

A large, high-resolution satellite image of the Earth from space, showing the African continent and surrounding oceans with visible cloud patterns. The image is positioned on the left side of the slide, partially overlapping a white diagonal shape.

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A New Approach for Harmonized Maps

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Challenge

Harmonizing geological maps from independent traditional heterogeneous sources

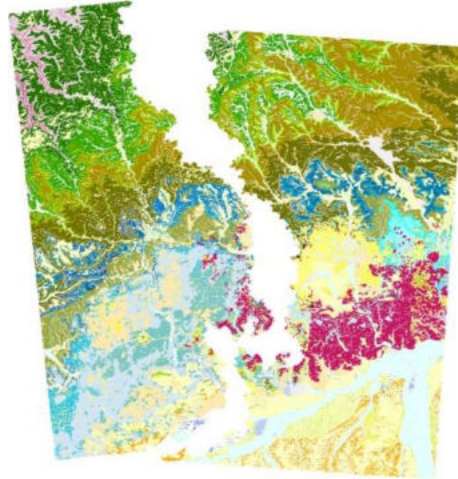


1. It is possible, of course!
2. The standard procedure typically comprises a joint working group, lots of discussions about matching the geological units, even more discussions about willingness for adaption, some GIS and so on - a time consuming work!
3. We are proud of the joint products (maps) achieved. But what about updating and improving them?
4. We face inside Germany a similar situation like in EGS – a bunch of independent players.
5. There is an urgent need for smarter solutions!

Kick off during a coffee break

The directors of BGR and the regional GSOs of BW and BY decided to step forward and start their joint ConSent (*Content Semantic*) project.

- **Starting point:** geological surveys follow integrated mapping concepts based on general legends of geological units.
- The maps series of the different surveys are **not compatible** with each other.
- **Main objective:** Provide interoperability of the integrated mapping concepts.

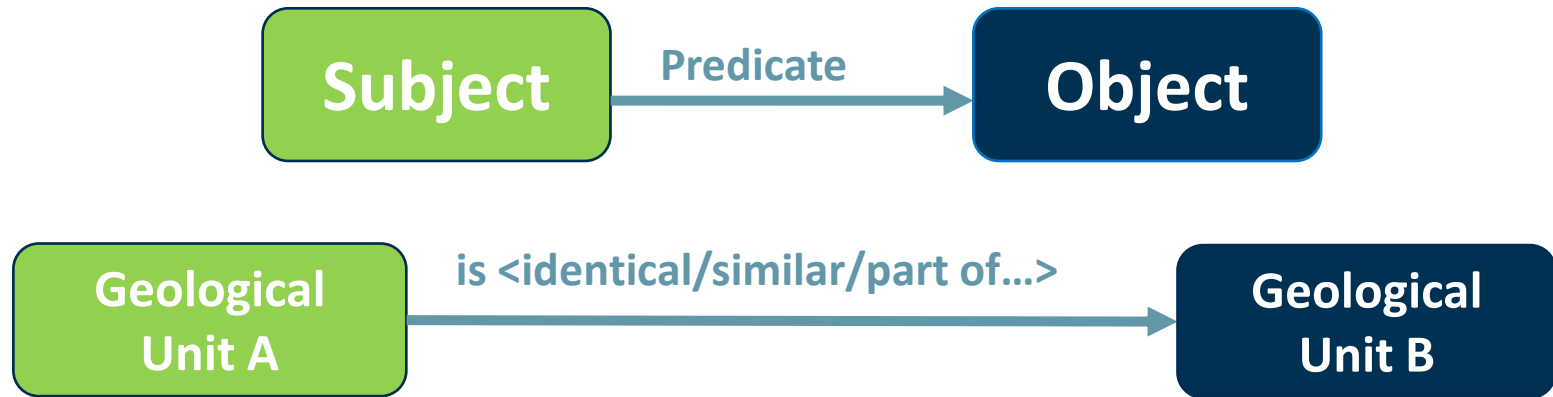


Goal: Linking of the geological general legends BW and BY by Semantic Web technology for the following applications:

- transborder **harmonisation of the large-scale geological maps** (scale 1:25,000) of the two regions
- **machinable downscaling** to maps 1:250,000, 1:500,000, 1:1,000,000 from large scale maps 1 : 25,000 of the regions
- Linking to further resources; here: LithoLex (**Lithostratigraphic Lexicon Germany**)

Linking of general legend units by SKOS (Simple Knowledge Organization System)

- applying Web 3.0 concepts
- assignment of unique and persistent URIs (*Uniform Resource Identifier* in the internet) to general legend units
- relationships between units realised by a triple structure in RDF language (**R**esource **D**escription **F**ramework) respecting a stratigraphic hierarchy:



Overarching hierarchical geological legend at different **downscaling** levels map scales
1:250,000 and smaller

↑ Hierarchical relations

Overarching geological legend at formation level (hierarchical) map scale abt. 1:50,000 to 1:100,000

SKOS relations ↑

↑ SKOS relations

Geological Legend of **BW**
map scale 1:25,000



Geological Legend of **BY**
Map scale 1:25,000

Implementation of geological legends in an editorial system (PoolParty)

- internet-based thesauri
- URIs are assigned to units → machine-readable
- relationships between the units are realised by the RDF language (triples)

poolparty LINKED DATA EDITOR

Linked Data Frontend

Geologische Generallegende von Baden-Württemberg
Geologische Legendeneinheiten (dd)
LAST MODIFIED: 28.04.2023 - 16:59 CET
NUMBER OF CONCEPTS: 1238

Geologische Generallegende von Bayern
Geologische Legendeneinheiten (dd)
LAST MODIFIED: 24.03.2023 - 13:54 CET
NUMBER OF CONCEPTS: 3145

Übergeordnete Generallegende Geologie
LAST MODIFIED: 12.01.2023 - 09:26 CET
NUMBER OF CONCEPTS: 87

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Implementation in PoolParty

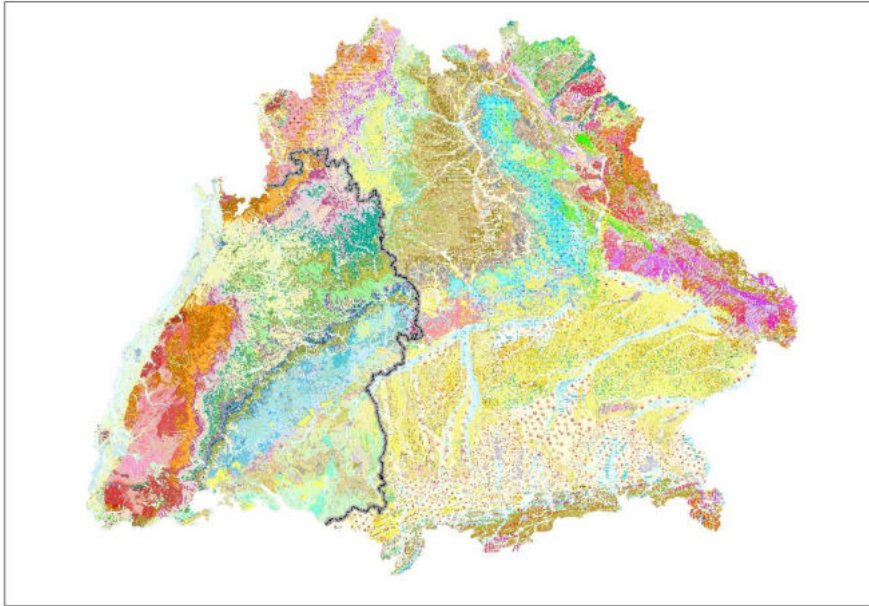
Example Amaltheenton-Formation (Jurassic)

The screenshot shows the PoolParty interface with a tree view on the left and a details panel on the right. The tree view lists various geological formations, with 'Amaltheenton-Formation' highlighted in orange. The details panel shows the 'Amaltheenton-Formation' entry with its SKOS details, including 'Übergordnete Konzepte' (Schwarzjura-Gruppe) and 'Untergeordnete Konzepte' (Amaltheenton-Formation, Eisenerzflöz (Randfazies), Costatenkalk-Subformation). It also shows 'Verwandte Konzepte' and 'Konzepte mit exakter Übereinstimmung' (Amaltheenton-Formation, Amaltheenton-Formation, https://resource.bgr.de/...). The interface includes a top navigation bar with 'PROJEKT', 'KORPORA', 'EXTRAS', and 'ERWEITERT' tabs, and a language dropdown set to 'de'.

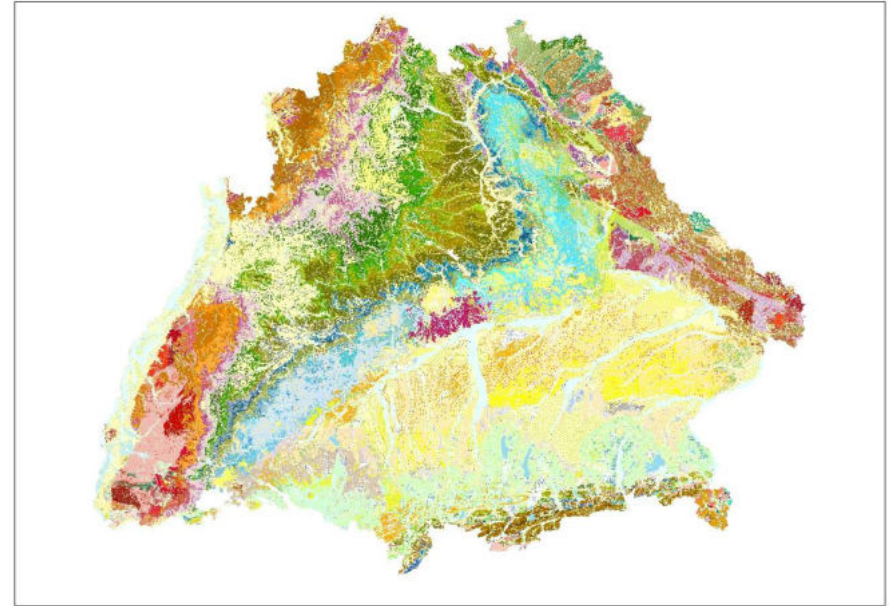
This screenshot shows a different view of the PoolParty interface, focusing on a specific path in the tree view. The path is 'Jura-Ablagerung (Germanische Fazies) (4)', which is expanded to show its sub-entries: 'Weißjura-Gruppe (4)', 'Braunjura-Gruppe (4)', and 'Schwarzjura-Gruppe (25)'. The 'Schwarzjura-Gruppe' is further expanded to show its sub-entries: 'Posidonienschiefer- oder Jurensismergel-Formation (0)', 'Obtususton- bis Jurensismergel-Formation (0)', 'Gryphäensandstein- bis Jurensismergel-Formation (0)', 'Angulatensandstein- bis Jurensismergel-Formation (0)', 'Jurensismergel-Formation (1)', 'Numismalmergel- bis Posidonienschiefer-Formation (0)', 'Posidonienschiefer-Formation (7)', 'Numismalmergel- oder Amaltheenton-Formation (0)', 'Obtususton- bis Amaltheenton-Formation (0)', 'Amaltheenton-Formation (2)', 'Amaltheenton-Formation, Eisenerzflöz (Randfazies) (0)', and 'Costatenkalk-Subformation (1)'. The 'Amaltheenton-Formation (2)' entry is highlighted in orange. The interface includes a top navigation bar with 'PROJEKT', 'KORPORA', 'EXTRAS', and 'ERWEITERT' tabs, and a language dropdown set to 'de'.

Visualization of geological maps 1:25,000

Original geological maps of BW and
BY 1:25,000

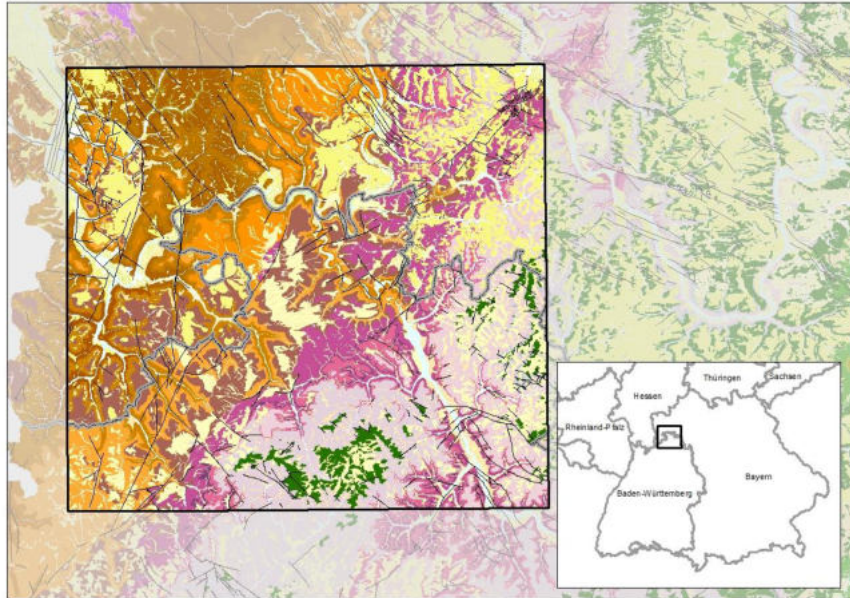


Harmonised map with the
overarching geological legend

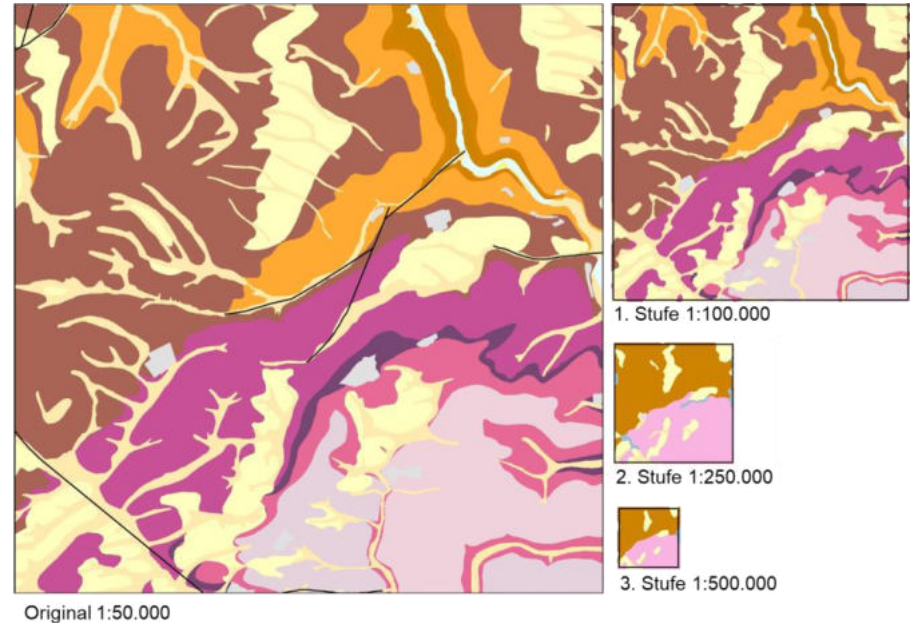


Next step: legend units of overarching geological units are connected to the German stratigraphic lithological lexicon (LithoLex).

Downscaling of maps using the *AutoGen* tool



Location of the pilot area



Machinable downscaling starting at 1:25,000

Conclusion



- Harmonisation of the geological map series could be achieved with little loss of detail using the overarching geological legend (OGL).
- Based on the OGL, a transnational harmonisation of further geological objects (boreholes, 3D models, thematic maps) will also be possible.
- Automated generalisation of geological maps with *AutoGen* shows promising results.
- The directors of all German GSOs decided to extend the ConSent project over entire Germany.

Thank you for your attention!

<https://concent.bgr.de>

<https://www.bgr.bund.de/DE/Themen/Geodatenmanagement/Projekte/laufend/>