

CETAF Earth Science Working Group

Promote Multidisciplinary Expertise: minerals, fossils, rocks, meteorites.

Fostering the use of earth science collections: Leveraging collections and knowledge to address current and future global challenges.

Increasing the visibility through a community supported specimen data portal.

Contributing to common metadata and description frameworks.

Hazards and disasters in the geological and geomorphological record: a key to understanding past and future hazards and disasters

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Abstract



Why Earth Science Collection's matter

Consistent Reference Points

Enable data validation and repeat testing over time.

Irreplaceable Specimens

Many geological field sites are now inaccessible; collections preserve unique material.

Global Comparisons

Allow direct comparison between specimens from different regions.

Interdisciplinary Value

Support research in geology, palaeontology, climatology, and environmental science.

The Third Dimension (Deep Time)

Reveal the history of Earth's evolution far beyond living systems.



Why publish Earth Science Collection data?

Increase Discoverability: make collections visible and searchable.

Enable FAIR & Open Science: share data that others can find and reuse.

Boost Research Impact: support cross-disciplinary studies and collaboration.

Preserve Knowledge: protect information on rare or inaccessible specimens.

Improve Data Quality: apply shared standards and validation tools.

Show Value: demonstrate institutional and societal relevance.

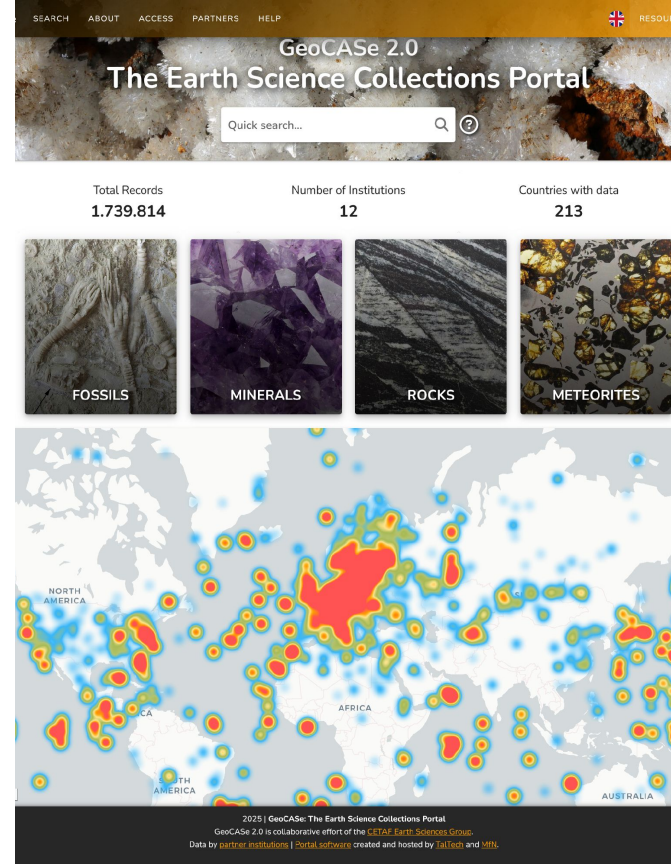


What is GeoCAsE?

GeoCAsE (Geoscience Collections Access Service)

A **European data infrastructure and web portal** providing open access to specimen data from **minerals, rocks, fossils, and meteorites** held in museums and research institutions.

It connects Earth science collections through **shared data standards** and services, making them **discoverable, comparable, and reusable** for multidisciplinary research.



<https://www.geocase.eu/>



Development history



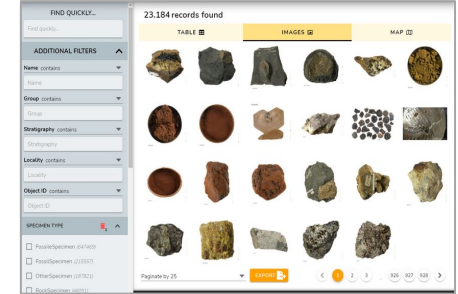
2007

Initial GeoCASE portal was established.

**TAL
TECH**

2020

GeoCASE 2.0 redevelopment. A CETAF endorsed effort led by Tallin.



2021 - Present

GeoCase 2.0 launched. New interface and search features

GeoCAsE Data Model

ABCD-EFG

Access to *Biological Collection Data*, created for biological specimens (plants, animals, etc.).

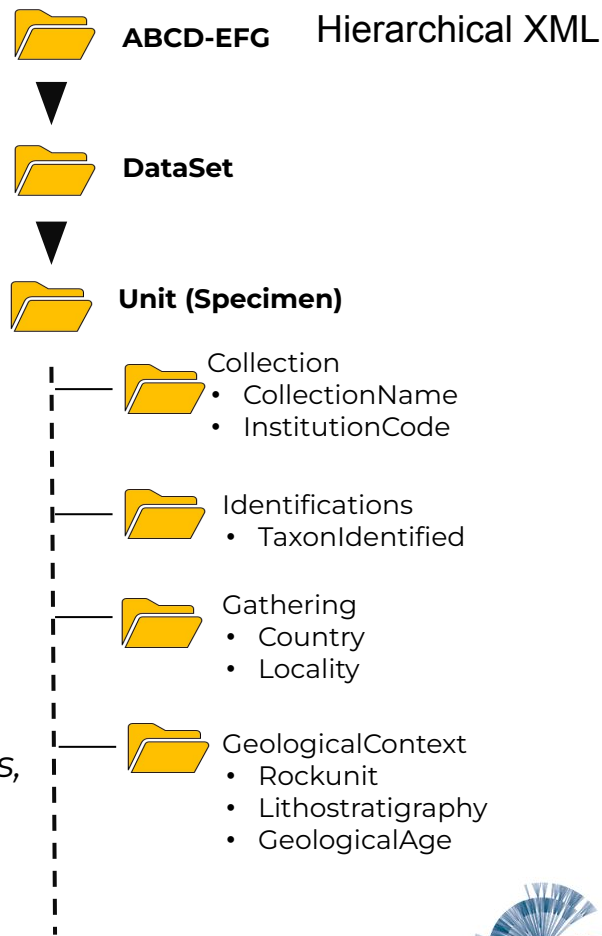
Geosciences require additional data types (stratigraphy, lithology, rock units, mineral composition, fossil taxa).

ABCD-EFG = ABCD + Extensions for Geosciences

Enables standardised sharing of geological and palaeontological specimen data.

History

- **Early 2000's**: developed by TDWG
- **2007 – 2008**: Geological community extension for the geological/paleontology (*stratigraphy, lithology, rock units, fossil data*)
- **3.0 ABCD – EFG** widely used amongst the community.



GeoCAsE Data Model

Darwin Core (DwC) archive

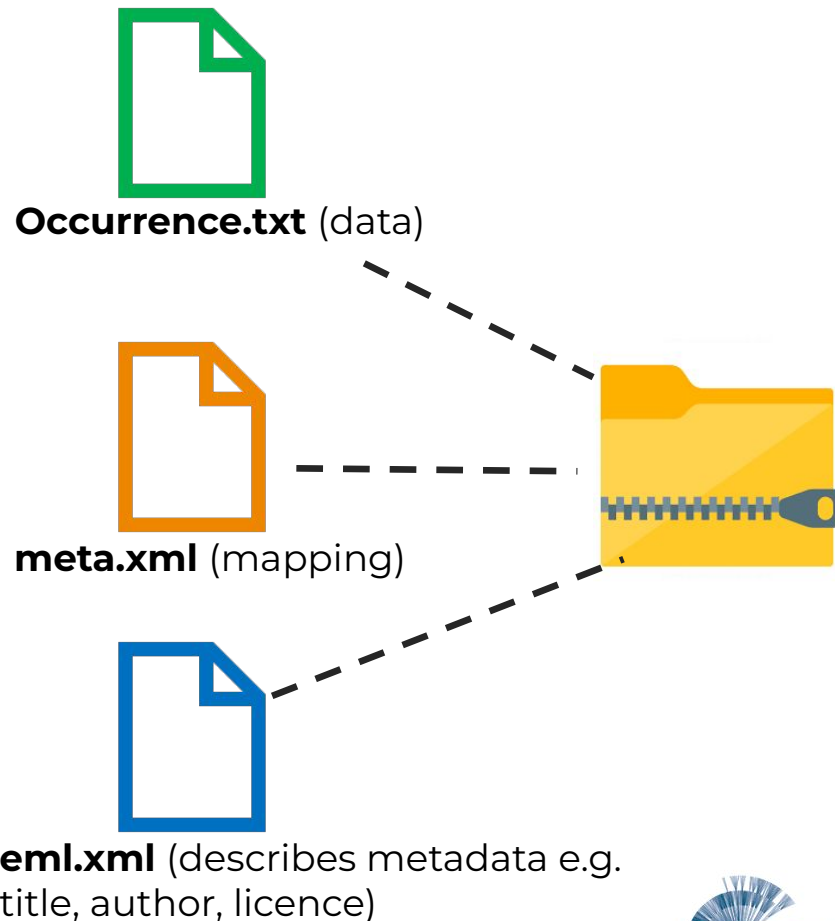
Developed by: TDWG community

Purpose: Standardised sharing of specimen & biodiversity data

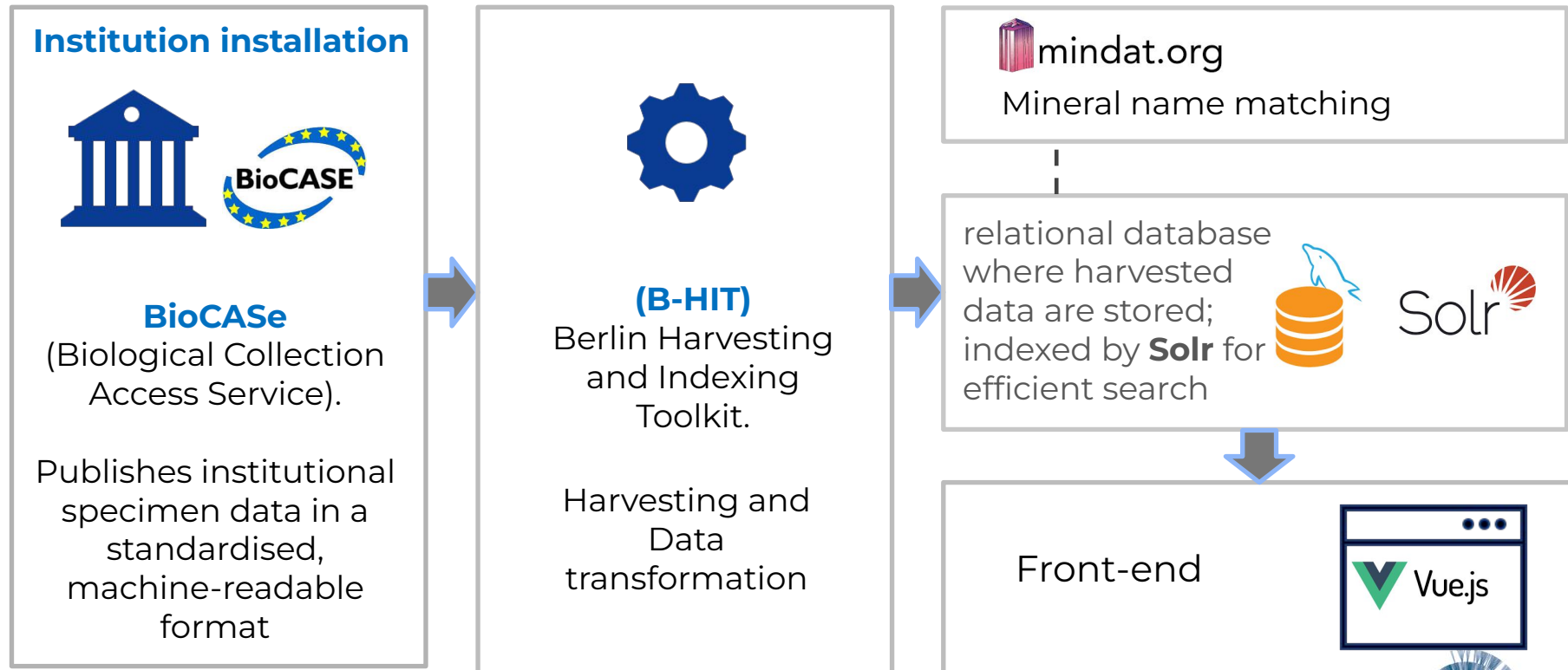
Format: Simple terms/fields

Examples: *scientificName*, *locality*, *eventDate*, *collector*

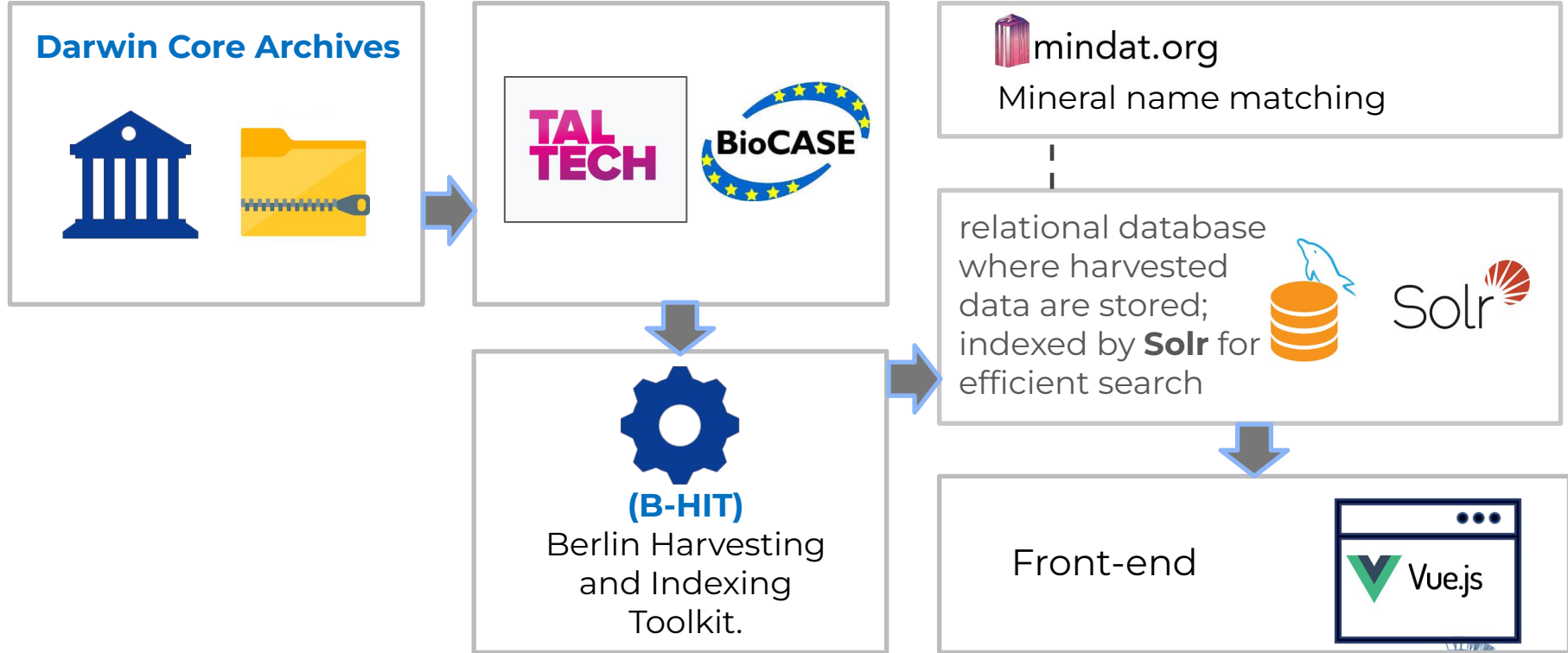
Use: Works in CSV tables or online system



Technical components of GeoCASE



Technical components of GeoCASE



GeoCASE Front-end Features

Quick Search: Google-style free-text search across all records.

Advanced Filters: by specimen type, institution, object ID, locality, geological age, etc.

Search Results Views:

Table view: structured data table

Map view: geographic heat map of occurrences

Gallery view: specimen images and thumbnails

The screenshot displays the GeoCASE web application interface. At the top, there is a navigation bar with 'GeoCASE', 'SEARCH', 'ABOUT', 'ACCESS', 'PARTNERS', and 'HELP'. A search bar is located on the left side. Below it, there are several filter sections: 'ADDITIONAL FILTERS', 'Name contains', 'Group contains', 'Stratigraphy contains', 'Locality contains', 'Object ID contains', 'MAP', 'SPECIMEN TYPE', 'GROUP', 'TYPE STATUS', 'COUNTRY', 'DATASET OWNER', 'PROVIDER', and 'PROVIDER COUNTRY'. The main content area shows a table with 929,026 records found. The table has columns for 'Collection code', 'Object ID', 'Group', 'Name', 'Country', 'Locality', 'Stratigraphy', 'Record URI', and 'URL'. The table is currently in 'TABLE' view. At the bottom of the page, there is a footer with logos for 'CETAF', 'TAL TECH', and 'JAN VAN NIEUWMEEREN MUSEUM FOR NATURE HISTORY', along with text indicating the portal is a collaborative effort of the CETAF Earth Sciences Group.

Collection code	Object ID	Group	Name	Country	Locality	Stratigraphy	Record URI	URL
TUG	116-17	Brachiopoda	Fenestroira glacialis (Billings, 1862)	Canada	Anticosti Island	Llandovery Silurian		
TUG	116-161	Brachiopoda	Fenestroira glacialis (Billings, 1862)	Canada	Anticosti Island	Llandovery Silurian		
TUG	116-162	Brachiopoda	Fenestroira glacialis (Billings, 1862)	Canada	Anticosti Island	Llandovery Silurian		
TUG	116-163	Brachiopoda	Fenestroira glacialis (Billings, 1862)	Canada	Anticosti Island	Llandovery Silurian		
TUG	116-164	Brachiopoda	Fenestroira glacialis (Billings, 1862)	Canada	Anticosti Island	Llandovery Silurian		
TUG	116-165	Brachiopoda	Fenestroira glacialis (Billings, 1862)	Canada	Anticosti Island	Llandovery Silurian		
TUG	116-166	Brachiopoda	Fenestroira glacialis (Billings, 1862)	Canada	Anticosti Island	Llandovery Silurian		
TUG	116-167	Brachiopoda	Fenestroira glacialis (Billings, 1862)	Canada	Anticosti Island	Llandovery Silurian		
TUG	116-168	Brachiopoda	Fenestroira glacialis (Billings, 1862)	Canada	Anticosti Island	Llandovery Silurian		
TUG	116-169	Brachiopoda	Fenestroira glacialis (Billings, 1862)	Canada	Anticosti Island	Llandovery Silurian		
TUG	116-170	Brachiopoda	Fenestroira glacialis (Billings, 1862)	Canada	Anticosti Island	Llandovery Silurian		
TUG	116-171	Brachiopoda	Fenestroira glacialis (Billings, 1862)	Canada	Anticosti Island	Llandovery Silurian		
TUG	116-172	Brachiopoda	Fenestroira glacialis (Billings, 1862)	Canada	Anticosti Island	Llandovery Silurian		
TUG	116-173	Brachiopoda	Fenestroira glacialis (Billings, 1862)	Canada	Anticosti Island	Llandovery Silurian		
TUG	116-174	Brachiopoda	Fenestroira glacialis (Billings, 1862)	Canada	Anticosti Island	Llandovery Silurian		
TUG	116-175	Brachiopoda	Fenestroira glacialis (Billings, 1862)	Canada	Anticosti Island	Llandovery Silurian		
TUG	116-176	Brachiopoda	Fenestroira glacialis (Billings, 1862)	Canada	Anticosti Island	Llandovery Silurian		
TUG	116-177	Brachiopoda	Fenestroira glacialis (Billings, 1862)	Canada	Anticosti Island	Llandovery Silurian		
TUG	116-178	Brachiopoda	Fenestroira glacialis (Billings, 1862)	Canada	Anticosti Island	Llandovery Silurian		
TUG	116-1600	Brachiopoda	Brachiopoda	Canada	Anticosti Island	Llandovery Silurian		
TUG	116-1601	Brachiopoda	Brachiopoda	Canada	Anticosti Island	Llandovery Silurian		
TUG	116-1602	Brachiopoda	Brachiopoda	Canada	Anticosti Island	Llandovery Silurian		
TUG	116-1603	Brachiopoda	Brachiopoda	Canada	Anticosti Island	Llandovery Silurian		
TUG	116-1604	Brachiopoda	Brachiopoda	Canada	Anticosti Island	Llandovery Silurian		
TUG	116-1605	Brachiopoda	Brachiopoda	Canada	Anticosti Island	Llandovery Silurian		

GeoCASE Front-end Features

Detailed record view with

Specimen metadata (ID, type status, collection, locality, geological context)

Linked images and thumbnails

Links to external databases (e.g. *Mindat.org*, *Meteorite Names Database*)

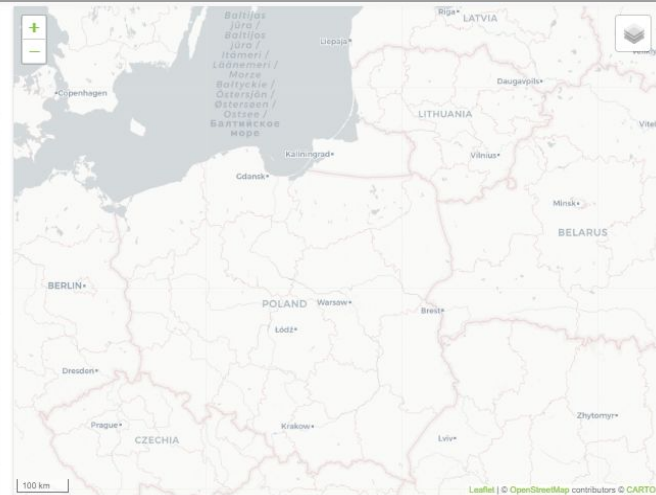
Stable URLs for citation and sharing.

● Fossil - GIT 152-703
Pseudolingula sp.1,sp,2
Other identifications: *Pseudolingula*

TAL
TECH

Collection	GIT
Object ID	152-703
Group	Brachiopoda
Country	Estonia
Locality	Kiviõli trench
Latitude	59.365763
Longitude	26.967969
Stratigraphy	○ System: Ordovician
Collector	Männil, Ralf
Date collected	1964
Record URI	https://geocollections.info/specimen/703

Institution	TalTech geological collections
Dataset owner	Department of Geology, TalTech
Contact person	Ursula Toom
Contact e-mail	u.ursula.toom@taltech.ee
Contact phone	📞 +3726203009
Contact address	📍 Ehitajate 5, 19086 Tallinn, Estonia
Data source country	Estonia
Copyright	© Department of Geology, TalTech
Terms of use	Free for non-commercial usage, provided that Department of Geology at TalTech and https://geocollections.info are acknowledged.
Disclaimer	We make efforts to ensure that the data we serve are accurate. However, quality and completeness of every data record cannot be guaranteed. Use the data at your own responsibility.
Acknowledgement	National geological collection of Estonia: Department of Geology, TalTech
Last Edited	2004-06-09



European geological data publishing landscape

DiSSCover

The platform for curating and annotating Digital Specimens: digital surrogates of physical collection objects.

DiSSCo members

Uses Community Standards

All types of collections

Not specific to Earth Science

DiSSCover Home All Specimens Virt

DiSSCo
Distributed System of Scientific Collections

Total specimens: 3,755,312

Biology Microbiology: 0	Biology Anthropology: 0	Biology Botany: 412,051
Biology Zoology: 1,882,531	Biology/Geology Palaeontology: 725,199	Biology/Geology Other Bio / Geodiversity: 0
Biology Ecology: 0	Geology Earth Geology: 64,367	Geology Astrogeology: 2,468

Annotat contribu

Help us with improv
We aim to provide al
to make that inform
We need your help t
of our data.

Search Digital Speci
Bellis perennis

DiSSCover Home All Specimens Virtual Collections About Take a tour Login / Sign-up

Specimens *Bellis perennis* Search Share this list Compare

Quality/completeness indicators
MIDS Level: MIDS 0 MIDS 1

Search filters
Topic Discipline: Select
 Palaeontology 725199

Taxonomy: Select or type
Country: Select or type
Organisation: Select or type
Source System: Select or type

DOI	Specimen Name	Physical Specimen ID	Topic Discipline	Country of Origin	Date Collected
10.3333/7LH-7CK-VW6	Gastropoda Cuvier, 1795	https://geocollections.info/specimen/98608	Palaeontology	Estonia	
10.3333/WI-DLQ-TQ1	Chasmops	https://geocollections.info/specimen/98807	Palaeontology	Estonia	
10.3333/TEL-GLP-V3Y	Psychogys angustifrons Dalmán	https://geocollections.info/specimen/98652	Palaeontology		
10.3333/CNL-KHM-CX7	†Pleurotomaria Defrance, 1826	https://geocollections.info/specimen/986423	Palaeontology	Estonia	
10.3333/BPS-KCA-53D	†Bucanella Meek, 1871	https://geocollections.info/specimen/986170	Palaeontology	Estonia	
10.3333/ZSC-MTH-SW9	Bryozoa	https://geocollections.info/specimen/985576	Palaeontology	Estonia	
10.3333/PFN-PRC-VB2	†Alolepea J. Hall, 1847	https://geocollections.info/specimen/980487	Palaeontology	Estonia	

Specimen found: 725199

Funded by the European Union Distributed System of Scientific Collections Get support Acknowledgements Privacy Terms Send us feedback on GitHub

The **Research Infrastructure** uses the Digital Specimen architecture and FAIR principles to unify Europe's natural science collections

Open Digital Specimen

Connects the physical object with all its digital information, ensuring accessibility, traceability, and reuse.



Geochemical



Taxonomic



Geological age



**Geographical
/paleogeographic**



**Ecological & Environmental
related data**



Publications, images & scans



Challenges for data publishing and GeoCASE

Data Standardisation

Legacy data

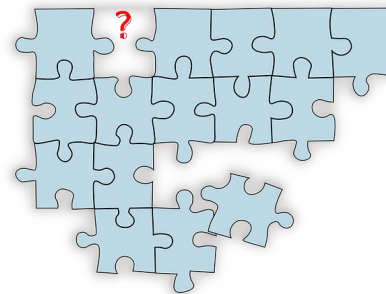
Volume and Complexity

Limited Resources and Funding

More focus on modern biological standards

Limited Awareness

Technical support



ESG current work

Case study and publication on enhancing Earth Science specimen metadata

Aim: Improve the quality, discoverability and usability of Earth Science Specimen data through a case study based assessment of metadata terms and vocabulary requirements.

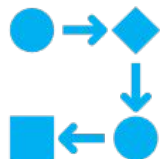
Objectives

- Collect representative Earth Specimen case studies
- Identify metadata needed for discovery and research reuse
- Assess standards, vocabularies and current gaps
- Develop recommendations for improving specimen publication

Outputs



Publication



Metadata/vocab
decision tree



Best practices



Recommendations
improving geocase

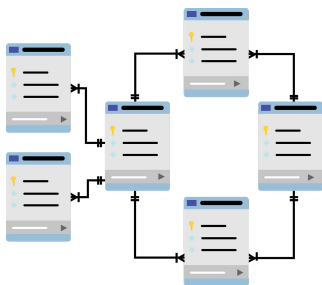
Hosted by:



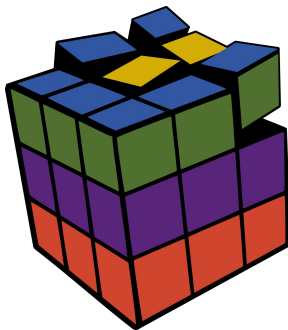
SISTEMA MUSEALE
DI ATENE
UNIVERSITÀ DEGLI
STUDI DI FIRENZE

Why are we doing this?

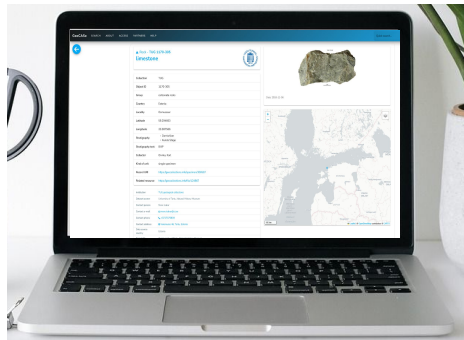
Earth Science specimen data are often difficult to discover and evaluate the usefulness



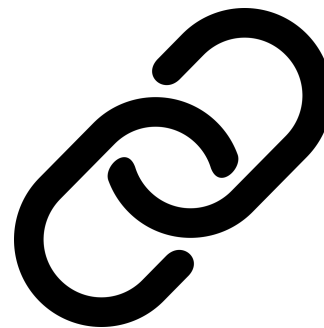
Inconsistency with using metadata schema fields & missing information



Lack of alignment in the use of vocabularies



Difficult to determine if specimens are suitable for certain research



Limited interoperability between portals and infrastructure

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Specimen case studies



Foraminifera
(NHM London)

Planktonic foraminifera and other microscopic items from Oceanic sediments that range from Recent to Pleistocene collected by H.M.S. Challenger 1873-1876.



Brittle Stars
(NHM Luxembourg)

Macro- and microfossils of brittle stars from strata ranging from the Silurian to the Recent, and from localities around the world.
- Macrofossils of various taxa from Devonian, Triassic and Jurassic strata of Luxembourg and neighbouring areas.



Plesiosaur
(NHM Luxembourg)



Meteorites
(University of Florence)

This is the first case of a fall meteorite that has been recovered on a beach shore. It is an ordinary chondrite with a wonderful black fusion crust and a perfectly preserved interior



Krantz specimens
(NHM Finland)

Historic scientific collection of minerals, fossils, rocks, and teaching specimens associated with the Krantz family and company in Germany



Pollen
(Tallinn University of Technology)

Well dated quaternary pollen samples from Europe. Used in the Past 2 Future project to reconstruct vegetation cover & climate change.

geodera - geological data for research and applications

Connecting Earth Science collections to EOSC



Aim: Increase the broader use of Earth Science collections by improving specimen data and integrating them into the EOSC federation through GeoCAsE and thematic node EOSC Data Terra.

- Enhanced and FAIR Earth Science datasets published through GeoCAsE
- Earth Science collection data integrated into EOSC/Data Terra workflows
- Two demonstrated research use cases linking collections and environmental data
- Recommendations and reusable workflows for future Earth Science–EOSC integration
- Increased visibility and reuse of Earth Science collections

Hosted by:



- Review and ratification of new standards : Darwin Core extension of Mineralogy
- Extension of biological metadata standards to include Earth Science (e.g. ABCD-EFG standard).
- Expressed need for a standard on soil samples → TDWG material sample extension



Mineral Name:

Chemical Formula

Crystallography:

Geological Context

Occurrence Data

Future Priorities for GeoCAsE

Develop better data workflows and automation.

Replace B-HIT with a modern, scalable harvester.

Enable automatic updates from institutions.

Improve usability, integration, and community support.

Centralised system that doesn't rely on individual downloading of BioCAsE

Thank you