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Swiss Geological Survey

Towards a Swiss geological data model

7th Swiss Geoscience Meeting,
Neuchâtel 2009

Stefan Strasky, Pauline Baland, Nils Oesterling & Andreas Kühni

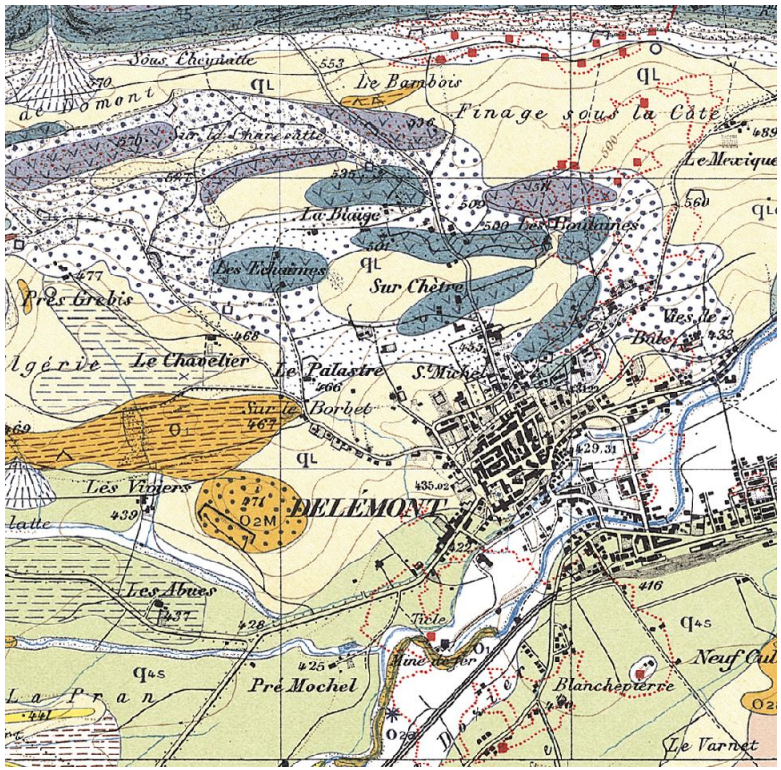
Outline

- Introduction
- Status quo of the geological data model
- Current challenges
- Goals & outlook

Introduction

- ~80 years of traditional geological map production for the Geological Atlas of Switzerland 1:25000 (GA25)

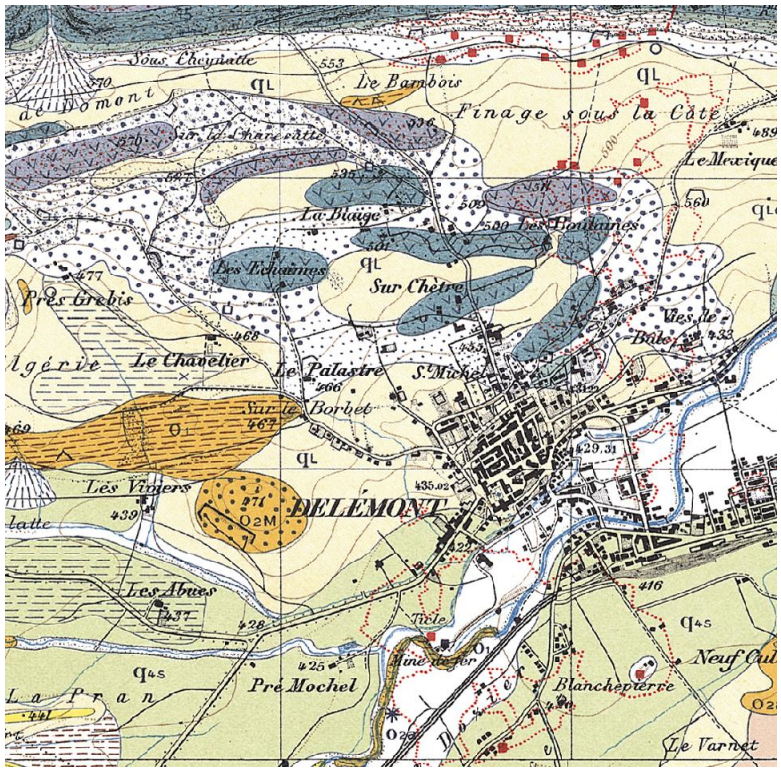
GA25 001 Delémont (1930)



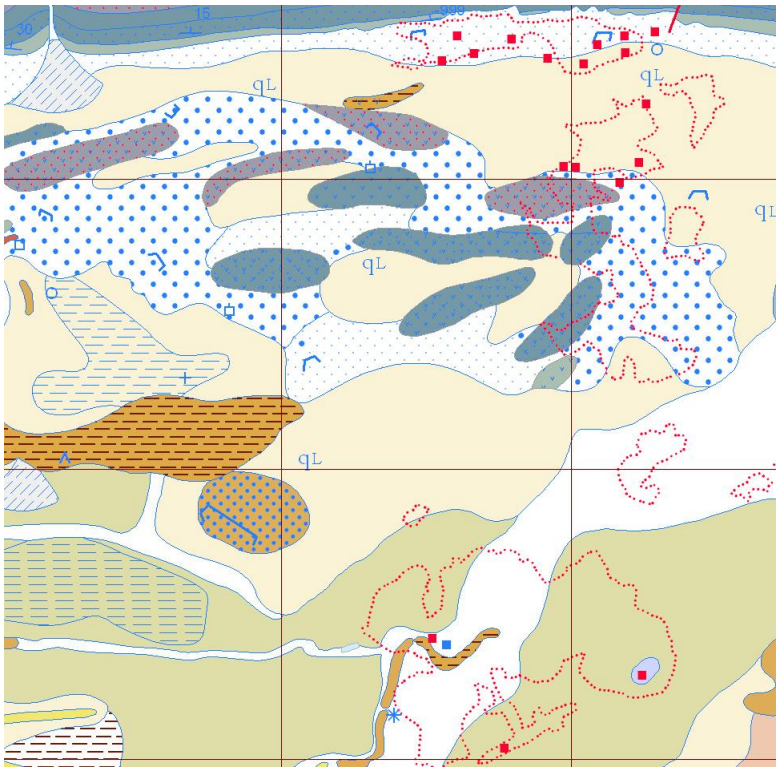
Introduction

- A growing need for vector datasets of this map series has evolved during the last decade

GA25 001 Delémont (1930)



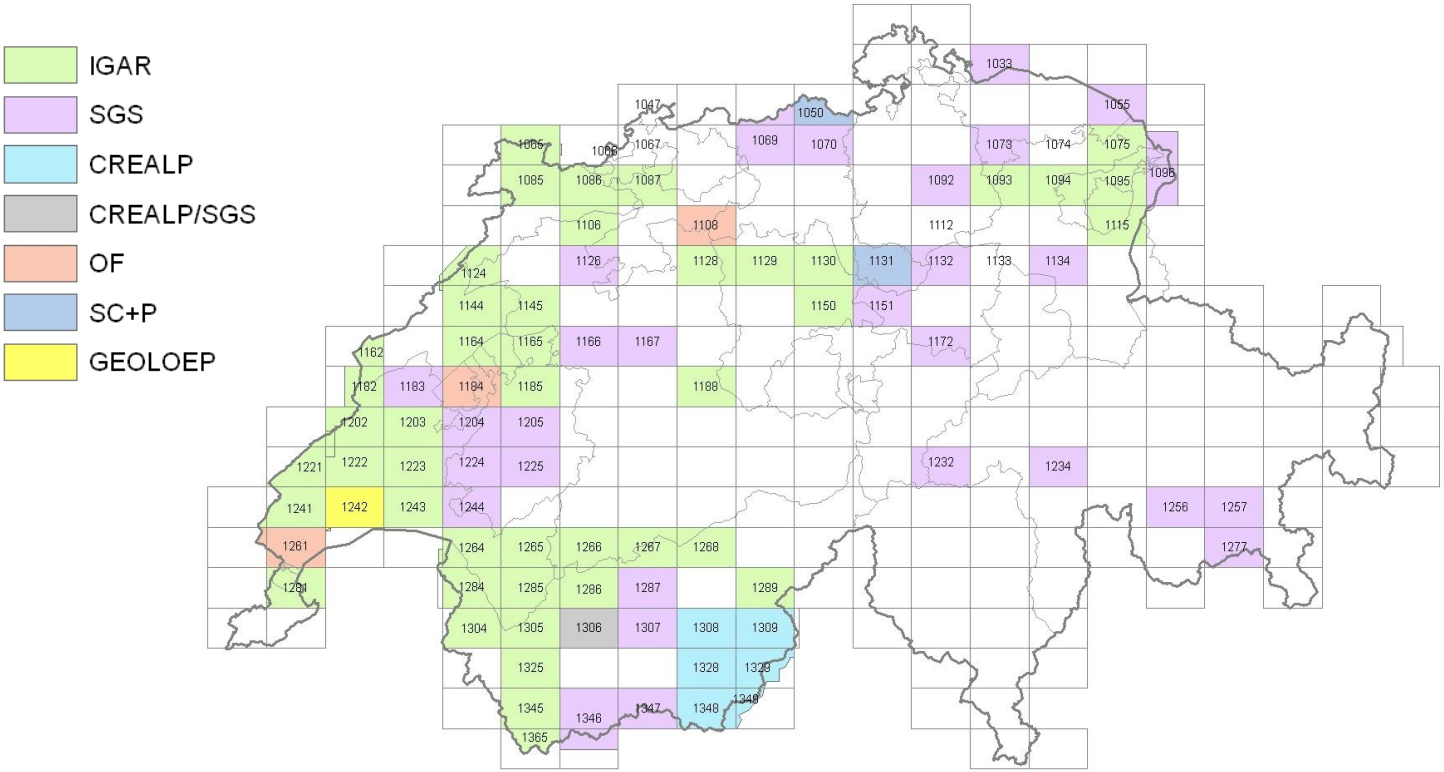
Vectordata 2009



Introduction

Conversion from raster to vector graphics (until 2005)

- Different producers established different data structures
  → inhomogeneous data, lack of standardised attributes

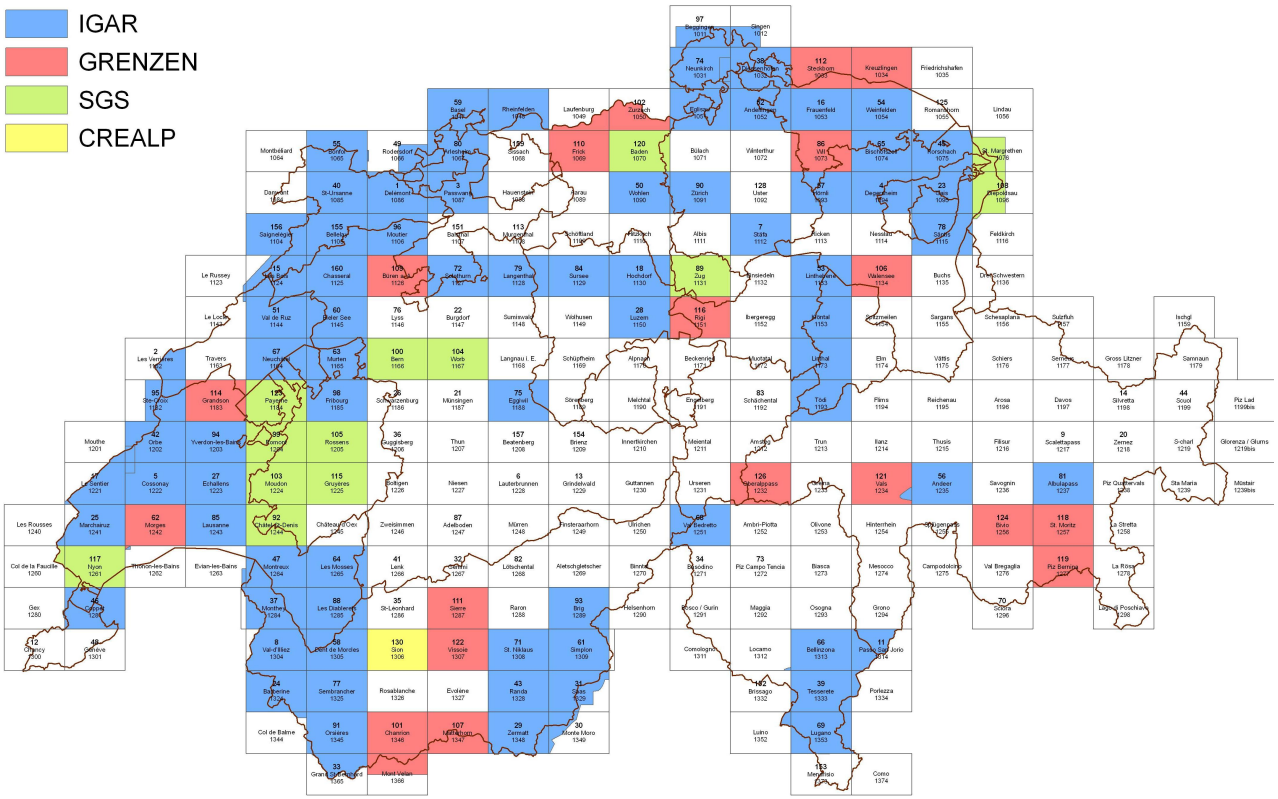


Introduction

Conversion from raster to vector graphics (since 2005)

- First approach of data homogenisation

  → simple geological data model «IGAR»



Introduction

Conversion from raster to vector graphics (since 2005)

- First approach of data homogenisation
  → simple geological data model «IGAR»

- In parallel: development of the first version of a more complex geological data model by *Baland-Renaud & Oesterling* (2007)

Introduction

Legal obligation

- According to the Federal Legislation geological surveying data belong to the official geobasis data and thus requires a minimal datamodel.

Law of geoinformation

Geobasis data

Geoinformationsgesetz **510.62**

Art. 5 Geobasisdaten des Bundesrechts

[1] Der Bundesrat legt in einem Katalog die Geobasisdaten des Bundesrechts fest.

[2] Er erlässt Vorschriften über die qualitativen und technischen Anforderungen an Geobasisdaten des Bundesrechts, insbesondere über:

a. die geodätischen Bezugssysteme und Bezugsrahmen;

b. die Geodatenmodelle;

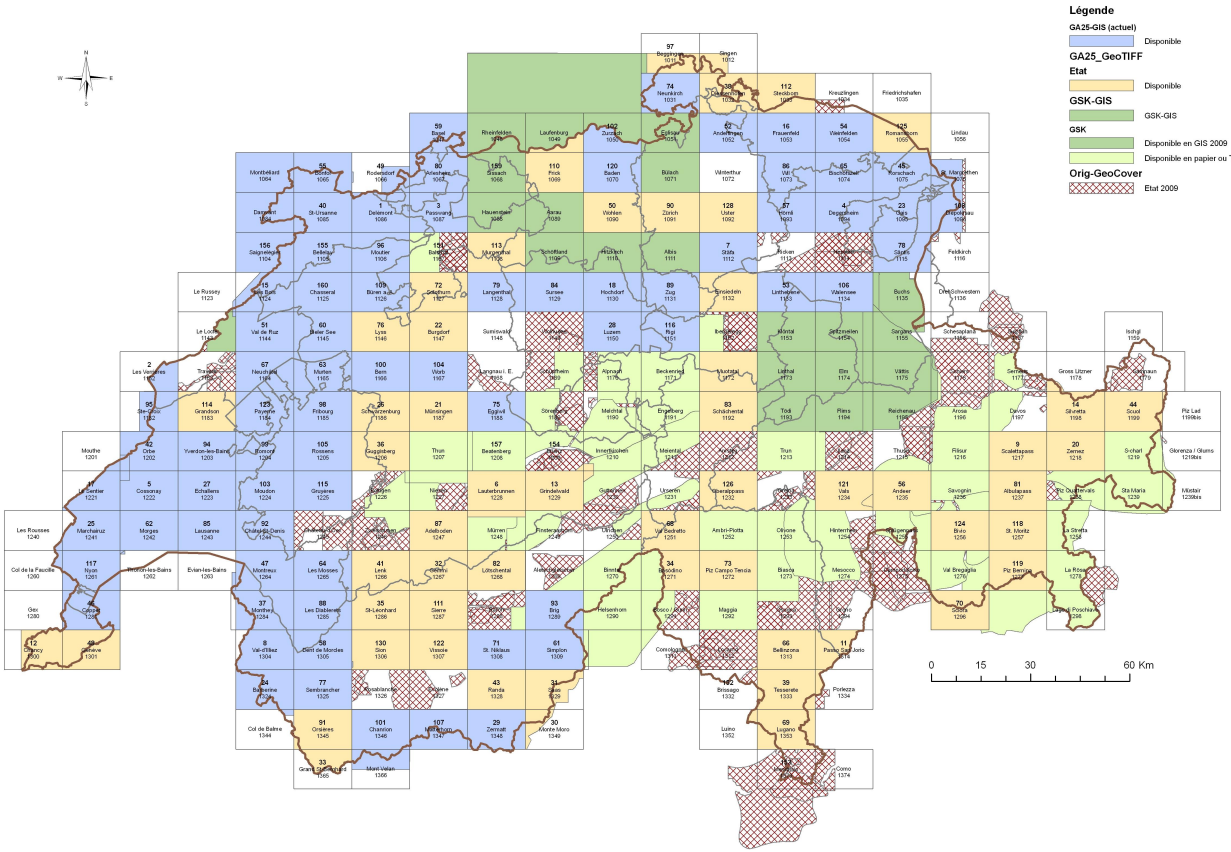
Geoinformationsverordnung **510.620**

Geologisches Kartenwerk	SR *510.62* Art. 22 ff. SR *510.626* Art. 23	swisstopo			A	X	46

Introduction

Motivation through the customer's needs

- GeoCover: geological GIS-data at a scale of 1:25000 throughout Switzerland



Introduction

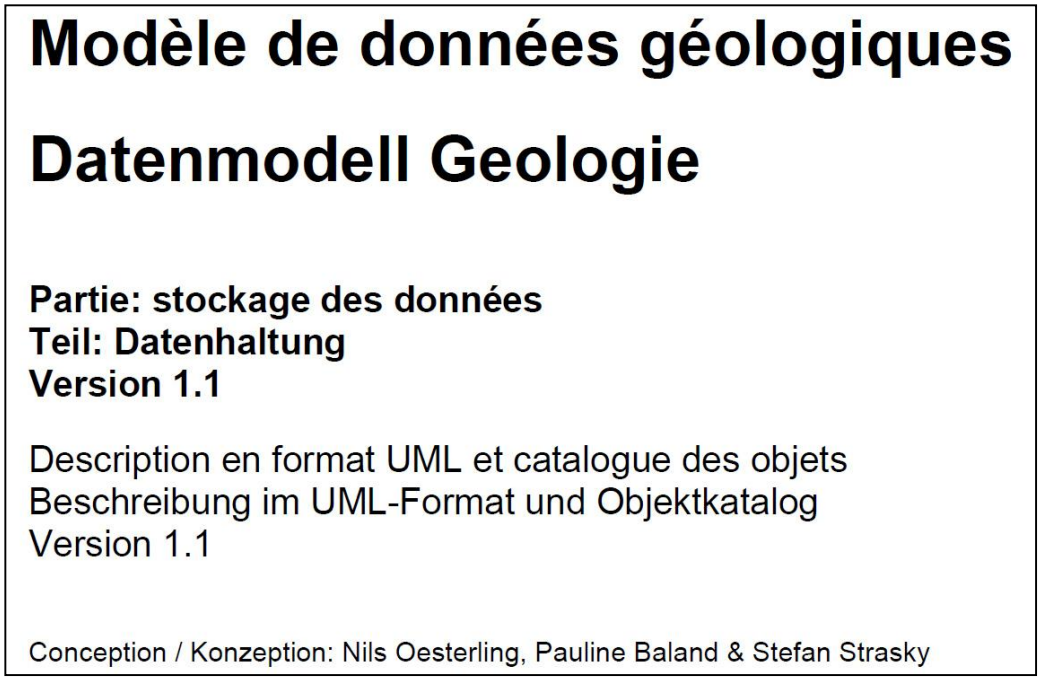
The main goal of the data model project is:

- To establish a harmonised structure of geological data
- To describe all relevant objects, attributes and relationships of these data

  → In order to enable thorough GIS-analyses

Status quo of the geological data model

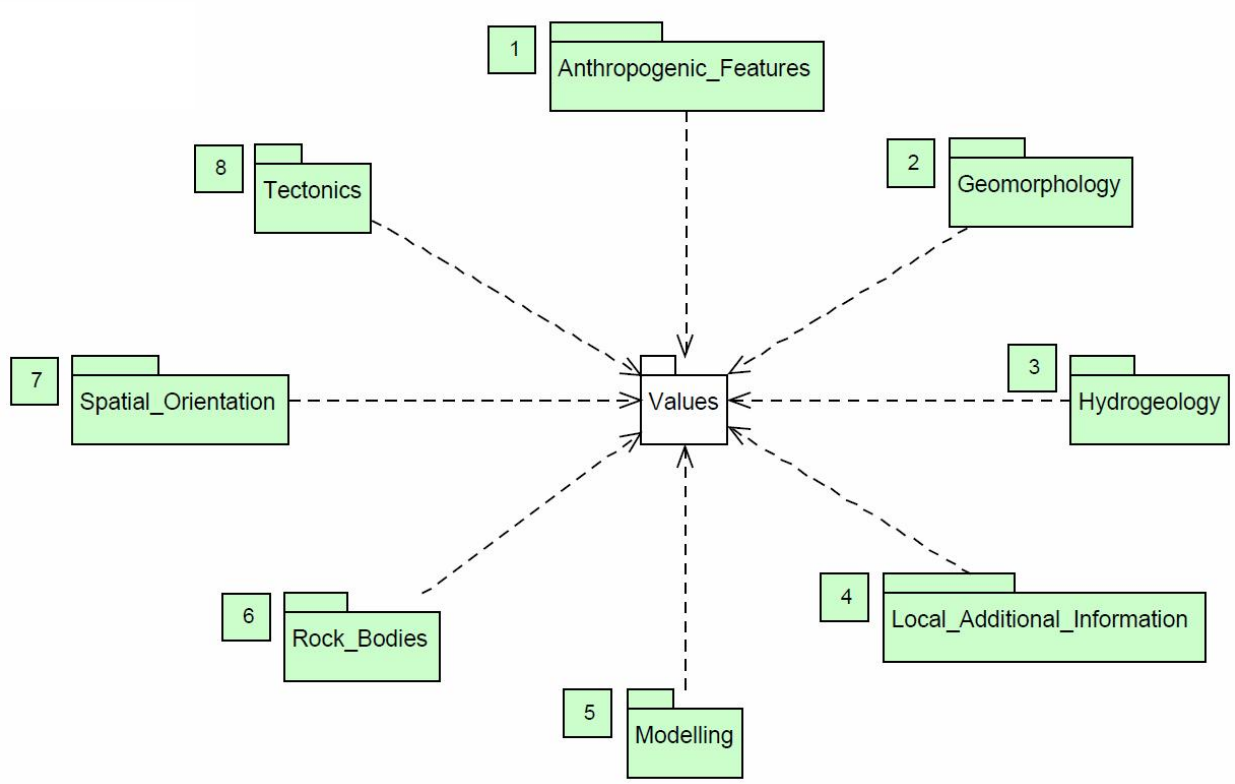
- Draft version 1.1 now available (revised version of *Baland-Renaud & Oesterling, 2007*)
  - Structure
  - Semantics



Status quo of the geological data model

Structure

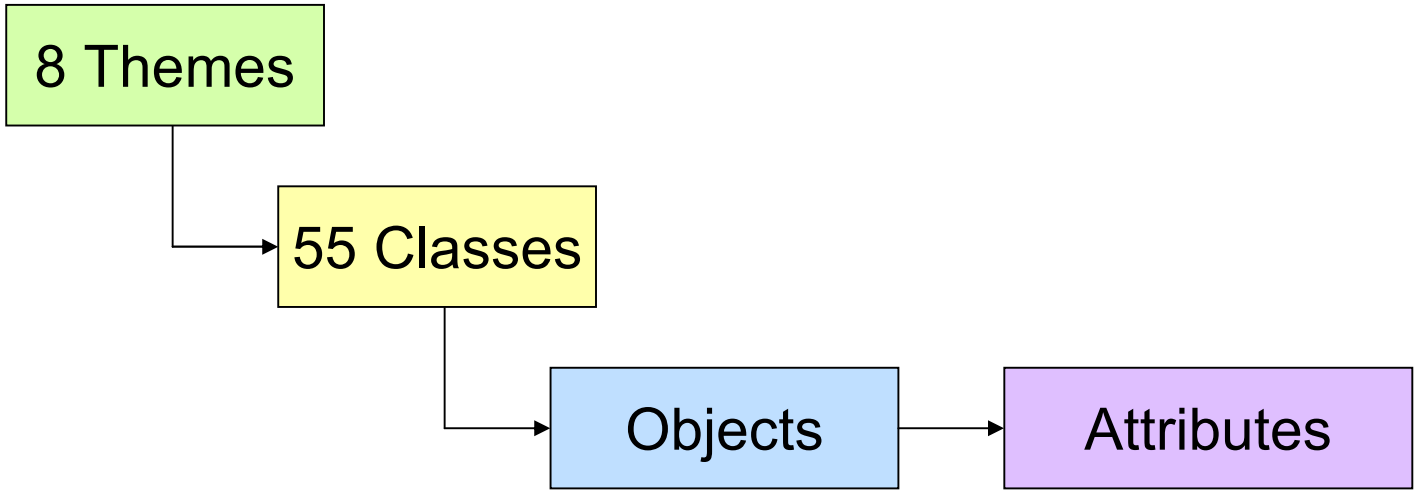
- Objects are divided in 8 themes



Status quo of the geological data model

Structure

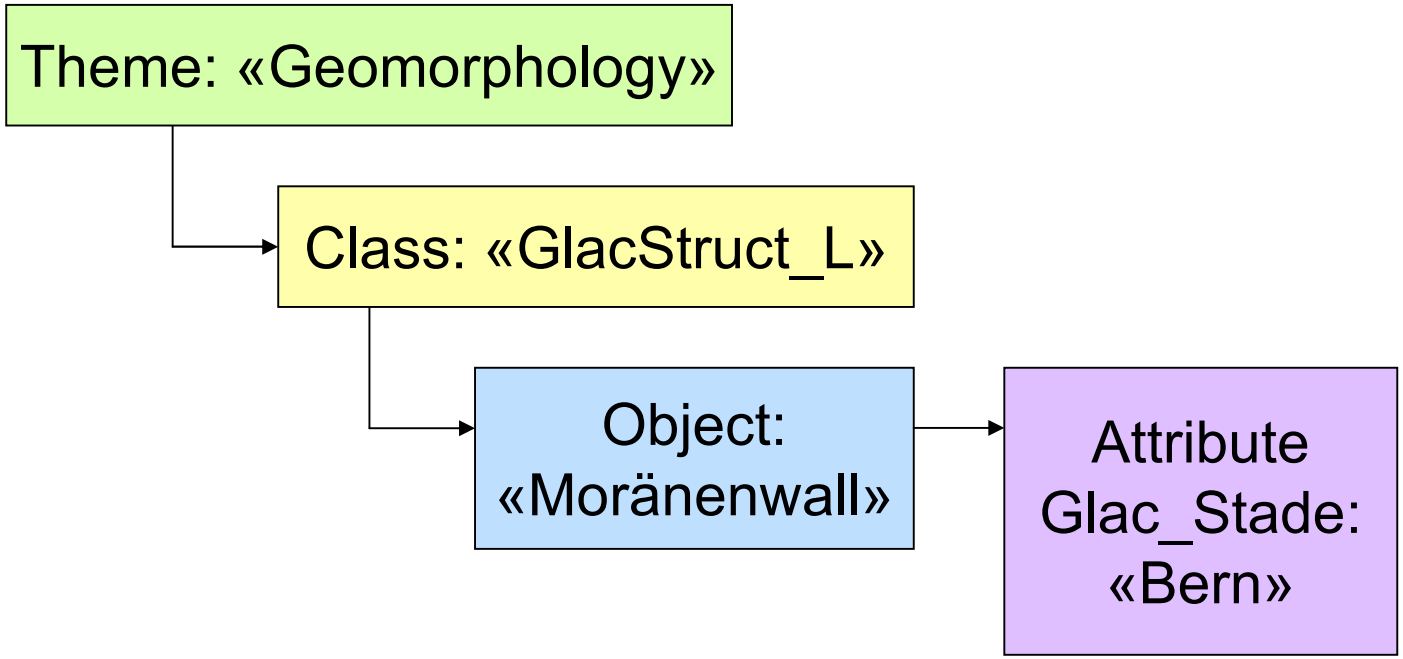
- The 8 themes are further classified into different classes



Status quo of the geological data model

Structure

- Example of a moraine ridge



Status quo of the geological data model

Structure

- Theme: «Geomorphology», class: «GlacStruct_L»

2.2 Classe GlacStruct_L

Attribut [Cardinalité]	Domaine de valeur	NULL	Description
Ge [1]			
Kir [1]			
Mc [0.			
Gla [0.			
Glacial_Stade [0…1]	Code (GlacStructGlac_Stade_L)	o	
Symbol [1]	Code (Symbol_GA25)	n	

2.2.1 Attribut Kind

Code_LZV	Kind (frz)
54	Ancien stade glaciaire
48	Bord de terrasse de kame
62	Cordon de blocs dans un glacier
62	Levée de blocs par apport d´avala
42–47; 62	Vallum morainique

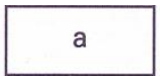
2.2.4 Attribut Glacial_Stade

Glac_Stade (frz)	Glac_Stade (de)
-	-
Bern	Bern
Fenerthalden	Fenerthalden
Hurden	Hurden
Konstanz	Konstanz
Maximalstand	Maximalstand
Muri	Muri
Schlieren	Schlieren
Schosshalden	Schosshalden
Spreitenbach-Killwangen	Spreitenbach-Killwangen
Stein-am-Rhein	Stein-am-Rhein
Zürich	Zürich

Status quo of the geological data model

Semantics

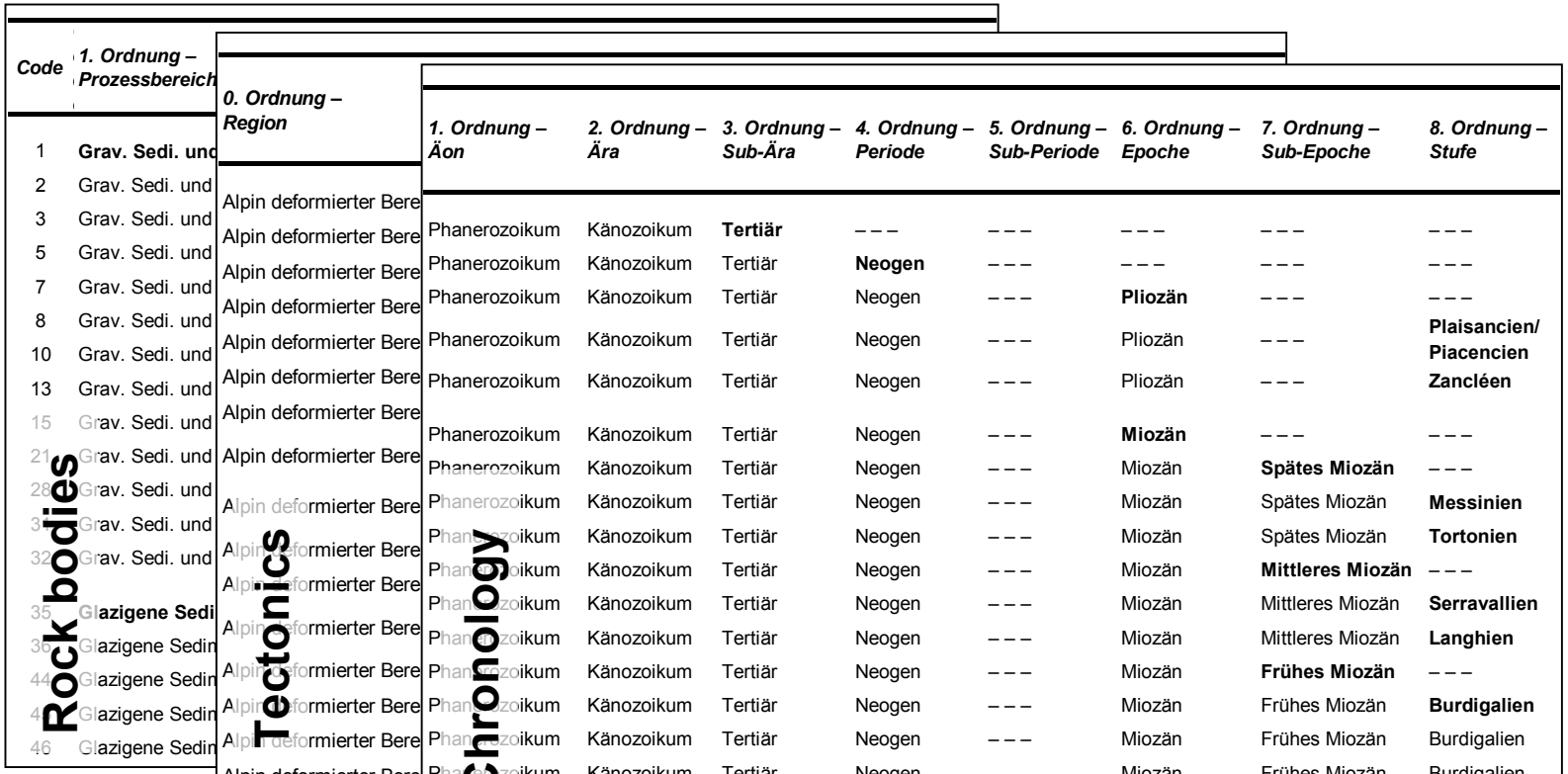
- To avoid multiple expressions for a particular object we defined standard terms

	Brig (GA25 093)	*Säntis (GA25 078)*	*Linthebene (GA25 053)*
	Alluvionen		
	*Alluvionen*	*Talboden, rezente Alluvionen*	*Alluvialböden*
	Hangschutt		
	*Hangschutt Trockenschuttkegel*	*Gehängeschutt Trockenschuttkegel*	*Gehängeschutt trockener Schuttkegel*
	Hangschutt (Morphologie:) Kegel		
	*Hangschutt vermischt mit Blockschutt*		*Schutt mit Blöcken*
	Hangschutt mit Blockschutt vermischt		

Status quo of the geological data model

Semantics

- Tables with standard terms allow to assign standardised geological information to each object



Status quo of the geological data model

Collaboration with expert group

- private companies
- federal offices
- cantonal offices

→ Refinement of the geological data model

Current challenges

- Reorganisation of some classes and objects within themes
- Constraints for attributes: which attribute combinations are possible, which impossible?

2.2.1 Attribut Kind

Code_LZV	Kind (frz)	Kind (de)
54	Ancien stade glaciaire	Älterer Gletscherstand
48	Bord de terrasse de kame	Kameterrasse
62	Cordon de blocs dans un glacier rocheux	Blockgirlande im Blockstrom
62	Levée de blocs par apport d´avalanches	Lawinenmoränenwall
42–47; 62	Vallum morainique	Moränenwall

2.2.2 Attribut Moraine_Type

Morai_Type (frz)	Morai_Type (de)
-	-
de névé	Schneehaldenmoräne
sur glace morte	auf Toteis

2.2.3 Attribut Glacier_Type

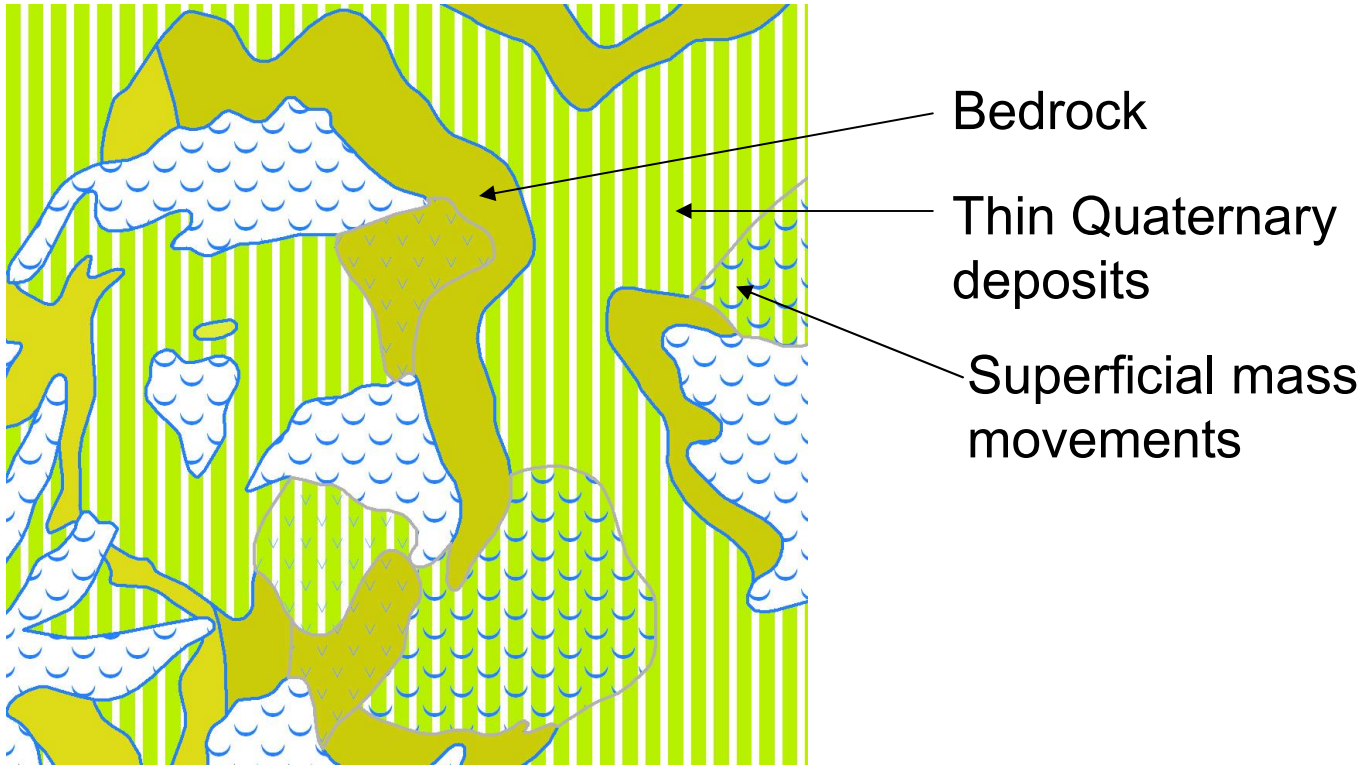
Glac_Type (frz)	Glac_Typ (de)
-	-
glacier de piedmont	Piedmontgletscher
glacier local	Lokalgletscher

2.2.4 Attribut Glacial_Stade

Glac_Stade (frz)	Glac_Stade (de)
-	-
Bern	Bern
Fenerthalden	Fenerthalden
Hurden	Hurden
Konstanz	Konstanz
Maximalstand	Maximalstand
Muri	Muri

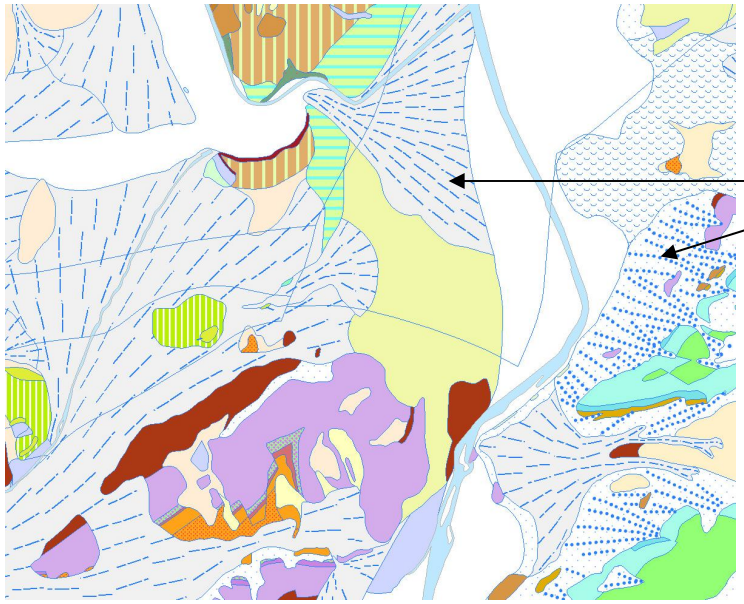
Current challenges

- Spatial and geometrical basis, relations and topology between objects (*e.g. how to define a thin sediment cover over bedrock or older Quaternary deposits?)*



Current challenges

- Spatial and geometrical basis, relations and topology between objects (*e.g. how to define a thin sediment cover over bedrock or older Quaternary deposits?)*
- How to handle cartographic elements used for printed maps?



Lines of alluvial fans and scree

Current challenges

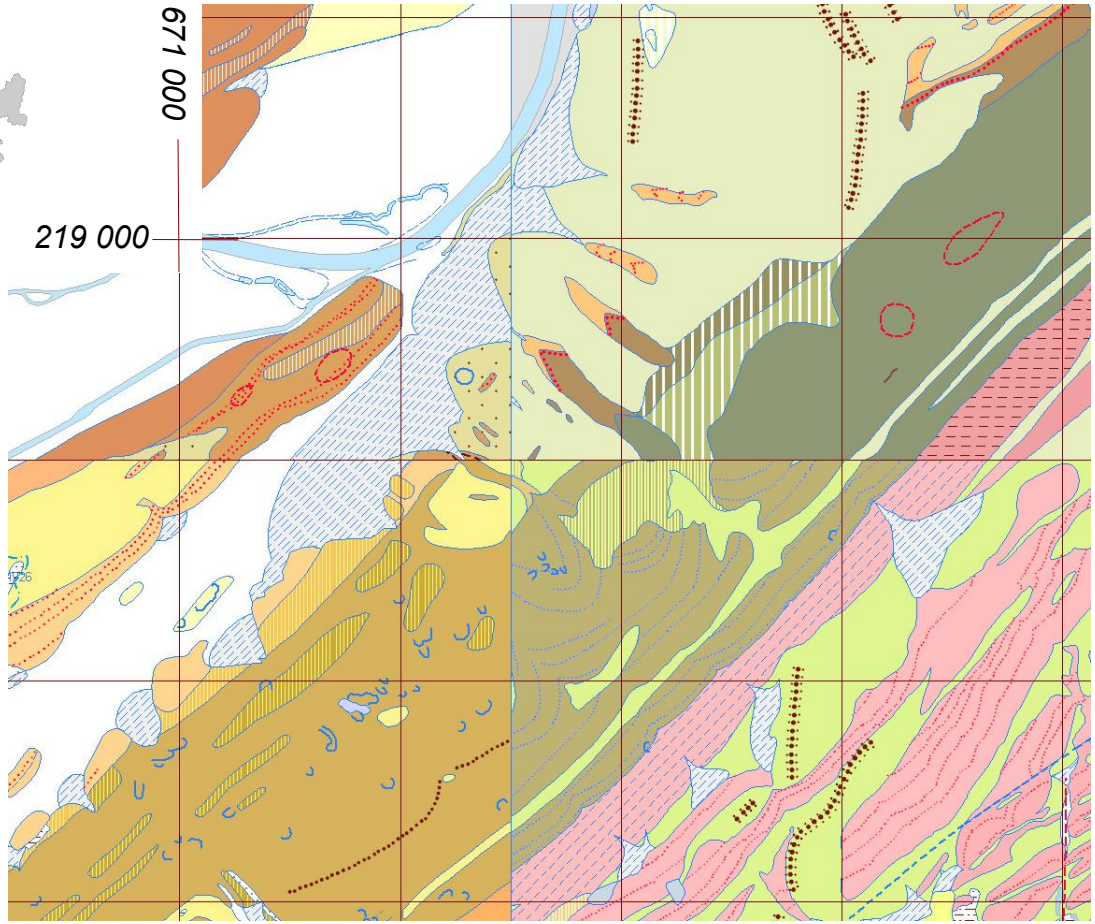
- Spatial and geometrical basis, relations and topology between objects (*e.g. how to define a thin sediment cover over bedrock or older Quaternary deposits?)*
- How to handle cartographic elements used for printed maps?
- Relation between the geological data model and data models from related scientific domains (natural hazards, hydrogeology, resources, …)

Goals & outlook

- Most of the described challenges resolved — March 2010
- Final draft accepted from the expert group — Spring 2010
- Final draft submitted for external review — Summer 2010
- Model (incl. UML and INTERLIS) and document-ation adjusted — Winter 2010 / 11
- Model implemented — December 2011

Goals & outlook

- Create a fundamental basis for the compilation of a seamless, nationwide vector dataset of Switzerland



018 Hochdorf (1945)

089 Zug (1990)

028 Luzern (1955)

116 Rigi (2006)

Goals & outlook

- Create a fundamental basis for the compilation of a seamless, nationwide vector dataset of Switzerland

671 000

219 000

018 Hochdorf (1945)

089 Zug (1990)

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Thank you for your attention.