

Christine Hörfarter

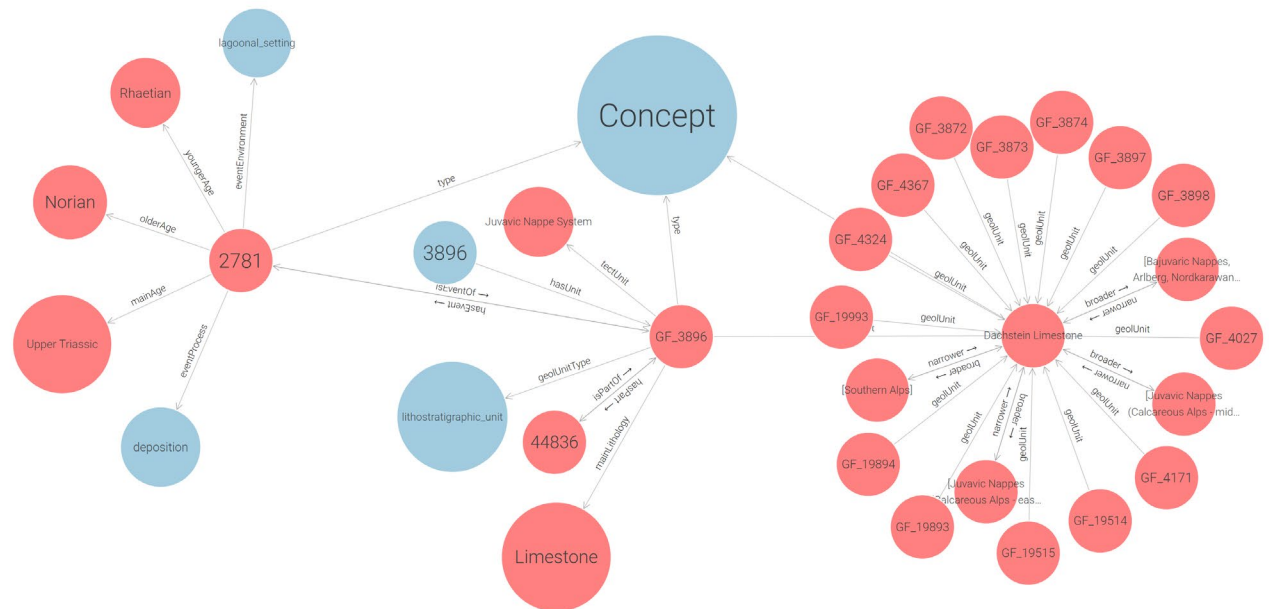
# Scientific Vocabularies for Basic Geology in Europe

## Part: Examples and Outreach

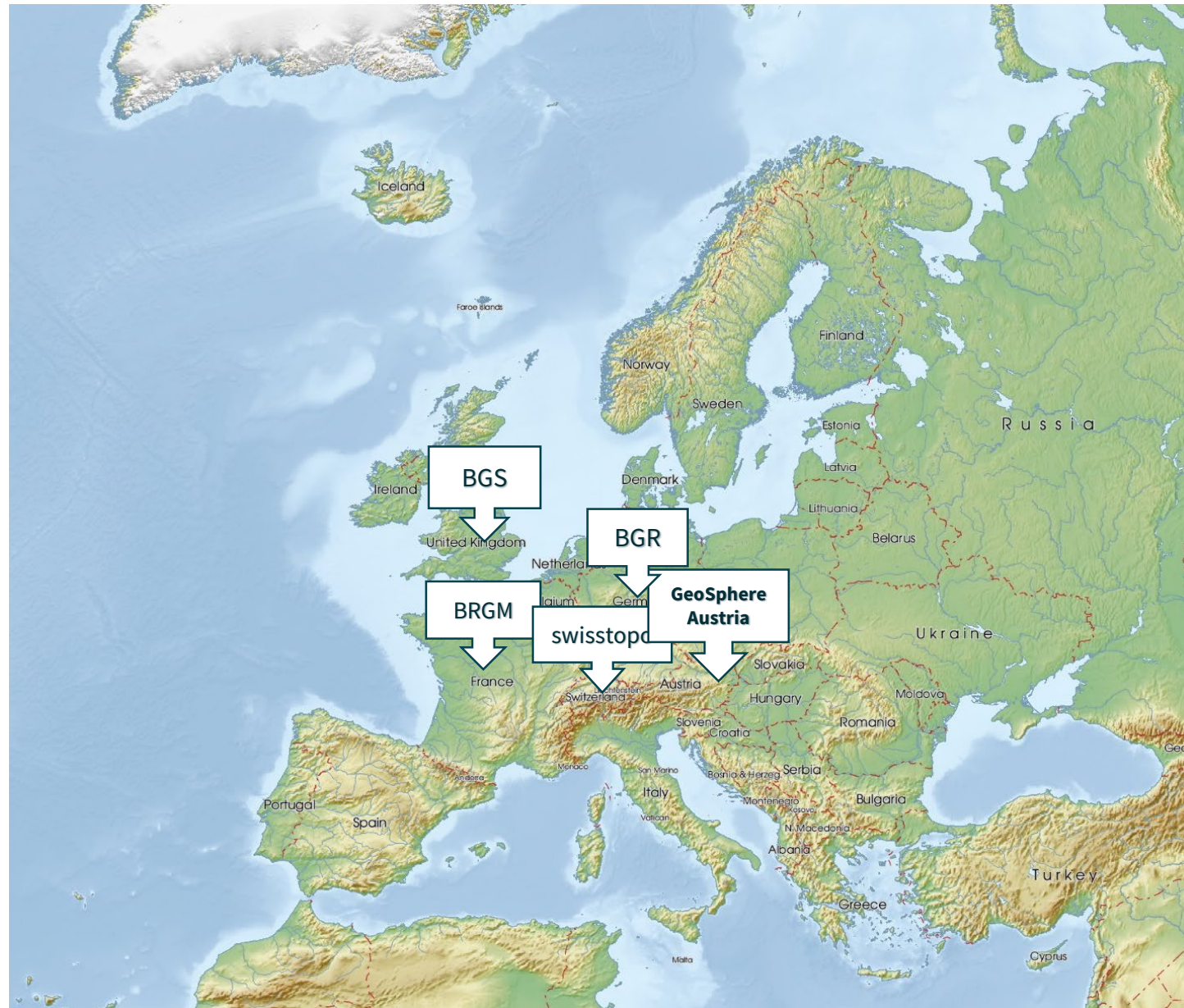
Christine Hörfarter

Department of Geoinformation

Christine.hoerfarter@geosphere.at

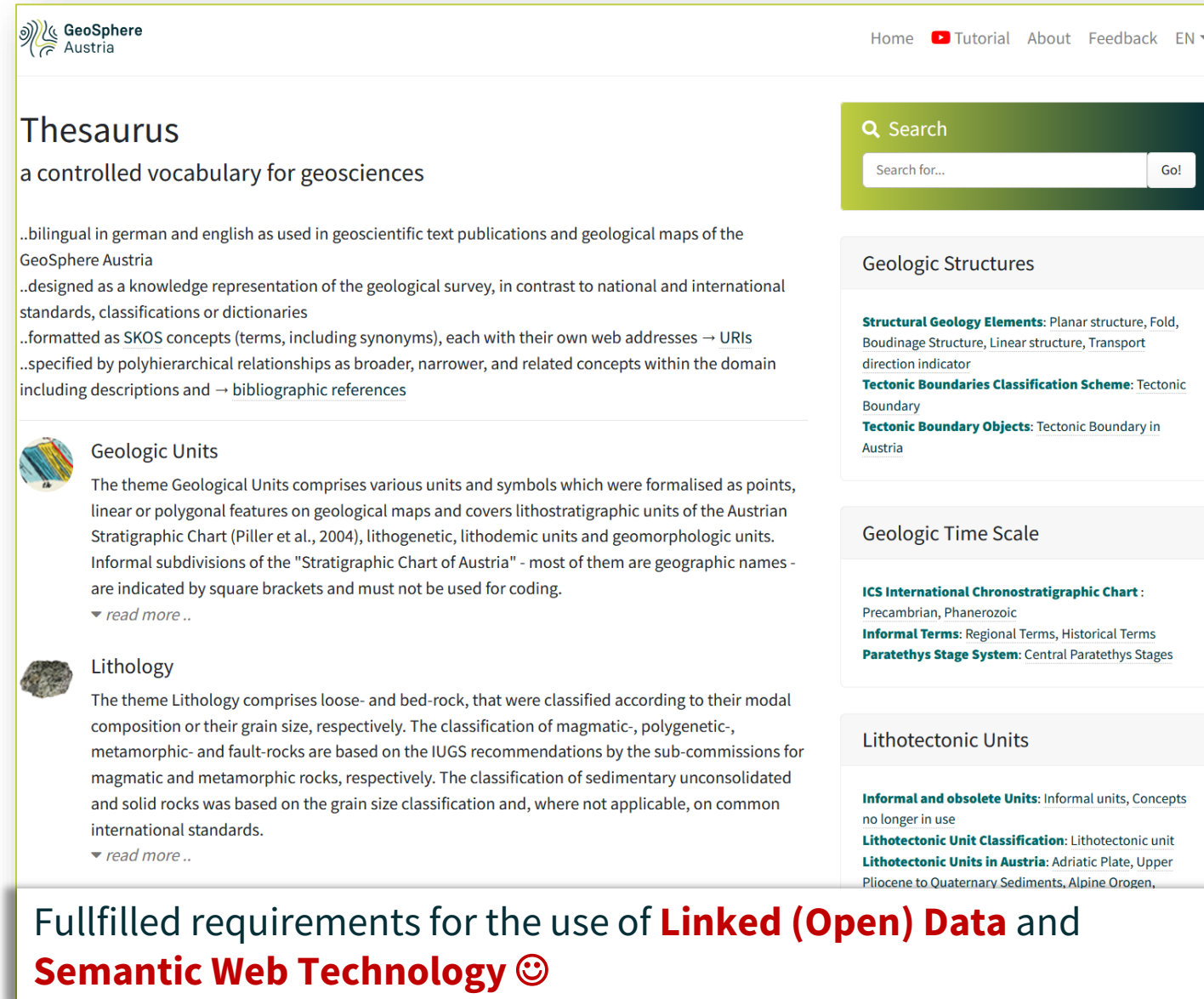


16. November 2023



- **Federal Institute for Geosciences and Natural Resources in Germany (BGR)**
  - Lithostratigraphic Lexicon of Germany LithoLex – and the Project ConSent (Connect Semantic)
  - <https://www.bgr.bund.de/DE/Themen/Geodatenmanagement/Projekte/laufend/ConSent>
- **French Geological Survey (BRGM)**
  - French Geological Survey Registry Tool
  - <https://data.geoscience.fr/ncl/>
- **British Geological Survey (BGS)**
  - BGS Information Hub
  - <https://www.bgs.ac.uk/information-hub/dictionaries/>
- **Swisstopo (CH)**
  - Lithostratigraphic Lexicon of Switzerland
  - [strati.ch](http://strati.ch)
- **GeoSphere Austria (former Geolog.Surv.Austria)**
  - Thesaurus – a controlled vocabulary for geosciences
  - [resource.geolba.ac.at](http://resource.geolba.ac.at) !will soon be changed due to an organisational merger!

- **THESAURI** are **controlled vocabularies** whose concepts are linked by semantic relations following a standard structure.
- This **standard structure** for the GBA thesaurus is **SKOS** standard (**Simple Knowledge Organization System**) for vocabularies
- SKOS stands for a light weight ontology and is **based on RDF data model (Resource description framework)** with XML syntax.
- RDF is a standard model for data interchange on the Web and states that **every THING in the real world is a resource**
- A resource/concept in **SKOS-RDF** is indexed by an unique and persistent identifier called **URI (Uniform Resource Identifier)**.



The screenshot shows the GeoSphere Austria Thesaurus website. The header includes the GeoSphere Austria logo and navigation links: Home, Tutorial, About, Feedback, and EN. The main content area is titled "Thesaurus" and describes it as a controlled vocabulary for geosciences. It lists several features: bilingual in German and English, designed as a knowledge representation, formatted as SKOS concepts, and specified by polyhierarchical relationships. Below this, there are three main sections: "Geologic Units", "Lithology", and "Geologic Time Scale". Each section has a small icon and a brief description. The "Geologic Units" section includes a link to "read more..". The "Lithology" section also includes a link to "read more..". On the right side, there is a search bar with a "Go!" button. Below the search bar, there are three main categories: "Geologic Structures", "Geologic Time Scale", and "Lithotectonic Units". Each category has a list of related terms and concepts. At the bottom of the screenshot, there is a banner with the text: "Fullfilled requirements for the use of **Linked (Open) Data** and **Semantic Web Technology** 😊".

## SKOS-CONCEPT

Preferred lexical label

URI = identifier

Synonyms, multilingual labels

Definition

References

Semantic relation properties

Mapping properties

## Inntal Subfault System

URI: <http://resource.geolba.ac.at/structure/174> ⇒ [RDF download](#)

Inntal-Teilstörungssystem  Inntal Subfault System 

This ca. 170 km long, approximately SW-NE trending subfault system extends from Innsbruck, following the Inn Valley to Wörgl and Kufstein and then to Salzburg and Thalgau. It includes faults and shearzones along the Inn Valley and parallel trending structures. Left-lateral brittle strike-slip faults active from Upper Oligocene to Miocene is indicated by synorogenic sediment deposition described in the Inn Valley (Froitzheim et al, 1997; Ortner et al., 2006). Seismic activity has been observed along the Inn Valley. Total displacement reaches up to 17 km normal faulting and 31-75 km left-lateral displacement. (Froitzheim et al., 1997; Linzer et al., 2002 and references therein).

— Froitzheim, N., Conti, P. & Van Daalen, M. (1997): *Late Cretaceous, synorogenic, low-angle normal faulting along the Schling fault (Switzerland, Italy, Austria) and its significance for the tectonics of the Eastern Alps*. In: *Tectonophysics* 280, Nr. 3-4, S. 267-293 - [\[PDF\]](#)  
 — Linzer, H.-G., Decker, K., Peresson, H., Dell'Mour, R. & Frisch, W. (2002): *Balancing lateral orogenic float of the Eastern Alps*. - In: *Tectonophysics* 354, Nr. 3-4, S. 211-237 - [\[Catalog\]](#)

### Concept relations

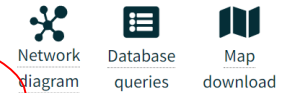
broader	<a href="#">Innsbruck-Salzburg-Amstetten Fault System</a> <a href="#">Engadin-Inntal Fault System</a>
narrower	<a href="#">Inntal Fault</a> <a href="#">Inntal Shear zone</a>
exactMatch	<a href="https://data.geoscience.earth/ncl/geoera/hike/faults/473">https://data.geoscience.earth/ncl/geoera/hike/faults/473</a>

▼ [read more ..](#)

Q Search



### Applications



### Geologic Structures (subject)

The Theme Geologic Structures includes linear and planar predominantly deformation structures in geologic maps. Shear sense indicators and fold structures are also covered by this theme.

 **Linked to other vocabulary Data**

# National Vocabularies - Example on European Outreach

- **The GeoERA HIKE Project Vocabulary**

- Named fault inventory of the European Fault Database, the attributes and the hierarchical fault classification. The SKOS relations within the vocabulary itself, and with existing vocabularies and links to online sources creates an extensive network of information.
- <https://geoera.eu/projects/hike10/semanticnetwork/>



## Inntal Subfault System

URI <https://data.geoscience.earth/ncl/geoera/hike/faults/473>

Inntal-Teilstörungssystem Inntal Subfault System

Notation: AT-507

This ca. 170 km long, approximately SW-NE trending subfault system extends from Innsbruck, following the Inn Valley to Wörgl and Kufstein and then to Salzburg and Thalgau. It includes faults and shearzones along the Inn Valley and parallel trending structures. Left-lateral brittle strike-slip faults are active from the Upper Oligocene to the Miocene, indicated by sediment deposits described in the Inn Valley (Froitzheim et al., 1997; Ortner et al., 2006). Seismic activity has been observed along the Inn Valley. Total displacement reaches up to around 17 km normal faulting and 31-75 km left-lateral displacement. (Froitzheim et al., 1997; Linzer et al., 2002 and references therein)

- Froitzheim, N., Conti, P. & Van Daalen, M. (1997): Late Cretaceous, synorogenic, low-angle normal faulting along the Schlingig fault (Switzerland, Italy, Austria) and its significance for the tectonics of the Eastern Alps. In: *Tectonophysics* 280, Nr. 3-4, S. 267-293
- Linzer, H.-G., Decker, K., Peresson, H., Dell'Mour, R. & Frisch, W. (2002): Balancing lateral orogenic float of the Eastern Alps. In: *Tectonophysics* 354, Nr. 3-4, S. 211-237

### Concept relations

broader	<a href="#">Engadin-Inntal Fault System</a> (3) <a href="#">Innsbruck-Salzburg-Amstetten Fault System</a> (1)
narrower	<a href="#">Inntal Fault</a> <a href="#">Inntal Shear zone</a>
exactMatch	<a href="#">structure/174</a> (GBA)

home | docs | API | download

Search for:  Go!

### HIKE - Hazard and Impact Knowledge for Europe

The HIKE project aims to support research and assessments of induced hazards and impacts that are related to the exploitation of subsurface resources and capacities throughout Europe. This will be achieved through development, demonstration and implementation of harmonized subsurface data sets and methodologies, investigation of applied use cases, and facilitation of knowledge shared between geological surveys and stakeholders. WP-2 focuses on the development of a European fault database.

<https://geoera.eu/projects/hike10/>

Download: [RDF](#), [TTL](#)

**Inntal-Teilstörungssystem**

Dieses in etwa NE-SW - streichende ca. 170 km lange Teilstörungssystem läuft das Inntal entlang von Innsbruck-Wörgl bis Kufstein und weiter über Salzburg bis Thalgau. Es beinhaltet entlang und parallel des Inntals verlaufende Störungen und Scherzonen. Ihre spröde Hauptprägung erfuhr sie im späten Oligozän bis Miozän mit sinistral seitenverschiebender Kinematik und Sedimentation im Inntal. Auch rez...

**Fault type:** strike slip fault , **Time:** **Observation method:** observed outcrop  
**Dip angle:** steep , **Dip direction:** , **Strike:** ENE-WSW  
**Movement sense:** sinistral  
**Offset:** **see also:** [surface](#)

Article

### Late Cretaceous, synorogenic, low-angle normal faulting along the Schlingig fault (Switzerland, Italy)

significance for the tectonics of the Eastern Alps

October 1997 · *Tectonophysics* 280(3-4):267-293  
DOI: [10.1016/S0040-1951\(97\)00037-1](https://doi.org/10.1016/S0040-1951(97)00037-1)

Authors: Nikolaus Froitzheim University of Bonn Paolo Conti Università degli Studi di Padova

**SHARE** The European Database of Seismogenic Faults

Source Info Summary

General information	
Region	Central Europe
Code	ATCS013
Name	Inntal
Compiler(s)	Garcia Moreno D.(1)
Contributor(s)	Garcia Moreno D.(1), Decker K.(2), Camelbeeck T.(1)
Created	08/05/2010
Updated	08/05/2010

Parametric information		Qual. Evidence
Min Depth (km)	4.5	LD Based on earthquake data (Lenhardt et al., 2007)
Max Depth (km)	11.5	LD Based on geophysical and earthquake data
Strike (deg)	50 - 80	LD Based on structural and geological maps (Linzer et al., 2002; Ortner et al., 2006)
Dip (deg)	60 - 80	EJ Inferred from a seismic survey (Ortner et al., 2006)

European Fault Database | Semantic Network | Knowledge Statement | Data Sources | Background Info | Documentation & API

The HIKE project has created a European fault database (FDB) that has collated and harmonized relevant information and knowledge on all types of geological faults. The HIKE FDB is developed in order to cover any type of fault represented at arbitrary depth levels. The HIKE FDB includes fault information from all participating Geological Survey Organizations (GSO) and additionally from other GeoERA projects ([GeoConnect](#)), ([Hull](#)), ([3DGeo-EU](#)).

Through the viewer and link below, the content of the HIKE European Fault Database is made accessible. Click on a fault line to open the attribute table and vocabularies. The entire Fault Database can be downloaded in [GeoPackage](#) format here. Please note that this database contains faults that were delivered by partners. No faults are shown in areas where no data was delivered. This does not mean that no faults are present!

EGDI

Layers: Layer search...

- nonpartnermask
- HIKE FaultDatabase
- Search EGD I metadata catalogue
- Add your own data (WMS)

POINT(12727412.206647921 2406168.125285781)

EPSG:3004 | EPSG:4326

# National Vocabularies - Example on European Outreach

- **The GeoERA HIKE Project Vocabulary**

- Named fault inventory of the European Fault Database, the attributes and the hierarchical fault classification. The SKOS relations within the vocabulary itself, and with existing vocabularies and links to online sources creates an extensive network of information.
- <https://geoera.eu/projects/hike10/semanticnetwork/>



## Inntal Subfault System

URI <https://data.geoscience.earth/ncl/geoera/hike/faults/473>

Inntal-Teilstörungssystem Inntal Subfault System

Notation: AT-507

This ca. 170 km long, approximately SW-NE trending subfault system extends from Innsbruck, following the Inn Valley to Wörgl and Kufstein and then to Salzburg and Thalgau. It includes faults and shearzones along the Inn Valley and parallel trending structures. Left-lateral brittle strike-slip faults are active from the Upper Oligocene to the Miocene, indicated by sediment deposits described in the Inn Valley (Froitzheim et al., 1997; Ortner et al., 2006). Seismic activity has been observed along the Inn Valley. Total displacement reaches up to around 17 km in normal faulting and 31-75 km left-lateral displacement. (Froitzheim et al., 1997; Linzer et al., 2002 and references therein)

— Froitzheim, N., Conti, P. & Van Daalen, M. (1997): Late Cretaceous, synorogenic, low-angle normal faulting along the Schliening fault (Switzerland, Italy, Austria) and its significance for the tectonics of the Eastern Alps. In: *Tectonophysics* 280, Nr. 3-4, S. 267-293

— Linzer, H.-G., Decker, K., Peresson, H., Dell'Mour, R. & Frisch, W. (2002): Balancing late Cenozoic tectonic evolution of the Eastern Alps. In: *Tectonophysics* 354, Nr. 3-4, S. 211-237

### Concept relations

broader	Engadin-Inntal Fault System (3) Innsbruck-Salzburg-Amstetten Fault System (1)
narrower	Inntal Fault Inntal Shear zone
exactMatch	structure/174 (GBA)

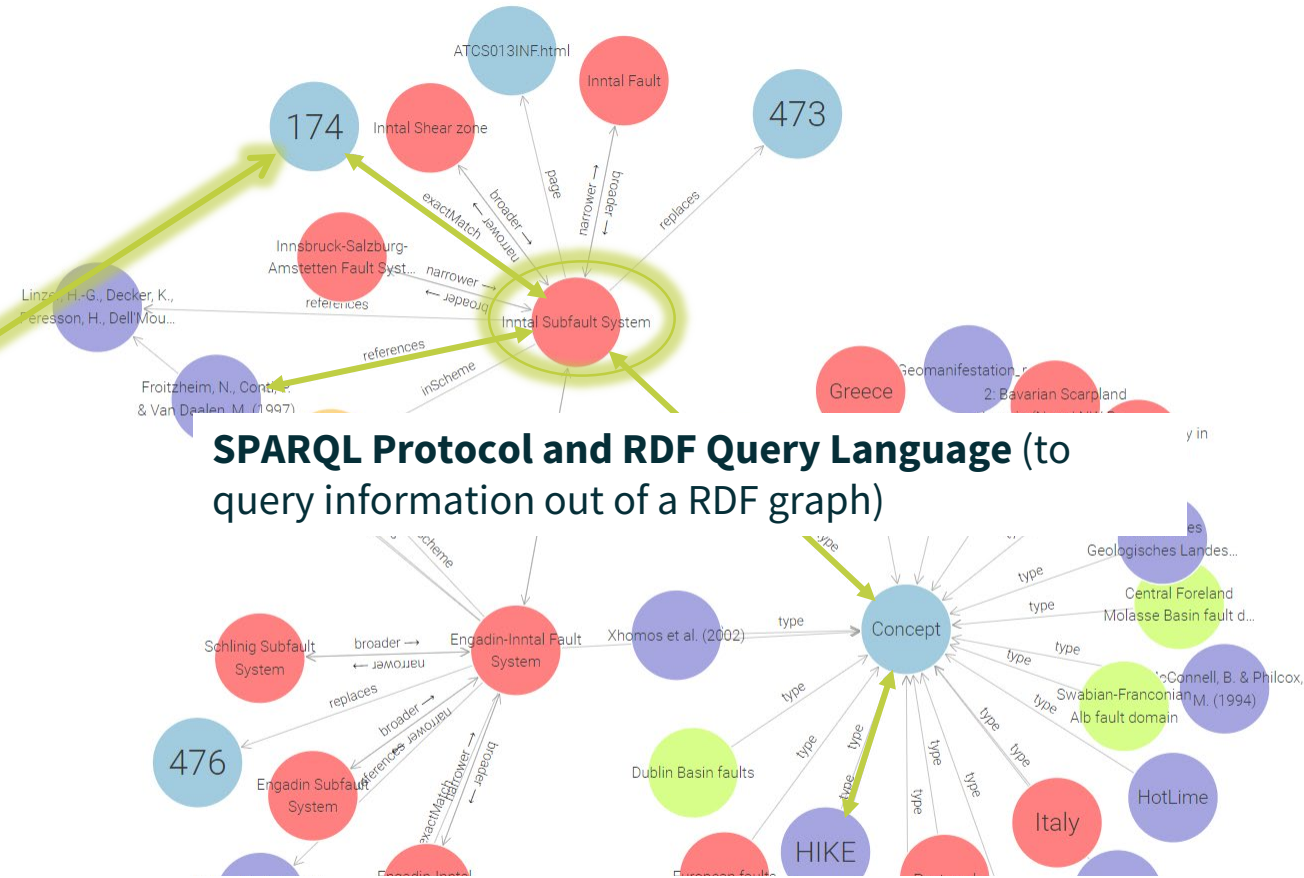
home | docs | API | download

Search for...

### HIKE - Hazard and Impact Knowledge for Europe

The HIKE project aims to support research and assessments of induced hazards and impacts that are related to the exploitation of subsurface resources and capacities throughout Europe. This will be achieved through development, demonstration and implementation of harmonized subsurface data sets and methodologies, investigation of applied use cases and facilitation of knowledge shared between geological surveys and stakeholders. WP-2 focuses the development of a European fault database. <https://geoera.eu/projects/hike10/>  
Download: [RDF](#), [TTL](#)

- **Graph DB Visualization**



## SPARQL Protocol and RDF Query Language (to query information out of a RDF graph)

# SEMANTIC NETWORK

# National Vocabularies - Examples an Outreach - THANK YOU for your attention!

Linking of geological information

to

Enhance knowledge  
across borders

...and we are part of the WP7 team for



<https://eurogeosurveys.org/research/gseu/>

**GeoSphere Austria (former Geological Survey of Austria)**

**Thesaurus screen cast:** [https://www.youtube.com/playlist?list=PLfshul-4XQW9H-k-\\_Q98eRI5LHfUPGbtc](https://www.youtube.com/playlist?list=PLfshul-4XQW9H-k-_Q98eRI5LHfUPGbtc)

TEAMWORK

thanks to

Martin Schiegl  
Vicky Haider  
Christian Linsberger

thanks to

Werner Stöckl  
Thomas Brus  
Esther Hintersberger

thanks to

Haya M. Qureshi  
Johannes Reischer  
Thomas Fuhrmann