

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Type of resource or research output.

**Allowed values and other constraints:** controlled vocabulary

#### 6.5 Additional details

**ID and name:** B5.5 relation\_detail

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** Additional information about the relation, e.g., if the related work addresses a specific aspect of the item (e.g., the geological setting).

**Allowed values and other constraints:** free text

**Example:** Information about the dating of the site.

# Objects

## TerraLID ID

**ID and name:** O0 terralid\_object\_id

**Provided by:** TerraLID system

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The ID of the object in the TerraLID database.

**Allowed values and other constraints:** t.b.d.

**Example:** t.b.d.

## 1. Collectors

**ID and name:** O1 object\_collectors

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Details of the creator(s), excavator(s), or other person(s) intellectually responsible for the sample collection.

*with the nine subproperties:*

### 1.1 Role

**ID and name:** B1.1 person\_role

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The role in which the person is related to the linked information.

**Allowed values and other constraints:** controlled vocabulary

**Example:** Author

### 1.2 First names

**ID and name:** B1.2 person\_name\_first

**Provided by:** data provider, API (ORCID ID)

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The first and middle name(s) of the person.

**Allowed values and other constraints:** free text

**Example:** Jane

### 1.3 Last Name

**ID and name:** B1.3 person\_name\_last

**Provided by:** data provider, API (ORCID ID)

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The last name of the person.

**Allowed values and other constraints:** free text

**Example:** Doe

## 1.4 Persistent Identifier

**ID and name:** B1.4 person\_pid

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Persistent identifier(s) assigned to the person.

*with the two subproperties:*

### 1.4.1 VALUE OF PERSISTENT IDENTIFIER

**ID and name:** B1.4.1 person\_pid\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** A persistent identifier assigned to the analysed material.

**Allowed values and other constraints:** Valid persistent identifier according to B1.4.2 Type of persistent identifier

**Example:** 0000–0001–2345–678X

### 1.4.2 TYPE OF PERSISTENT IDENTIFIER

**ID and name:** B1.4.2 person\_pid\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The type of the persistent identifier.

**Allowed values and other constraints:** controlled vocabulary

## 1.5 Affiliation name

**ID and name:** B1.5 person\_affiliation\_name

**Provided by:** data provider, API (ORCID ID, ROR ID)

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The name of the person's affiliation.

**Allowed values and other constraints:** free text

**Example:** Institute of Time Travels

## 1.6 ROR ID

**ID and name:** B1.6 person\_affiliation\_ror

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The [ROR](#) of the person's affiliation.

**Allowed values and other constraints:** is valid ROR ID

**Example:** 09af7gtg53

## 1.7 Address

**ID and name:** B1.7 person\_affiliation\_address

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The address of the person's affiliation.

**Allowed values and other constraints:** free text

**Example:** Teleporter Avenue 123, Ankh–Morpok, United States of Humanities

## 1.8 Mail address

**ID and name:** B1.8 person\_mail

**Provided by:** data provider, API (ORCID ID)

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The mail address of the person.

**Allowed values and other constraints:** is valid mail address

**Example:** jane.doe@timetravels.int

## 1.9 Website

**ID and name:** B1.9 person\_url

**Provided by:** data provider, API (ORCID ID)

**Obligation:** optional

**Occurrences:** 0–1

**Definition:** The URL of a person.

**Allowed values and other constraints:** is valid URL

**Example:** <https://www.timetravels.int/members/jane-doe>

# 2. Contributors

**ID and name:** O2 object\_contributors

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Individuals or organizations who have contributed to the resource.

*with the nine subproperties:*

## 2.1 Role

**ID and name:** B1.1 person\_role

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The role in which the person is related to the linked information.

**Allowed values and other constraints:** controlled vocabulary

**Example:** Author

## 2.2 First names

**ID and name:** B1.2 person\_name\_first

**Provided by:** data provider, API (ORCID ID)

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The first and middle name(s) of the person.

**Allowed values and other constraints:** free text

**Example:** Jane

## 2.3 Last Name

**ID and name:** B1.3 person\_name\_last

**Provided by:** data provider, API (ORCID ID)

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The last name of the person.

**Allowed values and other constraints:** free text

**Example:** Doe

## 2.4 Persistent Identifier

**ID and name:** B1.4 person\_pid

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Persistent identifier(s) assigned to the person.

*with the two subproperties:*

### 2.4.1 VALUE OF PERSISTENT IDENTIFIER

**ID and name:** B1.4.1 person\_pid\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** A persistent identifier assigned to the analysed material.

**Allowed values and other constraints:** Valid persistent identifier according to B1.4.2 Type of persistent identifier

**Example:** 0000–0001–2345–678X

## 2.4.2 TYPE OF PERSISTENT IDENTIFIER

**ID and name:** B1.4.2 person\_pid\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The type of the persistent identifier.

**Allowed values and other constraints:** controlled vocabulary

## 2.5 Affiliation name

**ID and name:** B1.5 person\_affiliation\_name

**Provided by:** data provider, API (ORCID ID, ROR ID)

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The name of the person's affiliation.

**Allowed values and other constraints:** free text

**Example:** Institute of Time Travels

## 2.6 ROR ID

**ID and name:** B1.6 person\_affiliation\_ror

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The [ROR](#) of the person's affiliation.

**Allowed values and other constraints:** is valid ROR ID

**Example:** 09af7gtg53

## 2.7 Address

**ID and name:** B1.7 person\_affiliation\_address

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The address of the person's affiliation.

**Allowed values and other constraints:** free text

**Example:** Teleporter Avenue 123, Ankh–Morpok, United States of Humanities

## 2.8 Mail address

**ID and name:** B1.8 person\_mail

**Provided by:** data provider, API (ORCID ID)

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The mail address of the person.

**Allowed values and other constraints:** is valid mail address

**Example:** jane.doe@timetravels.int

## 2.9 Website

**ID and name:** B1.9 person\_url

**Provided by:** data provider, API (ORCID ID)

**Obligation:** optional

**Occurrences:** 0–1

**Definition:** The URL of a person.

**Allowed values and other constraints:** is valid URL

**Example:** <https://www.timetravels.int/members/jane-doe>

## 3. Object title

**ID and name:** O3 object\_title

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Name of the object to make it distinguishable.

**Allowed values and other constraints:** free text

**Example:** Coin 231 of hoard from the northwest palace in Atlantis

## 4. Object description

**ID and name:** O4 object\_description

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** (Detailed) description of the object. Should include information about the object and its collection not captured in other properties. For example, the primary reason for object collection or selection in terms of analytics.

**Allowed values and other constraints:** free text

**Example:** Galena-rich sediment from the washing pit.

## 5. Object identifiers

**ID and name:** O5 object\_identifiers

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Identifiers associated with the object. At least one identifier must be provided.

*with the three subproperties:*

### 5.1 Persistent Identifier

**ID and name:** O5.1 object\_pid

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Persistent identifier(s) assigned to the object.

*with the two subproperties:*

#### 5.1.1 Value of persistent identifier

**ID and name:** O5.1.1 object\_pid\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The persistent identifier assigned to the object.

**Allowed values and other constraints:** Valid persistent identifier according to [05.1.2 Type of persistent identifier](#)

**Example:** 10.60510/ABCD123EF4567

#### 5.1.2 Type of persistent identifier

**ID and name:** O5.1.2 object\_pid\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The type of a persistent identifier that was assigned to the object.

**Allowed values and other constraints:** controlled vocabulary

### 5.2 Value of other identifier

**ID and name:** O5.2 object\_id\_value

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Identifier by which the object is identified in a catalogue, database or comparable records (e.g., of the excavation catalogue or records of a laboratory).

**Allowed values and other constraints:** free text

**Example:** AG-01

### 5.3 Type of other identifier

**ID and name:** O5.3 object\_id\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The name of the catalogue, database or comparable records to which the ID refers. Mandatory if [05.2 Value of other identifier](#) is provided.

**Allowed values and other constraints:** free text

**Example:** catalogue in the final excavation report

## 6. Date of collection

**ID and name:** O6 object\_collection\_date

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Collection date of the object.

**Allowed values and other constraints:** date formatted as YYYY-MM-DD

**Example:** 1990-06-08

## 7. Collection method

**ID and name:** O7 object\_collection\_method

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** How the object was collected or obtained.

**Allowed values and other constraints:** controlled vocabulary

## 8. Object housing

**ID and name:** O8 object\_housing

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 1–n

**Definition:** The material in which the object is currently stored or was stored at any time after its collection. At least the current state should be recorded.

*with the two subproperties:*

### 8.1 Housing material

**ID and name:** O8.1 object\_housing\_material

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The material the object was or is stored in at the stage in its life cycle recorded in [08.2 Stage of Storage](#).

**Allowed values and other constraints:** controlled vocabulary

### 8.2 Stage of Storage

**ID and name:** O8.2 object\_housing\_stage

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The stage of the object's life cycle when the object was stored in the material recorded in [08.1 Housing material](#).

**Allowed values and other constraints:** controlled vocabulary

## 9. Object photo

**ID and name:** O9 object\_photo

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Photograph of the object, preferably at the time of collection. For guidance on photographs, see e.g. [L. J. Fisher \(2009\), Photography for Archaeologists Part II: Artefact recording \(BAJR Practical Guide Series 26\)](#).

**Allowed values and other constraints:** file path

**Example:** t.b.d.

## 10. Object weight

**ID and name:** O10 object\_weight

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–1

**Definition:** The weight of the object at the point of collection, before analysis.

*with the three subproperties:*

### 10.1 Value

**ID and name:** O10.1 object\_weight\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The value of the weight.

**Allowed values and other constraints:** decimal number

**Example:** 120.3

### 10.2 Unit

**ID and name:** O10.2 object\_weight\_unit

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** SI unit in which the weight is given.

**Allowed values and other constraints:** controlled vocabulary

## 10.3 Weight condition

**ID and name:** O10.3 object\_weight\_condition

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Additional information about state of object at the time the weight was measured to give a better idea how representative the measured weight is.

**Allowed values and other constraints:** free text

**Example:** dry sandy material adhering to object

# 11. Object dimensions

**ID and name:** O11 object\_dimension

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–1

**Definition:** The dimensions of the object.

*with the four subproperties:*

## 11.1 Height

**ID and name:** O11.1 object\_dimension\_height

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The height of the object.

**Allowed values and other constraints:** decimal number

**Example:** 3.52

## 11.2 Length

**ID and name:** O11.2 object\_dimension\_length

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The length of the object.

**Allowed values and other constraints:** decimal number

**Example:** 10.30

## 11.3 Width

**ID and name:** O11.3 object\_dimension\_width

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The width of the object.

**Allowed values and other constraints:** decimal number

**Example:** 2.42

## 11.4 Unit of Dimensions

**ID and name:** O11.4 object\_dimension\_unit

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Unit in which the dimension(s) of the object are provided.

**Allowed values and other constraints:** controlled vocabulary

## 12. Material

**ID and name:** O12 object\_material

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The material the object is made of.

**Allowed values and other constraints:** controlled vocabulary. This property determines which material-specific metadata will be additionally recorded.

## 13. Bulk Pb concentration

**ID and name:** O13 object\_bulk\_chemistry\_pb

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The bulk lead concentration of the object.

*with the eight subproperties:*

### 13.1 Analytical method

**ID and name:** B4.1 chemistry\_method

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The method used to determine the chemical composition.

**Allowed values and other constraints:** controlled vocabulary

### 13.2 Analysed compound

**ID and name:** B4.2 chemistry\_compound

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The analysed chemical compound (chemical element or oxide).

**Allowed values and other constraints:** controlled vocabulary, not available if a mass spectrometric-method is recorded in B4.1 Analytical method .

### 13.3 Analysed isotope

**ID and name:** B4.3 chemistry\_icp\_isotope

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The isotope used for quantification of a chemical element.

**Allowed values and other constraints:** controlled vocabulary, only available if a mass spectrometric-method is recorded in B4.1 Analytical method .

### 13.4 Value

**ID and name:** B4.4 chemistry\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The concentration of the analysed chemical compound.

**Allowed values and other constraints:** decimal number

**Example:** 15.3

### 13.5 Unit

**ID and name:** B4.5 chemistry\_unit

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The unit in which the concentration of the analysed chemical compound is given.

**Allowed values and other constraints:** controlled vocabulary

### 13.6 Uncertainty type

**ID and name:** B4.6 chemistry\_uncertainty\_type

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The type of analytical uncertainty.

**Allowed values and other constraints:** controlled vocabulary

### 13.7 Confidence level

**ID and name:** B4.7 chemistry\_uncertainty\_sigma

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Sigma value of the reported absolute analytical uncertainty.

**Allowed values and other constraints:** 1, 2, 3

**Example:** 2

### 13.8 Uncertainty value

**ID and name:** B4.8 chemistry\_uncertainty\_value

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Value of the absolute analytical uncertainty.

**Allowed values and other constraints:** decimal number

**Example:** 0.3

## 14. Dating of object

**ID and name:** O14 object\_date

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The date of the object.

*with the eight subproperties:*

### 14.1 Persistent identifier

**ID and name:** B3.1 date\_pid

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

*with the two subproperties:*

#### 14.1.1 VALUE

**ID and name:** B3.1.1 date\_pid\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The value of the persistent identifier.

**Allowed values and other constraints:** The period's persistent identifier in one or more of the data infrastructures listed in B3.1.2 Type .

**Example:** 99152/p0qhb66vvth

#### 14.1.2 TYPE

**ID and name:** B3.1.2 date\_pid\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The name of the data infrastructure.

**Allowed values and other constraints:** controlled vocabulary

### 14.2 Date type

**ID and name:** B3.2 date\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Is this an archaeological or geological age? Archaeological dates must be given in calendar years, with BCE dates as negative values. Geological dates must be given in million years.

**Allowed values and other constraints:** geological, archaeological

**Example:** archaeological

### 14.3 Absolute Date

**ID and name:** B3.3 date\_absolute

**Provided by:** data provider, API

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The absolute date of a point in time or period in years before or after common era. Values in BCE are reported as negative values. If the absolute date is given with an uncertainty such as 450 +/- 50 BC, start and end date mark the lower and upper limit of the date range, i.e. -500 and -400.

*with the four subproperties:*

#### 14.3.1 START

**ID and name:** B3.3.1 date\_absolute\_start

**Provided by:** data provider, API

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The oldest possible date of the period.

**Allowed values and other constraints:** integer

**Example:** -15

#### 14.3.2 END

**ID and name:** B3.3.2 date\_absolute\_end

**Provided by:** data provider, API

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The youngest possible date of the period.

**Allowed values and other constraints:** integer

**Example:** 15

#### 14.3.3 DATING METHOD

**ID and name:** B3.3.3 date\_absolute\_method

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The method used to determine the absolute date.

**Allowed values and other constraints:** controlled vocabulary

#### 14.3.4 UNIT OF DATE

**ID and name:** B3.3.4 date\_absolute\_unit

**Provided by:** TerraLID system

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The unit of the date.

**Allowed values and other constraints:** a, Ma

**Example:** a

### 14.4 Relative Date

**ID and name:** B3.4 date\_relative

**Provided by:** data provider, API

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The relative date of a point in time or period.

*with the two subproperties:*

#### 14.4.1 CHRONOLOGICAL UNIT

**ID and name:** B3.4.1 date\_relative\_period

**Provided by:** data provider, API

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The relative date expressed as a chronological unit.

**Allowed values and other constraints:** controlled vocabulary

#### 14.4.2 DATING METHOD

**ID and name:** B3.4.2 date\_relative\_method

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The method used to determine the relative date.

**Allowed values and other constraints:** controlled vocabulary

#### 14.5 Cultural unit

**ID and name:** B3.5 date\_archaeo\_cultural

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** Relevant cultural and user created labels for the relative date of the item.

**Allowed values and other constraints:** free text, only available if B3.2 Date type = "archaeological".

**Example:** Roman

#### 14.6 Orogenesis

**ID and name:** B3.6 date\_geol\_orogenesis

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The relative date expressed as anorogenic event.

**Allowed values and other constraints:** controlled vocabulary, only available if B3.2 Date type = "geological".

#### 14.7 Definition of chronological unit

**ID and name:** B3.7 date\_relative\_reference

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The reference defining the relative date or period.

*with the five subproperties:*

##### 14.7.1 Persistent Identifier

**ID and name:** B5.1 relation\_pid

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The persistent identifier or TerraLID ID associated with a resource or related research output. If referring to another entity in the TerraLID database, the TerraLID identifier must be used.

*with the two subproperties:*

##### # 14.7.1.1 Value

**ID and name:** B5.1.1 relation\_pid\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Value of the persistent identifier or TerraLID ID.

**Allowed values and other constraints:** valid persistent identifier according to the options listed in B5.1.2 Type .

**Example:** 10.60510/ICDP5054ESYI201

# 14.7.1.2 Type

**ID and name:** B5.1.2 relation\_pid\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The type of the identifier.

**Allowed values and other constraints:** controlled vocabulary

14.7.2 Full reference

**ID and name:** B5.2 relation\_text

**Provided by:** data provider, API (DOI)

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The full reference of a publication.

**Allowed values and other constraints:** free text

**Example:** Palinkaš, L. A., 1985, Lead isotope patterns in galenas from some selected ore deposits in Croatia and NW Bosnia, Geološki Vjesnik, 38, 175–89.

14.7.3 Kind of relation

**ID and name:** B5.3 relation\_kind

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Relationship between item and the research output.

**Allowed values and other constraints:** controlled vocabulary

14.7.4 Type of resource

**ID and name:** B5.4 relation\_resource

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Type of resource or research output.

**Allowed values and other constraints:** controlled vocabulary

14.7.5 Additional details

**ID and name:** B5.5 relation\_detail

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** Additional information about the relation, e.g., if the related work addresses a specific aspect of the item (e.g., the geological setting).

**Allowed values and other constraints:** free text

**Example:** Information about the dating of the site.

## 15. Keywords

**ID and name:** O15 object\_keywords

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** Keywords to describe aspects of the sample not covered by other metadata.

**Allowed values and other constraints:** free text

**Example:** t.b.d.

## 16. Object contamination

**ID and name:** O16 object\_contamination

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Information about potential contamination or treatment of the object that might impact the relevance of retrieved information (e.g. by post-depositional processes or conservation treatment).

**Allowed values and other constraints:** free text

**Example:** Galvanic restoration of the surface in 1967

## 17. Status of object

**ID and name:** O17 object\_status

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Information about the current status of the object and how to access it.

*with the two subproperties:*

### 17.1 Institution

**ID and name:** B2.1 status\_institution

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The institution at which the material is located.

*with the five subproperties:*

#### 17.1.1 NAME

**ID and name:** B2.1.1 status\_institution\_name

**Provided by:** data provider, API (ROR ID)

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Name of the institution.

**Allowed values and other constraints:** free text

**Example:** Institute of Time Travels

#### 17.1.2 ROR

**ID and name:** B2.1.2 status\_institution\_ror

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** [ROR](#) of the institution.

**Allowed values and other constraints:** is valid ROR ID

**Example:** 09af7gtg53

#### 17.1.3 ADDRESS

**ID and name:** B2.1.3 status\_institution\_address

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Address of the institution.

**Allowed values and other constraints:** free text

**Example:** Teleporter Avenue 123, Ankh–Morpok, United States of Humanities

#### 17.1.4 STORAGE LOCATION

**ID and name:** B2.1.4 status\_institution\_location

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Location of the item within the institution.

**Allowed values and other constraints:** free text

**Example:** Archive 9, shelf 3, box 1

#### 17.1.5 CONTACT

**ID and name:** B2.1.5 status\_institution\_contact

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Contact information for inquiries about the material. This may include, for example, a mail address or phone number of the respective department within the institution or the identification of a specific contact person as well as constraints on the availability of the point of contact such as opening hours.

**Allowed values and other constraints:** free text

**Example:** t.b.d.

## 17.2 Accessibility

**ID and name:** B2.2 status\_accessibility

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Is the material accessible to other researchers and do restrictions apply?

**Allowed values and other constraints:** controlled vocabulary

## 18. Authenticity of object

**ID and name:** O18.1 object\_authenticity

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 0–1

**Definition:** The contemporary legal status of an object: whether it is a genuine archaeological object, contemporary imitation, or a modern imitation. For example, authentic numismatic objects were created by an authority that had the rights to do so, while contemporary imitations were not.

*with the two subproperties:*

### 18.1 Authenticity type

**ID and name:** O18.1 object\_authenticity\_type

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 1

**Definition:** The object's type of authenticity.

**Allowed values and other constraints:** controlled vocabulary

### 18.2 Reasoning

**ID and name:** O18.2 object\_authenticity\_description

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Reasoning for the given classification.

**Allowed values and other constraints:** free text

**Example:** The zinc content in the brass is higher than can be achieved with Roman technology.

## 19. Relations

**ID and name:** O19 object\_relation

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Information about related entities, including samples belonging to the object, and other research output such as publications providing relevant information about the object. This includes any literature from which information about the object was extracted.

*with the five subproperties:*

### 19.1 Persistent Identifier

**ID and name:** B5.1 relation\_pid

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The persistent identifier or TerraLID ID associated with a resource or related research output. If referring to another entity in the TerraLID database, the TerraLID identifier must be used.

*with the two subproperties:*

#### 19.1.1 VALUE

**ID and name:** B5.1.1 relation\_pid\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Value of the persistent identifier or TerraLID ID.

**Allowed values and other constraints:** valid persistent identifier according to the options listed in [B5.1.2 Type](#).

**Example:** 10.60510/ICDP5054ESYI201

#### 19.1.2 TYPE

**ID and name:** B5.1.2 relation\_pid\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The type of the identifier.

**Allowed values and other constraints:** controlled vocabulary

### 19.2 Full reference

**ID and name:** B5.2 relation\_text

**Provided by:** data provider, API (DOI)

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The full reference of a publication.

**Allowed values and other constraints:** free text

**Example:** Palinkaš, L. A., 1985, Lead isotope patterns in galenas from some selected ore deposits in Croatia and NW Bosnia, Geološki Vjesnik, 38, 175–89.

### 19.3 Kind of relation

**ID and name:** B5.3 relation\_kind

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Relationship between item and the research output.

**Allowed values and other constraints:** controlled vocabulary

#### 19.4 Type of resource

**ID and name:** B5.4 relation\_resource

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Type of resource or research output.

**Allowed values and other constraints:** controlled vocabulary

#### 19.5 Additional details

**ID and name:** B5.5 relation\_detail

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** Additional information about the relation, e.g., if the related work addresses a specific aspect of the item (e.g., the geological setting).

**Allowed values and other constraints:** free text

**Example:** Information about the dating of the site.

# Samples

## TerraLID ID

**ID and name:** S0 terralid\_sample\_id

**Provided by:** TerraLID system

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The ID of the sample in the TerraLID database.

**Allowed values and other constraints:** t.b.d.

**Example:** t.b.d.

## 1. Sample identifiers

**ID and name:** S1 sample\_identifiers

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Identifiers assigned to the sample.

*with the three subproperties:*

### 1.1 Laboratory ID

**ID and name:** S1.1 sample\_id\_lab

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The identifier by which the sample was identified in the lab or publication.

**Allowed values and other constraints:** free text

**Example:** 2024/02

### 1.2 Persistent Identifier

**ID and name:** S1.2 sample\_pid

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Persistent identifier(s) assigned to the analysed material.

*with the two subproperties:*

#### 1.2.1 Value of persistent Identifier

**ID and name:** S1.2.1 sample\_pid\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** A persistent identifier assigned to the analysed material.

**Allowed values and other constraints:** valid persistent identifier according to [S1.2.2 Type of persistent identifier](#)

**Example:** 10.60510/ICDP5054ESYI201

### 1.2.2 Type of persistent identifier

**ID and name:** S1.2.2 sample\_pid\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The type of a persistent identifier that was assigned to the sample.

**Allowed values and other constraints:** controlled vocabulary

## 2. Objective of sampling

**ID and name:** S2 sample\_objective

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Short note for which purpose the sample was originally taken.

**Allowed values and other constraints:** free text

**Example:** provenance analysis

## 3. Sampled material

**ID and name:** S3 sample\_material

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The material that was sampled. This may often be the material recorded at [012 Material](#) but can also be different, especially when a heterogeneous material is sampled.

**Allowed values and other constraints:** controlled vocabulary

## 4. Sampling location

**ID and name:** S4 sample\_location

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Information about where on the object the sample was taken.

*with the two subproperties:*

#### 4.1 Description of sampling location

**ID and name:** S4.1 sample\_location\_description

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Description of location the sample was taken from.

**Allowed values and other constraints:** free text

**Example:** edge of the coin

#### 4.2 Photo of sampling location

**ID and name:** S4.2 sample\_location\_photo

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–1

**Definition:** Photograph of the sample location. File size must be smaller than 2 MB.

**Allowed values and other constraints:** file path

**Example:** t.b.d.

### 5. Sample type

**ID and name:** S5 sample\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The type of the sampled material.

**Allowed values and other constraints:** controlled vocabulary

### 6. Sample weight

**ID and name:** S6 sample\_weight

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–1

**Definition:** The weight of the sample before analysis.

*with the two subproperties:*

#### 6.1 Value

**ID and name:** S6.1 sample\_weight\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The value of the weight.

**Allowed values and other constraints:** decimal number

**Example:** 3.25

## 6.2 Unit

**ID and name:** S6.2 sample\_weight\_unit

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** SI unit in which the weight is given.

**Allowed values and other constraints:** controlled vocabulary

## 7. Sampling method

**ID and name:** S7 sample\_method

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The method used to take the sample.

**Allowed values and other constraints:** controlled vocabulary

## 8. Sample condition

**ID and name:** S8 sample\_condition

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The state of the sample after analysis.

**Allowed values and other constraints:** controlled vocabulary

## 9. Sampling date

**ID and name:** S9 sample\_date

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Date when the sample was taken.

**Allowed values and other constraints:** date formatted as YYYY-MM-DD

**Example:** 2024-02-24

## 10. Sampling laboratory

**ID and name:** S10 sample\_laboratory

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Name (and address) of the laboratory, in which the sample was taken.

**Allowed values and other constraints:** free text

**Example:** Geochemistry laboratory of the University of Dreamland

## 11. Sample description

**ID and name:** S11 sample\_description

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–1

**Definition:** Additional information about the sampling process not captured elsewhere.

**Allowed values and other constraints:** free text

**Example:** Sample was drilled with diamond-sputtered steel drill.

## 12. Bulk Pb concentration

**ID and name:** S12 sample\_chemistry\_pb

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The bulk lead concentration of the sample.

*with the eight subproperties:*

### 12.1 Analytical method

**ID and name:** B4.1 chemistry\_method

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The method used to determine the chemical composition.

**Allowed values and other constraints:** controlled vocabulary

### 12.2 Analysed compound

**ID and name:** B4.2 chemistry\_compound

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The analysed chemical compound (chemical element or oxide).

**Allowed values and other constraints:** controlled vocabulary, not available if a mass spectrometric-method is recorded in [B4.1 Analytical method](#).

### 12.3 Analysed isotope

**ID and name:** B4.3 chemistry\_icp\_isotope

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The isotope used for quantification of a chemical element.

**Allowed values and other constraints:** controlled vocabulary, only available if a mass spectrometric-method is recorded in [B4.1 Analytical method](#).

### 12.4 Value

**ID and name:** B4.4 chemistry\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The concentration of the analysed chemical compound.

**Allowed values and other constraints:** decimal number

**Example:** 15.3

### 12.5 Unit

**ID and name:** B4.5 chemistry\_unit

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The unit in which the concentration of the analysed chemical compound is given.

**Allowed values and other constraints:** controlled vocabulary

### 12.6 Uncertainty type

**ID and name:** B4.6 chemistry\_uncertainty\_type

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The type of analytical uncertainty.

**Allowed values and other constraints:** controlled vocabulary

### 12.7 Confidence level

**ID and name:** B4.7 chemistry\_uncertainty\_sigma

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Sigma value of the reported absolute analytical uncertainty.

**Allowed values and other constraints:** 1, 2, 3

**Example:** 2

## 12.8 Uncertainty value

**ID and name:** B4.8 chemistry\_uncertainty\_value

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Value of the absolute analytical uncertainty.

**Allowed values and other constraints:** decimal number

**Example:** 0.3

# 13. Sampling person

**ID and name:** S13 sample\_creator

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Information about the person that took the sample.

*with the nine subproperties:*

## 13.1 Role

**ID and name:** B1.1 person\_role

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The role in which the person is related to the linked information.

**Allowed values and other constraints:** controlled vocabulary

**Example:** Author

## 13.2 First names

**ID and name:** B1.2 person\_name\_first

**Provided by:** data provider, API (ORCID ID)

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The first and middle name(s) of the person.

**Allowed values and other constraints:** free text

**Example:** Jane

## 13.3 Last Name

**ID and name:** B1.3 person\_name\_last

**Provided by:** data provider, API (ORCID ID)

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The last name of the person.

**Allowed values and other constraints:** free text

**Example:** Doe

#### 13.4 Persistent Identifier

**ID and name:** B1.4 person\_pid

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Persistent identifier(s) assigned to the person.

*with the two subproperties:*

##### 13.4.1 VALUE OF PERSISTENT IDENTIFIER

**ID and name:** B1.4.1 person\_pid\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** A persistent identifier assigned to the analysed material.

**Allowed values and other constraints:** Valid persistent identifier according to B1.4.2 Type of persistent identifier

**Example:** 0000–0001–2345–678X

##### 13.4.2 TYPE OF PERSISTENT IDENTIFIER

**ID and name:** B1.4.2 person\_pid\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The type of the persistent identifier.

**Allowed values and other constraints:** controlled vocabulary

#### 13.5 Affiliation name

**ID and name:** B1.5 person\_affiliation\_name

**Provided by:** data provider, API (ORCID ID, ROR ID)

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The name of the person's affiliation.

**Allowed values and other constraints:** free text

**Example:** Institute of Time Travels

#### 13.6 ROR ID

**ID and name:** B1.6 person\_affiliation\_ror

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The [ROR](#) of the person's affiliation.

**Allowed values and other constraints:** is valid ROR ID

**Example:** 09af7gtg53

### 13.7 Address

**ID and name:** B1.7 person\_affiliation\_address

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The address of the person's affiliation.

**Allowed values and other constraints:** free text

**Example:** Teleporter Avenue 123, Ankh–Morpok, United States of Humanities

### 13.8 Mail address

**ID and name:** B1.8 person\_mail

**Provided by:** data provider, API (ORCID ID)

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The mail address of the person.

**Allowed values and other constraints:** is valid mail address

**Example:** jane.doe@timetravels.int

### 13.9 Website

**ID and name:** B1.9 person\_url

**Provided by:** data provider, API (ORCID ID)

**Obligation:** optional

**Occurrences:** 0–1

**Definition:** The URL of a person.

**Allowed values and other constraints:** is valid URL

**Example:** <https://www.timetravels.int/members/jane-doe>

## 14. Sample status

**ID and name:** S14 sample\_status

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Information about the current status of the sample and how to access it.

*with the two subproperties:*

## 14.1 Institution

**ID and name:** B2.1 status\_institution

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The institution at which the material is located.

*with the five subproperties:*

### 14.1.1 NAME

**ID and name:** B2.1.1 status\_institution\_name

**Provided by:** data provider, API (ROR ID)

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Name of the institution.

**Allowed values and other constraints:** free text

**Example:** Institute of Time Travels

### 14.1.2 ROR

**ID and name:** B2.1.2 status\_institution\_ror

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** [ROR](#) of the institution.

**Allowed values and other constraints:** is valid ROR ID

**Example:** 09af7gtg53

### 14.1.3 ADDRESS

**ID and name:** B2.1.3 status\_institution\_address

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Address of the institution.

**Allowed values and other constraints:** free text

**Example:** Teleporter Avenue 123, Ankh–Morpok, United States of Humanities

### 14.1.4 STORAGE LOCATION

**ID and name:** B2.1.4 status\_institution\_location

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Location of the item within the institution.

**Allowed values and other constraints:** free text

**Example:** Archive 9, shelf 3, box 1

#### 14.1.5 CONTACT

**ID and name:** B2.1.5 status\_institution\_contact

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Contact information for inquiries about the material. This may include, for example, a mail address or phone number of the respective department within the institution or the identification of a specific contact person as well as constraints on the availability of the point of contact such as opening hours.

**Allowed values and other constraints:** free text

**Example:** t.b.d.

#### 14.2 Accessibility

**ID and name:** B2.2 status\_accessibility

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Is the material accessible to other researchers and do restrictions apply?

**Allowed values and other constraints:** controlled vocabulary

### 15. Relations

**ID and name:** S15 sample\_relation

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Information about related entities, including analysis made on the sample, and other research output such as publications providing relevant information about the sample. This includes any literature from which information about the sample was extracted.

*with the five subproperties:*

#### 15.1 Persistent Identifier

**ID and name:** B5.1 relation\_pid

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The persistent identifier or TerraLID ID associated with a resource or related research output. If referring to another entity in the TerraLID database, the TerraLID identifier must be used.

*with the two subproperties:*

##### 15.1.1 VALUE

**ID and name:** B5.1.1 relation\_pid\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Value of the persistent identifier or TerraLID ID.

**Allowed values and other constraints:** valid persistent identifier according to the options listed in B5.1.2 Type .

**Example:** 10.60510/ICDP5054ESYI201

#### 15.1.2 TYPE

**ID and name:** B5.1.2 relation\_pid\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The type of the identifier.

**Allowed values and other constraints:** controlled vocabulary

#### 15.2 Full reference

**ID and name:** B5.2 relation\_text

**Provided by:** data provider, API (DOI)

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The full reference of a publication.

**Allowed values and other constraints:** free text

**Example:** Palinkaš, L. A., 1985, Lead isotope patterns in galenas from some selected ore deposits in Croatia and NW Bosnia, Geološki Vjesnik, 38, 175–89.

#### 15.3 Kind of relation

**ID and name:** B5.3 relation\_kind

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Relationship between item and the research output.

**Allowed values and other constraints:** controlled vocabulary

#### 15.4 Type of resource

**ID and name:** B5.4 relation\_resource

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Type of resource or research output.

**Allowed values and other constraints:** controlled vocabulary

#### 15.5 Additional details

**ID and name:** B5.5 relation\_detail

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** Additional information about the relation, e.g., if the related work addresses a specific aspect of the item (e.g., the geological setting).

**Allowed values and other constraints:** free text

**Example:** Information about the dating of the site.

# Analyses

## TerraLID ID

**ID and name:** A0 terralid\_analysis\_id

**Provided by:** TerraLID system

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The ID of the analysis in the TerraLID database.

**Allowed values and other constraints:** t.b.d.

**Example:** t.b.d.

## 1. Laboratory ID

**ID and name:** A1 analysis\_lab\_id

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The ID(s) of the analysis in a laboratory and/or another database.

**Allowed values and other constraints:** free text

**Example:** 2024-TR01

## 2. Analysis type

**ID and name:** A2 analysis\_lia\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The type of analysis for measuring the lead isotope composition.

**Allowed values and other constraints:** controlled vocabulary

## 3. Preparation protocol

**ID and name:** A3 analysis\_lia\_preparation

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Information about how the sample was prepared for analysis.

*with the two subproperties:*

### 3.1 Description

**ID and name:** A3.1 analysis\_lia\_preparation\_description

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The way the sample was prepared for analysis.

**Allowed values and other constraints:** free text

**Example:** Dissolution with aqua regia at 80°C and evaporation to dryness, followed by dissolution in 2% HNO<sub>3</sub>.

### 3.2 Publication

**ID and name:** A3.2 analysis\_lia\_preparation\_publication

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** If the preparation protocol was already published, the publication of the protocol.

*with the five subproperties:*

#### 3.2.1 Persistent Identifier

**ID and name:** B5.1 relation\_pid

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The persistent identifier or TerraLID ID associated with a resource or related research output. If referring to another entity in the TerraLID database, the TerraLID identifier must be used.

*with the two subproperties:*

##### 3.2.1.1 VALUE

**ID and name:** B5.1.1 relation\_pid\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Value of the persistent identifier or TerraLID ID.

**Allowed values and other constraints:** valid persistent identifier according to the options listed in B5.1.2 Type .

**Example:** 10.60510/ICDP5054ESYI201

##### 3.2.1.2 TYPE

**ID and name:** B5.1.2 relation\_pid\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The type of the identifier.

**Allowed values and other constraints:** controlled vocabulary

### 3.2.2 Full reference

**ID and name:** B5.2 relation\_text

**Provided by:** data provider, API (DOI)

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The full reference of a publication.

**Allowed values and other constraints:** free text

**Example:** Palinkaš, L. A., 1985, Lead isotope patterns in galenas from some selected ore deposits in Croatia and NW Bosnia, Geološki Vjesnik, 38, 175–89.

### 3.2.3 Kind of relation

**ID and name:** B5.3 relation\_kind

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Relationship between item and the research output.

**Allowed values and other constraints:** controlled vocabulary

### 3.2.4 Type of resource

**ID and name:** B5.4 relation\_resource

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Type of resource or research output.

**Allowed values and other constraints:** controlled vocabulary

### 3.2.5 Additional details

**ID and name:** B5.5 relation\_detail

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** Additional information about the relation, e.g., if the related work addresses a specific aspect of the item (e.g., the geological setting).

**Allowed values and other constraints:** free text

**Example:** Information about the dating of the site.

## 4. Analysed material

**ID and name:** A4 analysis\_lia\_material

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Capture here if specific materials within a sample are analysed, such as mineral separates or laser ablation of individual mineral species within the same specimen.

**Allowed values and other constraints:** free text

**Example:** only malachite analysed

## 5. Separation protocol

**ID and name:** A5 analysis\_lia\_separation

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Information about the protocol used for the separation of lead from the sample matrix.

*with the two subproperties:*

### 5.1 Description

**ID and name:** A5.1 analysis\_lia\_separation\_description

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** If unpublished, provide description of the protocol used for the separation of lead from the sample matrix. Otherwise, list all deviations from the published protocol.

**Allowed values and other constraints:** free text

**Example:** t.b.d.

### 5.2 Publication

**ID and name:** A5.2 analysis\_lia\_separation\_publication

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The publication of the protocol used for separating lead from the sample matrix.

*with the five subproperties:*

#### 5.2.1 Persistent Identifier

**ID and name:** B5.1 relation\_pid

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The persistent identifier or TerraLID ID associated with a resource or related research output. If referring to another entity in the TerraLID database, the TerraLID identifier must be used.

*with the two subproperties:*

#### 5.2.1.1 VALUE

**ID and name:** B5.1.1 relation\_pid\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Value of the persistent identifier or TerraLID ID.

**Allowed values and other constraints:** valid persistent identifier according to the options listed in B5.1.2 Type .

**Example:** 10.60510/ICDP5054ESYI201

#### 5.2.1.2 TYPE

**ID and name:** B5.1.2 relation\_pid\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The type of the identifier.

**Allowed values and other constraints:** controlled vocabulary

### 5.2.2 Full reference

**ID and name:** B5.2 relation\_text

**Provided by:** data provider, API (DOI)

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The full reference of a publication.

**Allowed values and other constraints:** free text

**Example:** Palinkaš, L. A., 1985, Lead isotope patterns in galenas from some selected ore deposits in Croatia and NW Bosnia, Geološki Vjesnik, 38, 175–89.

### 5.2.3 Kind of relation

**ID and name:** B5.3 relation\_kind

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Relationship between item and the research output.

**Allowed values and other constraints:** controlled vocabulary

### 5.2.4 Type of resource

**ID and name:** B5.4 relation\_resource

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Type of resource or research output.

**Allowed values and other constraints:** controlled vocabulary

### 5.2.5 Additional details

**ID and name:** B5.5 relation\_detail

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** Additional information about the relation, e.g., if the related work addresses a specific aspect of the item (e.g., the geological setting).

**Allowed values and other constraints:** free text

**Example:** Information about the dating of the site.

## 6. Measurement device

**ID and name:** A6 analysis\_lia\_instrument

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Information about the instrument used to measure the lead isotope composition.

*with the three subproperties:*

### 6.1 Instrument type

**ID and name:** A6.1 analysis\_lia\_instrument\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The type of instrument.

**Allowed values and other constraints:** controlled vocabulary

### 6.2 Instrument model

**ID and name:** A6.2 analysis\_lia\_instrument\_model

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The manufacturer and model name of the instrument.

**Allowed values and other constraints:** controlled vocabulary

### 6.3 Persistent identifier (PIDinst)

**ID and name:** A6.3 analysis\_lia\_instrument\_pid

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–1

**Definition:** The full URL of the instrument's [PIDinst](#).

**Allowed values and other constraints:** is valid PIDinst

**Example:** <http://hdl.handle.net/21.11157/cd5777a9-07c4-4e80-a770-9f294f09894d>

## 7. Analyte Pb concentration

**ID and name:** A7 analysis\_lia\_pb\_concentration

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The lead concentration of the analyte.

*with the eight subproperties:*

### 7.1 Analytical method

**ID and name:** B4.1 chemistry\_method

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The method used to determine the chemical composition.

**Allowed values and other constraints:** controlled vocabulary

### 7.2 Analysed compound

**ID and name:** B4.2 chemistry\_compound

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The analysed chemical compound (chemical element or oxide).

**Allowed values and other constraints:** controlled vocabulary, not available if a mass spectrometric-method is recorded in B4.1 Analytical method .

### 7.3 Analysed isotope

**ID and name:** B4.3 chemistry\_icp\_isotope

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The isotope used for quantification of a chemical element.

**Allowed values and other constraints:** controlled vocabulary, only available if a mass spectrometric-method is recorded in B4.1 Analytical method .

### 7.4 Value

**ID and name:** B4.4 chemistry\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The concentration of the analysed chemical compound.

**Allowed values and other constraints:** decimal number

**Example:** 15.3

## 7.5 Unit

**ID and name:** B4.5 chemistry\_unit

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The unit in which the concentration of the analysed chemical compound is given.

**Allowed values and other constraints:** controlled vocabulary

## 7.6 Uncertainty type

**ID and name:** B4.6 chemistry\_uncertainty\_type

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The type of analytical uncertainty.

**Allowed values and other constraints:** controlled vocabulary

## 7.7 Confidence level

**ID and name:** B4.7 chemistry\_uncertainty\_sigma

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Sigma value of the reported absolute analytical uncertainty.

**Allowed values and other constraints:** 1, 2, 3

**Example:** 2

## 7.8 Uncertainty value

**ID and name:** B4.8 chemistry\_uncertainty\_value

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Value of the absolute analytical uncertainty.

**Allowed values and other constraints:** decimal number

**Example:** 0.3

# 8. Mean total intensity of analyte

**ID and name:** A8 analysis lia\_pb\_intensity

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The mean total intensity (sum of all isotope signals) during the analysis.

*with the two subproperties:*

## 8.1 Value

**ID and name:** A8.1 analysis\_liq\_pb\_intensity\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The value of the mean total intensity.

**Allowed values and other constraints:** decimal number

**Example:** 40.5

## 8.2 Unit

**ID and name:** A8.2 analysis\_liq\_pb\_intensity\_unit

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The SI unit in which the mean total intensity is given.

**Allowed values and other constraints:** controlled vocabulary

# 9. Reference materials

**ID and name:** A9 analysis\_liq\_standard-pb

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Information about the reference material(s) for lead isotopes used during the analysis for quality control and/or correction of instrumental fractionation.

*with the six subproperties:*

## 9.1 Name of lead isotope reference material

**ID and name:** A9.1 analysis\_liq\_standard-pb\_name

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The name of the reference material for lead isotopes.

**Allowed values and other constraints:** controlled vocabulary

## 9.2 Publication of lead isotope reference material

**ID and name:** A9.2 analysis\_lia\_standard-pb\_publication

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Publication reporting the values of the reference material's lead isotope ratios used for mass bias correction. These are not necessarily the values originally published for the reference material.

*with the five subproperties:*

### 9.2.1 Persistent Identifier

**ID and name:** B5.1 relation\_pid

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The persistent identifier or TerraLID ID associated with a resource or related research output. If referring to another entity in the TerraLID database, the TerraLID identifier must be used.

*with the two subproperties:*

#### 9.2.1.1 VALUE

**ID and name:** B5.1.1 relation\_pid\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Value of the persistent identifier or TerraLID ID.

**Allowed values and other constraints:** valid persistent identifier according to the options listed in B5.1.2 Type .

**Example:** 10.60510/ICDP5054ESYI201

#### 9.2.1.2 TYPE

**ID and name:** B5.1.2 relation\_pid\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The type of the identifier.

**Allowed values and other constraints:** controlled vocabulary

### 9.2.2 Full reference

**ID and name:** B5.2 relation\_text

**Provided by:** data provider, API (DOI)

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The full reference of a publication.

**Allowed values and other constraints:** free text

**Example:** Palinkaš, L. A., 1985, Lead isotope patterns in galenas from some selected ore deposits in Croatia and NW Bosnia, Geološki Vjesnik, 38, 175–89.

### 9.2.3 Kind of relation

**ID and name:** B5.3 relation\_kind

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Relationship between item and the research output.

**Allowed values and other constraints:** controlled vocabulary

### 9.2.4 Type of resource

**ID and name:** B5.4 relation\_resource

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Type of resource or research output.

**Allowed values and other constraints:** controlled vocabulary

### 9.2.5 Additional details

**ID and name:** B5.5 relation\_detail

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** Additional information about the relation, e.g., if the related work addresses a specific aspect of the item (e.g., the geological setting).

**Allowed values and other constraints:** free text

**Example:** Information about the dating of the site.

## 9.3 Measured values of lead isotope reference material

**ID and name:** A9.3 analysis\_lia\_standard-pb\_measured

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The measured lead isotope ratios of the reference material.

*with the seven subproperties:*

### 9.3.1 Name

**ID and name:** B6.1 lia\_ratio\_name

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The lead isotope ratio for which the value is reported.

**Allowed values and other constraints:** 206Pb/204Pb, 207Pb/204Pb, 208Pb/204Pb, 204Pb/206Pb, 207Pb/206Pb,

208Pb/206Pb, 207Pb/208Pb, 206Pb/208Pb

**Example:** 206Pb/204Pb

### 9.3.2 Value

**ID and name:** B6.2 lia\_ratio\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Value of the lead isotope ratio.

**Allowed values and other constraints:** decimal number

**Example:** 18.59123

### 9.3.3 Uncertainty

**ID and name:** B6.3 lia\_ratio\_uncertainty\_type

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Type of analytical uncertainty for the lead isotope ratio.

**Allowed values and other constraints:** controlled vocabulary

### 9.3.4 Confidence level

**ID and name:** B6.4 lia\_ratio\_uncertainty\_sigma

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Sigma value of the reported absolute analytical uncertainty.

**Allowed values and other constraints:** 1, 2, 3

**Example:** 2

### 9.3.5 Absolute uncertainty

**ID and name:** B6.5 lia\_ratio\_uncertainty\_value\_absolute

**Provided by:** data provider, TerraLID system

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Value of the reported absolute analytical uncertainty.

**Allowed values and other constraints:** decimal number

**Example:** 0.00008

### 9.3.6 Relative uncertainty

**ID and name:** B6.6 lia\_ratio\_uncertainty\_value\_relative

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Value of relative analytical uncertainty for the lead isotope ratio in per cent (%). If provided, the TerraLID

system will calculate the corresponding absolute values.

**Allowed values and other constraints:** decimal number

**Example:** 0.1

### 9.3.7 Source

**ID and name:** B6.7 lia\_ratio\_source

**Provided by:** TerraLID system

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Whether the date was reported in the publication or calculated by the TerraLID system from other published values.

**Allowed values and other constraints:** original, calculated

**Example:** original

## 9.4 Name of thallium isotope reference material

**ID and name:** A9.4 analysis\_lia\_standard-tl\_name

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The name of the thallium reference material used during the analysis for quality control and/or correction of instrumental fractionation.

**Allowed values and other constraints:** controlled vocabulary

## 9.5 Measured $^{205}\text{TI}/^{203}\text{TI}$ ratio of thallium isotope reference material

**ID and name:** A9.5 analysis\_lia\_standard-tl\_measured

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The measured  $^{205}\text{TI}/^{203}\text{TI}$  ratio of the reference material.

**Allowed values and other constraints:** decimal number

**Example:** 2.38714

## 9.6 Concentration of the thallium isotope reference material

**ID and name:** A9.6 analysis\_lia\_standard-tl\_concentration

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–1

**Definition:** The concentration of the thallium reference material added to the sample in ppb (e.g. ng/g,  $\mu\text{g/l}$ ).

**Allowed values and other constraints:** number

**Example:** 100

## 10. Mass bias correction model

**ID and name:** A10 analysis\_liu\_correction

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The model(s) used for mass bias correction of the lead isotope data.

**Allowed values and other constraints:** controlled vocabulary

## 11. Laboratory

**ID and name:** A11 analysis\_liu\_laboratory

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The laboratory that performed the lead isotope analysis.

*with the nine subproperties:*

### 11.1 Role

**ID and name:** B1.1 person\_role

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The role in which the person is related to the linked information.

**Allowed values and other constraints:** controlled vocabulary

**Example:** Author

### 11.2 First names

**ID and name:** B1.2 person\_name\_first

**Provided by:** data provider, API (ORCID ID)

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The first and middle name(s) of the person.

**Allowed values and other constraints:** free text

**Example:** Jane

### 11.3 Last Name

**ID and name:** B1.3 person\_name\_last

**Provided by:** data provider, API (ORCID ID)

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The last name of the person.

**Allowed values and other constraints:** free text

**Example:** Doe

#### 11.4 Persistent Identifier

**ID and name:** B1.4 person\_pid

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Persistent identifier(s) assigned to the person.

*with the two subproperties:*

##### 11.4.1 VALUE OF PERSISTENT IDENTIFIER

**ID and name:** B1.4.1 person\_pid\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** A persistent identifier assigned to the analysed material.

**Allowed values and other constraints:** Valid persistent identifier according to B1.4.2 Type of persistent identifier

**Example:** 0000–0001–2345–678X

##### 11.4.2 TYPE OF PERSISTENT IDENTIFIER

**ID and name:** B1.4.2 person\_pid\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The type of the persistent identifier.

**Allowed values and other constraints:** controlled vocabulary

#### 11.5 Affiliation name

**ID and name:** B1.5 person\_affiliation\_name

**Provided by:** data provider, API (ORCID ID, ROR ID)

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The name of the person's affiliation.

**Allowed values and other constraints:** free text

**Example:** Institute of Time Travels

#### 11.6 ROR ID

**ID and name:** B1.6 person\_affiliation\_ror

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The [ROR](#) of the person's affiliation.

**Allowed values and other constraints:** is valid ROR ID

**Example:** 09af7gtg53

## 11.7 Address

**ID and name:** B1.7 person\_affiliation\_address

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The address of the person's affiliation.

**Allowed values and other constraints:** free text

**Example:** Teleporter Avenue 123, Ankh–Morpok, United States of Humanities

## 11.8 Mail address

**ID and name:** B1.8 person\_mail

**Provided by:** data provider, API (ORCID ID)

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The mail address of the person.

**Allowed values and other constraints:** is valid mail address

**Example:** jane.doe@timetravels.int

## 11.9 Website

**ID and name:** B1.9 person\_url

**Provided by:** data provider, API (ORCID ID)

**Obligation:** optional

**Occurrences:** 0–1

**Definition:** The URL of a person.

**Allowed values and other constraints:** is valid URL

**Example:** <https://www.timetravels.int/members/jane-doe>

# 12. Date of analysis

**ID and name:** A12 analysis\_lia\_date

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The day of the analysis.

**Allowed values and other constraints:** date formatted as YYYY-MM-DD

**Example:** 2024-02-24

# 13. Description

**ID and name:** A13 analysis\_lia\_description

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–1

**Definition:** Additional information about the analytical procedure not captured elsewhere.

**Allowed values and other constraints:** free text

**Example:** t.b.d.

## 14. Lead isotope ratios

**ID and name:** A14 analysis\_lia\_ratio

**Provided by:** data provider, TerraLID system

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Mass-bias corrected lead isotope ratios and analytical uncertainty. The TerraLID system will calculate all ratios not reported in the original publication.

*with the seven subproperties:*

### 14.1 Name

**ID and name:** B6.1 lia\_ratio\_name

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The lead isotope ratio for which the value is reported.

**Allowed values and other constraints:** 206Pb/204Pb, 207Pb/204Pb, 208Pb/204Pb, 204Pb/206Pb, 207Pb/206Pb, 208Pb/206Pb, 207Pb/208Pb, 206Pb/208Pb

**Example:** 206Pb/204Pb

### 14.2 Value

**ID and name:** B6.2 lia\_ratio\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Value of the lead isotope ratio.

**Allowed values and other constraints:** decimal number

**Example:** 18.59123

### 14.3 Uncertainty

**ID and name:** B6.3 lia\_ratio\_uncertainty\_type

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Type of analytical uncertainty for the lead isotope ratio.

**Allowed values and other constraints:** controlled vocabulary

### 14.4 Confidence level

**ID and name:** B6.4 lia\_ratio\_uncertainty\_sigma

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Sigma value of the reported absolute analytical uncertainty.

**Allowed values and other constraints:** 1, 2, 3

**Example:** 2

#### 14.5 Absolute uncertainty

**ID and name:** B6.5 lia\_ratio\_uncertainty\_value\_absolute

**Provided by:** data provider, TerraLID system

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Value of the reported absolute analytical uncertainty.

**Allowed values and other constraints:** decimal number

**Example:** 0.00008

#### 14.6 Relative uncertainty

**ID and name:** B6.6 lia\_ratio\_uncertainty\_value\_relative

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Value of relative analytical uncertainty for the lead isotope ratio in per cent (%). If provided, the TerraLID system will calculate the corresponding absolute values.

**Allowed values and other constraints:** decimal number

**Example:** 0.1

#### 14.7 Source

**ID and name:** B6.7 lia\_ratio\_source

**Provided by:** TerraLID system

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Whether the date was reported in the publication or calculated by the TerraLID system from other published values.

**Allowed values and other constraints:** original, calculated

**Example:** original

### 15. Age model parameters

**ID and name:** A15 analysis\_lia\_age\_model

**Provided by:** TerraLID system

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Age model parameters calculated from the mass-bias corrected lead isotope ratios.

with the nine subproperties:

## 15.1 Age model name

**ID and name:** A15.1 analysis\_lia\_age\_model\_name

**Provided by:** TerraLID system

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The age model used for calculating the parameters

**Allowed values and other constraints:** SK75, CR75, AJ84, representing the age models defined by [Stacey & Kramers \(1975\)](#), [Cumming & Richards \(1975\)](#), and [Albarède & Juteau \(1984\)](#), respectively.

**Example:** SK75

## 15.2 Model age

**ID and name:** A15.2 analysis\_lia\_age\_model\_Tmod

**Provided by:** TerraLID system

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Value of the model age in million years (Ma).

**Allowed values and other constraints:** decimal number

**Example:** 250.54

## 15.3 Uncertainty of model age

**ID and name:** A15.3 analysis\_lia\_age\_model\_Tmod\_uncertainty

**Provided by:** TerraLID system

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Uncertainty of the model age.

**Allowed values and other constraints:** decimal number

**Example:** t.b.d.

## 15.4 Mu

**ID and name:** A15.4 analysis\_lia\_age\_model\_mu

**Provided by:** TerraLID system

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Value of mu ( $\mu$ ).

**Allowed values and other constraints:** decimal number

**Example:** 9.86

## 15.5 Uncertainty of mu

**ID and name:** A15.5 analysis\_lia\_age\_model\_mu\_uncertainty

**Provided by:** TerraLID system

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Uncertainty of mu.

**Allowed values and other constraints:** decimal number

**Example:** t.b.d.

## 15.6 Kappa

**ID and name:** A15.6 analysis\_lia\_age\_model\_kappa

**Provided by:** TerraLID system

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Value of kappa ( $\kappa$ ).

**Allowed values and other constraints:** decimal number

**Example:** 3.92

## 15.7 Uncertainty of kappa

**ID and name:** A15.7 analysis\_lia\_age\_model\_kappa\_uncertainty

**Provided by:** TerraLID system

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Uncertainty of kappa.

**Allowed values and other constraints:** decimal number

**Example:** t.b.d.

## 15.8 Omega

**ID and name:** A15.8 analysis\_lia\_age\_model\_omega

**Provided by:** TerraLID system

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Value of omega ( $\omega$ ).

**Allowed values and other constraints:** decimal number

**Example:** t.b.d.

## 15.9 Uncertainty of omega

**ID and name:** A15.9 analysis\_lia\_age\_model\_omega\_uncertainty

**Provided by:** TerraLID system

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Uncertainty of omega.

**Allowed values and other constraints:** decimal number

**Example:** t.b.d.

## 16. Relations

**ID and name:** A16 analysis\_lia\_relation

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** –n

**Definition:** Information about related entities and other research output such as publications providing relevant information about the analysis. This includes any literature from which information about the analysis was extracted.

*with the five subproperties:*

### 16.1 Persistent Identifier

**ID and name:** B5.1 relation\_pid

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The persistent identifier or TerraLID ID associated with a resource or related research output. If referring to another entity in the TerraLID database, the TerraLID identifier must be used.

*with the two subproperties:*

#### 16.1.1 VALUE

**ID and name:** B5.1.1 relation\_pid\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Value of the persistent identifier or TerraLID ID.

**Allowed values and other constraints:** valid persistent identifier according to the options listed in [B5.1.2 Type](#).

**Example:** 10.60510/ICDP5054ESYI201

#### 16.1.2 TYPE

**ID and name:** B5.1.2 relation\_pid\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The type of the identifier.

**Allowed values and other constraints:** controlled vocabulary

## 16.2 Full reference

**ID and name:** B5.2 relation\_text

**Provided by:** data provider, API (DOI)

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The full reference of a publication.

**Allowed values and other constraints:** free text

**Example:** Palinkaš, L. A., 1985, Lead isotope patterns in galenas from some selected ore deposits in Croatia and NW Bosnia, Geološki Vjesnik, 38, 175–89.

### 16.3 Kind of relation

**ID and name:** B5.3 relation\_kind

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Relationship between item and the research output.

**Allowed values and other constraints:** controlled vocabulary

### 16.4 Type of resource

**ID and name:** B5.4 relation\_resource

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Type of resource or research output.

**Allowed values and other constraints:** controlled vocabulary

### 16.5 Additional details

**ID and name:** B5.5 relation\_detail

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** Additional information about the relation, e.g., if the related work addresses a specific aspect of the item (e.g., the geological setting).

**Allowed values and other constraints:** free text

**Example:** Information about the dating of the site.

# Ore

## 1. Ore mineralogy

**ID and name:** OO1 material\_ore\_mineralogy

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The mineralogical composition of the ore.

*with the two subproperties:*

### 1.1 Minerals

**ID and name:** OO1.1 material\_ore\_mineralogy\_mineral

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The minerals included in the specimen.

*with the two subproperties:*

#### 1.1.1 Mineral name

**ID and name:** OO1.1.1 material\_ore\_mineralogy\_mineral\_name

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Name of the mineral approved by the International Mineralogical Association (IMA).

**Allowed values and other constraints:** controlled vocabulary ([IMA list of minerals](#)), retrieved from the Mindat API

#### 1.1.2 Mineral ID

**ID and name:** OO1.1.2 material\_ore\_mineralogy\_mineral\_id

**Provided by:** Mindat API

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The Mindat ID of the mineral.

**Allowed values and other constraints:** Value in the `id` field of a Mindat mineral record.

### 1.2 Mineral-hosting ore part

**ID and name:** OO1.2 material\_ore\_mineral\_part

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The part of the ore to which the mineral belongs to.

**Allowed values and other constraints:** controlled vocabulary

## 2. Commodity

**ID and name:** OO2 material\_ore\_commodity

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Information about the targeted metal(s) by mining activities through time.

*with the two subproperties:*

### 2.1 Targeted metals

**ID and name:** OO2.1 material\_ore\_commodity\_metal

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The target metal(s) of the mining activities.

**Allowed values and other constraints:** controlled vocabulary

### 2.2 Period of extraction

**ID and name:** OO2.2 material\_ore\_commodity\_period

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Period when the mine was exploited for the metals listed in [002.1 Targeted metals](#).

*with the eight subproperties:*

#### 2.2.1 Persistent identifier

**ID and name:** B3.1 date\_pid

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

*with the two subproperties:*

##### 2.2.1.1 VALUE

**ID and name:** B3.1.1 date\_pid\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The value of the persistent identifier.

**Allowed values and other constraints:** The period's persistent identifier in one or more of the data infrastructures listed in [B3.1.2 Type](#).

**Example:** 99152/p0qhb66vvth

#### 2.2.1.2 TYPE

**ID and name:** B3.1.2 date\_pid\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The name of the data infrastructure.

**Allowed values and other constraints:** controlled vocabulary

#### 2.2.2 Date type

**ID and name:** B3.2 date\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Is this an archaeological or geological age? Archaeological dates must be given in calendar years, with BCE dates as negative values. Geological dates must be given in million years.

**Allowed values and other constraints:** geological, archaeological

**Example:** archaeological

#### 2.2.3 Absolute Date

**ID and name:** B3.3 date\_absolute

**Provided by:** data provider, API

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The absolute date of a point in time or period in years before or after common era. Values in BCE are reported as negative values. If the absolute date is given with an uncertainty such as 450 +/- 50 BC, start and end date mark the lower and upper limit of the date range, i.e. -500 and -400.

*with the four subproperties:*

##### 2.2.3.1 START

**ID and name:** B3.3.1 date\_absolute\_start

**Provided by:** data provider, API

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The oldest possible date of the period.

**Allowed values and other constraints:** integer

**Example:** -15

##### 2.2.3.2 END

**ID and name:** B3.3.2 date\_absolute\_end

**Provided by:** data provider, API

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The youngest possible date of the period.

**Allowed values and other constraints:** integer

**Example:** 15

#### 2.2.3.3 DATING METHOD

**ID and name:** B3.3.3 date\_absolute\_method

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The method used to determine the absolute date.

**Allowed values and other constraints:** controlled vocabulary

#### 2.2.3.4 UNIT OF DATE

**ID and name:** B3.3.4 date\_absolute\_unit

**Provided by:** TerraLID system

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The unit of the date.

**Allowed values and other constraints:** a, Ma

**Example:** a

### 2.2.4 Relative Date

**ID and name:** B3.4 date\_relative

**Provided by:** data provider, API

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The relative date of a point in time or period.

*with the two subproperties:*

#### 2.2.4.1 CHRONOLOGICAL UNIT

**ID and name:** B3.4.1 date\_relative\_period

**Provided by:** data provider, API

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The relative date expressed as a chronological unit.

**Allowed values and other constraints:** controlled vocabulary

#### 2.2.4.2 DATING METHOD

**ID and name:** B3.4.2 date\_relative\_method

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The method used to determine the relative date.

**Allowed values and other constraints:** controlled vocabulary

## 2.2.5 Cultural unit

**ID and name:** B3.5 date\_archaeo\_cultural

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** Relevant cultural and user created labels for the relative date of the item.

**Allowed values and other constraints:** free text, only available if B3.2 Date type = "archaeological".

**Example:** Roman

## 2.2.6 Orogenesis

**ID and name:** B3.6 date\_geol\_orogenesis

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The relative date expressed as an orogenic event.

**Allowed values and other constraints:** controlled vocabulary, only available if B3.2 Date type = "geological".

## 2.2.7 Definition of chronological unit

**ID and name:** B3.7 date\_relative\_reference

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The reference defining the relative date or period.

*with the five subproperties:*

### 2.2.7.1 Persistent Identifier

**ID and name:** B5.1 relation\_pid

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The persistent identifier or TerraLID ID associated with a resource or related research output. If referring to another entity in the TerraLID database, the TerraLID identifier must be used.

*with the two subproperties:*

#### # 2.2.7.1.1 Value

**ID and name:** B5.1.1 relation\_pid\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Value of the persistent identifier or TerraLID ID.

**Allowed values and other constraints:** valid persistent identifier according to the options listed in B5.1.2 Type .

**Example:** 10.60510/ICDP5054ESYI201

#### # 2.2.7.1.2 Type

**ID and name:** B5.1.2 relation\_pid\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The type of the identifier.

**Allowed values and other constraints:** controlled vocabulary

#### 2.2.7.2 Full reference

**ID and name:** B5.2 relation\_text

**Provided by:** data provider, API (DOI)

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The full reference of a publication.

**Allowed values and other constraints:** free text

**Example:** Palinkaš, L. A., 1985, Lead isotope patterns in galenas from some selected ore deposits in Croatia and NW Bosnia, Geološki Vjesnik, 38, 175–89.

#### 2.2.7.3 Kind of relation

**ID and name:** B5.3 relation\_kind

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Relationship between item and the research output.

**Allowed values and other constraints:** controlled vocabulary

#### 2.2.7.4 Type of resource

**ID and name:** B5.4 relation\_resource

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Type of resource or research output.

**Allowed values and other constraints:** controlled vocabulary

#### 2.2.7.5 Additional details

**ID and name:** B5.5 relation\_detail

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** Additional information about the relation, e.g., if the related work addresses a specific aspect of the item

(e.g., the geological setting).

**Allowed values and other constraints:** free text

**Example:** Information about the dating of the site.

### 3. Mineralisation

**ID and name:** OO3 material\_ore\_mineralisation

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Information about the mineralisation of the ore.

*with the two subproperties:*

#### 3.1 Mineralisation type

**ID and name:** OO3.1 material\_ore\_mineralisation\_type

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The type of fabric to which the mineral belongs to.

**Allowed values and other constraints:** controlled vocabulary

#### 3.2 Mineralisation phase

**ID and name:** OO3.2 material\_ore\_mineralisation\_phase

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–1

**Definition:** The relative position in the sequence of events forming the ore deposit with 1 being the earliest mineralisation event.

**Allowed values and other constraints:** integer

**Example:** 2

### 4. Ore chemistry

**ID and name:** OO4 material\_ore\_chemistry

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Information about the chemical composition of the ore.

*with the two subproperties:*

#### 4.1 Chemical composition

**ID and name:** OO4.1 material\_ore\_chemistry\_element

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The chemical composition of the ore.

*with the eight subproperties:*

#### 4.1.1 Analytical method

**ID and name:** B4.1 chemistry\_method

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The method used to determine the chemical composition.

**Allowed values and other constraints:** controlled vocabulary

#### 4.1.2 Analysed compound

**ID and name:** B4.2 chemistry\_compound

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The analysed chemical compound (chemical element or oxide).

**Allowed values and other constraints:** controlled vocabulary, not available if a mass spectrometric-method is recorded in B4.1 Analytical method .

#### 4.1.3 Analysed isotope

**ID and name:** B4.3 chemistry\_icp\_isotope

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The isotope used for quantification of a chemical element.

**Allowed values and other constraints:** controlled vocabulary, only available if a mass spectrometric-method is recorded in B4.1 Analytical method .

#### 4.1.4 Value

**ID and name:** B4.4 chemistry\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The concentration of the analysed chemical compound.

**Allowed values and other constraints:** decimal number

**Example:** 15.3

#### 4.1.5 Unit

**ID and name:** B4.5 chemistry\_unit

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The unit in which the concentration of the analysed chemical compound is given.

**Allowed values and other constraints:** controlled vocabulary

#### 4.1.6 Uncertainty type

**ID and name:** B4.6 chemistry\_uncertainty\_type

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The type of analytical uncertainty.

**Allowed values and other constraints:** controlled vocabulary

#### 4.1.7 Confidence level

**ID and name:** B4.7 chemistry\_uncertainty\_sigma

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Sigma value of the reported absolute analytical uncertainty.

**Allowed values and other constraints:** 1, 2, 3

**Example:** 2

#### 4.1.8 Uncertainty value

**ID and name:** B4.8 chemistry\_uncertainty\_value

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Value of the absolute analytical uncertainty.

**Allowed values and other constraints:** decimal number

**Example:** 0.3

### 4.2 Abundance category

**ID and name:** OO4.2 material\_ore\_chemistry\_category

**Provided by:** TerraLID system

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The abundance category of each element inferred from the chemical composition.

**Allowed values and other constraints:** controlled vocabulary

## 5. Alteration

**ID and name:** OO5 material\_ore\_alteration

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 1

**Definition:** The extent of alteration.

**Allowed values and other constraints:** controlled vocabulary

## 6. Deposit type

**ID and name:** OO6 material\_ore\_deposit

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The type of the ore deposit.

**Allowed values and other constraints:** controlled vocabulary

## 7. Ore district

**ID and name:** OO7 material\_ore\_district

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The mining district the ore deposit belongs to.

**Allowed values and other constraints:** free text

**Example:** Mitterberg; Laurion; African Copper Belt

## 8. Access to targeted metal

**ID and name:** OO8 material\_ore\_accessibility

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Information about whether the ore was accessible with pre-industrial mining and/or smelting technology?

*with the two subproperties:*

### 8.1 Accessibility

**ID and name:** OO8.1 material\_ore\_accessibility

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Was the ore accessible for pre-industrial societies?

**Allowed values and other constraints:** yes, no

**Example:** yes

## 8.2 Details

**ID and name:** OO8.2 material\_ore\_accessibility\_detail

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** If [008.1 Accessibility](#) is provided, short explanation for choice.

**Allowed values and other constraints:** free text

**Example:** The ore is part of the gossan and can be smelted in prehistoric furnaces.

# Glass

## 1. Production context

**ID and name:** OG1 material\_glass\_production\_context

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The production context the object is related to.

**Allowed values and other constraints:** controlled vocabulary

## 2. Recycling

**ID and name:** OG2 material\_glass\_recycling

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Information about whether the glass was recycled.

*with the two subproperties:*

### 2.1 Indication for recycling

**ID and name:** OG2.1 material\_glass\_recycling\_indicator

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Does the glass show indicators for recycling?

**Allowed values and other constraints:** controlled vocabulary

### 2.2 Indicators

**ID and name:** OG2.2 material\_glass\_recycling\_reason

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** If [002.1 Recycling indicator](#) is provided, short explanation for choice.

**Allowed values and other constraints:** free text

**Example:** mixture of different glass pastes

## 3. Chemical composition

**ID and name:** OG3 material\_glass\_chemistry

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1-n

**Definition:** The chemical composition of the glass.

*with the eight subproperties:*

### 3.1 Analytical method

**ID and name:** B4.1 chemistry\_method

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The method used to determine the chemical composition.

**Allowed values and other constraints:** controlled vocabulary

### 3.2 Analysed compound

**ID and name:** B4.2 chemistry\_compound

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1-n

**Definition:** The analysed chemical compound (chemical element or oxide).

**Allowed values and other constraints:** controlled vocabulary, not available if a mass spectrometric-method is recorded in B4.1 Analytical method .

### 3.3 Analysed isotope

**ID and name:** B4.3 chemistry\_icp\_isotope

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0-n

**Definition:** The isotope used for quantification of a chemical element.

**Allowed values and other constraints:** controlled vocabulary, only available if a mass spectrometric-method is recorded in B4.1 Analytical method .

### 3.4 Value

**ID and name:** B4.4 chemistry\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1-n

**Definition:** The concentration of the analysed chemical compound.

**Allowed values and other constraints:** decimal number

**Example:** 15.3

### 3.5 Unit

**ID and name:** B4.5 chemistry\_unit

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The unit in which the concentration of the analysed chemical compound is given.

**Allowed values and other constraints:** controlled vocabulary

### 3.6 Uncertainty type

**ID and name:** B4.6 chemistry\_uncertainty\_type

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The type of analytical uncertainty.

**Allowed values and other constraints:** controlled vocabulary

### 3.7 Confidence level

**ID and name:** B4.7 chemistry\_uncertainty\_sigma

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Sigma value of the reported absolute analytical uncertainty.

**Allowed values and other constraints:** 1, 2, 3

**Example:** 2

### 3.8 Uncertainty value

**ID and name:** B4.8 chemistry\_uncertainty\_value

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Value of the absolute analytical uncertainty.

**Allowed values and other constraints:** decimal number

**Example:** 0.3

## 4. Glass group

**ID and name:** OG4 material\_glass\_group

**Provided by:** TerraLID system

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The glass material group of the sample, inferred from the chemical composition.

**Allowed values and other constraints:** controlled vocabulary

## 5. Glass colour

**ID and name:** OG5 material\_glass\_colour

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The colour of the glass.

**Allowed values and other constraints:** controlled vocabulary

## 6. Colourant

**ID and name:** OG6 material\_glass\_colourant

**Provided by:** TerraLID system

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The compound giving the glass its colour, inferred from the chemical composition.

**Allowed values and other constraints:** controlled vocabulary

**Example:** Cu

## 7. Decolourant

**ID and name:** OG7 material\_glass\_decolourant

**Provided by:** TerraLID system

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The compound responsible for decolouring the glass, inferred from the chemical composition.

**Allowed values and other constraints:** controlled vocabulary

## 8. Lead source

**ID and name:** OG8 material\_glass\_lead\_source

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The constituent that is the source of lead in the glass.

**Allowed values and other constraints:** controlled vocabulary

## 9. Sr isotopes

**ID and name:** OG9 material\_glass\_isotopes\_Sr

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** The  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio of the glass.

*with the two subproperties:*

## 9.1 Value

**ID and name:** OG9.1 material\_glass\_isotopes\_Sr\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Value of the  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio.

**Allowed values and other constraints:** decimal number

**Example:** 0.7856

## 9.2 Analytical precision

**ID and name:** OG9.2 material\_glass\_isotopes\_Sr\_2SD

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Absolute analytical uncertainty of the  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio in double standard deviation (2SD).

**Allowed values and other constraints:** decimal number

**Example:** 0.0002

# 10. Nd isotopes

**ID and name:** OG10 material\_glass\_isotopes\_Nd

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** The  $\epsilon_{\text{Nd}}$  value of the glass.

*with the two subproperties:*

## 10.1 Value

**ID and name:** OG10.1 material\_glass\_isotopes\_Nd\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Value of  $\epsilon_{\text{Nd}}$ .

**Allowed values and other constraints:** decimal number

**Example:** t.b.d.

## 10.2 Analytical precision

**ID and name:** OG10.2 material\_glass\_isotopes\_Nd\_2SD

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Absolute analytical uncertainty of the  $\epsilon_{\text{Nd}}$  value in double standard deviation (2SD).

**Allowed values and other constraints:** decimal number

**Example:** t.b.d.

## 11. Hf isotopes

**ID and name:** OG11 material\_glass\_isotopes\_Hf

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** The  $\epsilon_{\text{Hf}}$  value of the glass.

*with the two subproperties:*

### 11.1 Value

**ID and name:** OG11.1 material\_glass\_isotopes\_Hf\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Value of  $\epsilon_{\text{Hf}}$ .

**Allowed values and other constraints:** decimal number

**Example:** t.b.d.

### 11.2 Analytical precision

**ID and name:** OG11.2 material\_glass\_isotopes\_Hf\_2SD

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Absolute analytical uncertainty of the  $\epsilon_{\text{Hf}}$  value in double standard deviation (2SD).

**Allowed values and other constraints:** decimal number

**Example:** t.b.d.

## 12. O isotopes

**ID and name:** OG12 material\_glass\_isotopes\_O

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** The  $\delta^{18}\text{O}$  value of the glass.

*with the two subproperties:*

## 12.1 Value

**ID and name:** OG12.1 material\_glass\_isotopes\_O\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Value of  $\delta^{18}\text{O}$ .

**Allowed values and other constraints:** decimal number

**Example:** t.b.d.

## 12.2 Analytical precision

**ID and name:** OG12.2 material\_glass\_isotopes\_O\_SD

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Absolute analytical uncertainty of the  $\delta^{18}\text{O}$  value given in single SD.

**Allowed values and other constraints:** decimal number

**Example:** t.b.d.

## 13. Glass corrosion

**ID and name:** OG13 material\_glass\_corrosion

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** Information about the corrosion of the glass and its extent.

*with the two subproperties:*

## 13.1 Extent

**ID and name:** OG13.1 material\_glass\_corrosion\_extent

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The extent of corrosion affecting the glass.

**Allowed values and other constraints:** controlled vocabulary

## 13.2 Details

**ID and name:** OG13.2 material\_glass\_corrosion\_reason

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** If [0013.1 Recycling indicator](#) is provided, short description of features.

**Allowed values and other constraints:** free text

**Example:** iridescent corrosion crust

# Metals

## 1. Metal chemistry

**ID and name:** OM1 material\_metal\_chemistry

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Chemical composition of the metal.

*with the two subproperties:*

### 1.1 Chemical composition

**ID and name:** OM1.1 material\_metal\_chemistry

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The chemical composition of the metal with additional information.

*with the eight subproperties:*

#### 1.1.1 Analytical method

**ID and name:** B4.1 chemistry\_method

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The method used to determine the chemical composition.

**Allowed values and other constraints:** controlled vocabulary

#### 1.1.2 Analysed compound

**ID and name:** B4.2 chemistry\_compound

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The analysed chemical compound (chemical element or oxide).

**Allowed values and other constraints:** controlled vocabulary, not available if a mass spectrometric-method is recorded in B4.1 Analytical method .

#### 1.1.3 Analysed isotope

**ID and name:** B4.3 chemistry\_icp\_isotope

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The isotope used for quantification of a chemical element.

**Allowed values and other constraints:** controlled vocabulary, only available if a mass spectrometric-method is recorded in [B4.1 Analytical method](#).

#### 1.1.4 Value

**ID and name:** B4.4 chemistry\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The concentration of the analysed chemical compound.

**Allowed values and other constraints:** decimal number

**Example:** 15.3

#### 1.1.5 Unit

**ID and name:** B4.5 chemistry\_unit

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The unit in which the concentration of the analysed chemical compound is given.

**Allowed values and other constraints:** controlled vocabulary

#### 1.1.6 Uncertainty type

**ID and name:** B4.6 chemistry\_uncertainty\_type

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The type of analytical uncertainty.

**Allowed values and other constraints:** controlled vocabulary

#### 1.1.7 Confidence level

**ID and name:** B4.7 chemistry\_uncertainty\_sigma

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Sigma value of the reported absolute analytical uncertainty.

**Allowed values and other constraints:** 1, 2, 3

**Example:** 2

#### 1.1.8 Uncertainty value

**ID and name:** B4.8 chemistry\_uncertainty\_value

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Value of the absolute analytical uncertainty.

**Allowed values and other constraints:** decimal number

**Example:** 0.3

## 1.2 Major elements

**ID and name:** OM1.2 material\_metal\_chemistry\_major

**Provided by:** TerraLID system

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Major chemical elements (>1 wt%) in the metal, inferred from the chemical composition.

**Allowed values and other constraints:** controlled vocabulary

# 2. Metal corrosion

**ID and name:** OM2 material\_metal\_corrosion

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Information about the corrosion of the metal.

*with the two subproperties:*

## 2.1 Extent

**ID and name:** OM2.1 material\_metal\_corrosion\_extent

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The extent of corrosion affecting the metal.

**Allowed values and other constraints:** controlled vocabulary

## 2.2 Details

**ID and name:** OM2.2 material\_metal\_corrosion\_reason

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Indicators and observations for corrosion.

**Allowed values and other constraints:** free text

**Example:** thick green crust with sediment

# 3. Provenance indicators

**ID and name:** OM3 material\_metal\_provenance

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Information about provenance if known from other sources (e.g. stamps).

**Allowed values and other constraints:** free text

**Example:** Moulded inscription: Imp(eratoris) Caes(aris) Hadriani Aug(usti) met(alli) Lut(udarensis)

# Coins

Coin-specific metadata extent the [metal-specific metadata](#) and are a subset of the [Nomisma ontology](#) and intended to be filled in the records of the coin in a numismatic data infrastructure using this ontology based on the type series and the coin's type series ID. The equivalent in the Nomisma ontology is given by the prefix `nmo`. Descriptions are taken from the [Nomisma ontology](#) and the [controlled vocabulary of Nomisma](#) will be used for the respective properties.

## 1. Type series

**ID and name:** OM.C1 material\_coin\_type\_series (`nmo:TypeSeries`)

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** A published or recognized reference list of numismatic object types, such as a catalogue or corpus.

**Allowed values and other constraints:** [controlled vocabulary](#)

## 2. Type series ID

**ID and name:** OM.C2 material\_coin\_type\_series\_id (`nmo:hasTypeSeriesItem`)

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Identifies the position of a numismatic object within a published or recognized reference list of types, such as a catalogue or corpus.

**Allowed values and other constraints:** valid identifier according to reference work listed in [OM.C1 Type Series](#).

**Example:** ric.1(2).aug.2A

## 3. Deposition type

**ID and name:** OM.C3 material\_coin\_deposition\_type (`nmo:DepositionType`)

**Provided by:** Nomisma API, data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The circumstances under which an object or group of objects came to be deposited and part of the archaeological record, for example as a hoard, votive deposit or chance loss.

**Allowed values and other constraints:** [controlled vocabulary](#)

## 4. Authority

**ID and name:** OM.C4 material\_coin\_authority ( nmo:hasAuthority )

**Provided by:** Nomisma API, data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Identifies the authority in whose name (explicitly or implicitly) a numismatic object was issued.

**Allowed values and other constraints:** [controlled vocabulary \(Organisation\)](#), [controlled vocabulary \(Person\)](#)

## 5. Mint

**ID and name:** OM.C5 material\_coin\_mint ( nmo:hasMint )

**Provided by:** Nomisma API, data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Identifies the place of manufacture or issue of a numismatic object.

**Allowed values and other constraints:** [controlled vocabulary](#)

## 6. Denomination

**ID and name:** OM.C6 material\_coin\_denomination ( nmo:hasDenomination )

**Provided by:** Nomisma API, data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Describes the monetary value assigned to an object within a denominational system.

**Allowed values and other constraints:** [controlled vocabulary](#)

## 7. Date

**ID and name:** OM.C7 material\_coin\_date ( nmo:hasDate )

**Provided by:** Nomisma API, data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Describes date (range) assigned in a numismatic context.

*with the two subproperties:*

### 7.1 Opening date

**ID and name:** OM.C7.1 material\_coin\_date\_from ( nmo:hasNumismaticOpeningDate )

**Provided by:** Nomisma API, data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The date of the earliest numismatic object of a given context, e.g. a hoard or layer.

**Allowed values and other constraints:** integer

**Example:** -25

## 7.2 Closing date

**ID and name:** OM.C7.2 material\_coin\_date\_to ( nmo:hasNumismaticClosingDate )

**Provided by:** Nomisma API, data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The date of the latest numismatic object of a given context, e.g. a hoard or layer.

**Allowed values and other constraints:** integer

**Example:** -23

## 8. Manufacture

**ID and name:** OM.C8 material\_coin\_manufacture ( nmo:hasManufacture )

**Provided by:** Nomisma API, data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Describes the method of manufacture of a numismatic object.

**Allowed values and other constraints:** [controlled vocabulary](#)

## 9. Peculiarity of Production

**ID and name:** OM.C9 material\_coin\_peculiarity\_production ( nmo:PeculiarityOfProduction )

**Provided by:** Nomisma API, data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Describes a notable, characteristic or unusual physical feature of an individual numismatic object which distinguishes it from other examples of the same group, or of a group of numismatic objects that marks it out from other groups, and which is related to the process of production of a numismatic object.

**Allowed values and other constraints:** [controlled vocabulary](#)

**Example:** double-struck

# Pigments

## 1. Pigment name

**ID and name:** OP1 material\_pigment\_name

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Name(s) of the pigment.

**Allowed values and other constraints:** controlled vocabulary

## 2. Pigment form

**ID and name:** OP2 material\_pigment\_archaeological\_context

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** In which shape/form was the pigment found in the archaeological context?

**Allowed values and other constraints:** free text

**Example:** pellets; as part of a fresco

## 3. Pigment type

**ID and name:** OP3 material\_pigment\_type

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** Information about the pigment type.

*with the two subproperties:*

### 3.1 Type

**ID and name:** OP3.1 material\_pigment\_type\_chemistry

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Is it an organic or inorganic pigment?

**Allowed values and other constraints:** controlled vocabulary

### 3.2 Occurrence

**ID and name:** OP3.2 material\_pigment\_type\_production

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Is it a natural or synthetic pigment?

**Allowed values and other constraints:** controlled vocabulary

## 4. Pigment composition

**ID and name:** OP4 material\_pigment\_composition

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The chemical and/or mineralogical composition of the pigment. At least one of its subproperties must be provided.

*with the three subproperties:*

### 4.1 Chemical composition

**ID and name:** OP4.1 material\_pigment\_composition\_chemistry

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** If it is an inorganic pigment, the chemical composition of the pigment.

*with the eight subproperties:*

#### 4.1.1 Analytical method

**ID and name:** B4.1 chemistry\_method

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The method used to determine the chemical composition.

**Allowed values and other constraints:** controlled vocabulary

#### 4.1.2 Analysed compound

**ID and name:** B4.2 chemistry\_compound

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The analysed chemical compound (chemical element or oxide).

**Allowed values and other constraints:** controlled vocabulary, not available if a mass spectrometric-method is recorded in B4.1 Analytical method .

#### **4.1.3 Analysed isotope**

**ID and name:** B4.3 chemistry\_icp\_isotope

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The isotope used for quantification of a chemical element.

**Allowed values and other constraints:** controlled vocabulary, only available if a mass spectrometric-method is recorded in B4.1 Analytical method .

#### **4.1.4 Value**

**ID and name:** B4.4 chemistry\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The concentration of the analysed chemical compound.

**Allowed values and other constraints:** decimal number

**Example:** 15.3

#### **4.1.5 Unit**

**ID and name:** B4.5 chemistry\_unit

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1–n

**Definition:** The unit in which the concentration of the analysed chemical compound is given.

**Allowed values and other constraints:** controlled vocabulary

#### **4.1.6 Uncertainty type**

**ID and name:** B4.6 chemistry\_uncertainty\_type

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The type of analytical uncertainty.

**Allowed values and other constraints:** controlled vocabulary

#### **4.1.7 Confidence level**

**ID and name:** B4.7 chemistry\_uncertainty\_sigma

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Sigma value of the reported absolute analytical uncertainty.

**Allowed values and other constraints:** 1, 2, 3

**Example:** 2

#### **4.1.8 Uncertainty value**

**ID and name:** B4.8 chemistry\_uncertainty\_value

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Value of the absolute analytical uncertainty.

**Allowed values and other constraints:** decimal number

**Example:** 0.3

## 4.2 Organic compounds

**ID and name:** OP4.2 material\_pigment\_composition\_compound

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The (main) organic compounds in the pigment.

**Allowed values and other constraints:** controlled vocabulary

## 4.3 Mineralogical composition

**ID and name:** OP4.3 material\_pigment\_composition\_mineral

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** If it is mineral pigment, which minerals are present?

*with the two subproperties:*

### 4.3.1 Mineral name

**ID and name:** OP4.3.1 material\_pigment\_composition\_mineral\_name

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Name of the mineral approved by the International Mineralogical Association (IMA).

**Allowed values and other constraints:** controlled vocabulary ([IMA list of minerals](#)), retrieved from the Mindat API

### 4.3.2 Mineral ID

**ID and name:** OP4.3.2 material\_pigment\_composition\_mineral\_id

**Provided by:** Mindat API

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The Mindat ID of the mineral.

**Allowed values and other constraints:** Value in the `id` field of a Mindat mineral record.

## 5. Pigment production

**ID and name:** OP5 material\_pigment\_processing

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Information about the production context and processing steps of the pigment.

*with the two subproperties:*

## 5.1 Production context

**ID and name:** OP5.1 material\_pigment\_production\_context

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The production context the object is related to.

**Allowed values and other constraints:** controlled vocabulary

## 5.2 Treatment

**ID and name:** OP5.2 material\_pigment\_production\_treatment

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Which treatments were done to the raw material(s) to produce the pigment?

**Allowed values and other constraints:** controlled vocabulary

# 6. Colour

**ID and name:** OP6 material\_pigment\_colour

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The colour of the pigment.

*with the two subproperties:*

## 6.1 Name

**ID and name:** OP6.1 material\_pigment\_colour\_name

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** General colour of the pigment.

**Allowed values and other constraints:** free text

**Example:** blue; 5P 5/10; L56 a26 b\*3

## 6.2 Colour system

**ID and name:** OP6.2 material\_pigment\_colour\_system

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** The colour system used to determine the colour.

**Allowed values and other constraints:** controlled vocabulary

## 7. Pigment alteration

**ID and name:** OP7 material\_pigment\_alteration

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Information about the alteration of the pigment.

*with the two subproperties:*

### 7.1 Alteration type

**ID and name:** OP7.1 material\_pigment\_alteration\_type

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** The type of the observed alteration process.

**Allowed values and other constraints:** controlled vocabulary

### 7.2 Details

**ID and name:** OP7.2 material\_pigment\_alteration\_description

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–n

**Definition:** Additional information about the observed alteration or its productions.

**Allowed values and other constraints:** free text

**Example:** t.b.d.

## 8. Pigment recycling

**ID and name:** OP8 material\_pigment\_recycling

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Information about whether the pigment was recycled or reused.

*with the two subproperties:*

## 8.1 Indicators

**ID and name:** OP8.1 material\_pigment\_recycling\_indicator

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Does the pigment show indicators for recycling or reuse?

**Allowed values and other constraints:** controlled vocabulary

## 8.2 Reasoning

**ID and name:** OP8.2 material\_pigment\_recycling\_reason

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Observed indicators for recycling or reuse.

**Allowed values and other constraints:** free text

**Example:** presence of Sn in trace element analysis

## 9. Lead source

**ID and name:** OP9 material\_pigment\_lead\_source

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** The source of lead in the pigment.

**Allowed values and other constraints:** controlled vocabulary

## 10. Provenance indicators

**ID and name:** OP10 material\_pigment\_raw\_material\_provenance

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Information about provenance, if known from other sources.

**Allowed values and other constraints:** free text

**Example:** t.b.d.

## 11. Sr isotopes

**ID and name:** OP11 material\_pigment\_isotopes\_Sr

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** The  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio of the pigment.

*with the two subproperties:*

## 11.1 Value

**ID and name:** OP11.1 material\_pigment\_isotopes\_Sr\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Value of the  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio.

**Allowed values and other constraints:** decimal number

**Example:** 0.7856

## 11.2 Analytical precision

**ID and name:** OP11.2 material\_pigment\_isotopes\_Sr\_2SD

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Absolute analytical uncertainty of the  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio in double standard deviation (2SD).

**Allowed values and other constraints:** decimal number

**Example:** 0.0002

## 12. Nd isotopes

**ID and name:** OP12 material\_pigment\_isotopes\_Nd

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** The  $\varepsilon_{\text{Nd}}$  value of the pigment.

*with the two subproperties:*

## 12.1 Value

**ID and name:** OP12.1 material\_pigment\_isotopes\_Nd\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Value of  $\varepsilon_{\text{Nd}}$ .

**Allowed values and other constraints:** decimal number

**Example:** t.b.d.

## 12.2 Analytical precision

**ID and name:** OP12.2 material\_pigment\_isotopes\_Nd\_2SD

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Absolute analytical uncertainty of the  $\epsilon_{\text{Nd}}$  value in double standard deviation (2SD).

**Allowed values and other constraints:** decimal number

**Example:** t.b.d.

## 13. Hf isotopes

**ID and name:** OP13 material\_pigment\_isotopes\_Hf

**Provided by:** data provider

**Obligation:** optional

**Occurrences:** 0–n

**Definition:** The  $\epsilon_{\text{Hf}}$  value of the pigment.

*with the two subproperties:*

### 13.1 Value

**ID and name:** OP13.1 material\_pigment\_isotopes\_Hf\_value

**Provided by:** data provider

**Obligation:** mandatory

**Occurrences:** 1

**Definition:** Value of  $\epsilon_{\text{Hf}}$ .

**Allowed values and other constraints:** decimal number

**Example:** t.b.d.

### 13.2 Analytical precision

**ID and name:** OP13.2 material\_pigment\_isotopes\_Hf\_2SD

**Provided by:** data provider

**Obligation:** recommended

**Occurrences:** 0–1

**Definition:** Absolute analytical uncertainty of the  $\epsilon_{\text{Hf}}$  value in double standard deviation (2SD).

**Allowed values and other constraints:** decimal number

**Example:** t.b.d.

## By-products

 Coming soon...

Metadata for archaeometallurgical by-products are coming soon...

# Mappings

 Coming soon...

Mappings to other metadata profiles and research data infrastructures will be provided after the first version of the metadata profile is published.

# Version 0.3

- Export of the Metadata profile to pdf added
- Inclusion of citation information
- Publication on Zenodo (<https://doi.org/10.5281/zenodo.18069848>)
- Correct formatting and broken links

## 1. Version 0.2

- Integration of Community feedback

## 2. Version 0.1

- Initial version of metadata profile for community feedback