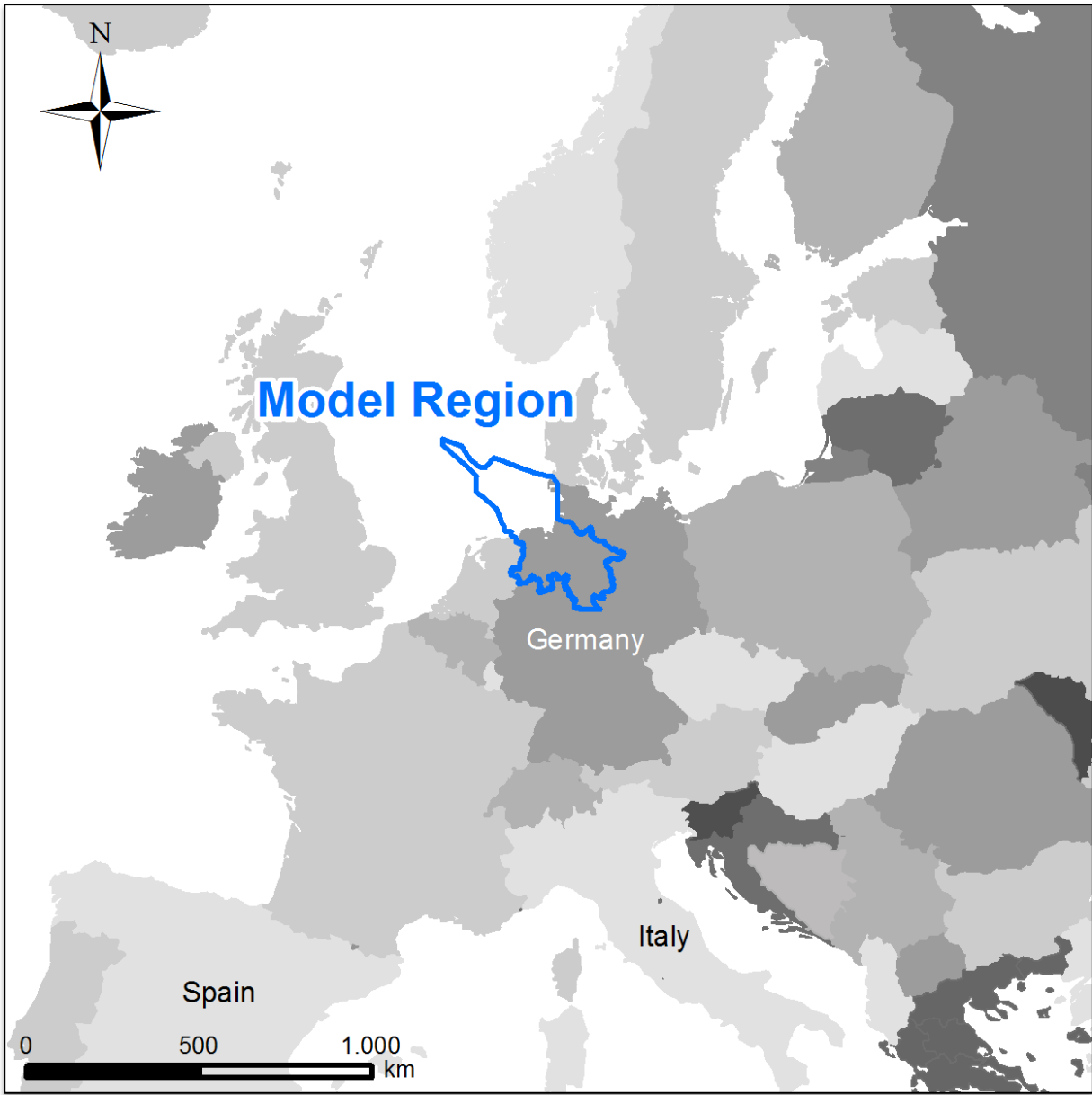


The Geological 3D-Model for Lower Saxony and the German North Sea Sector

Marcus Helms, Carolin Schmidt
State Authority for Mining, Energy and Geology, Hannover
(Landesamt für Bergbau, Energie und Geologie)

1 General Conditions



1 General Conditions

Tectonic Atlas of Northwest Germany and the German North Sea Sector

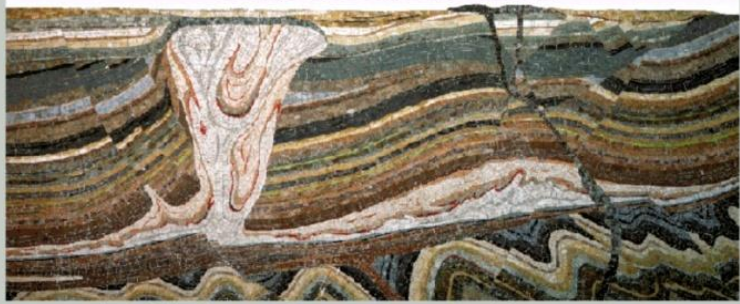
**Strukturen, Strukturentwicklung
Nordwest-Deutschlands und des
Nordsee-Sektors**
**Structures, Structural Evolution
Northwest-Germany and the
German North Sea Sector**

T Einleitung / Introduction

T Inhaltsverzeichnis / Content

T Erläuterungen / Explanatory Notes

**Geotektonischer Atlas von Nordwest-Deutschland und dem deutschen
Nordsee-Sektor**
Strukturen, Strukturentwicklung, Paläogeographie
Tectonic Atlas of Northwest Germany and the German North Sea Sector
Structures, structural development, palaeogeography



BGR
Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover
Federal Institute for Geosciences and Natural Resources

Weiter Continue Ende Quit

Nordwestdeutschland / NW Germany
Strukturpläne / Structural contour maps

<input type="checkbox"/> Mittelmiozän / Middle Miocene	<input type="checkbox"/> Dogger / Middle Jurassic
<input type="checkbox"/> Untermiozän / Lower Miocene	<input type="checkbox"/> Lias / Lower Jurassic
<input type="checkbox"/> Mitteloligozän / Middle Oligocene	<input type="checkbox"/> Keuper / Keuper
<input type="checkbox"/> Mitteleozän / Middle Eocene	<input type="checkbox"/> Oberer Buntsandstein Upper Buntsandstein
<input type="checkbox"/> Tertiär / Tertiary	<input type="checkbox"/> Unterer Buntsandstein Lower Buntsandstein
<input type="checkbox"/> Oberkreide / Upper Cretaceous	<input type="checkbox"/> Zechstein / Zechstein
<input type="checkbox"/> Marine Unterkreide Marine Lower Cretaceous	
<input type="checkbox"/> Oberjura und "Wealden" Upper Jurassic and "Wealden"	

Zurück Back Ende Quit

Nordwestdeutschland / NW Germany

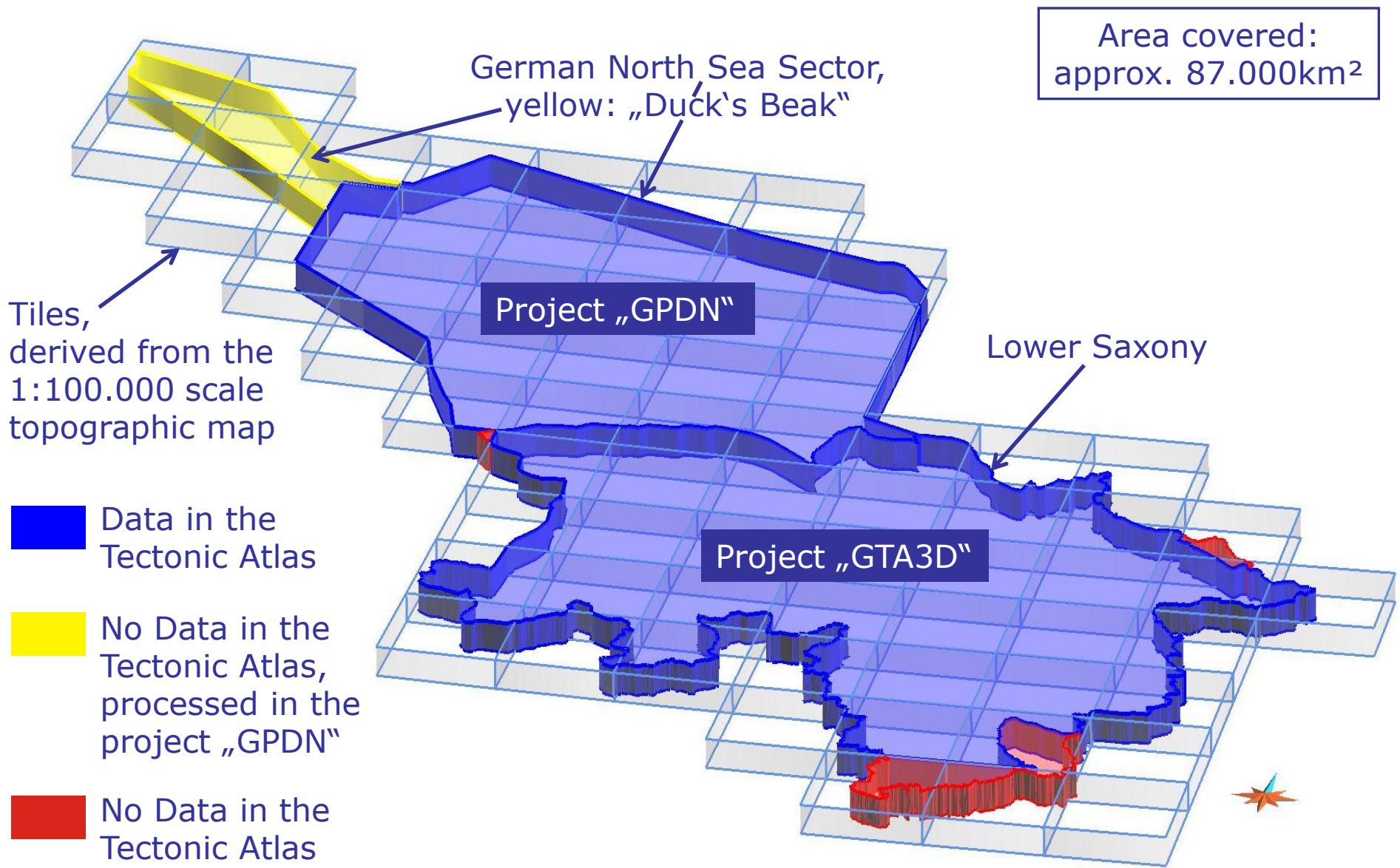
Deutsche Nordsee / German North Sea

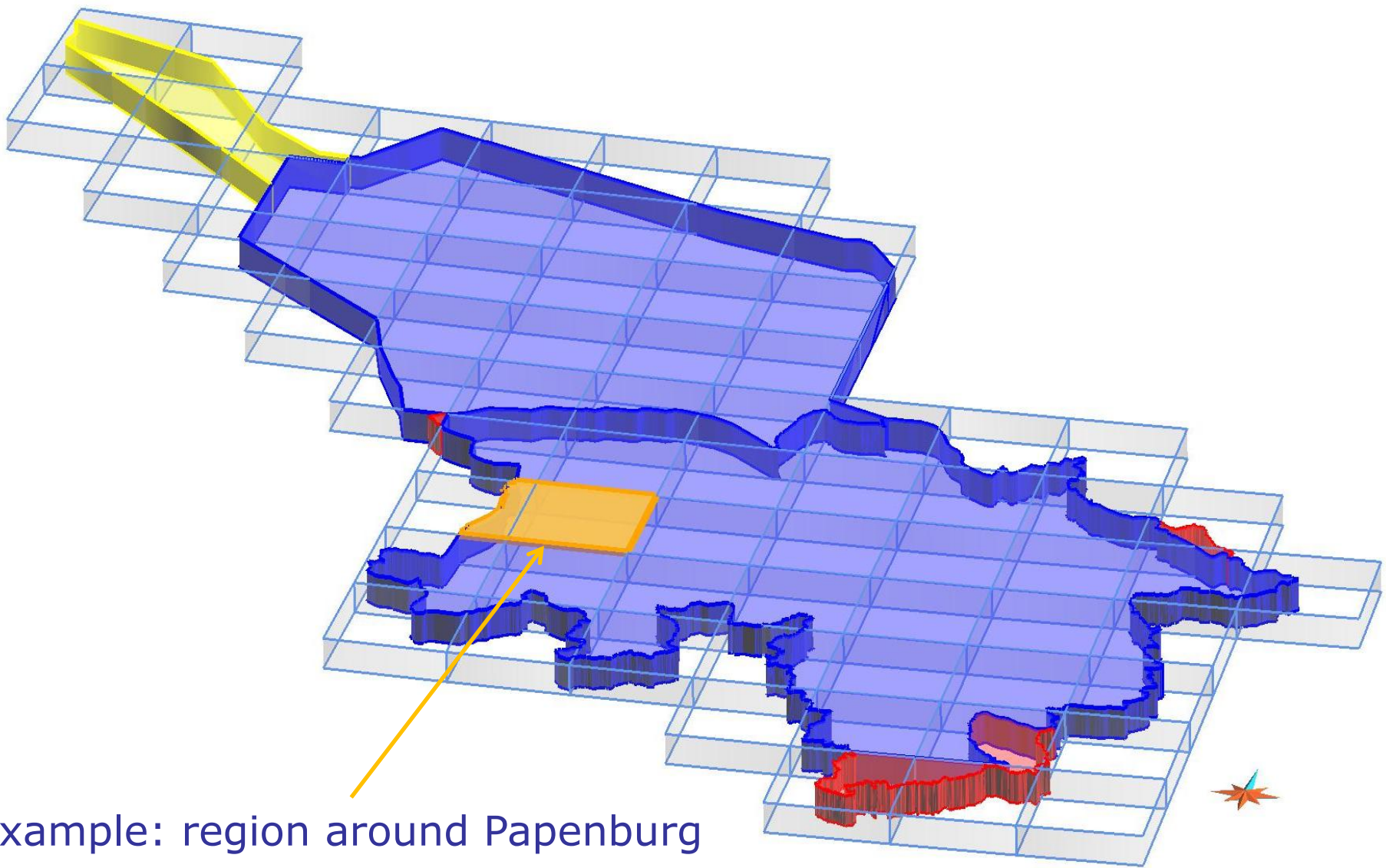
**Paläogeographie und Paläotektonik
Palaeogeography and Palaeotectonics**

Zurück Back Ende Quit

Geologisches Jahrbuch, Reihe A, Heft 153

1 General Conditions

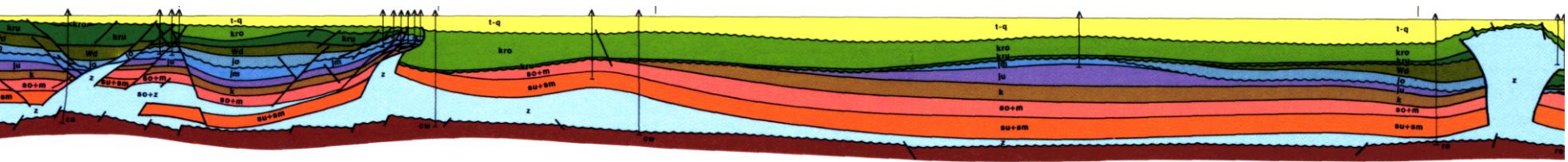
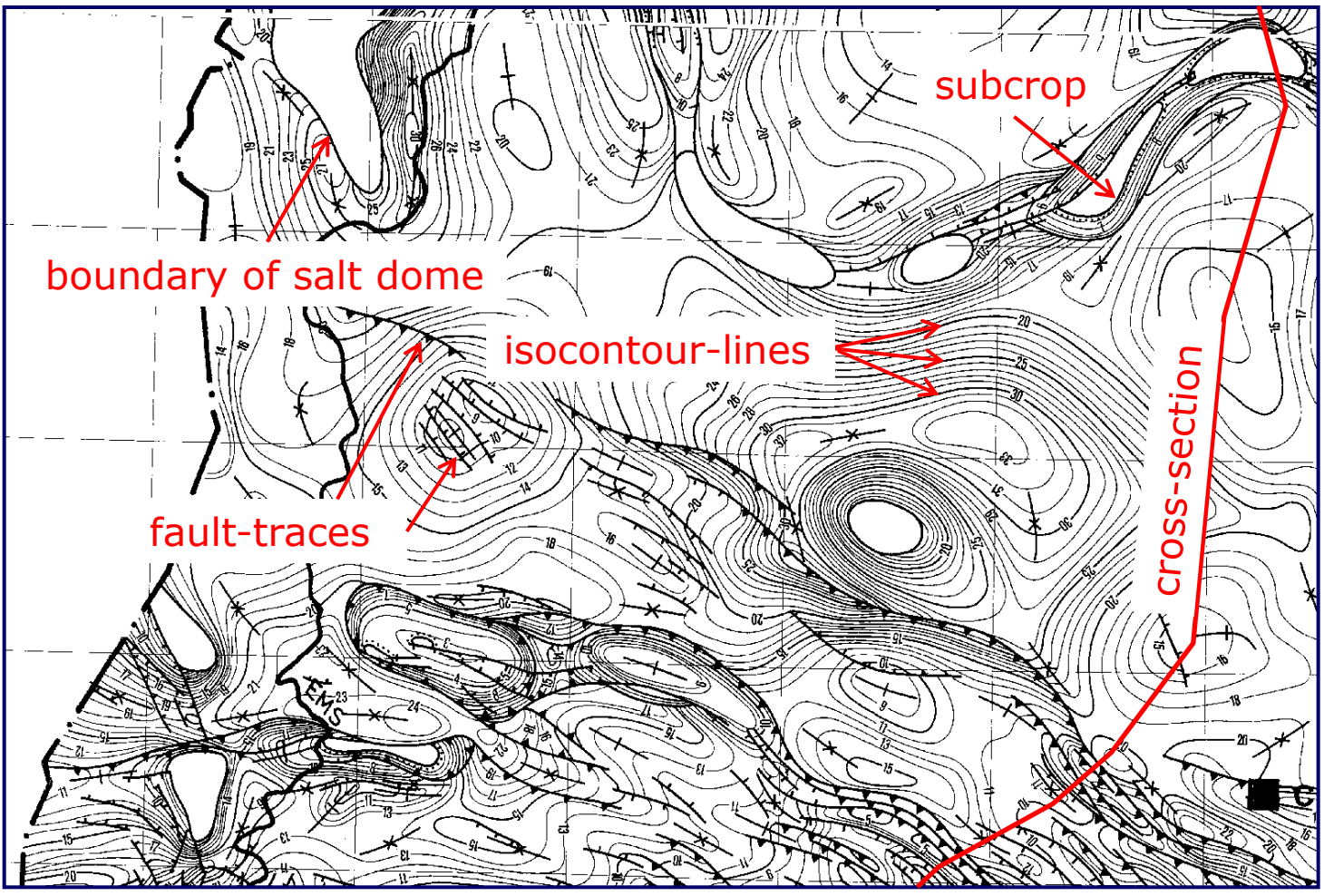




Example: region around Papenburg

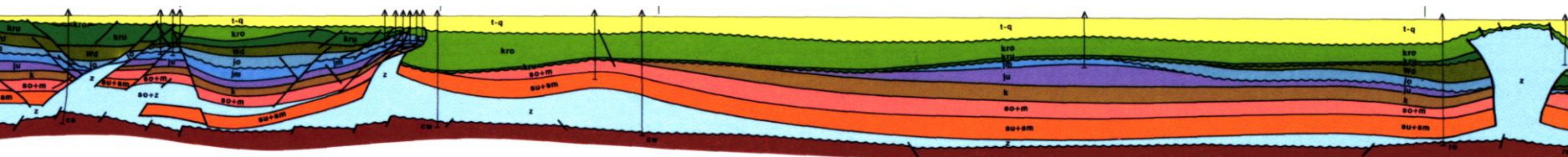
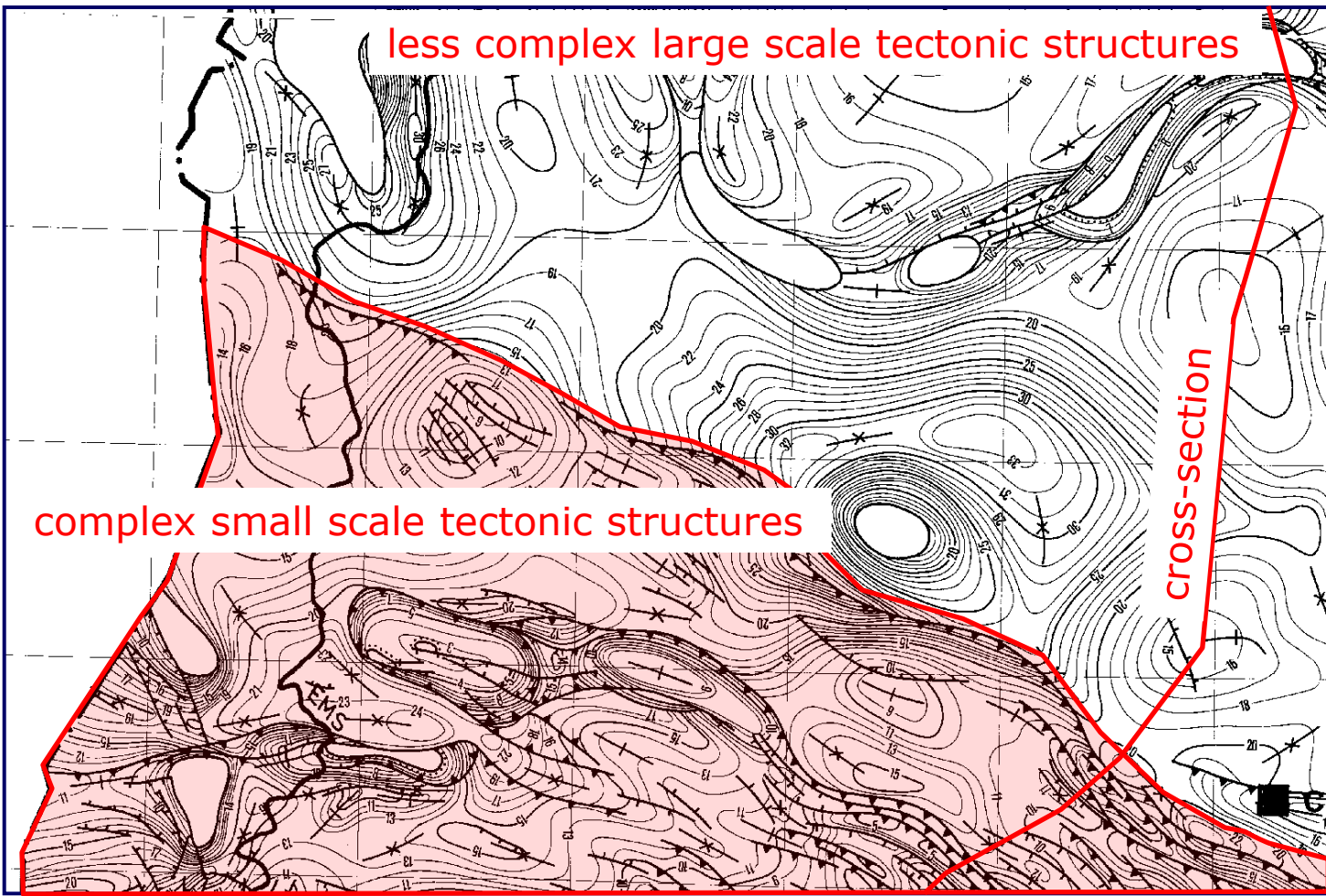
2 Data Set

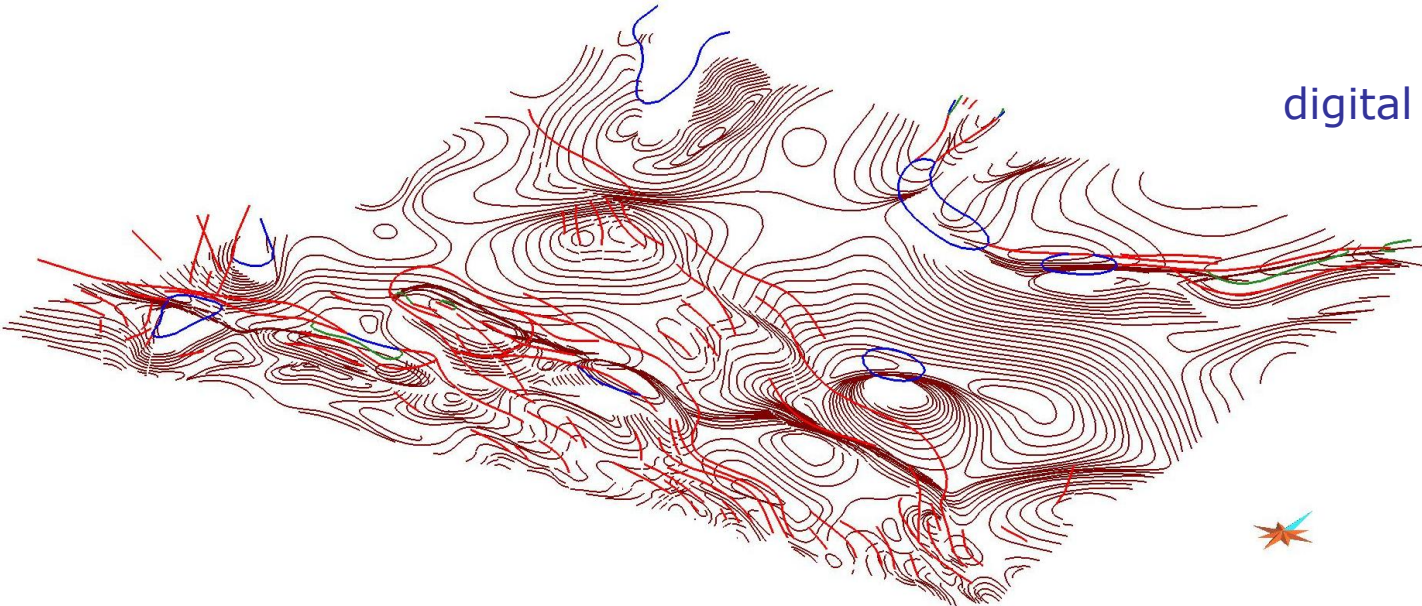
- Middle Miocene
- Lower Miocene
- Middle Oligocene
- Middle Eocene
- Base Tertiary
- Upper Cretaceous
- Marine Lower Cretaceous
- Upper Jurassic + Wealden
- Middle Jurassic
- Lower Jurassic
- Keuper
- Upper Buntsandstein
- Lower Buntsandstein
- Zechstein



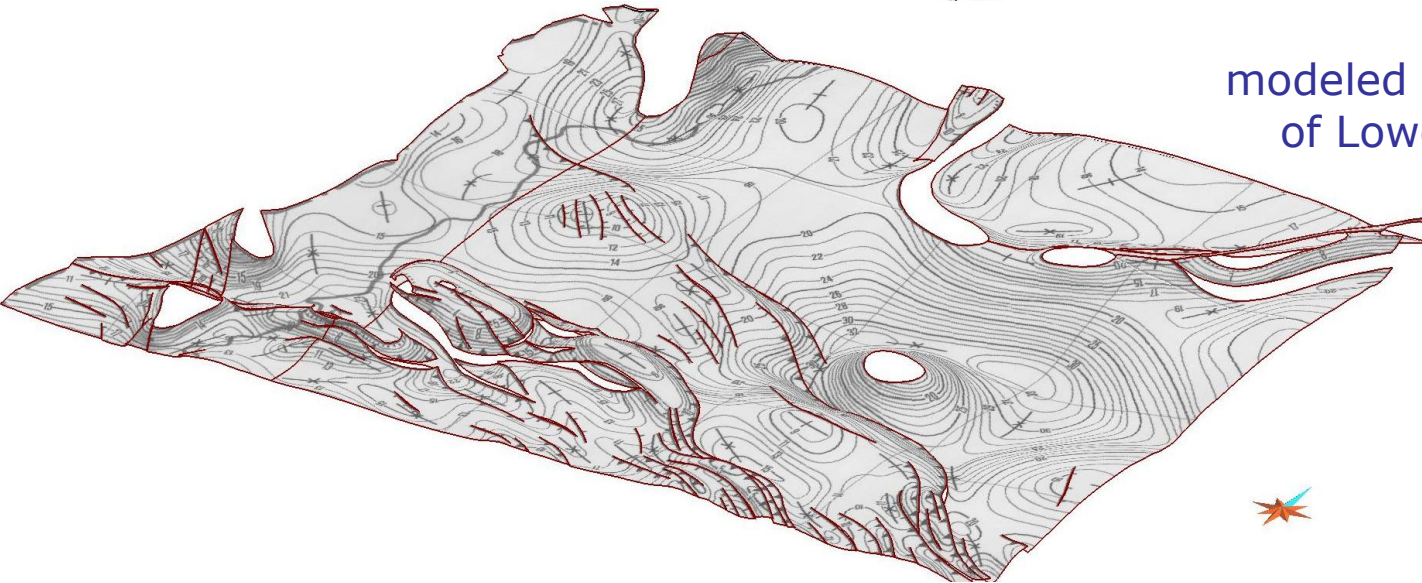
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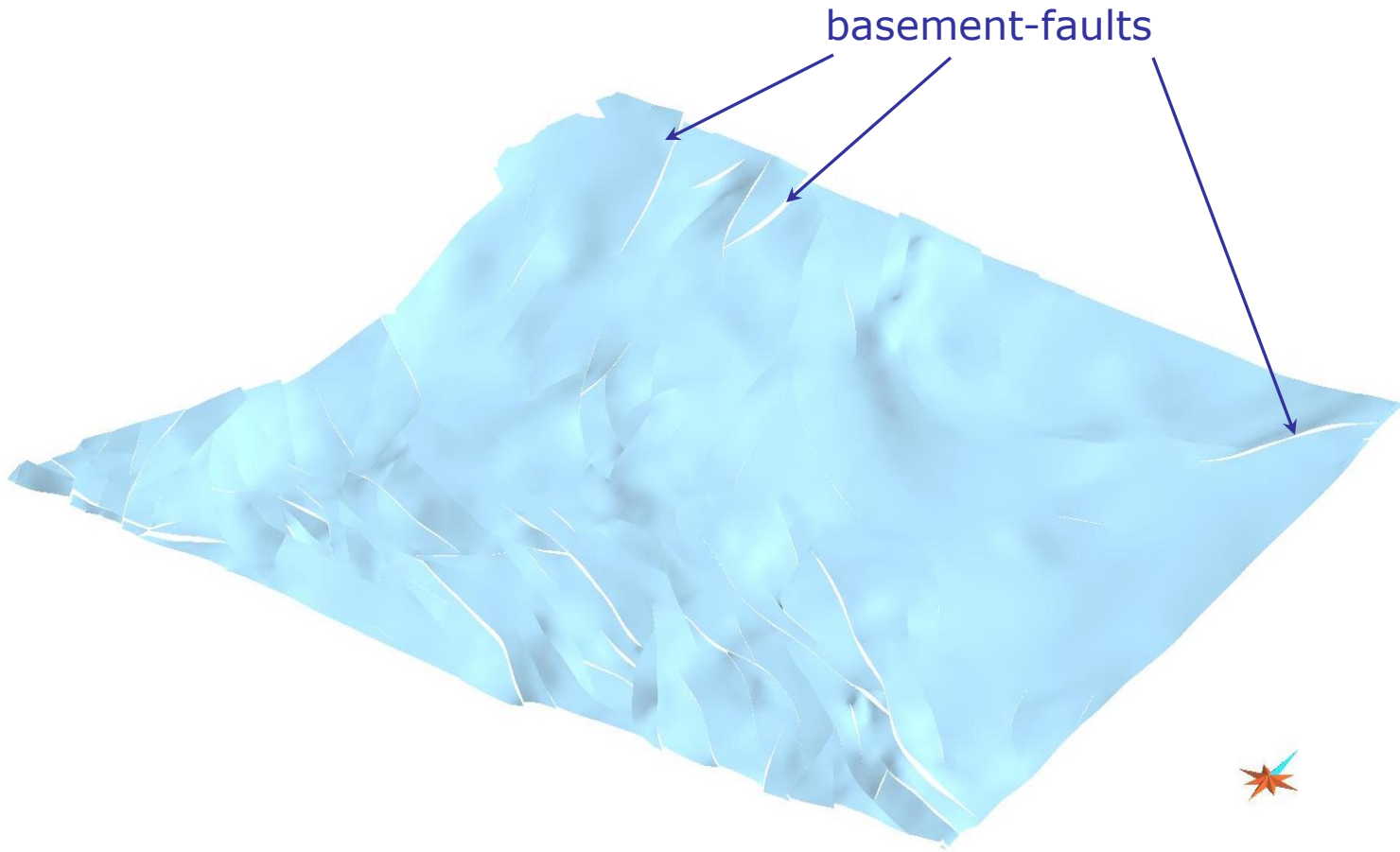
digital data for the base of Lower Cretaceous in 3-dimensional view



modeled surface for the base of Lower Cretaceous true to the original map

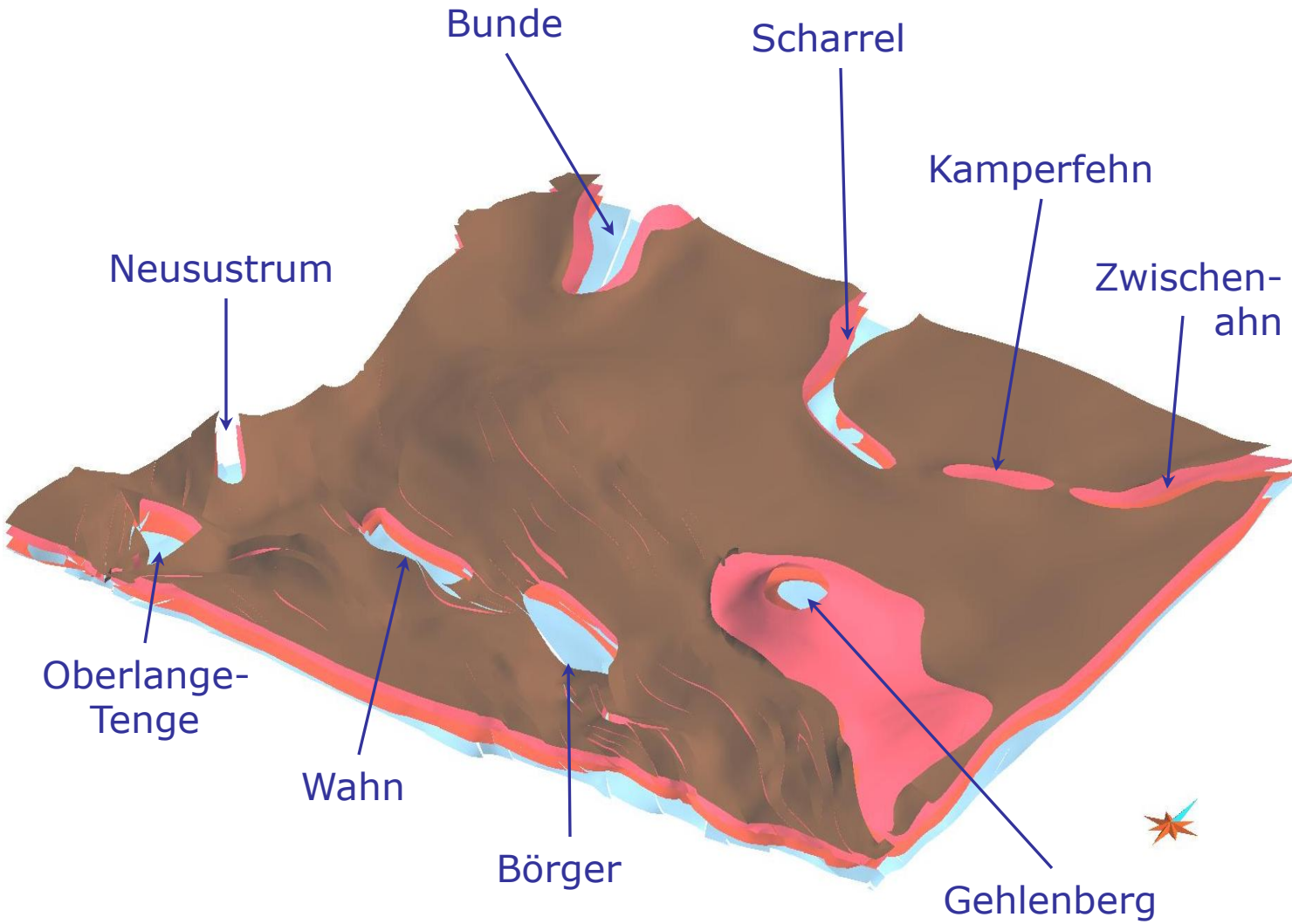
3 Surface Modeling of Horizon Bases

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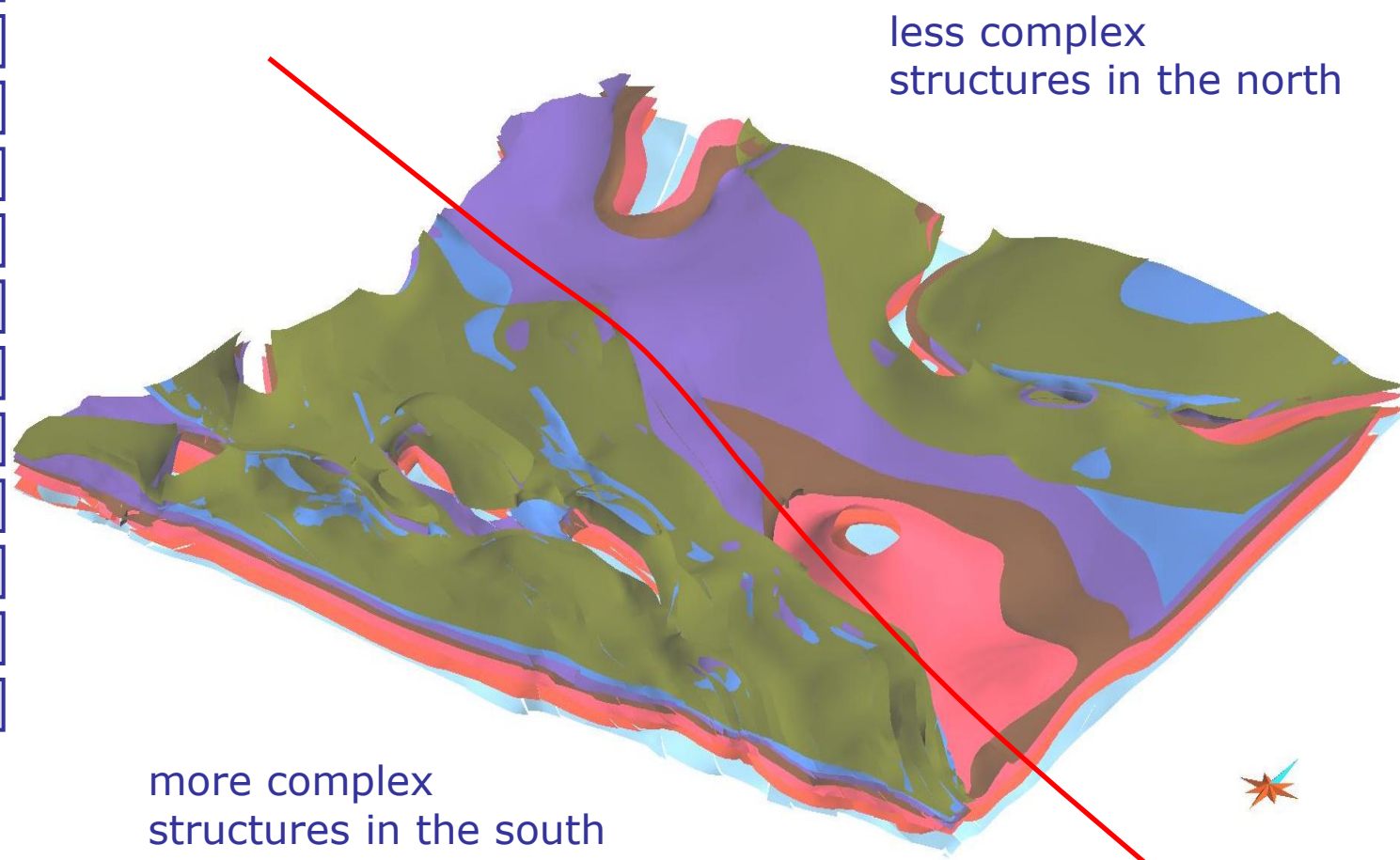
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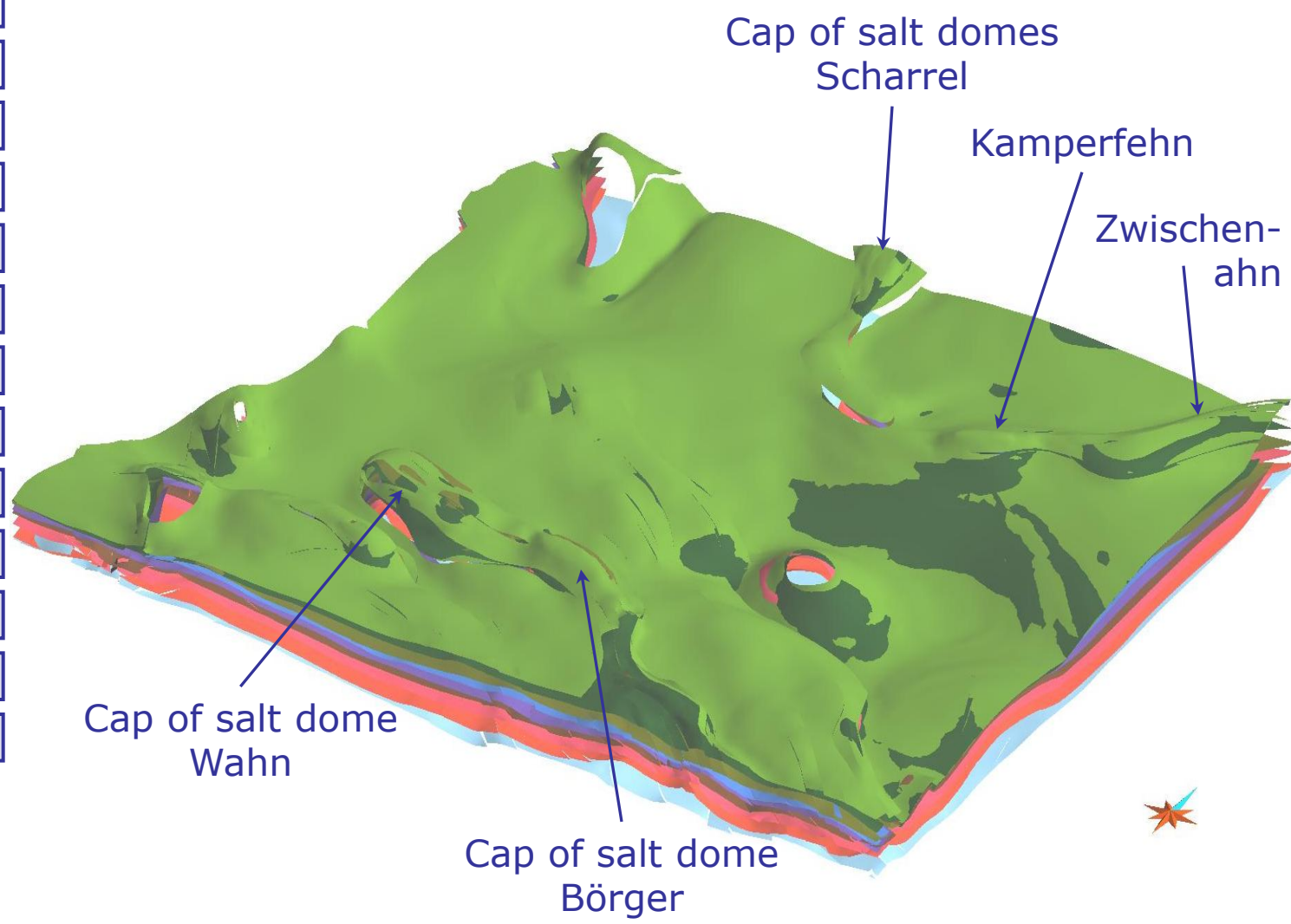


less complex structures in the north

more complex structures in the south

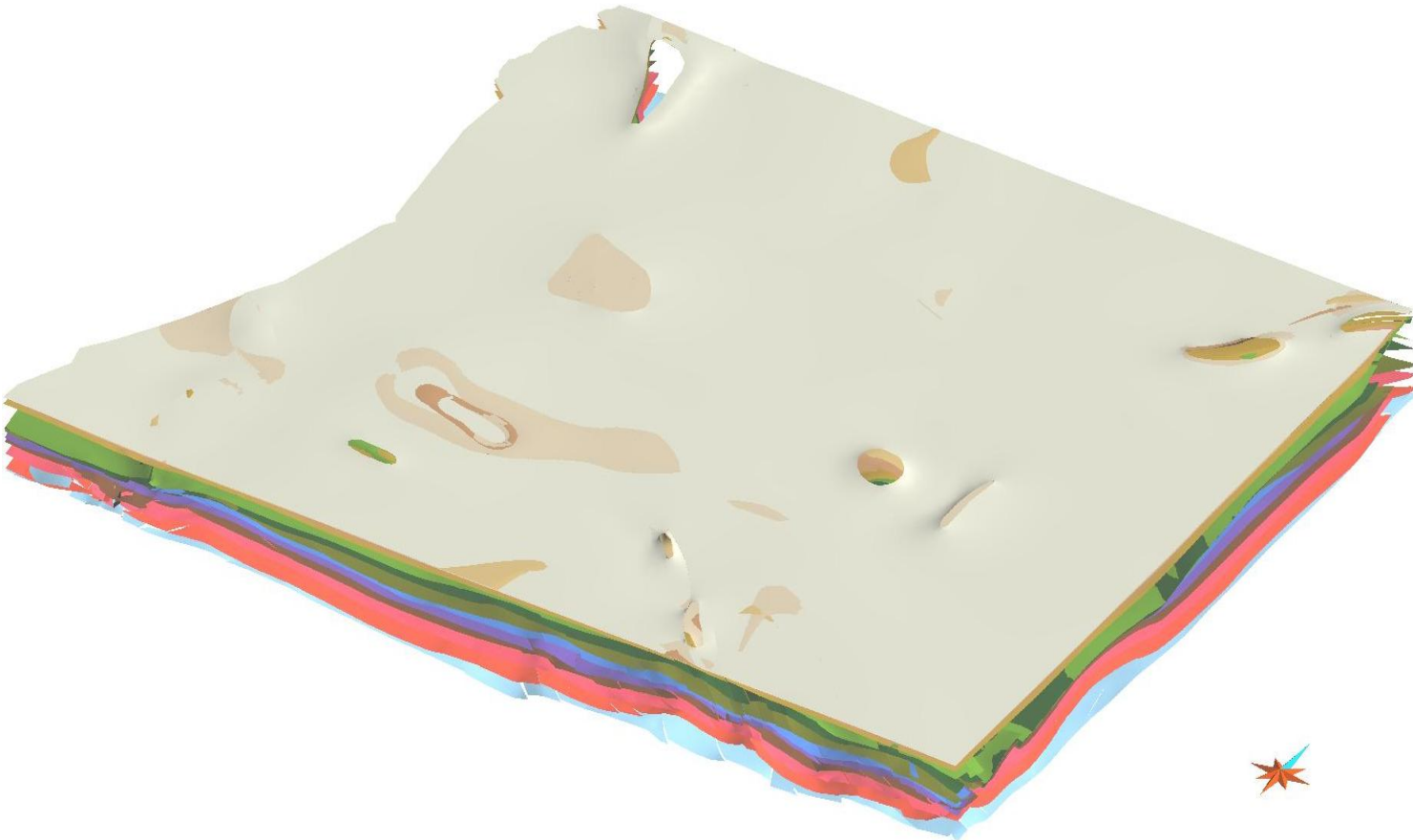
3 Surface Modeling of Horizon Bases

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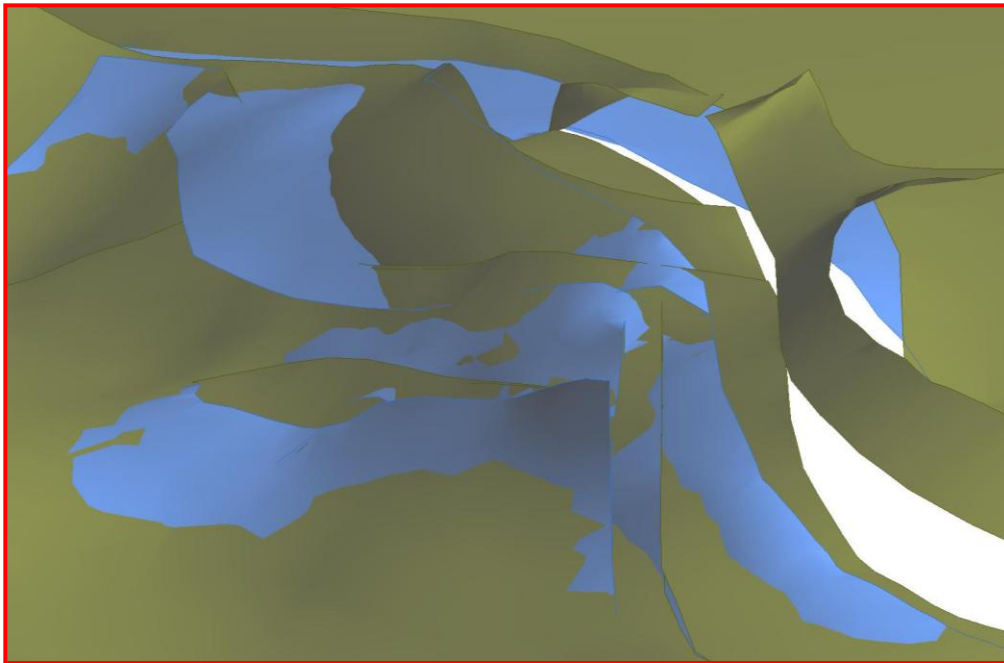
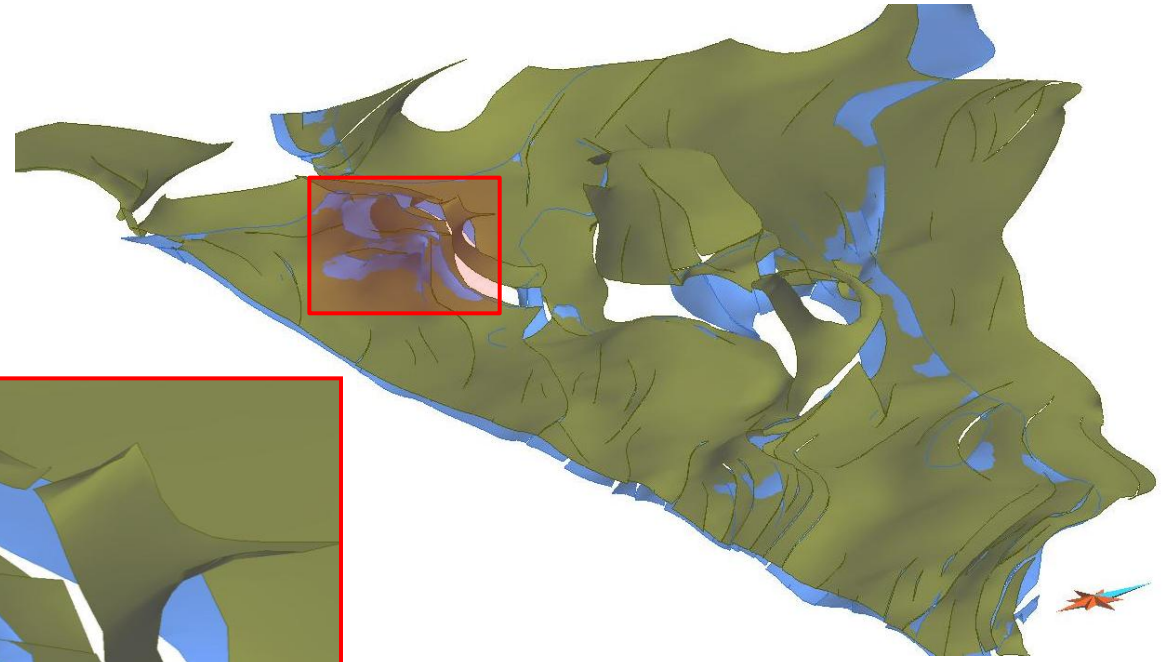
3d-surface-model of the horizon bases in the region around Papenburg true to the structural contour maps in the Tectonic Atlas

- Middle Miocene
- Lower Miocene
- Middle Oligocene
- Middle Eocene
- Base Tertiary
- Upper Cretaceous
- Marine Lower Cretaceous
- Upper Jurassic + Wealden
- Middle Jurassic
- Lower Jurassic
- Keuper
- Upper Buntsandstein
- Lower Buntsandstein
- Zechstein



3.2 Treatment of Data Inconsistencies

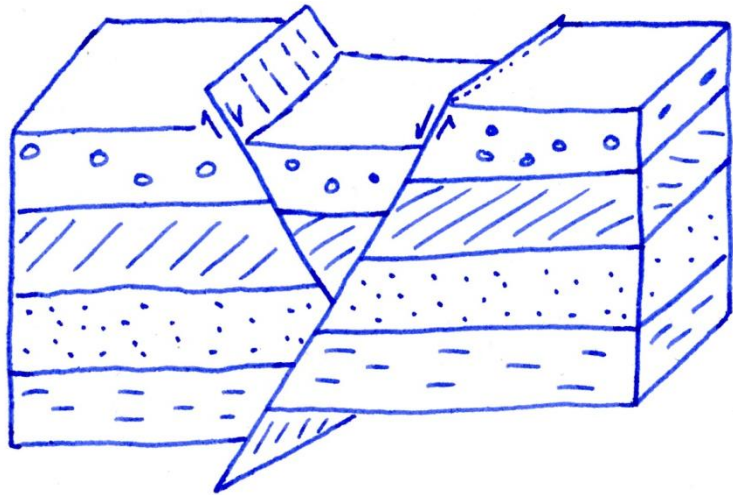
base surface of Middle Jurassic (blue) and Upper Jurassic + Wealden (green) in a tectonically complex structured area



left:
detail of a complex fault-system showing geometrically inconsistent intersections of horizon surfaces

data inconsistencies are not revised during the first step of modeling

3.1 Treatment of Faults



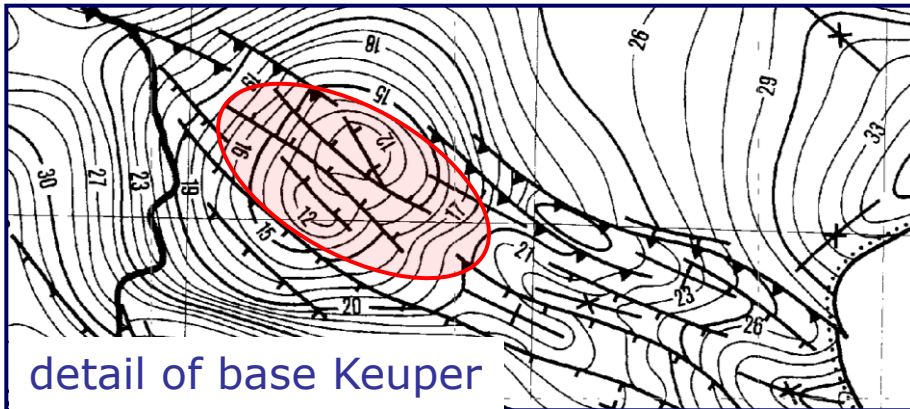
left:

exemplaric sketch of fault surfaces in a 3-dimensional view

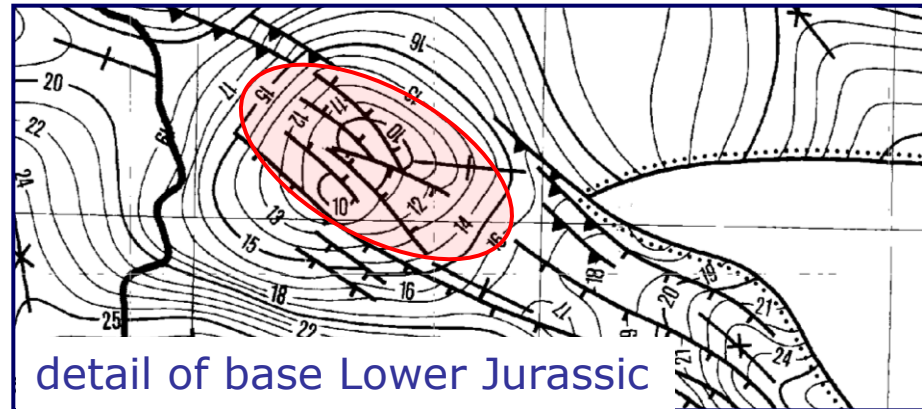
faults are characterised by **azimuth** and **dip** as well as **horizontal** and **vertical displacement** of the horizons along the fault

below:

graphical representation of faults in the Tectonic Atlas as **traces** on the horizon bases

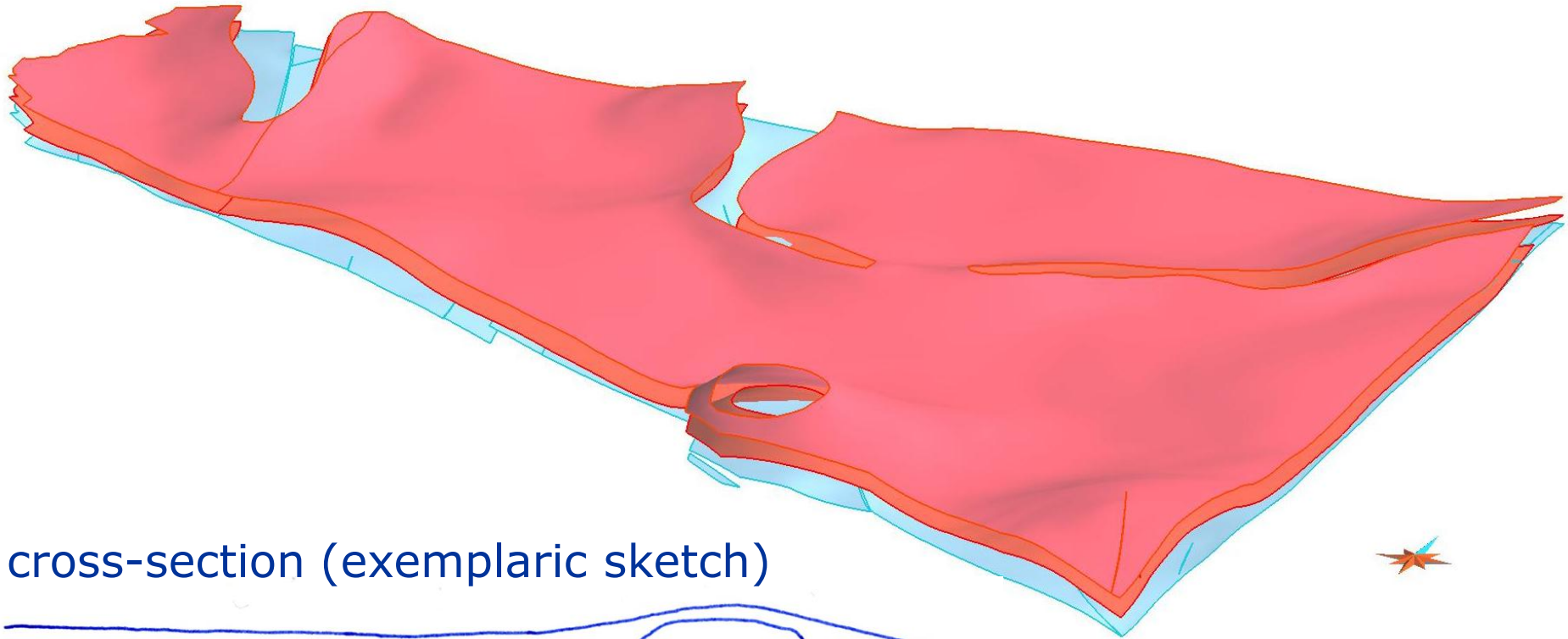


detail of base Keuper

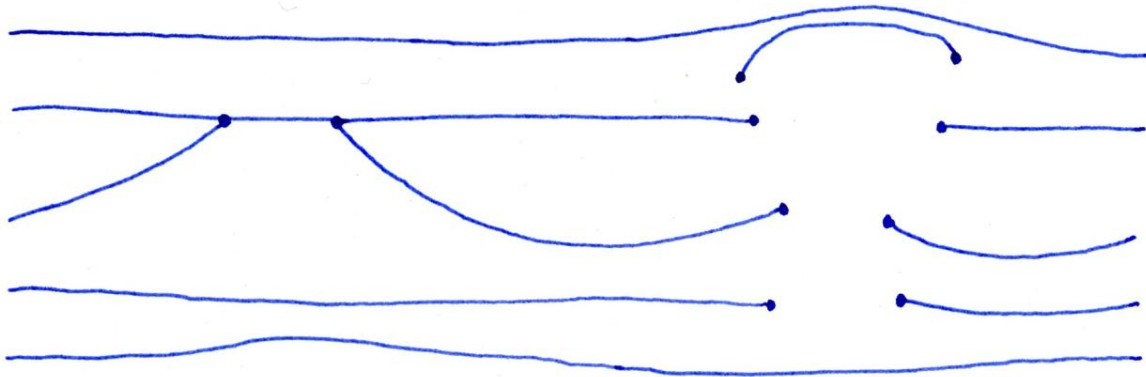


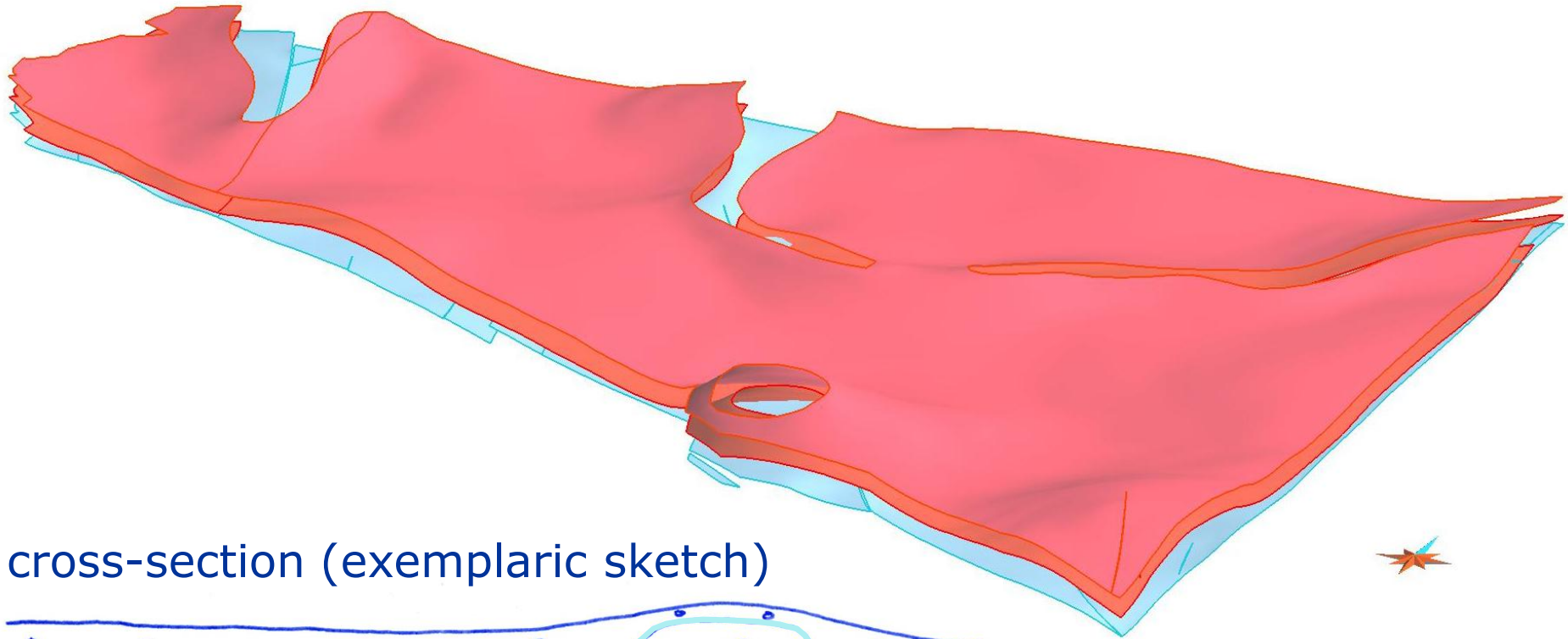
detail of base Lower Jurassic

fault traces are treated independently for each horizon by building vertical displacements for each single fault trace without trans-horizontal correlation

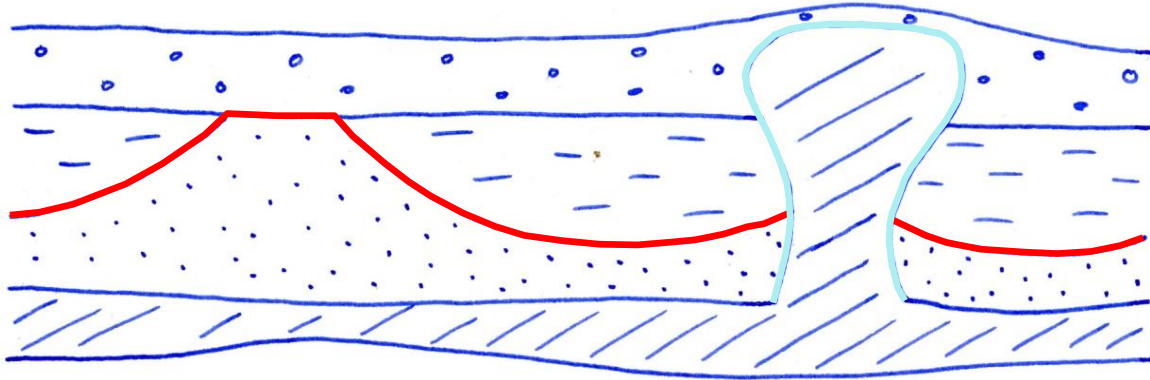


cross-section (exemplaric sketch)





cross-section (exemplaric sketch)

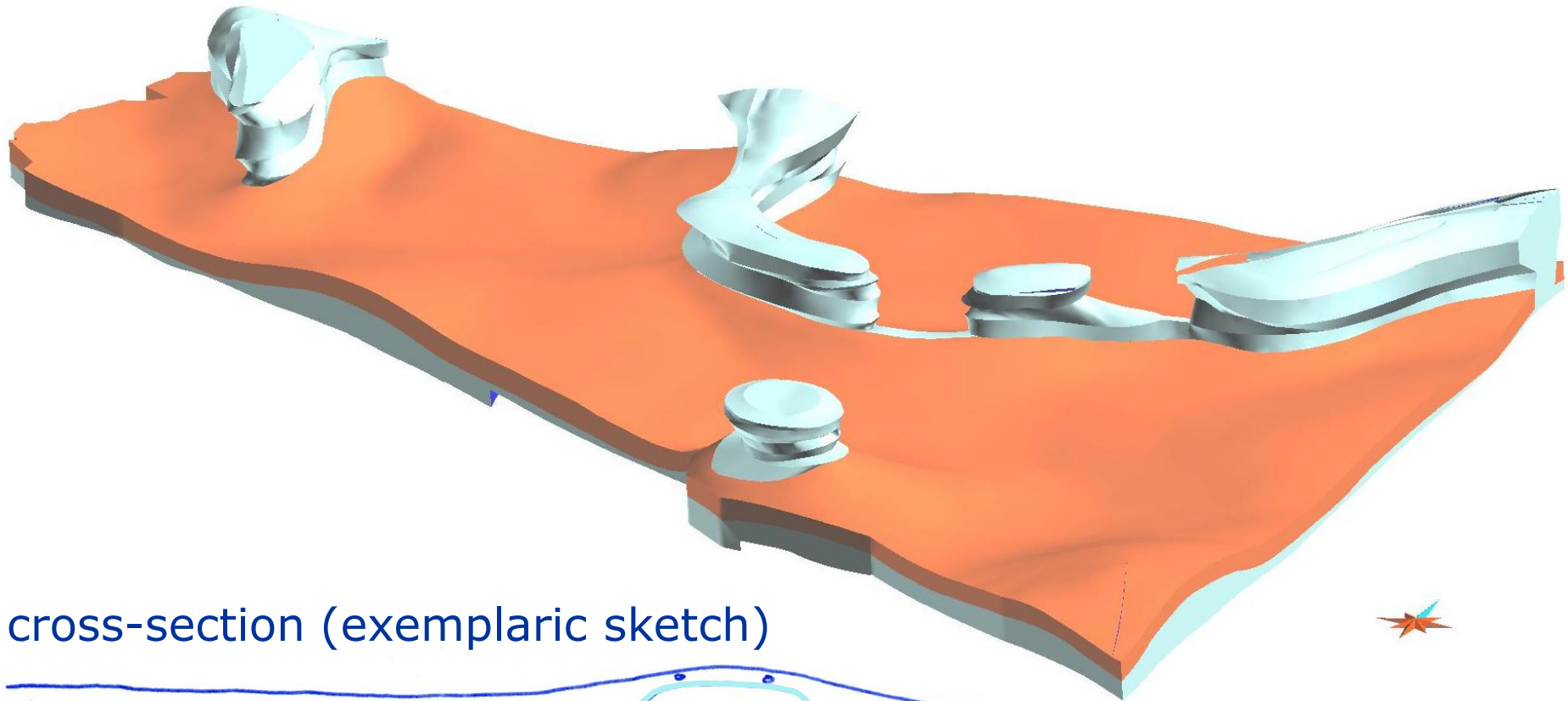


top-surfaces:

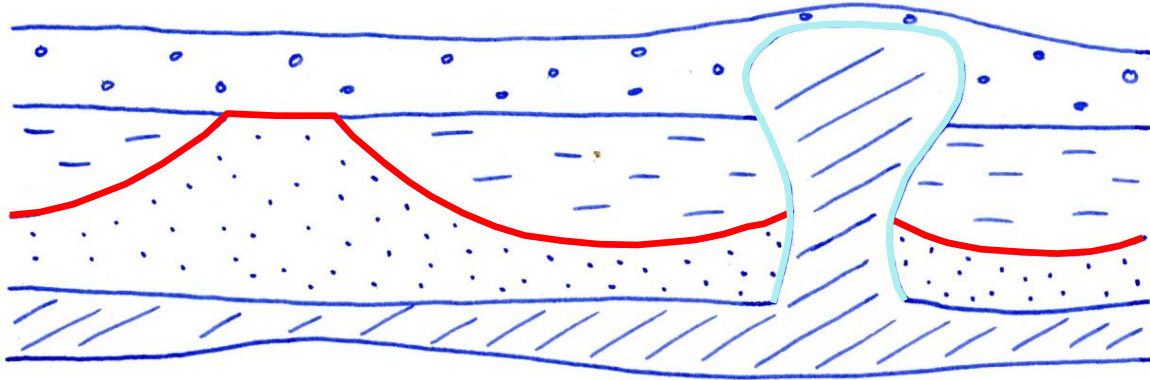
derived from mutual cut of base-surfaces of overlying horizons

salt dome envelopes:

derived from connection of salt dome boundaries and corresponding salt dome caps

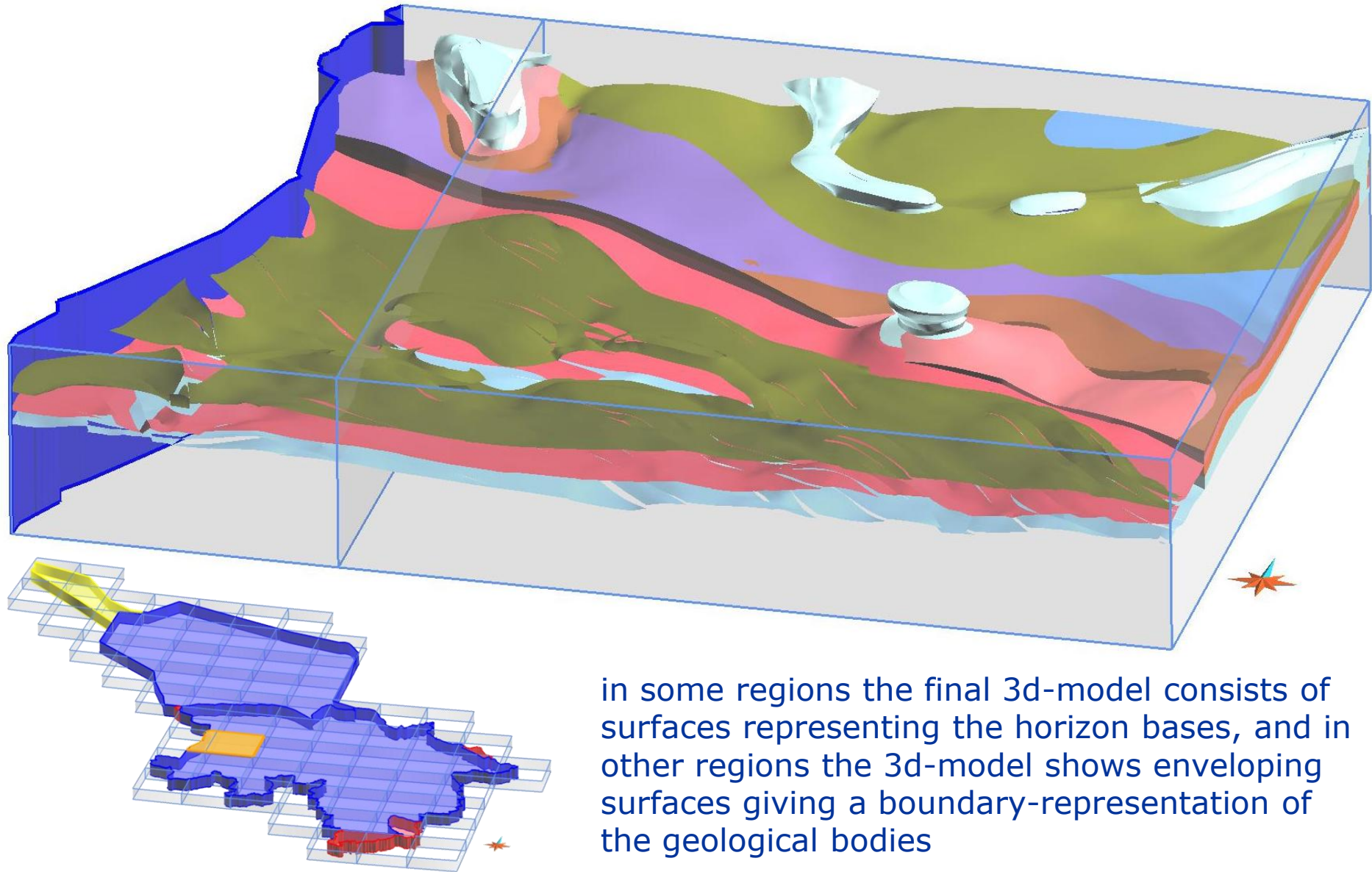


cross-section (exemplaric sketch)

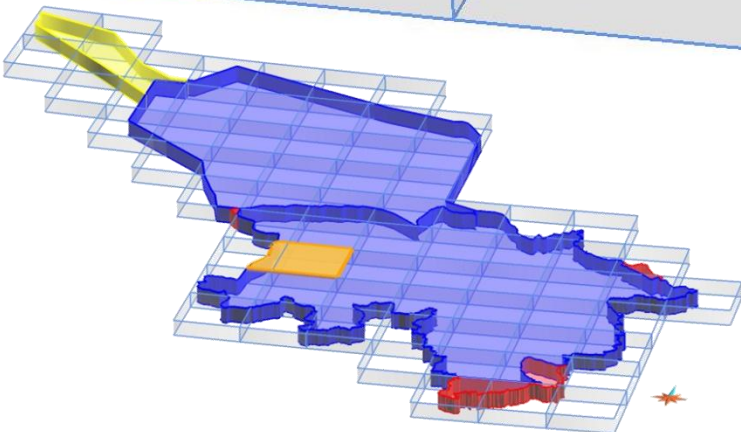
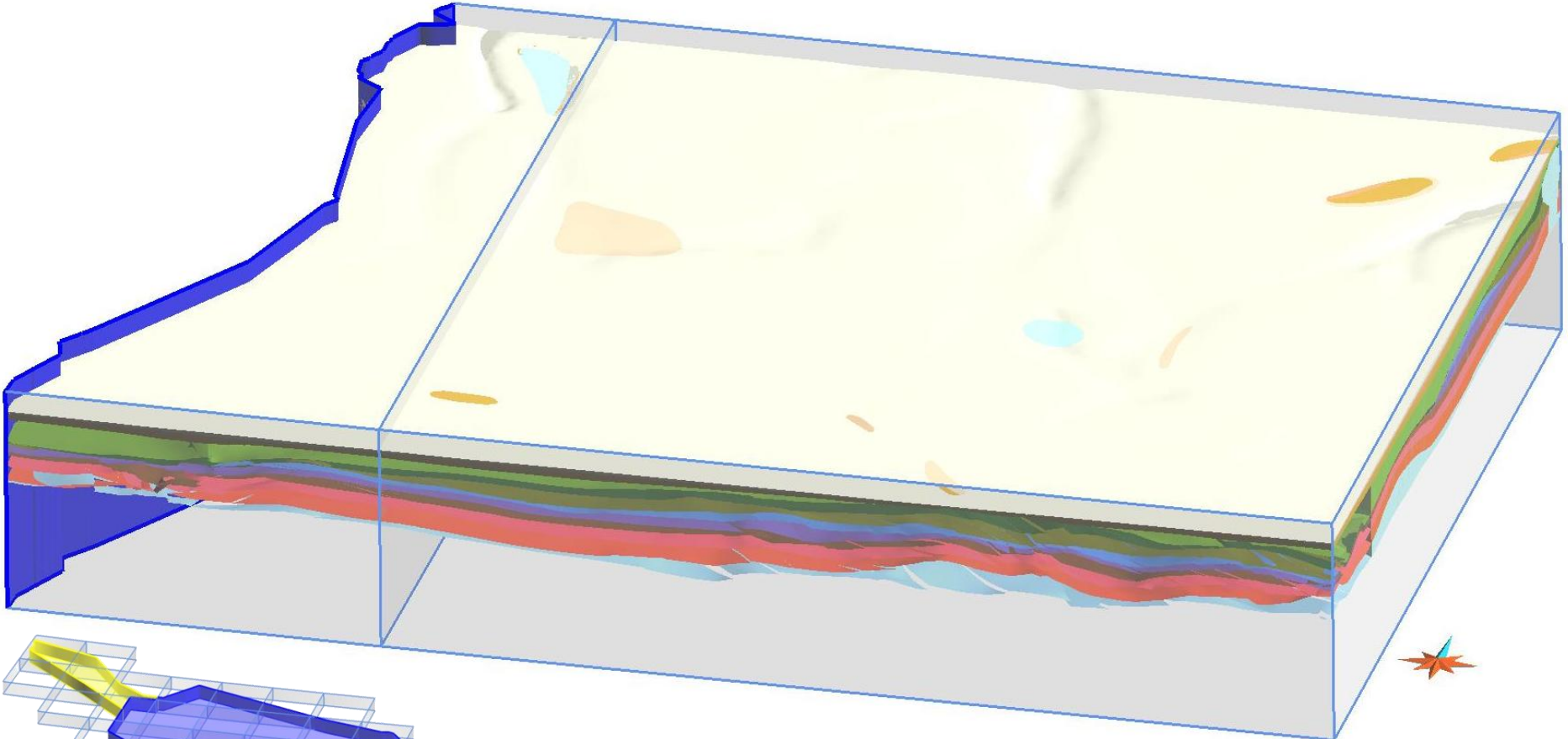


top-surfaces:
derived from mutual cut of base-surfaces of overlying horizons

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derived from connection of salt dome boundaries and corresponding salt dome caps

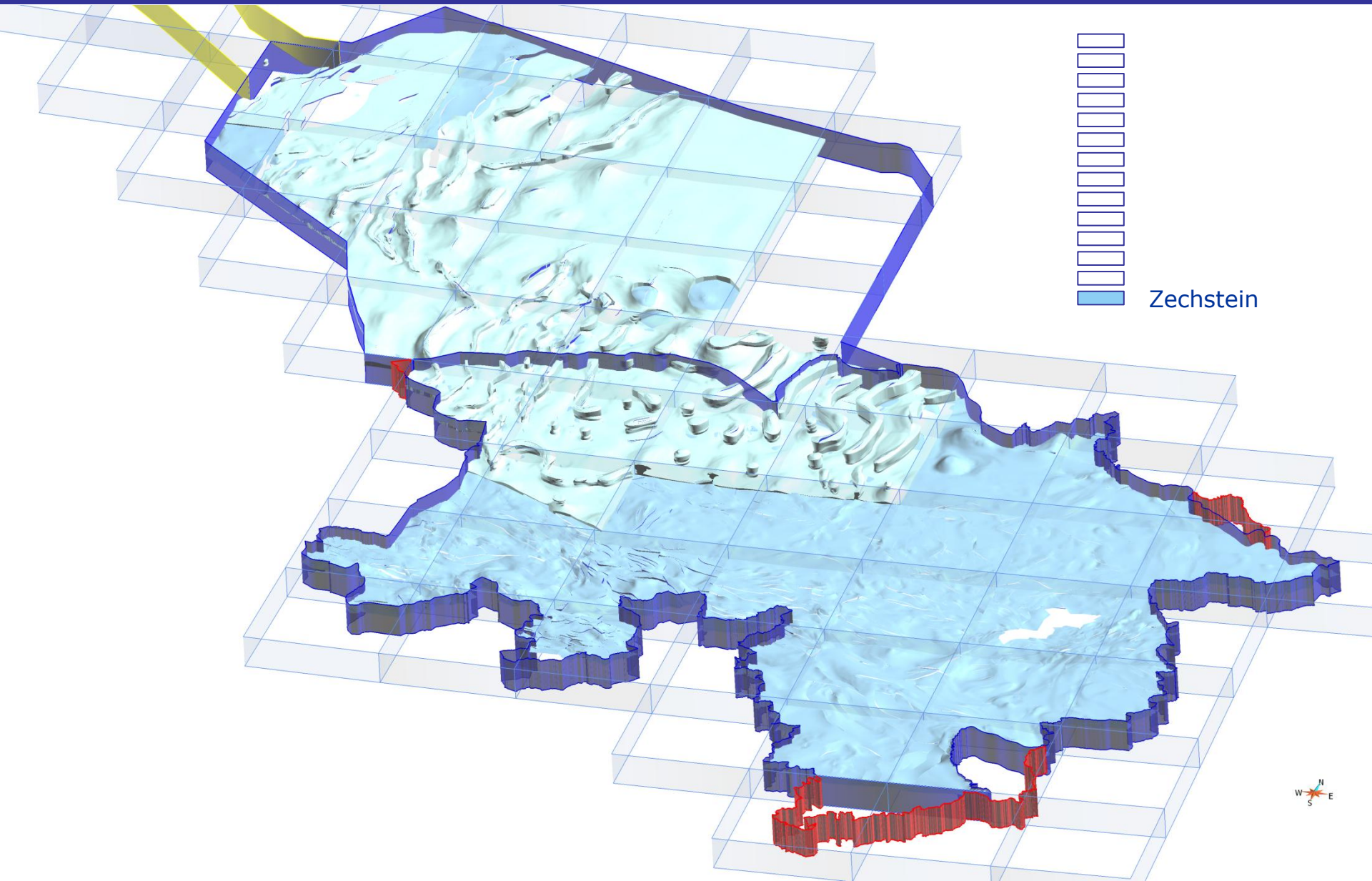


in some regions the final 3d-model consists of surfaces representing the horizon bases, and in other regions the 3d-model shows enveloping surfaces giving a boundary-representation of the geological bodies

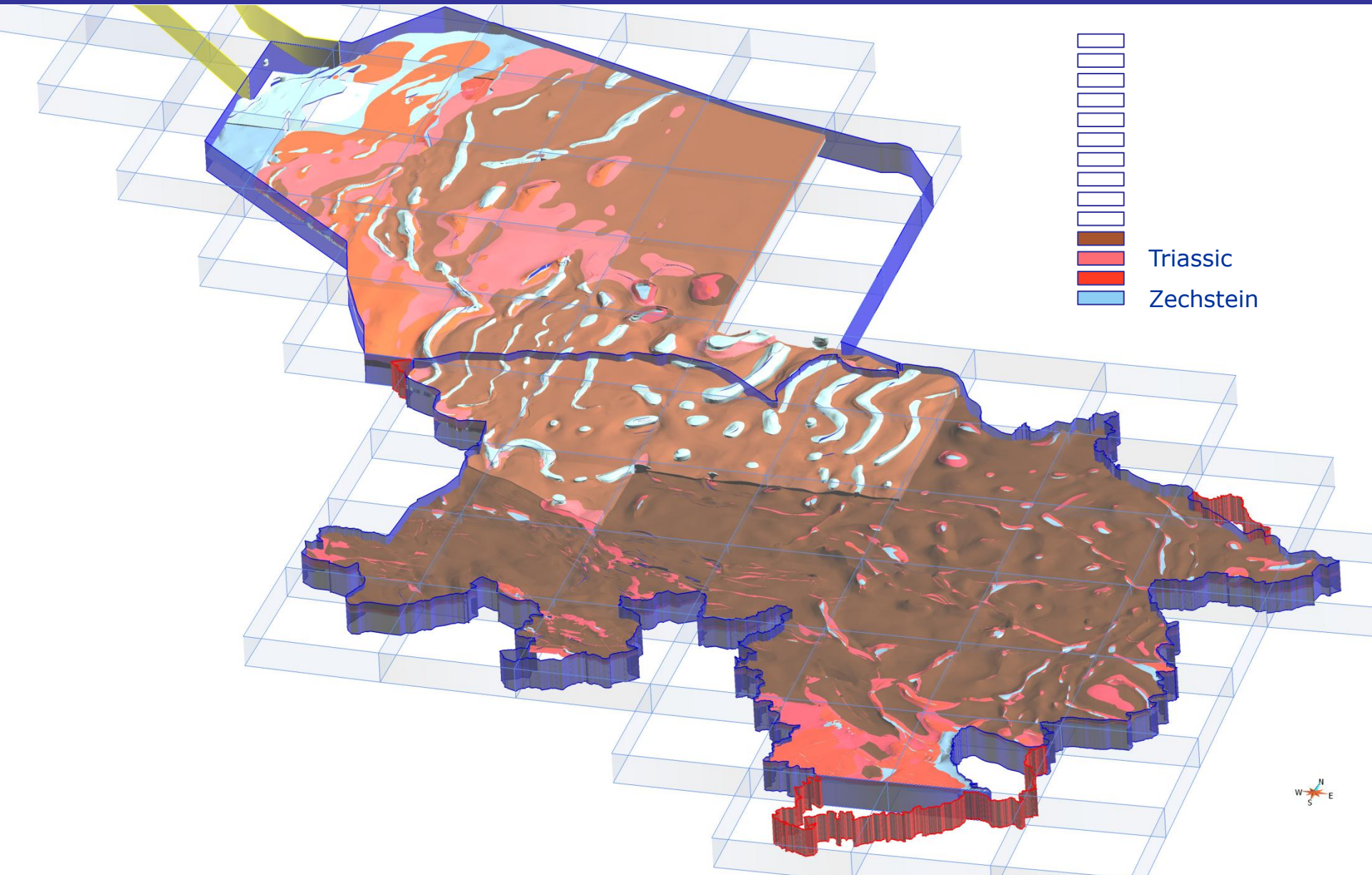


complete 3d-model in the region around Papenburg

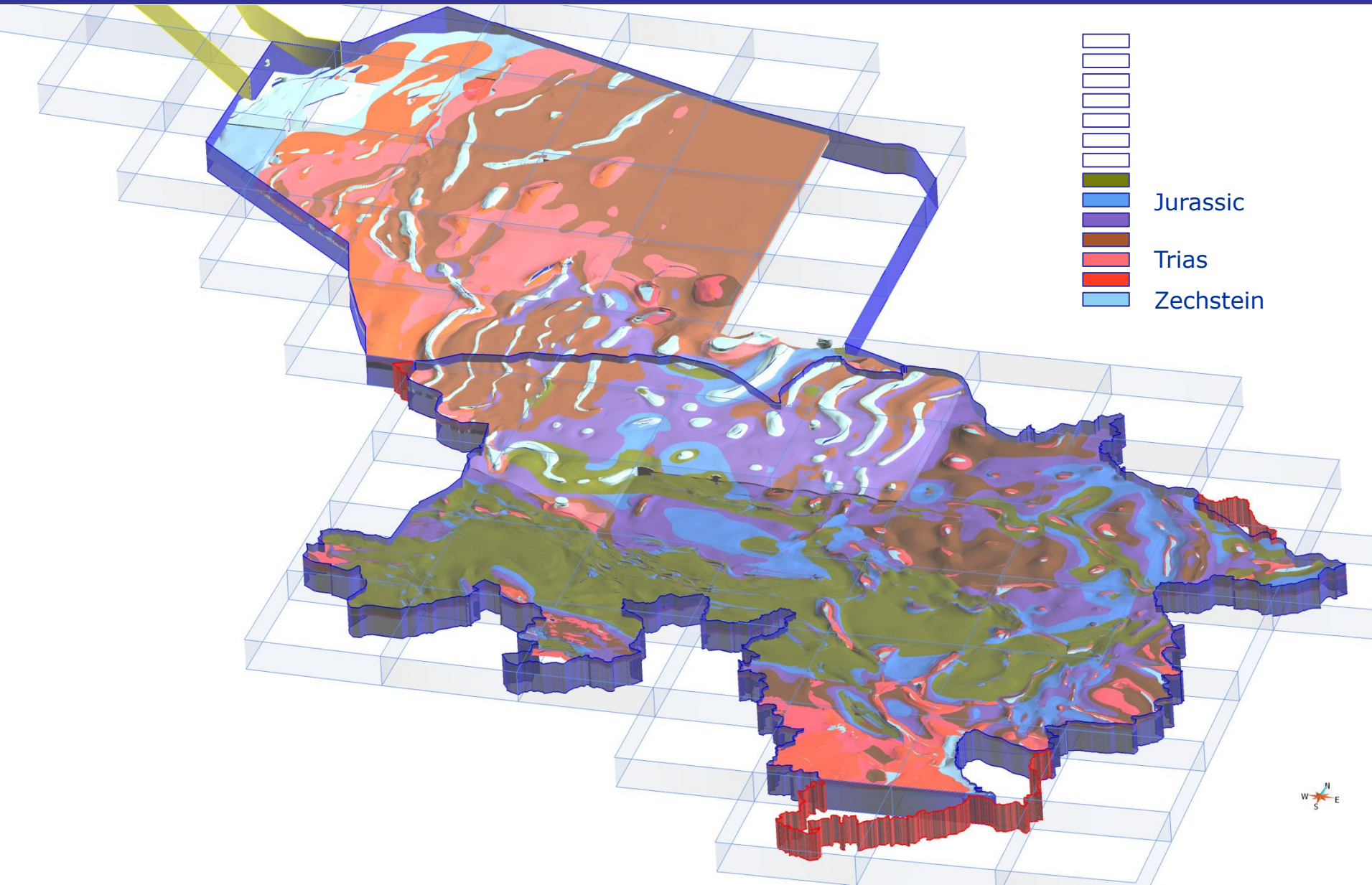
6 Available 3D-Model



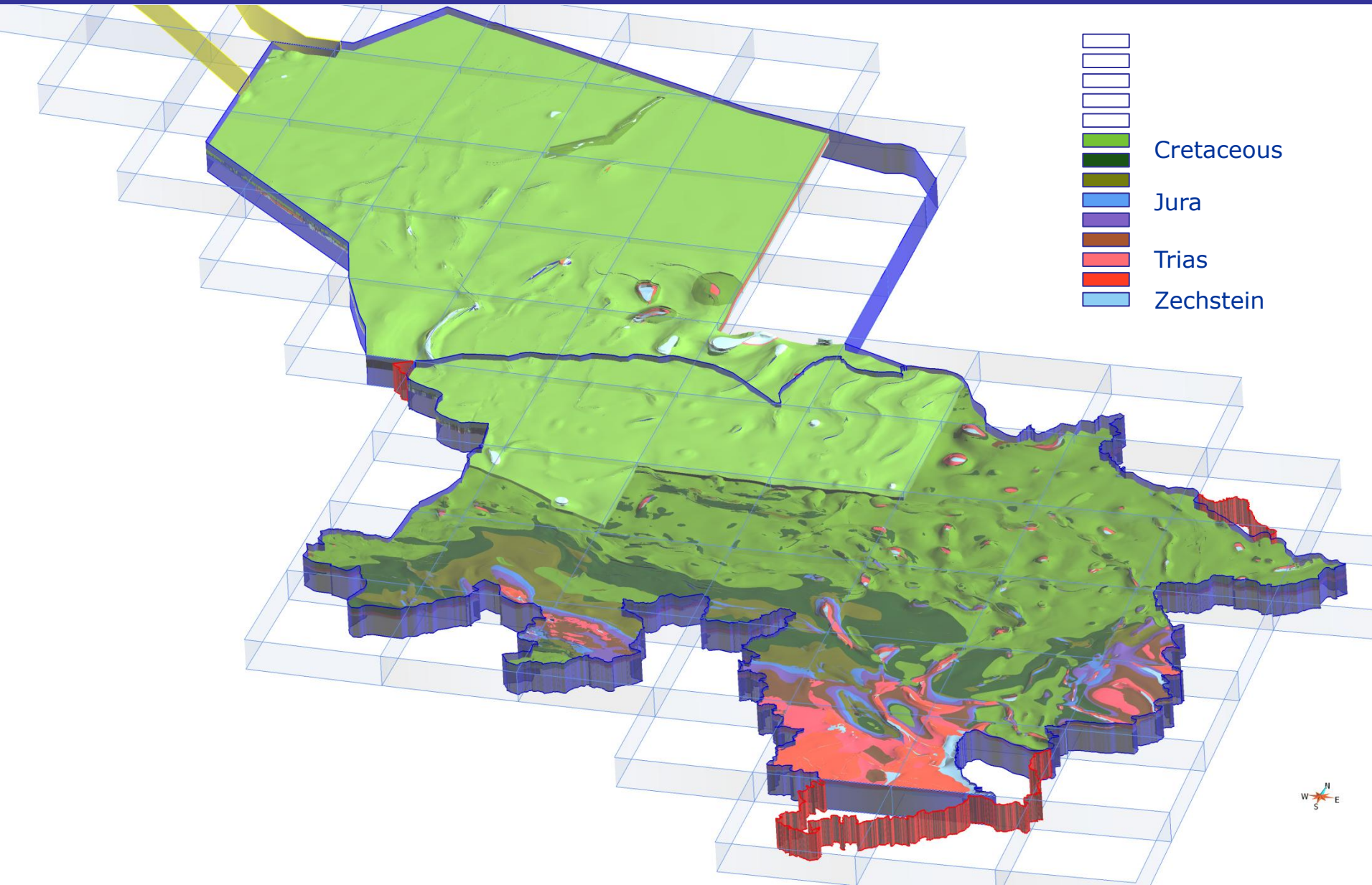
6 Available 3D-Model



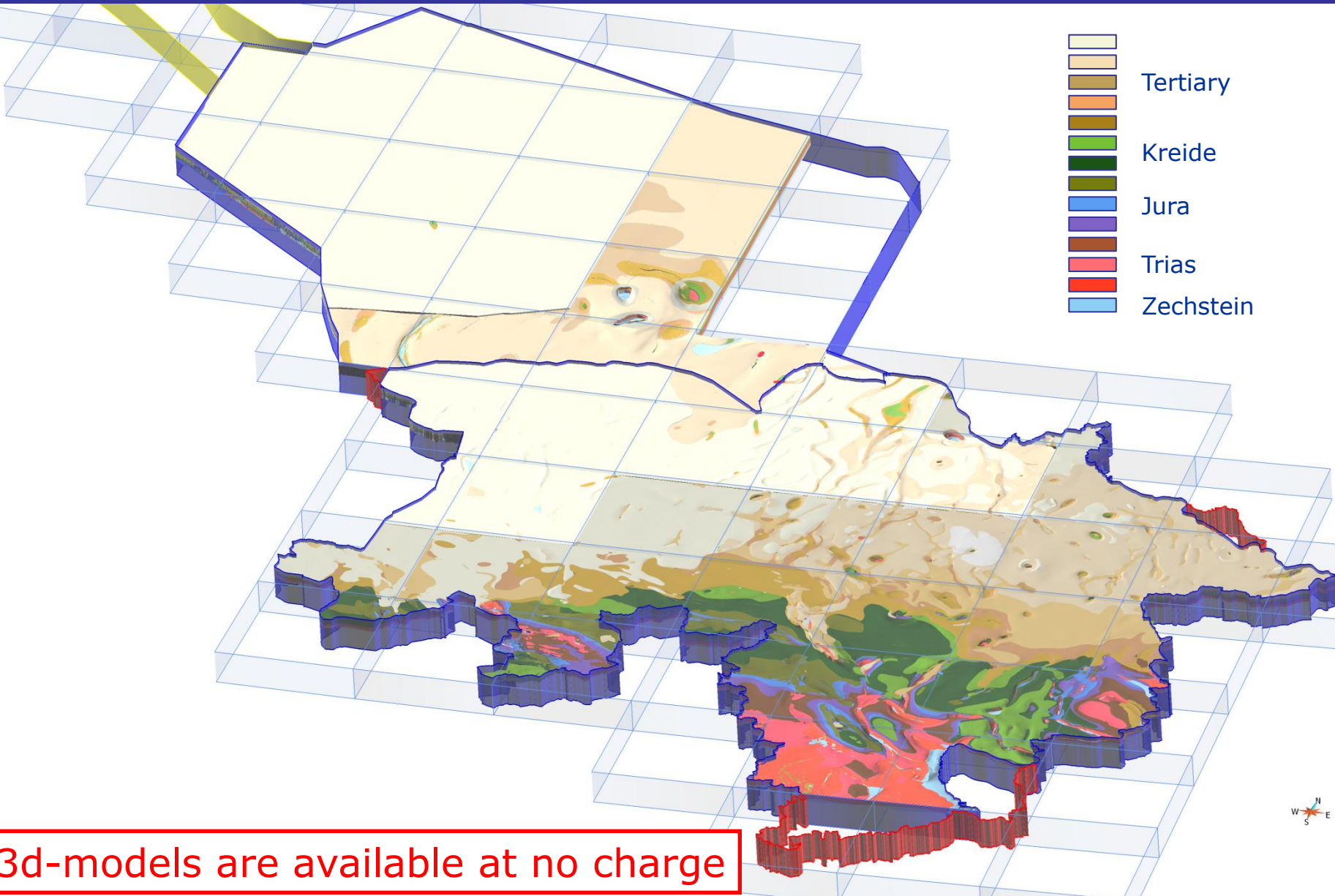
6 Available 3D-Model



6 Available 3D-Model



6 Available 3D-Model



3d-models are available at no charge

The screenshot shows the NIBIS Kartenserver interface. The main map area displays a grid of cross-section points (A1 to K15) over a geographical map of Northern Germany, including regions like Nordfriesland, Ostfriesland, and Schleswig-Holstein. The sidebar on the left contains a list of thematic layers such as 'Auswertung 3D-Modell', 'Freigegebene 3D-Modelle', and 'Administrative Grenzen'. The top navigation bar includes 'Topografie' and 'über Fachthemen'. A red circle highlights the 'Fachprogramme' button in the top right navigation area. Below the map, a red box contains the URL <http://nibis.lbeg.de/cardomap3> and the text '→ Fachprogramme → Auswertung 3D-Modell'. The bottom right sidebar contains a 'Schnittbilder' panel with options for 'Geologischer Schnitt von Punkt zu Punkt' and 'Hypothetische Bohrung an einem Punkt', along with input fields for 'Startpunkt' and 'Endpunkt' (Rechtswert and Hochwert) and settings for 'Maßstabszahl (1:x): 50000' and 'Überhöhung: 1'.

<http://nibis.lbeg.de/cardomap3>

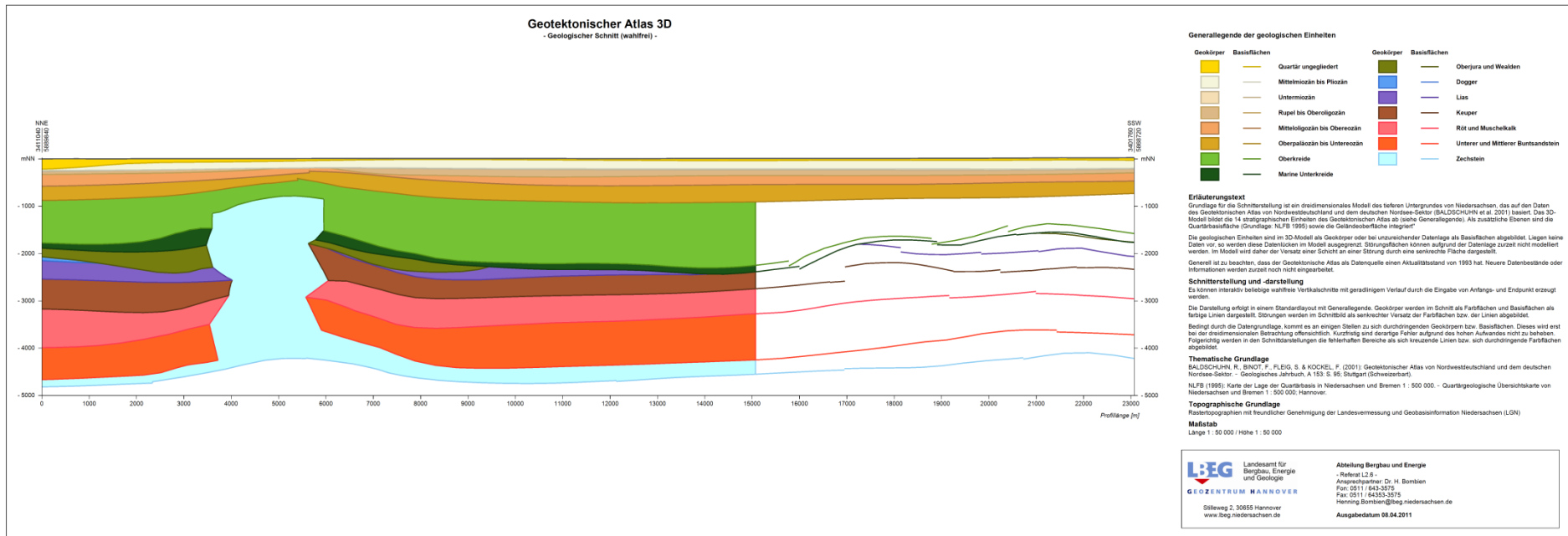
→ Fachprogramme → Auswertung 3D-Modell

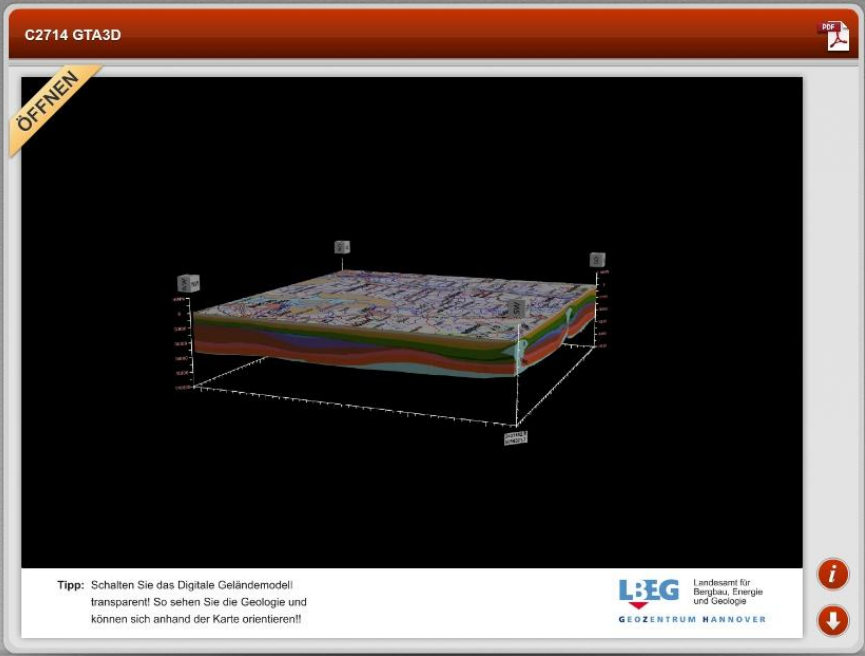


left: topographic map showing the trace of the cross-section

below: geological cross-section through the 3d-model resulting from the Tectonic Atlas

free download of map and cross-section





C2714 GTA3D
 Topographische Karte 1:100.000
 Blattschnitt C2714
 Öffnen Sie die Datei über das
 Kontextmenü (rechte Maustaste)
 Nutzen Sie die Bedienungsan-
 leitung und den Erläuterungstext



Watch out on our [Website](#):
 free download of the Model as 3DPDF-file in the course of 2012

Thank you very much for your attention.