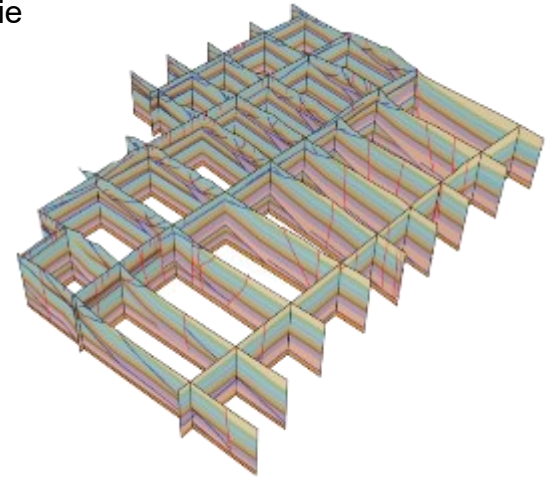
Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

**Bundesamt für Landestopografie swisstopo**
Landesgeologie

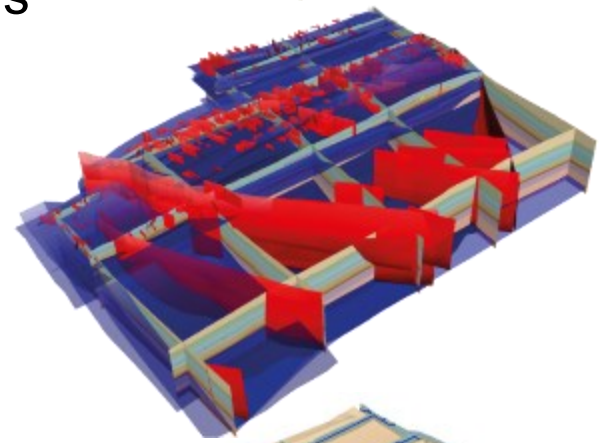


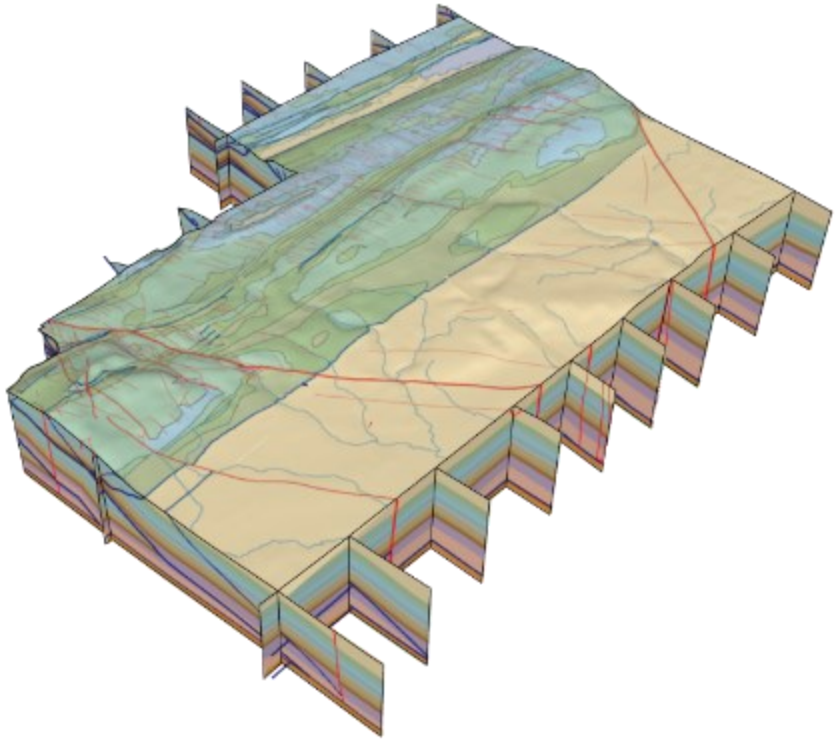
wissen wohin
savoir où
sapere dove
knowing where

swisstopo

# Making the Invisible Visible:

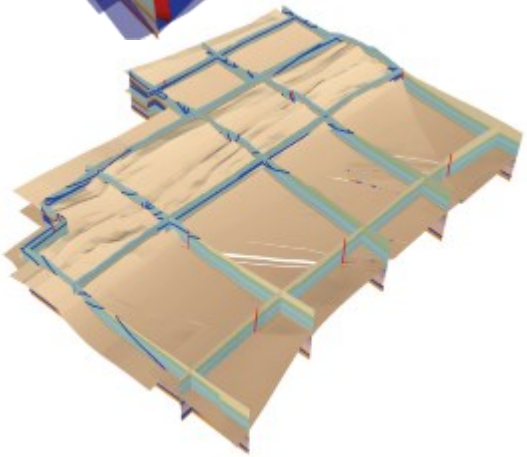
## Challenges in Visualising and Communicating 3D Geological Models



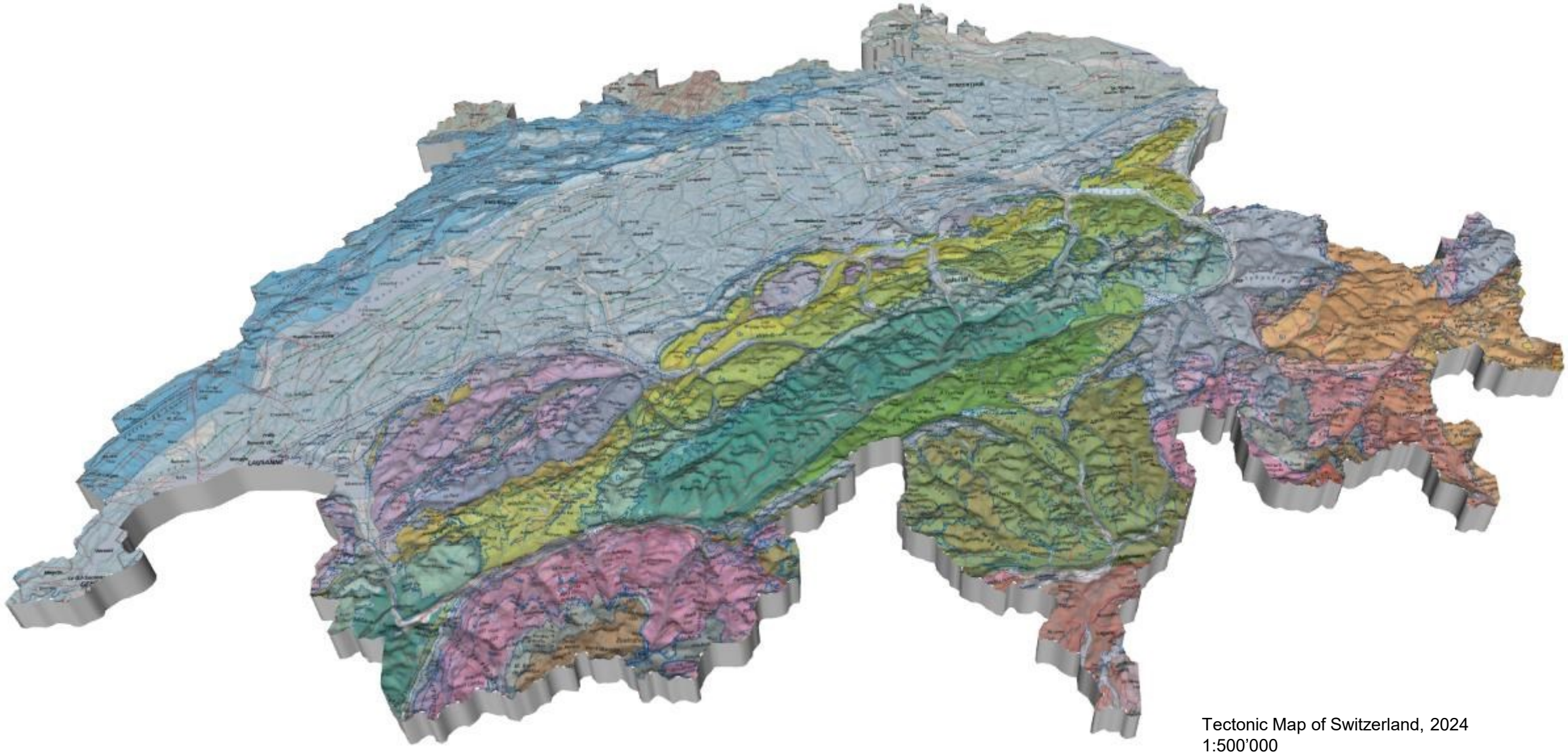


Eva Kurmann

10 April 2025

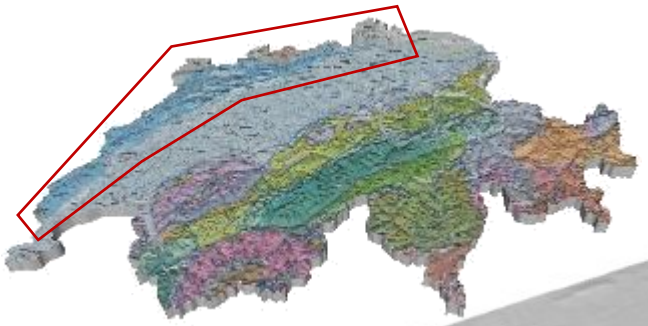


# Jura3D | 3D geological model of the Swiss Jura



Tectonic Map of Switzerland, 2024
1:500’000

# Jura3D | 3D geological model of the Swiss Jura





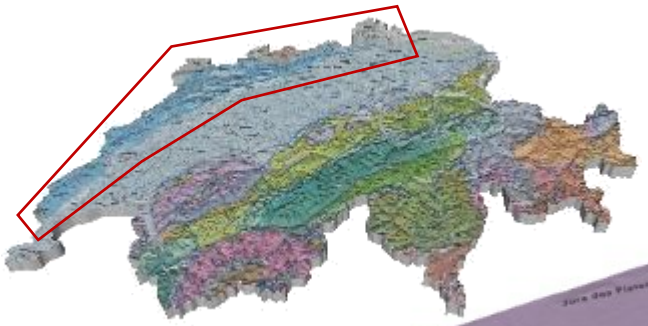
## Model Extent

- Jura 3D model covers the Swiss Jura (internal and external folded Jura),
- includes the Swiss areas of the Haute Saône Platform, the Upper Rhine Graben and the South German Platform and
- an area of overlap with GeoMol in the southwest.

## Data input

- Main source: Geological Atlas of Switzerland 1:25,000 (vectorised & harmonised)
- Heterogeneous dataset: geological profiles, borehole data, geophysical data with varying quality
- Key challenge: validation & geological interpretation to ensure consistency

# Jura3D | 3D geological model of the Swiss Jura

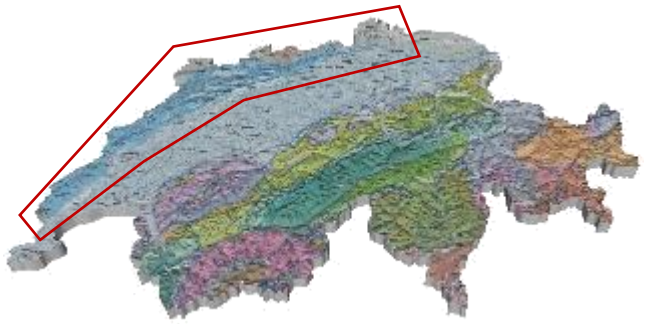





## Tectonic concept

- At the beginning of the modelling, a overall tectonic concept was developed to capture the tectonic and kinematic features in the Jura3D area.
- It includes a summary report, a **structural map** and **eight reference sections**.
- Special emphasis was placed on the amounts of **shortening** and the rough **structuring of the fold and thrust** belt into deformation cells.
- **Deformation cells** are structural units with common characteristics (folds, overthrusts, fractures) and comparable kinematic development.

# Jura3D | Reference section

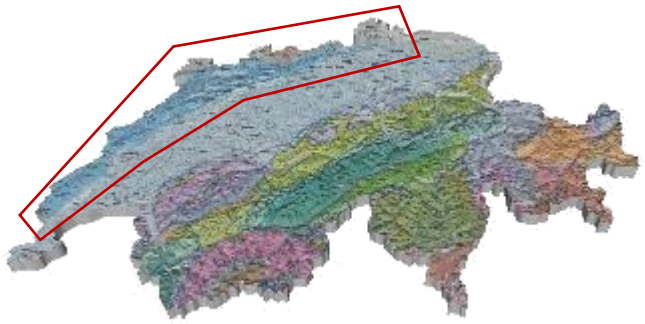


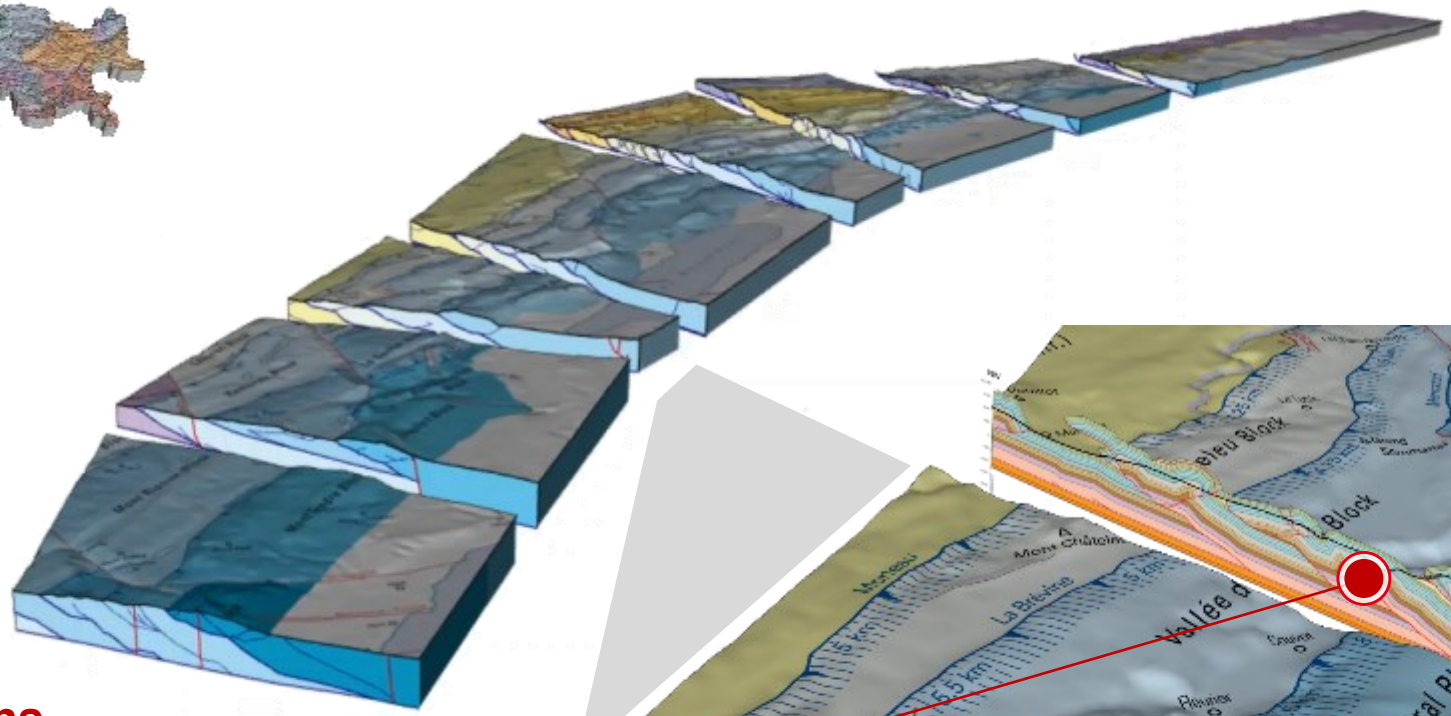
## Deformation cells

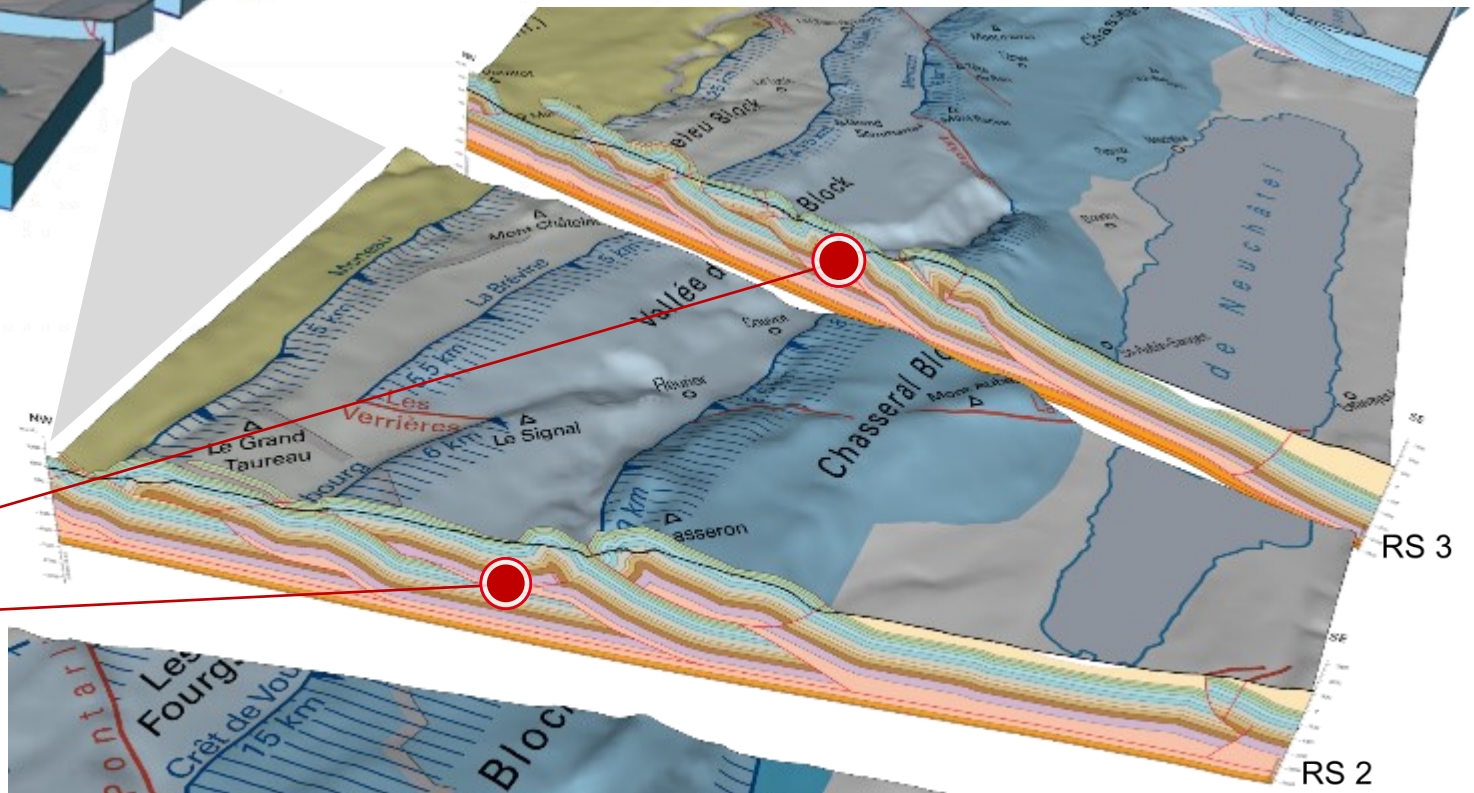
The deformation cells on the structural map correspond to those in the reference sections.

Transition from 2D to 3D.

# Jura3D | Reference section







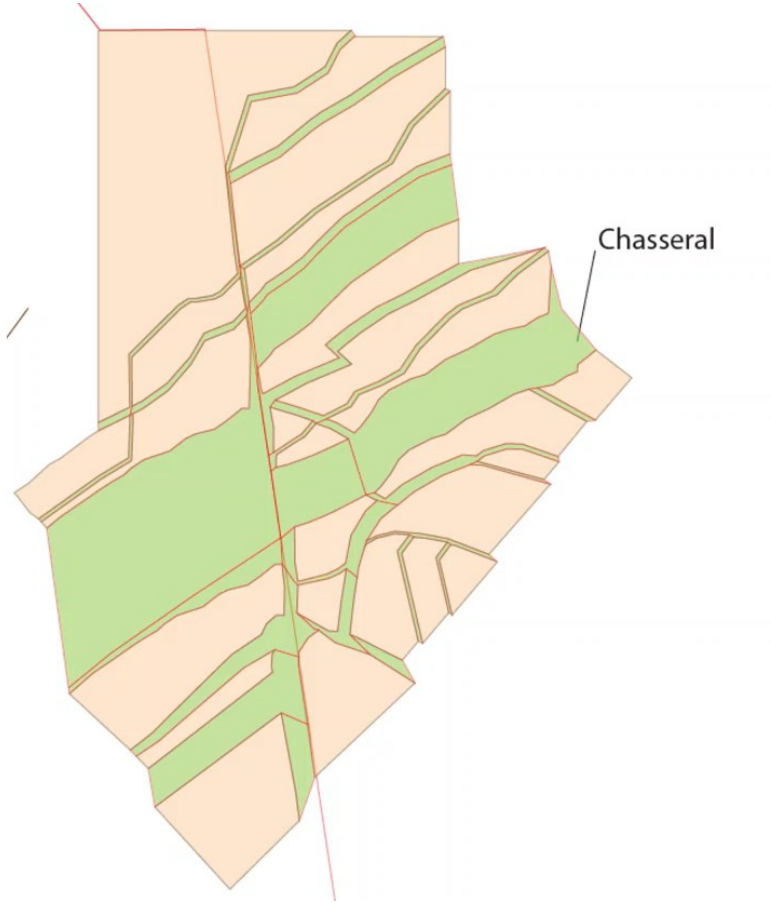

## Reference sections

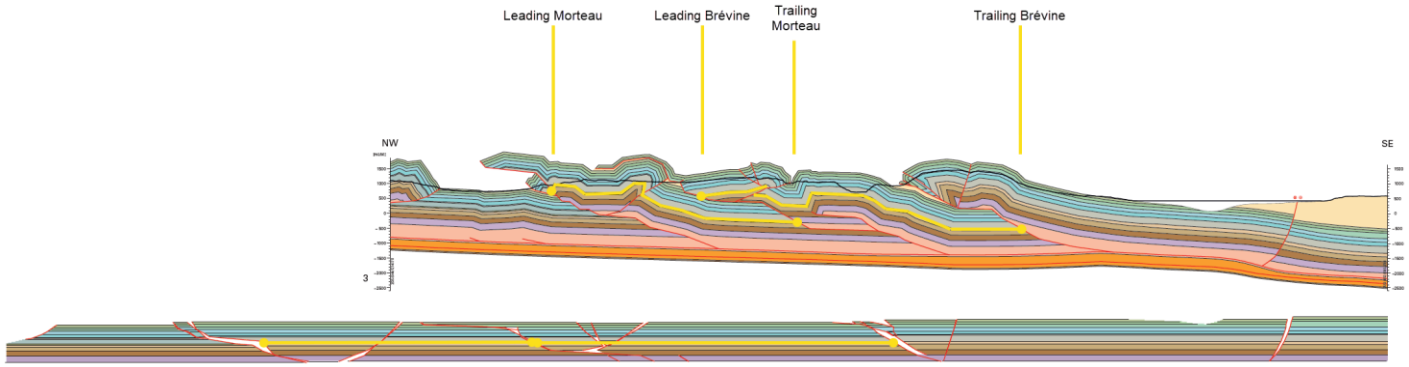
The reference sections indicate not only the deformation blocks, but also the entire modelled stratigraphy of Jura3D.

These sections also serve as a guideline for the level of detail of the panel model, as well as for the style of the profiles.

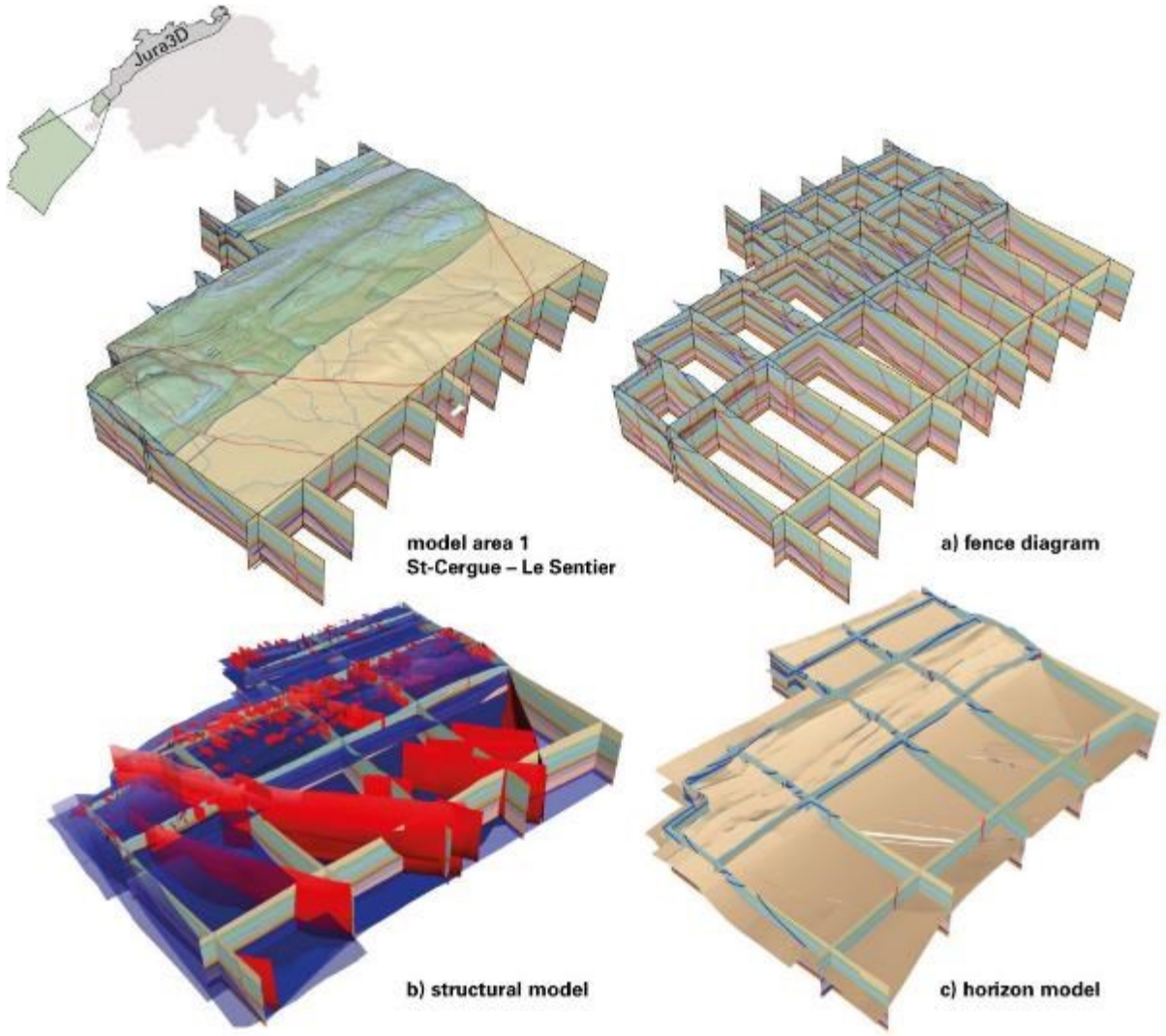
# The importance of kinematic understanding

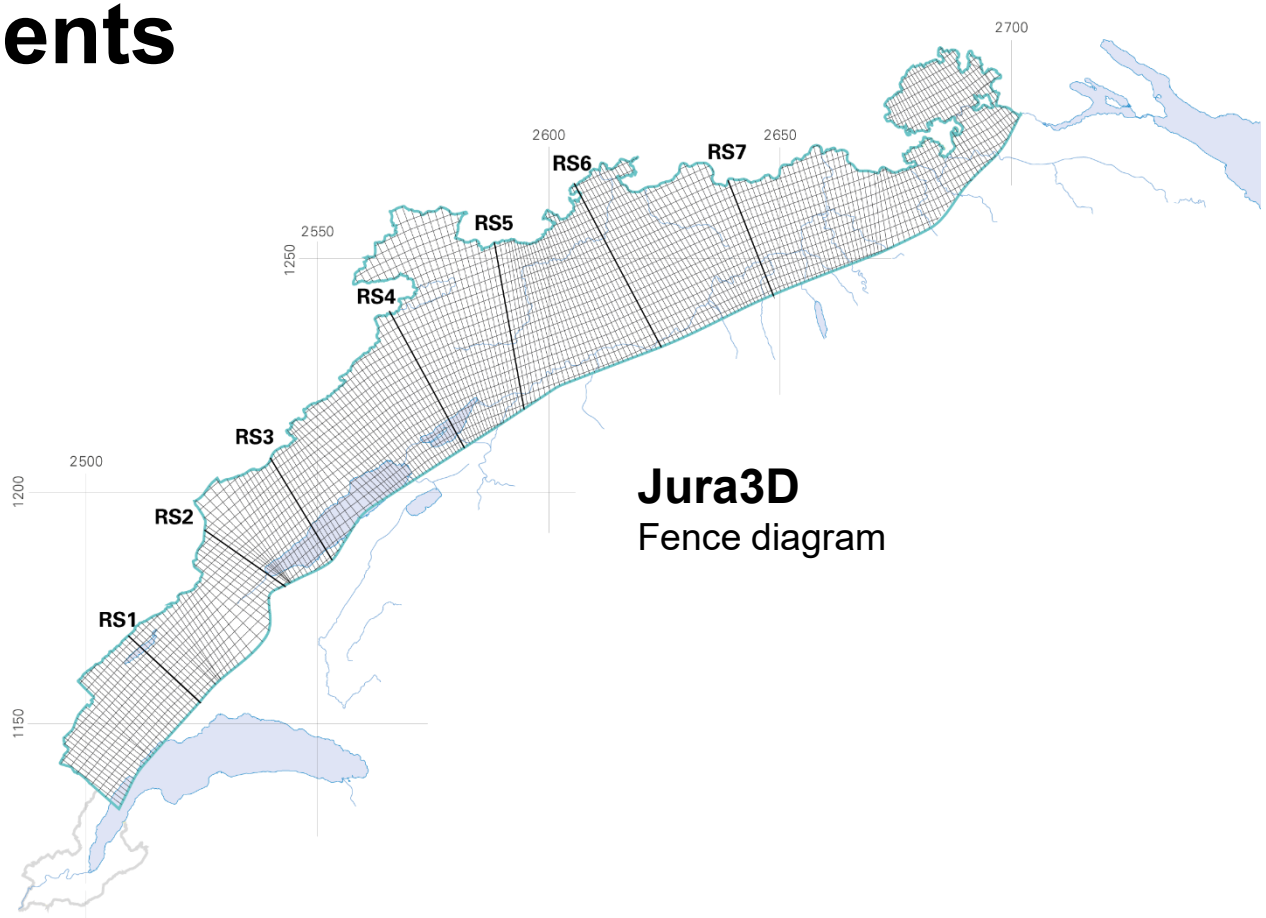
- **Stepwise refinement:** unfolding deformation structures and establishing a chronological sequence of events.
- **Consistent shortening:** Ensuring deformation is spatially coherent across the model.
- **Interdependency:** Solving one section affects adjacent areas - requiring an iterative, region-wide approach.



# Jura3D Model components

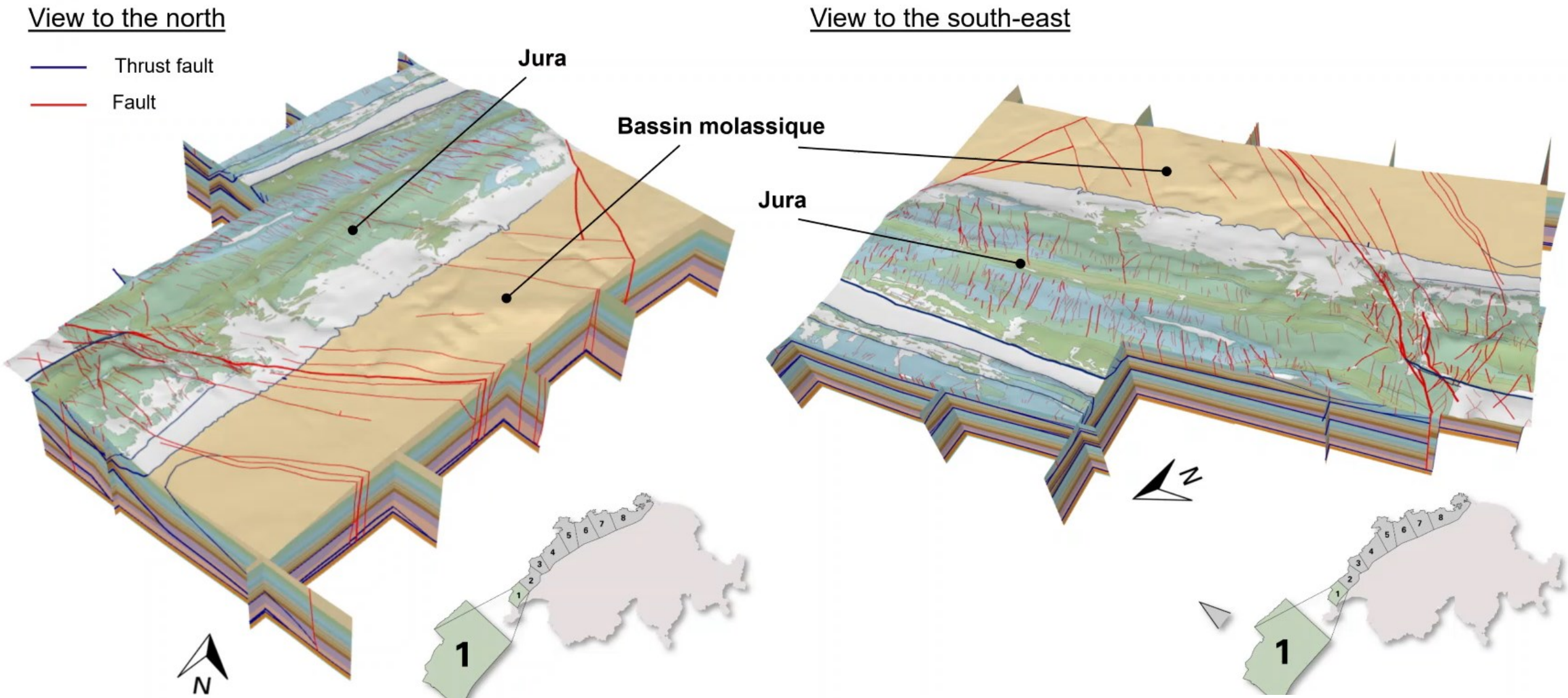



**Jura3D**
Fence diagram

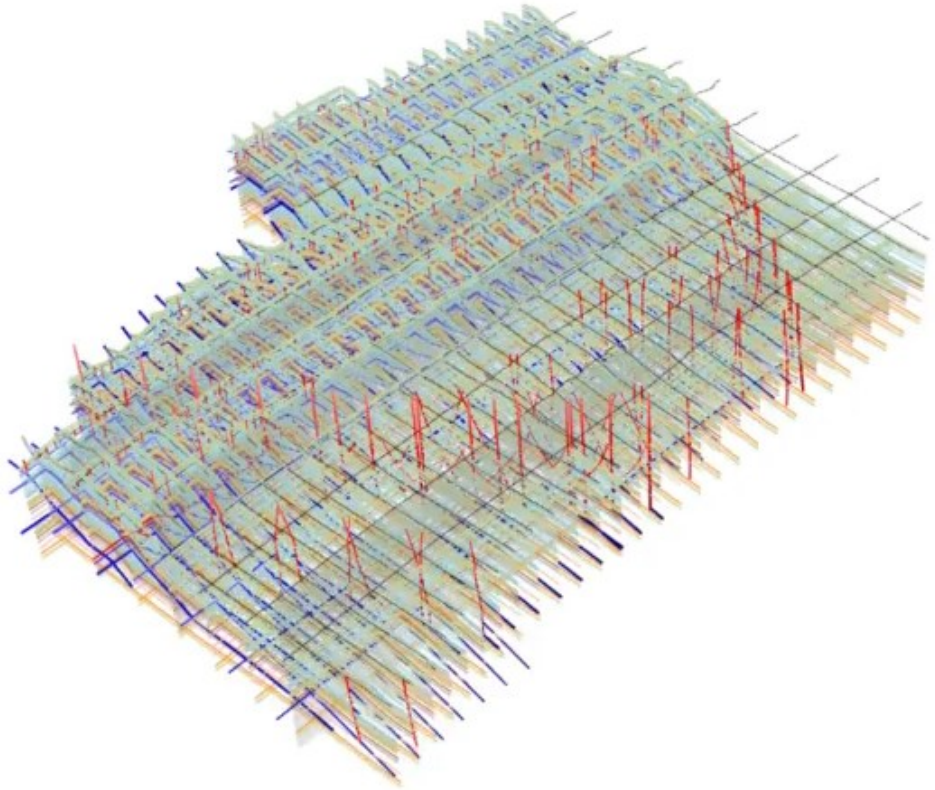
| Cross-section | Number | Spacing [m] | Total length [m] |
|---|---|---|---|
| NW–SE | 264 | 1 000 | 6 895 600 |
| SW–NE | 29 | 2 000 | 3 610 441 |
| Total | 293 | | 10 506 041 |

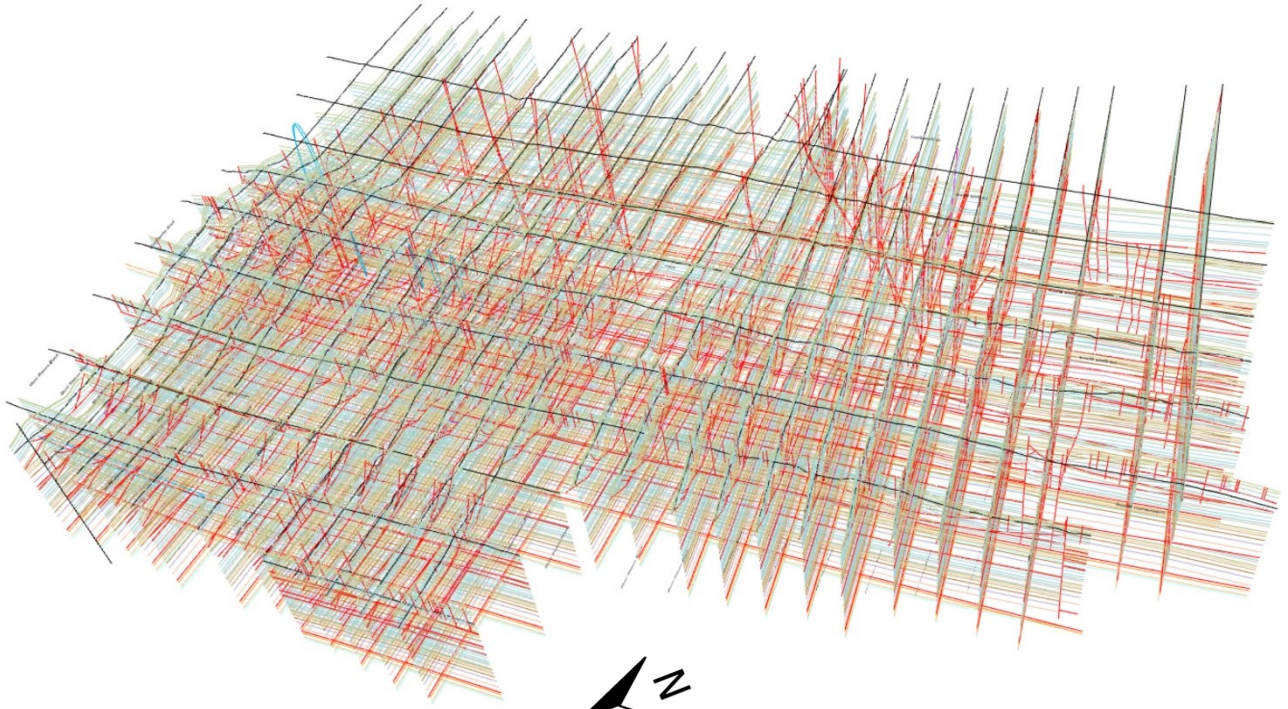
# Visualisation of Jura3D




Simplified view prepared for visualisation.
In reality, the fence diagram contains 41 sections.

# Visualisation of Jura3D

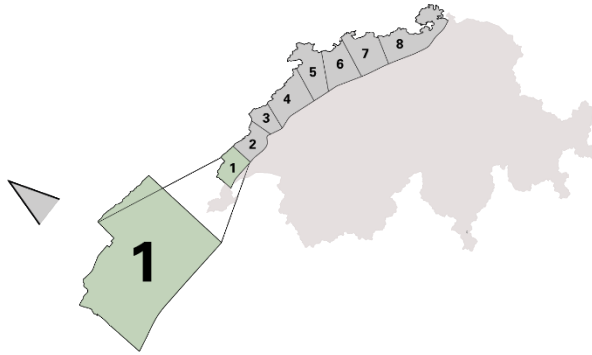




**Fence diagram**
40 modelled cross sections

**Structural model**
~~1000 fault planes

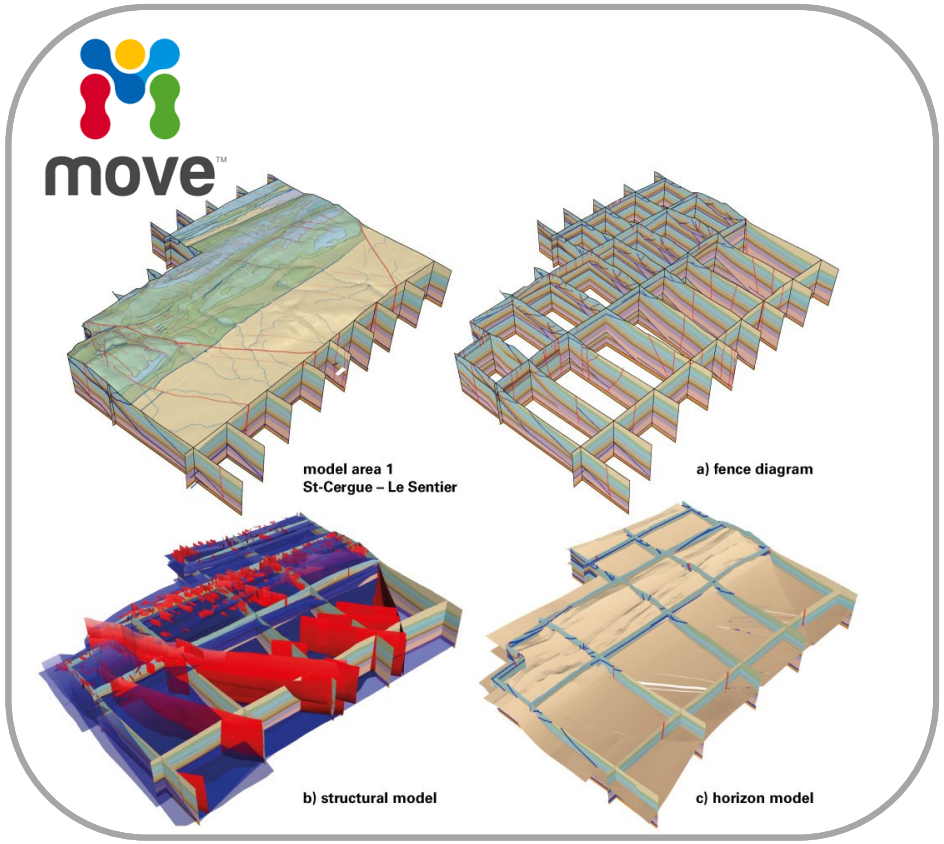
**Horizon model**
1 Horizon with fault cut outs

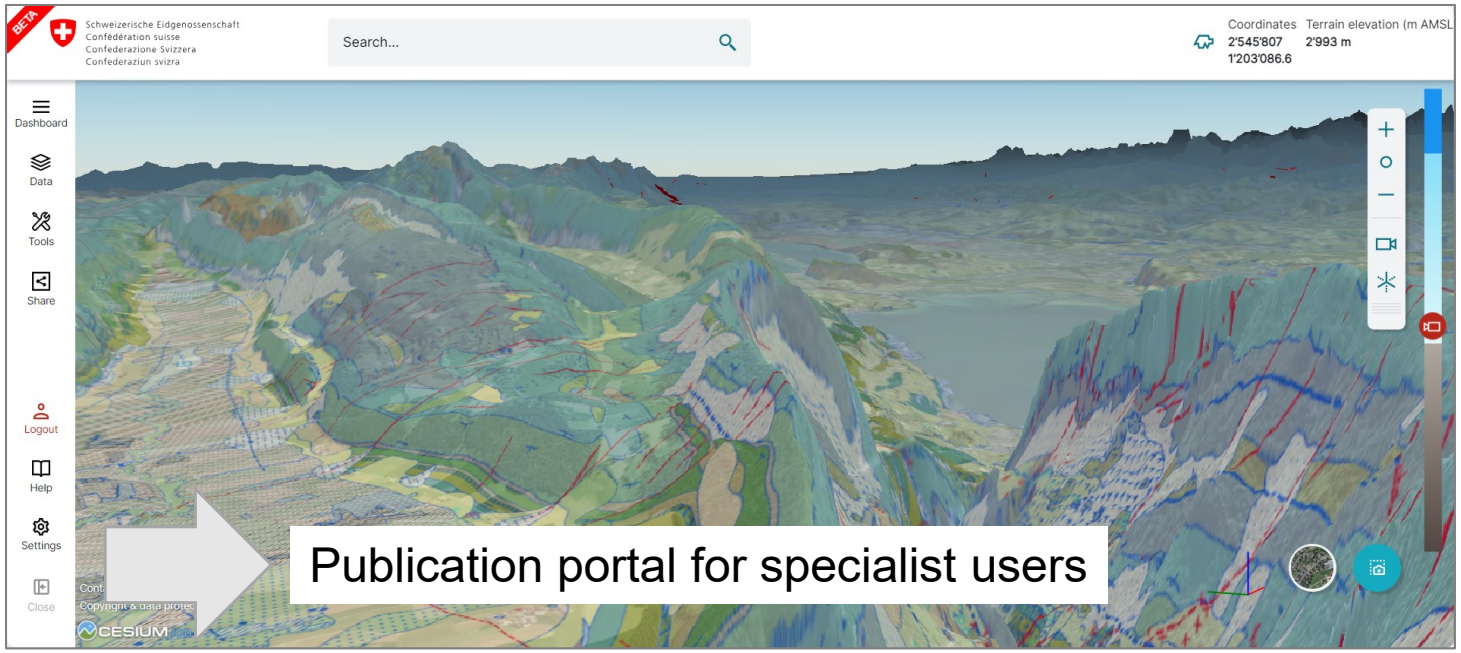


# Visualisation of Jura3D

GiGa infosystems

Move Link for GST (Section)




https://viewer.swissgeol.ch

## Complexity of the models

- The depth of the subject matter makes it difficult to present it in a way that is understandable for a broad audience.
- Need to combine scientific accuracy with simple communication.

## Access & use

- Geological 3D models are often available only in specialised formats and tools.
- Challenge of developing interactive and accessible forms of presentation for the public and decision-makers.

# Thank you for your attention!