

Updating the 3D geological model of Catalunya v. 1.0: the Neogene Empordà Basin (NE Catalunya)

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- 1 Introduction
- 2 Methodology
- 3 The 3D model of the Neogene Empordà Basin (NE Catalunya)
- 4 Conclusions

Surface or subsurface geological data

CAD files

SEGY files
(interp. in dxf, shp, pl, ...)

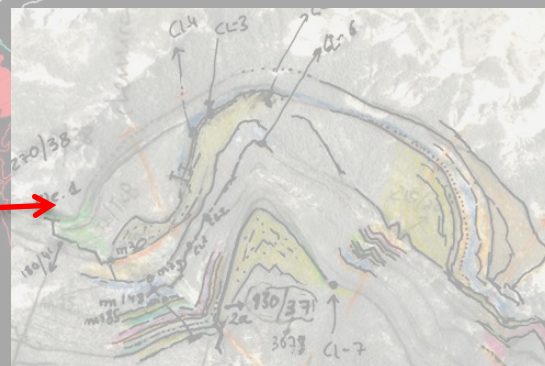
or X, Y, Z, Prop

RAW data in
analog format

Digital data
(shp, dxf, pl, ... files)

Digital Database

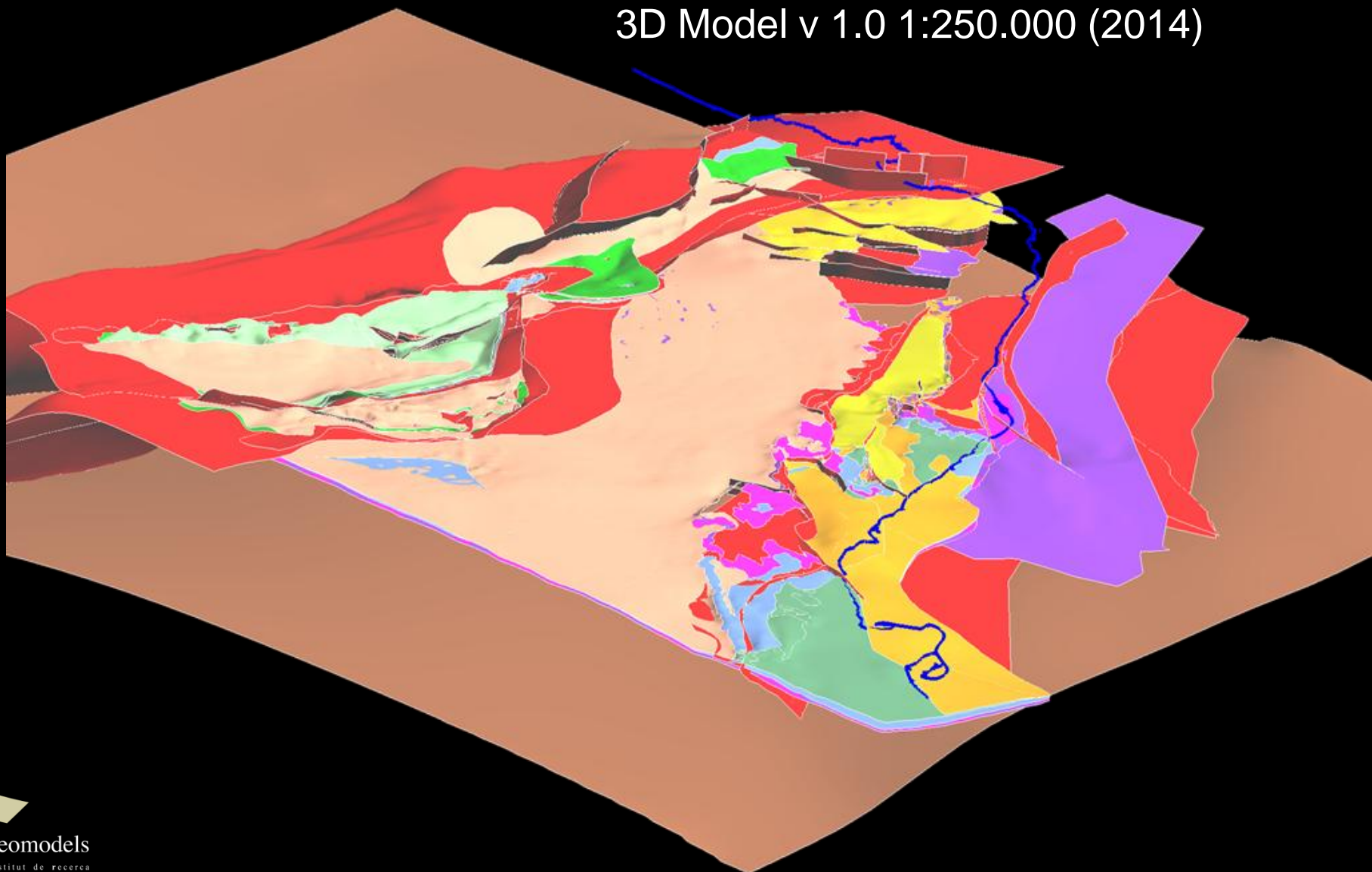
1
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4



Info	date	id	name	x	y	z	prop	id	name	date	dr	pr
1	1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9	9
10	10	10	10	10	10	10	10	10	10	10	10	10
11	11	11	11	11	11	11	11	11	11	11	11	11
12	12	12	12	12	12	12	12	12	12	12	12	12
13	13	13	13	13	13	13	13	13	13	13	13	13
14	14	14	14	14	14	14	14	14	14	14	14	14
15	15	15	15	15	15	15	15	15	15	15	15	15

5 km

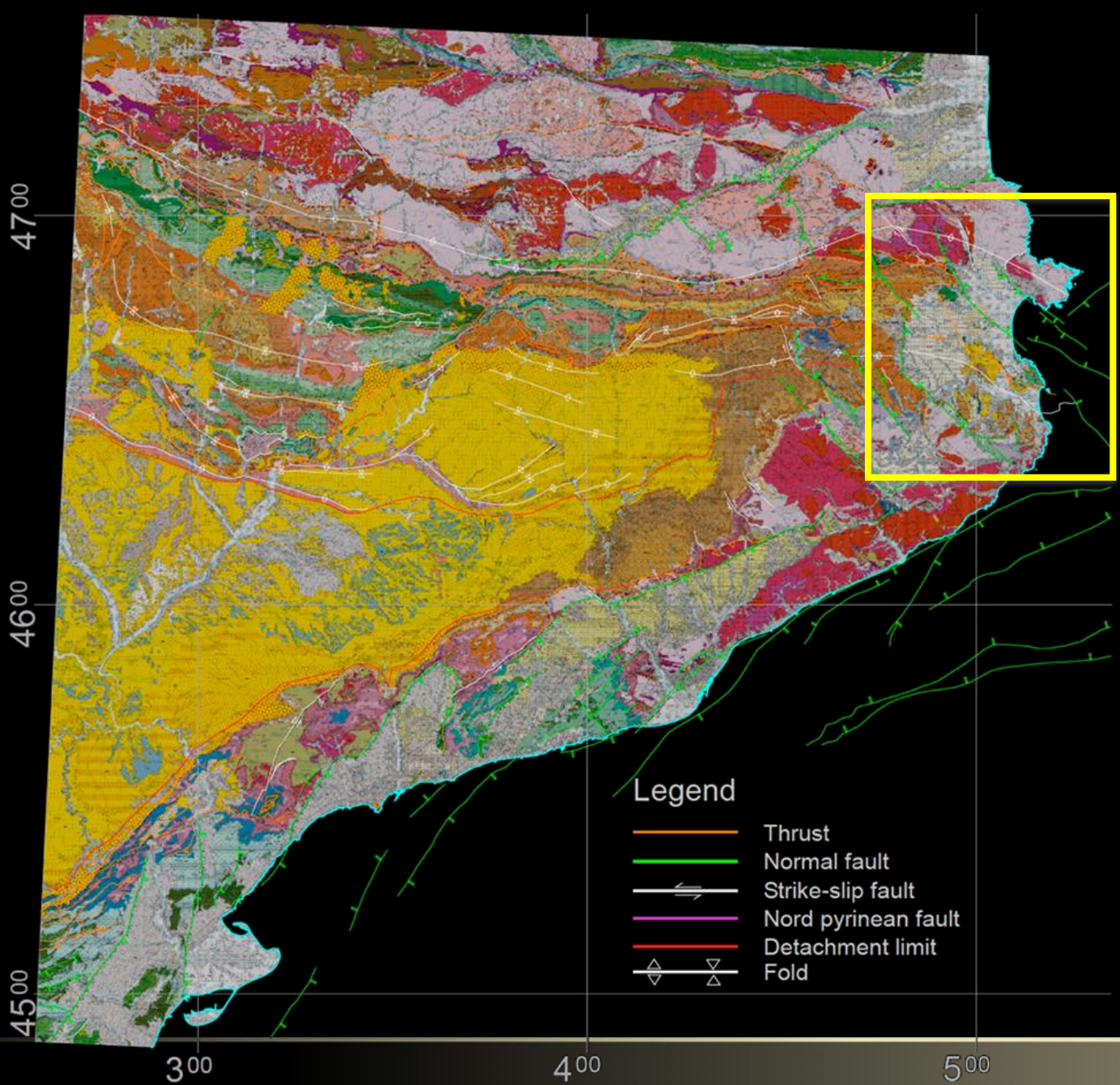
3D Model v 1.0 1:250.000 (2014)



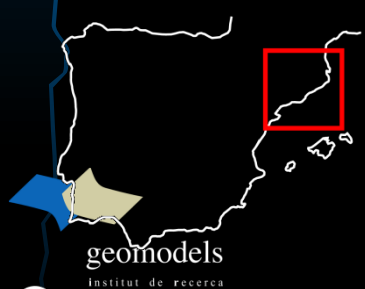
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Introduction

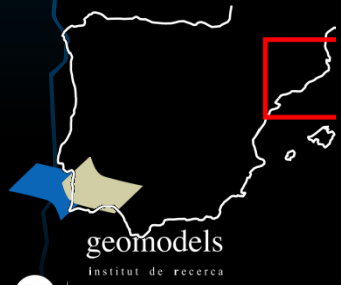
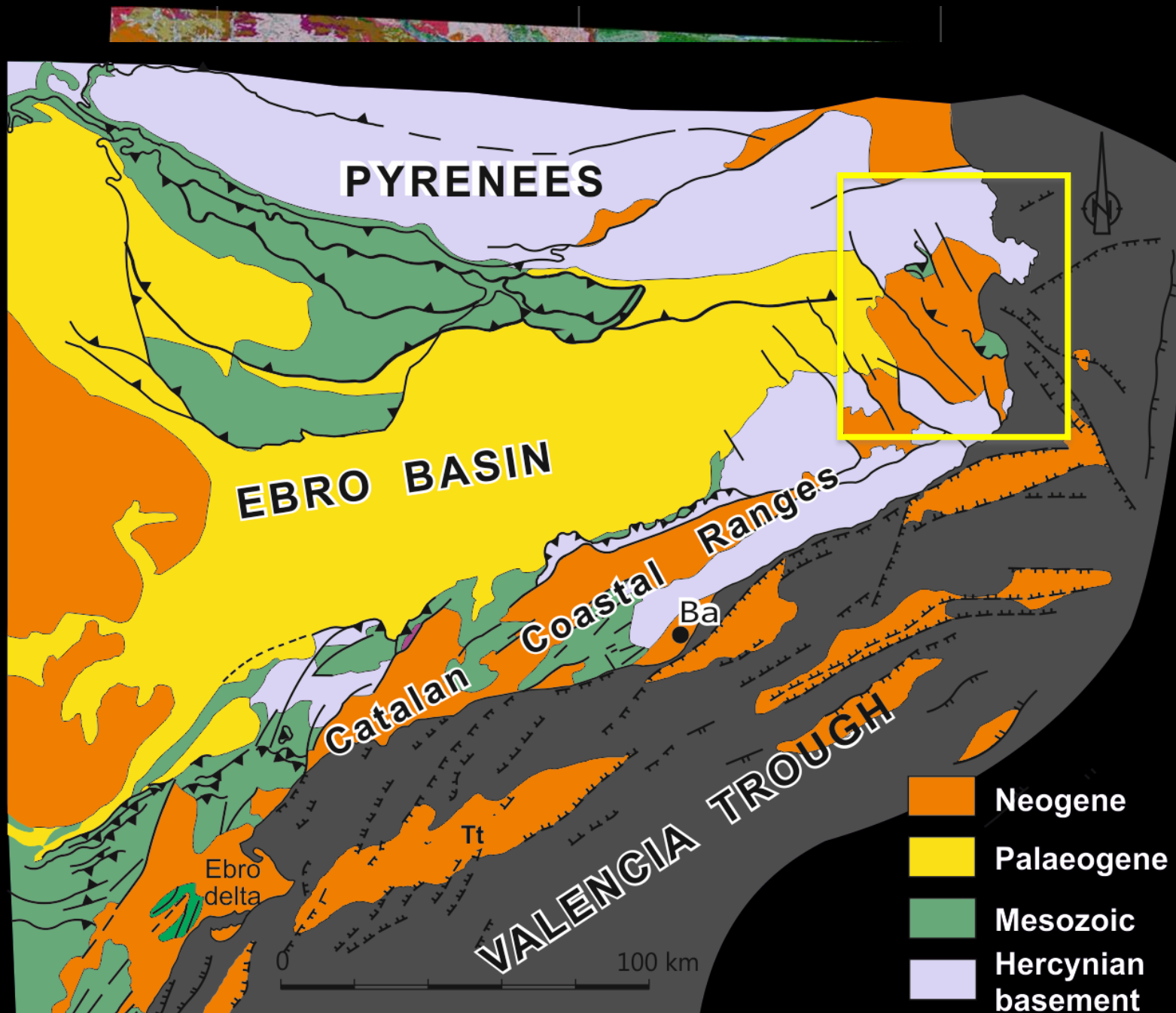
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- Legend**
- Thrust
 - Normal fault
 - Strike-slip fault
 - Nord pyrenean fault
 - Detachment limit
 - Fold

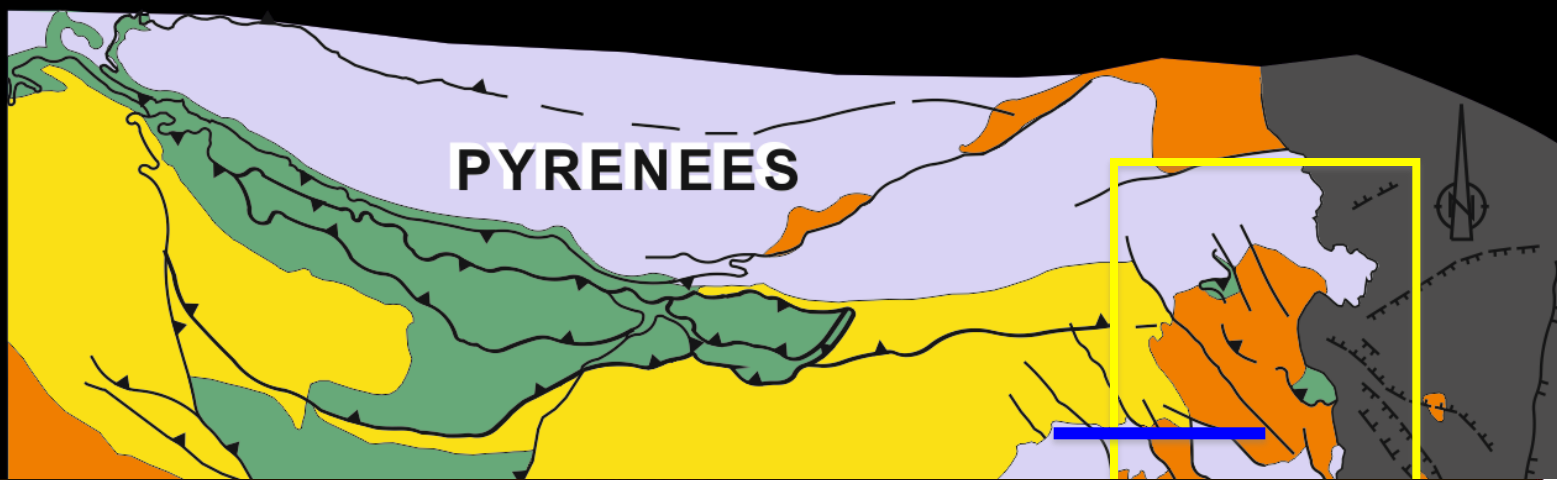


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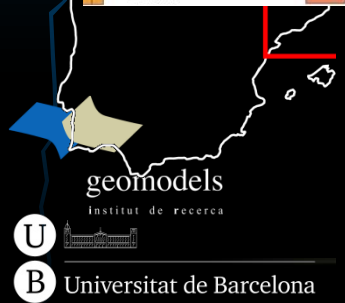
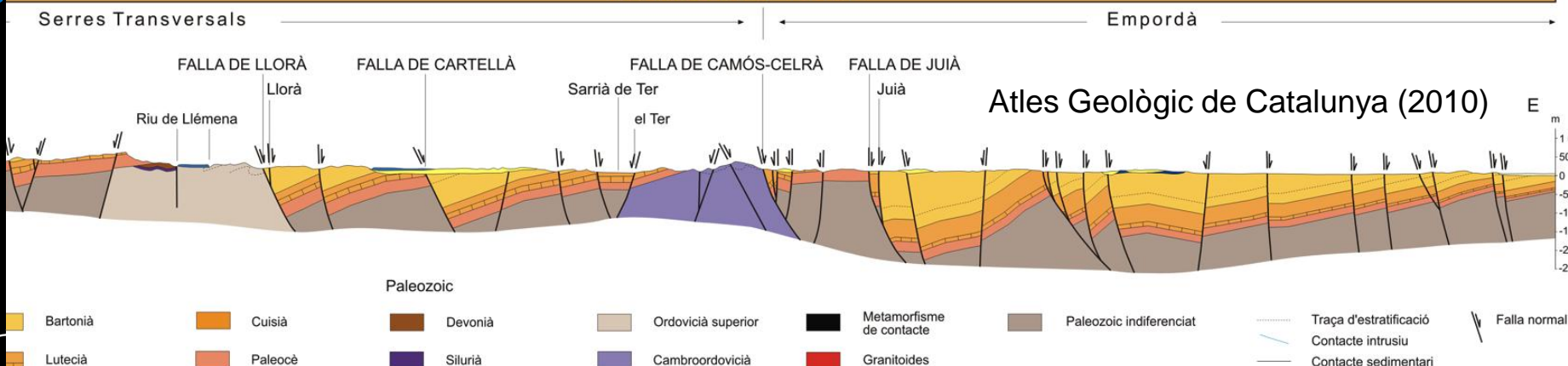


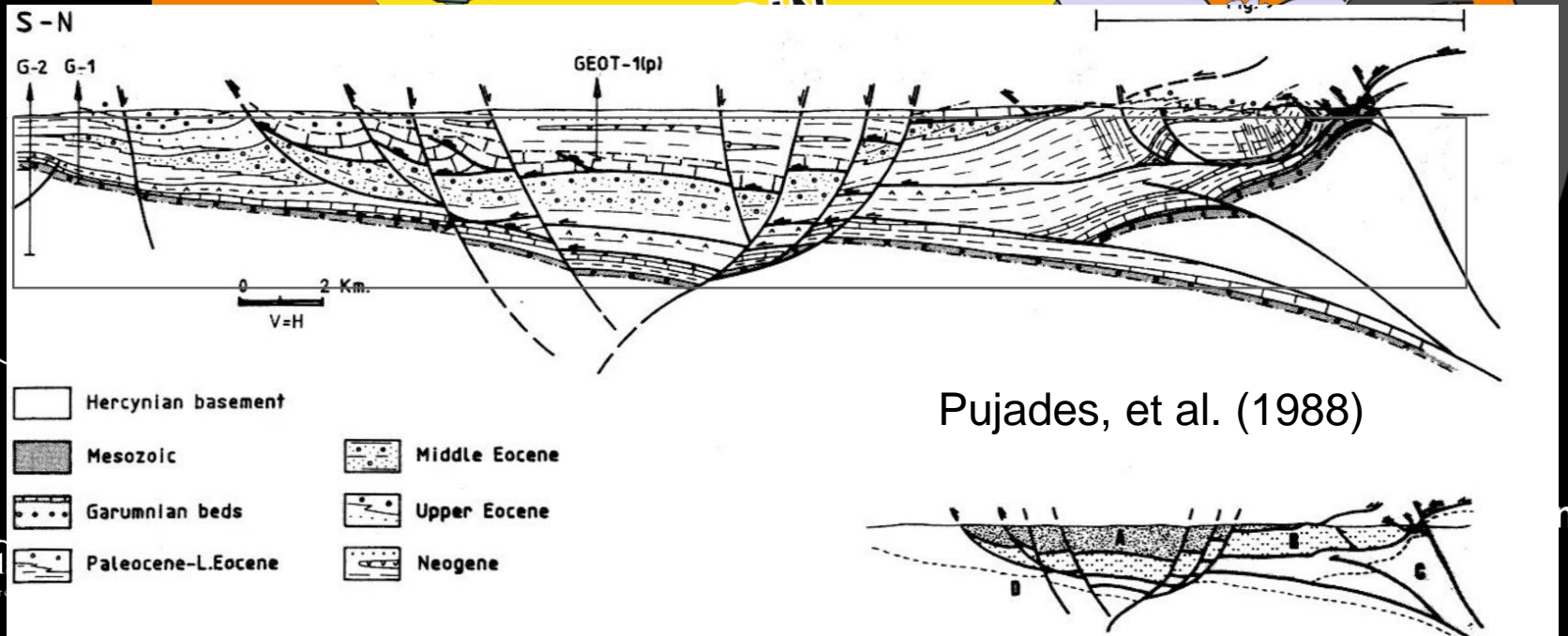
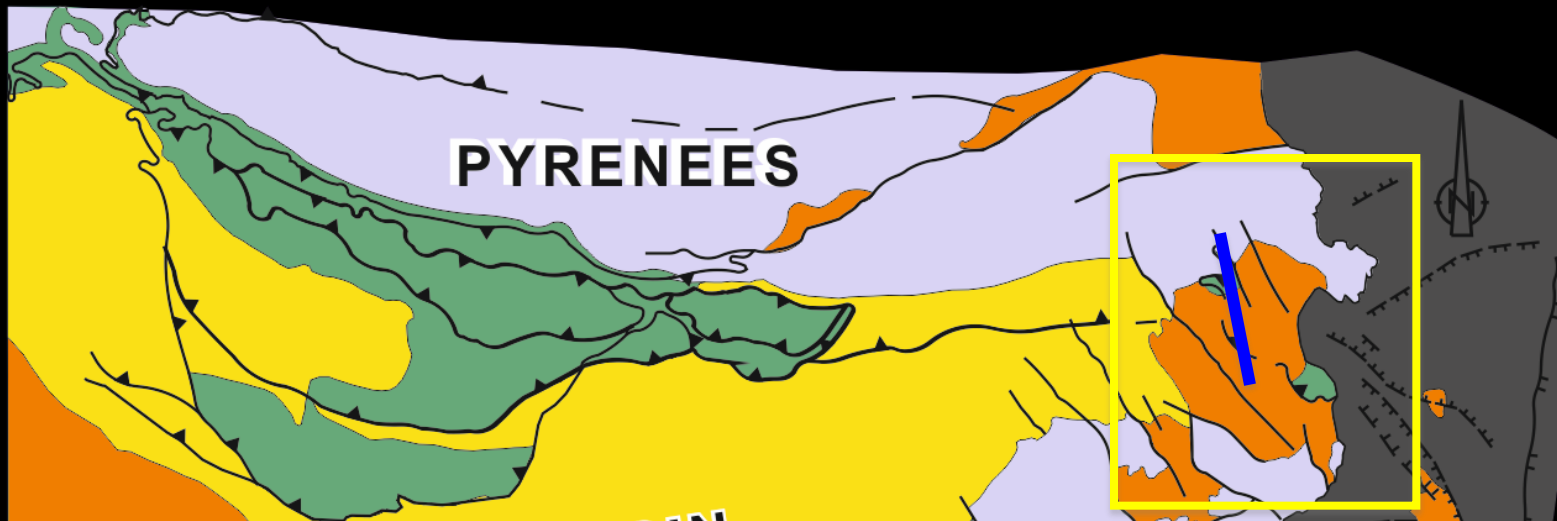
Introduction

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CONCA DE L'EBRE

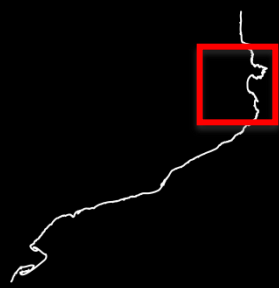
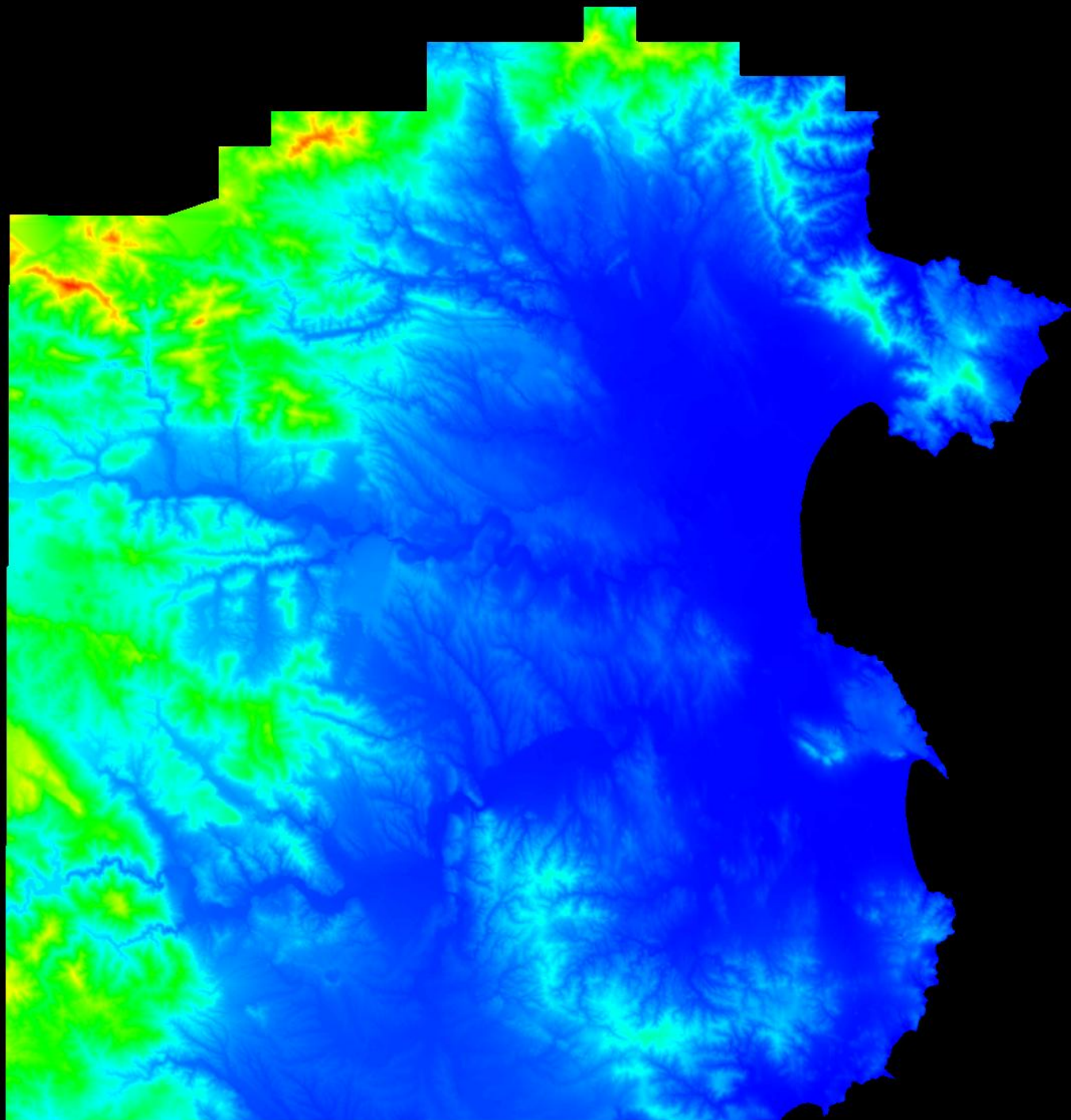




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Introduction

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1 ✓

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The 3D model of the Neogene Empordà Basin (NE Catalunya)

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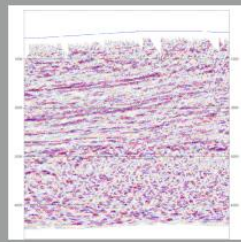
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Hard Data (Digital, 3D georeferenced)

Subsurface

Well

Seismic

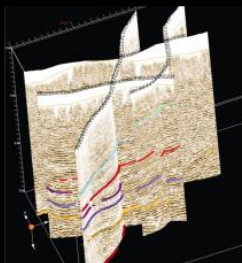


Surface

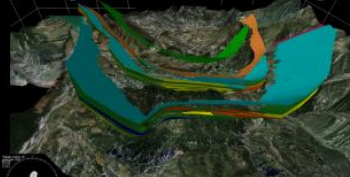


3D velocity model

Interpretation

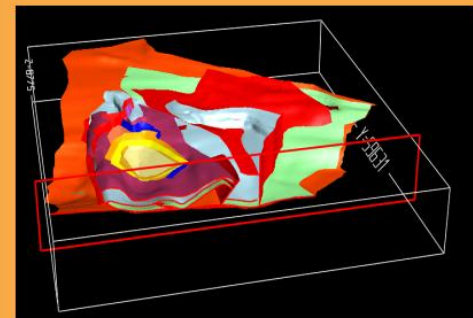


Preliminar Model
(from surface data)



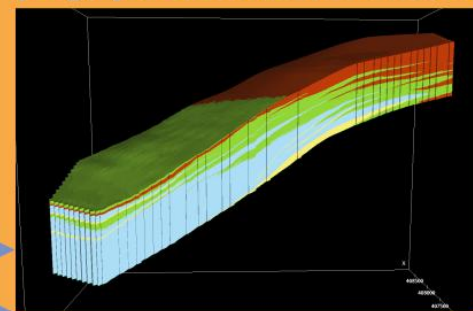
Depth conversion

Products



Structural deterministic model
(based on surfaces)

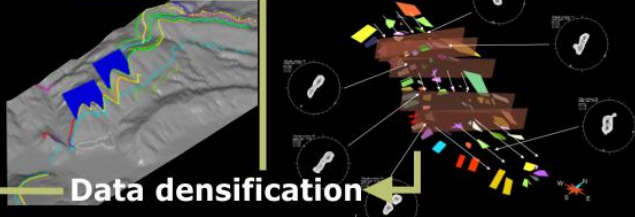
Others
(e.g. probabilistic models)



Correlation



Structural analysis



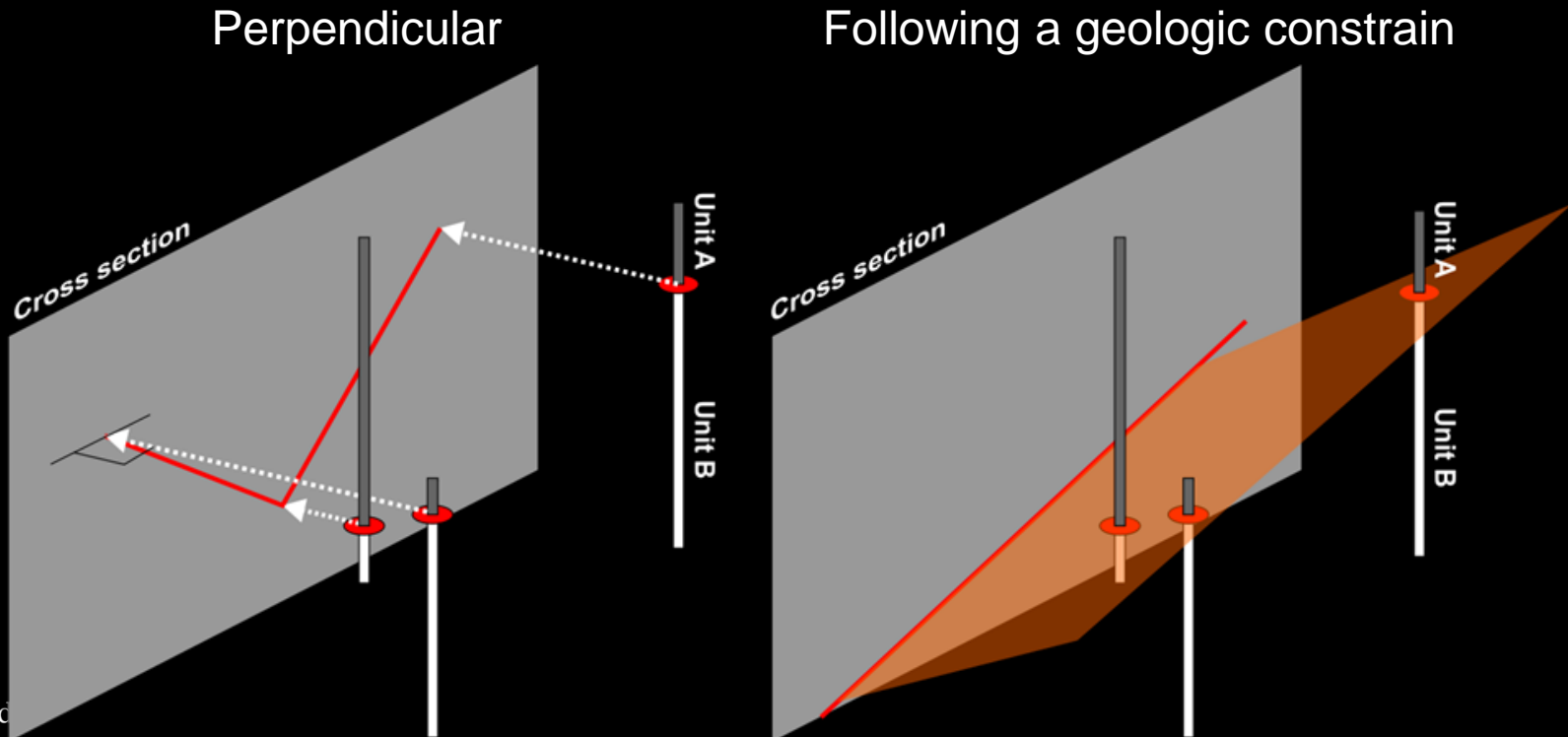
Data densification

Geostatistical characterization
(Soft data)
Hard data

1 ✓
2
3
4

Advantages of 3D models

- Work with field data in its original geographic position
- Avoid errors and simplifications in the projection process



Likewise...

-Construct a 3D model is not an easy task.

1 ✓
2
3
4
... if we want to introduce geological constraints (imposed by the structure) that determine the resulting structure

Likewise...

-Construct a 3D model is not an easy task.

1 ✓
2 ... if we want to introduce geological constraints (imposed by the structure) that determine the resulting structure

3
4 For this purpose it is essential the use of a **methodology** that would not even consider initial hard data but also allow introducing derived geological constraints.

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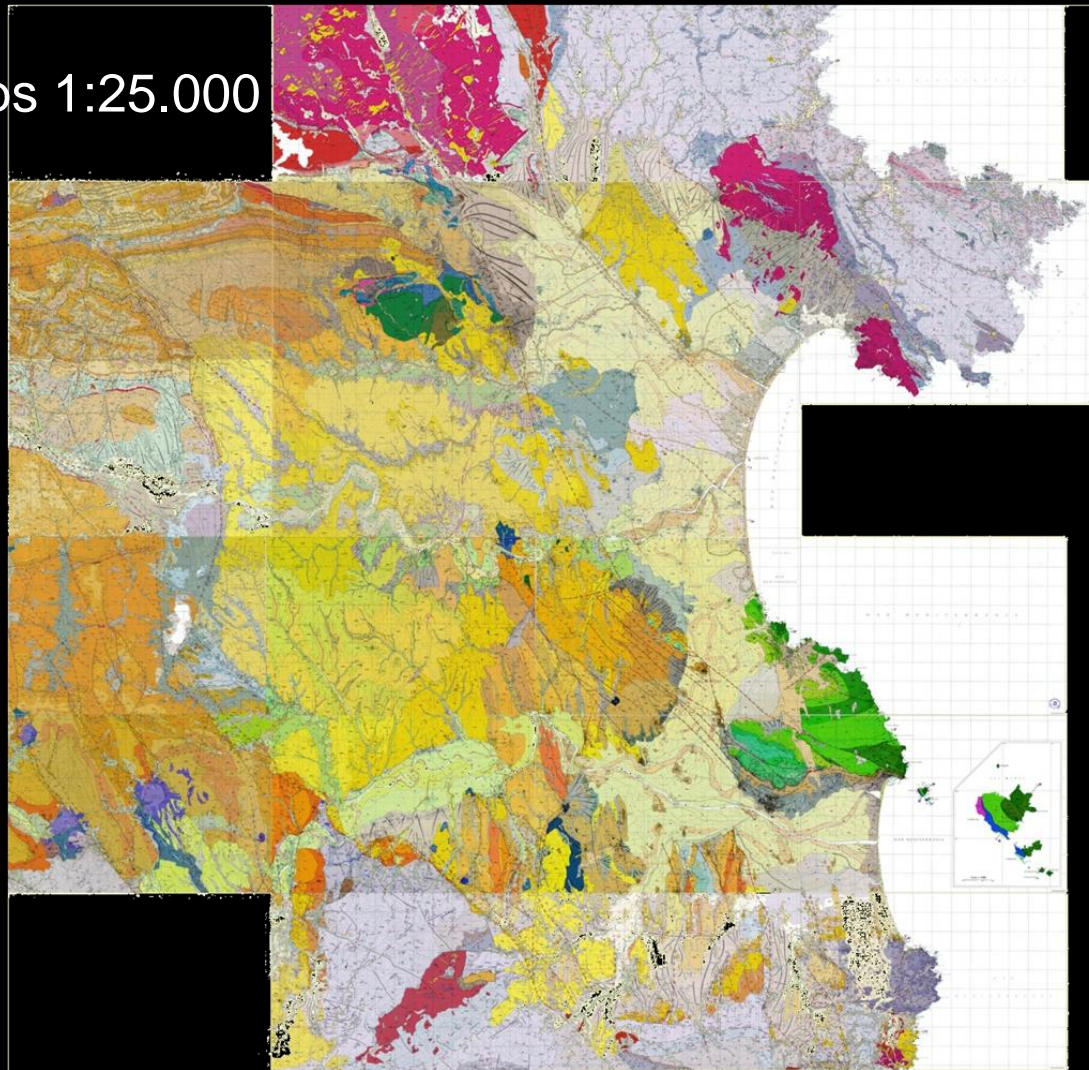
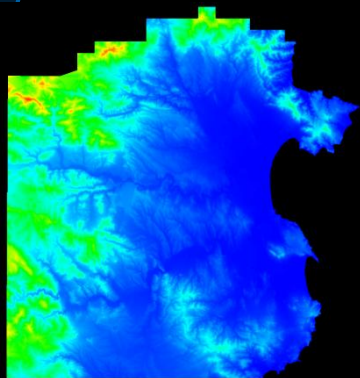
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Data used:

1 ✓ Geological maps 1:25.000



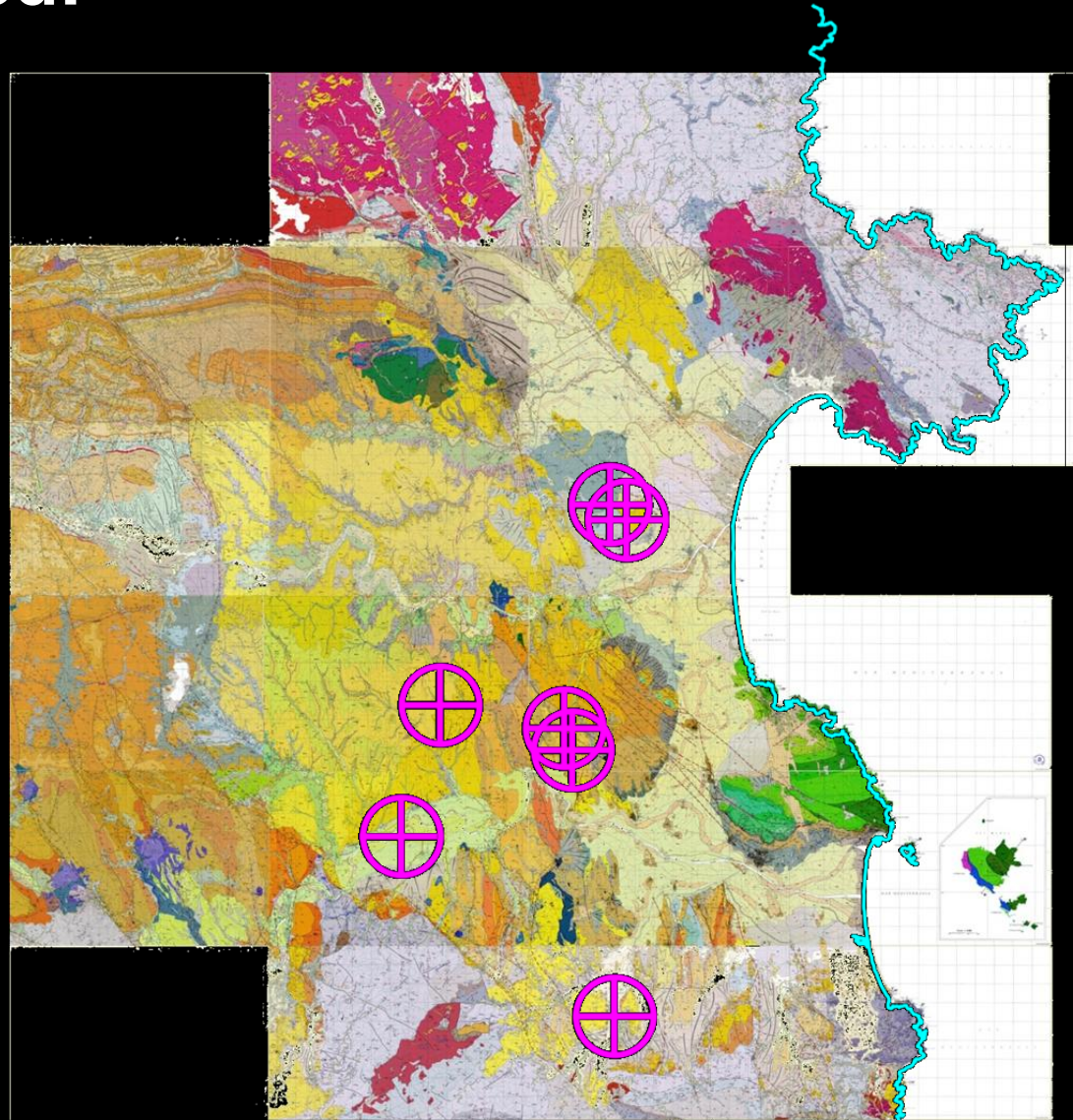
2 ✓
3 DTM
4 100 x 100 m



Data used:

7 wells

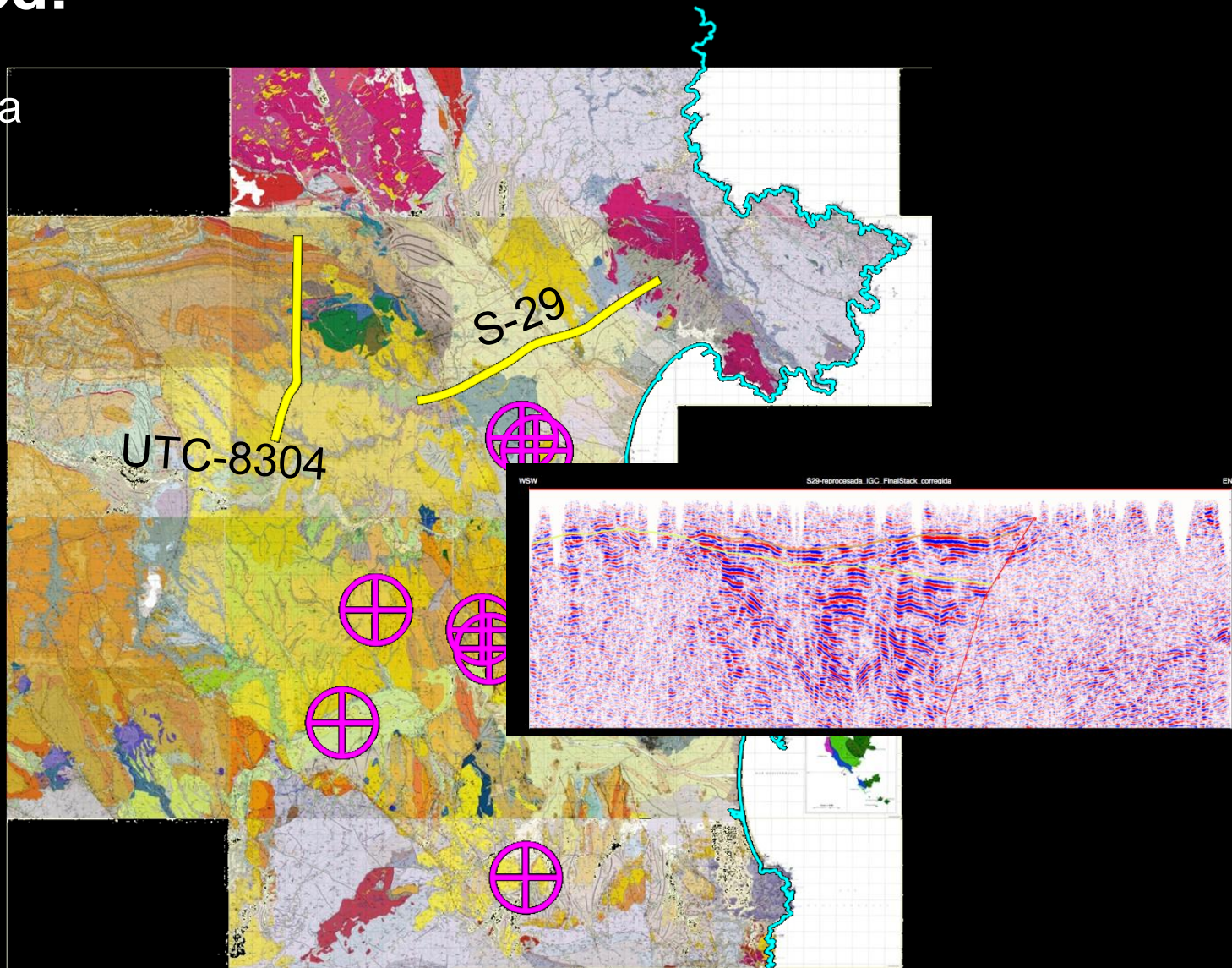
- 1 ✓ Geot-1
- 2 ✓ Geot-2
- 3 Gerona-1
- 4 Gerona-2
- La Bisbal
- Riumors
- Fallinas



- 1 ✓
- 2 ✓
- 3
- 4

Data used:

Seismic data



- 1 ✓
- 2 ✓
- 3
- 4



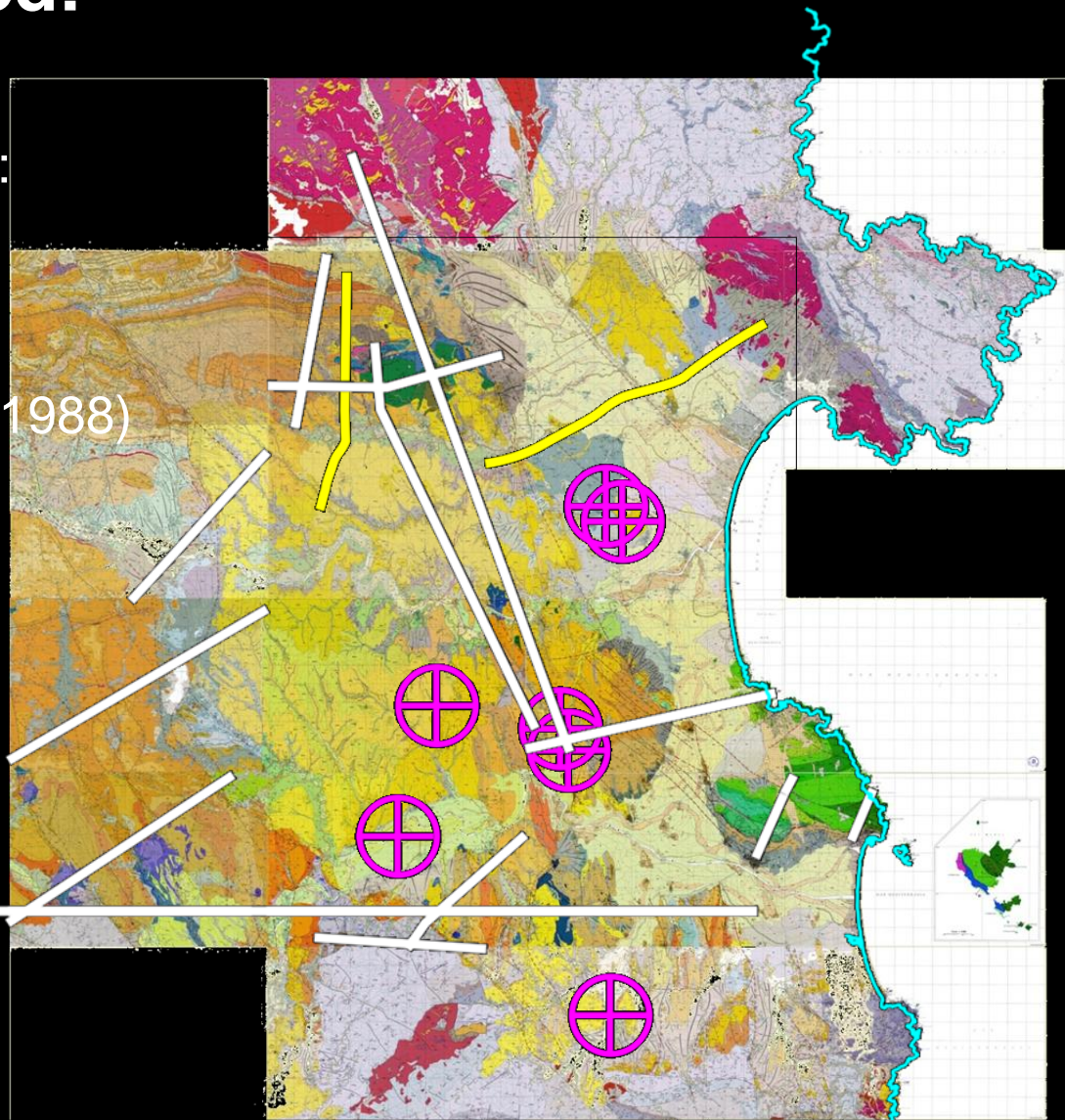
Data used:

1 ✓ Cross-sections:

2 ✓ 1:25.000

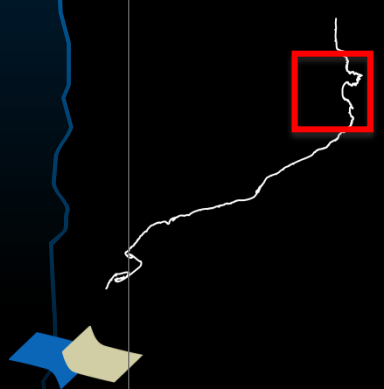
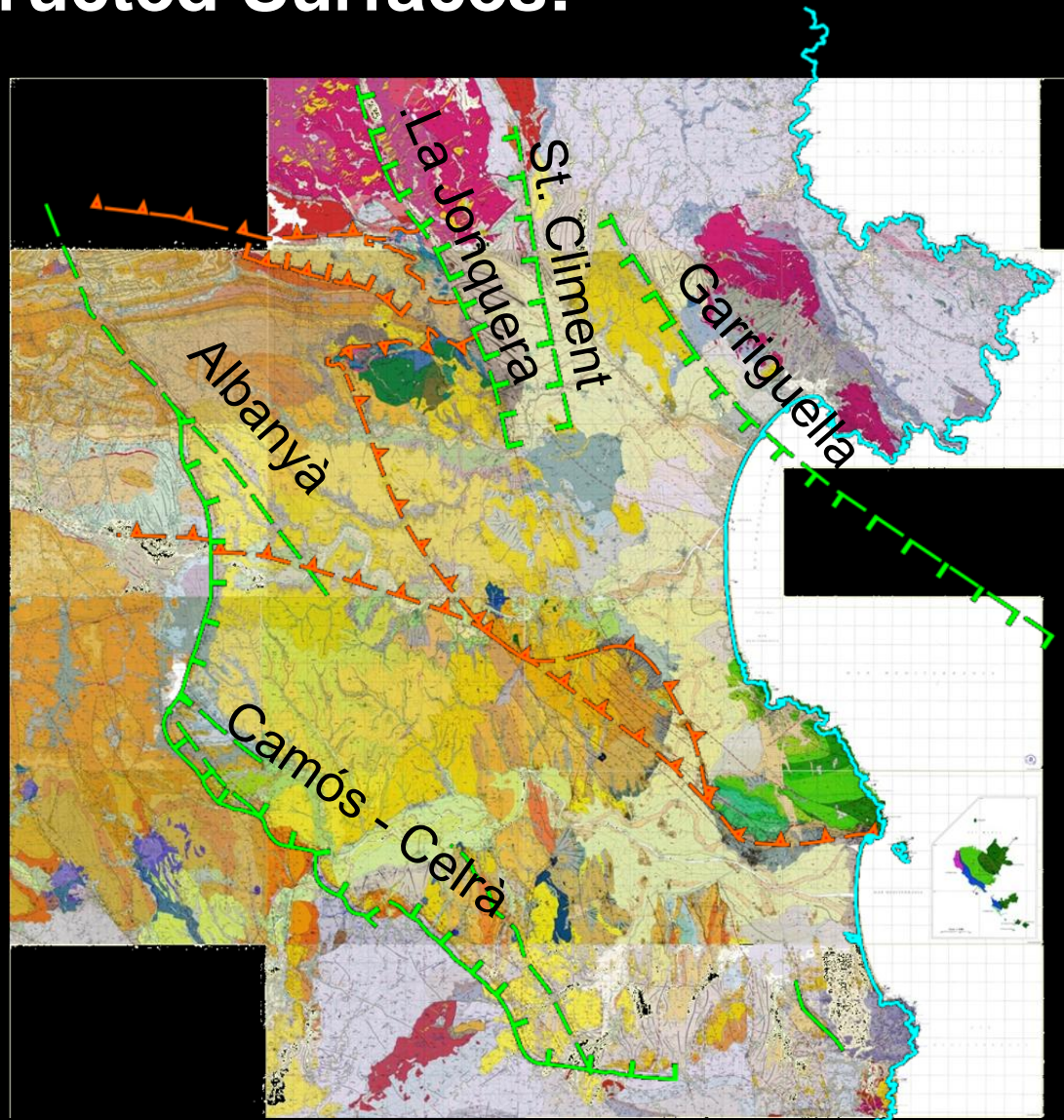
3 Atlas Geològic

4 Pujades et al. (1988)

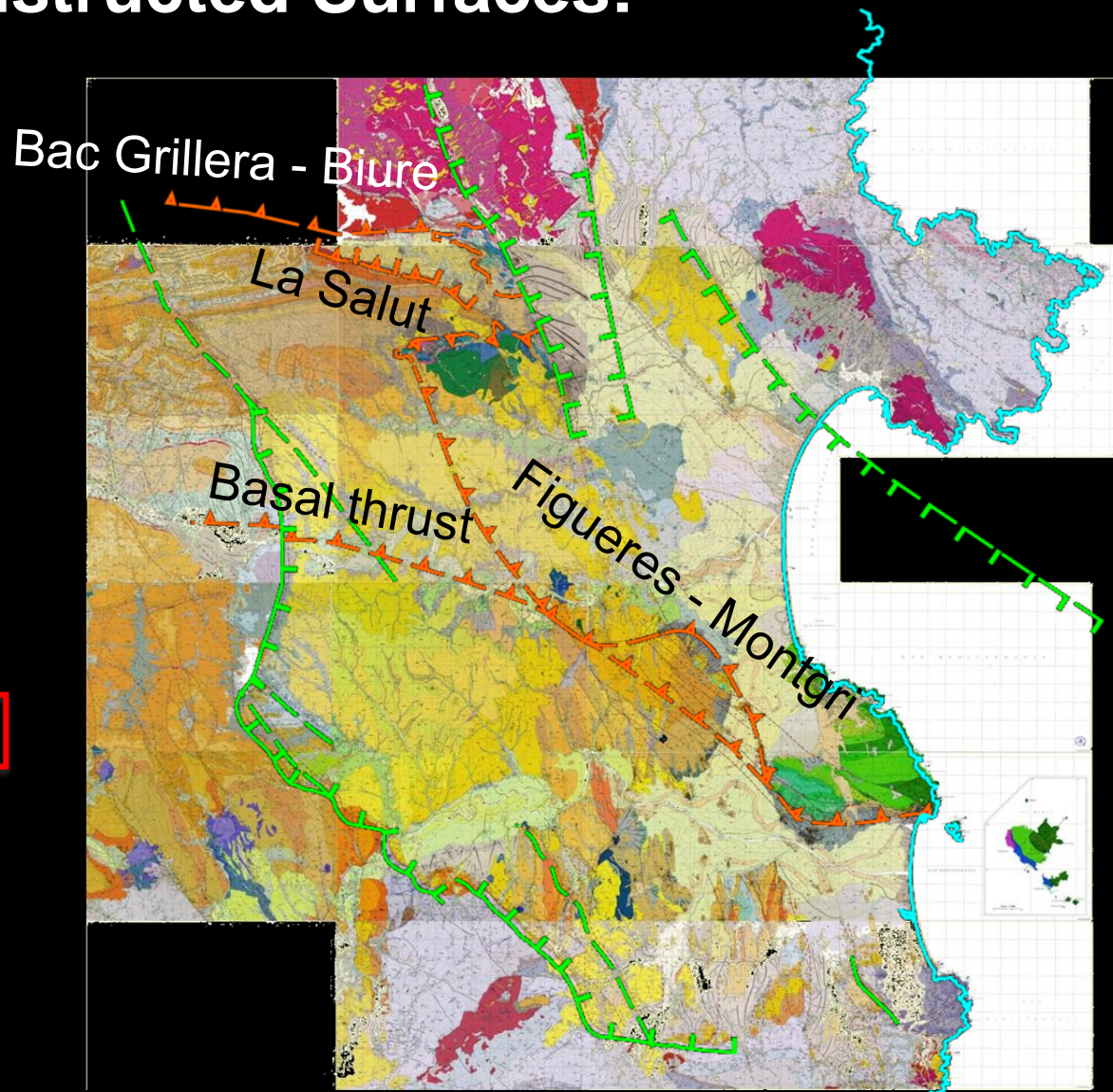


Reconstructed Surfaces:

- 1 ✓
- 2 ✓
- 3
- 4



Reconstructed Surfaces:



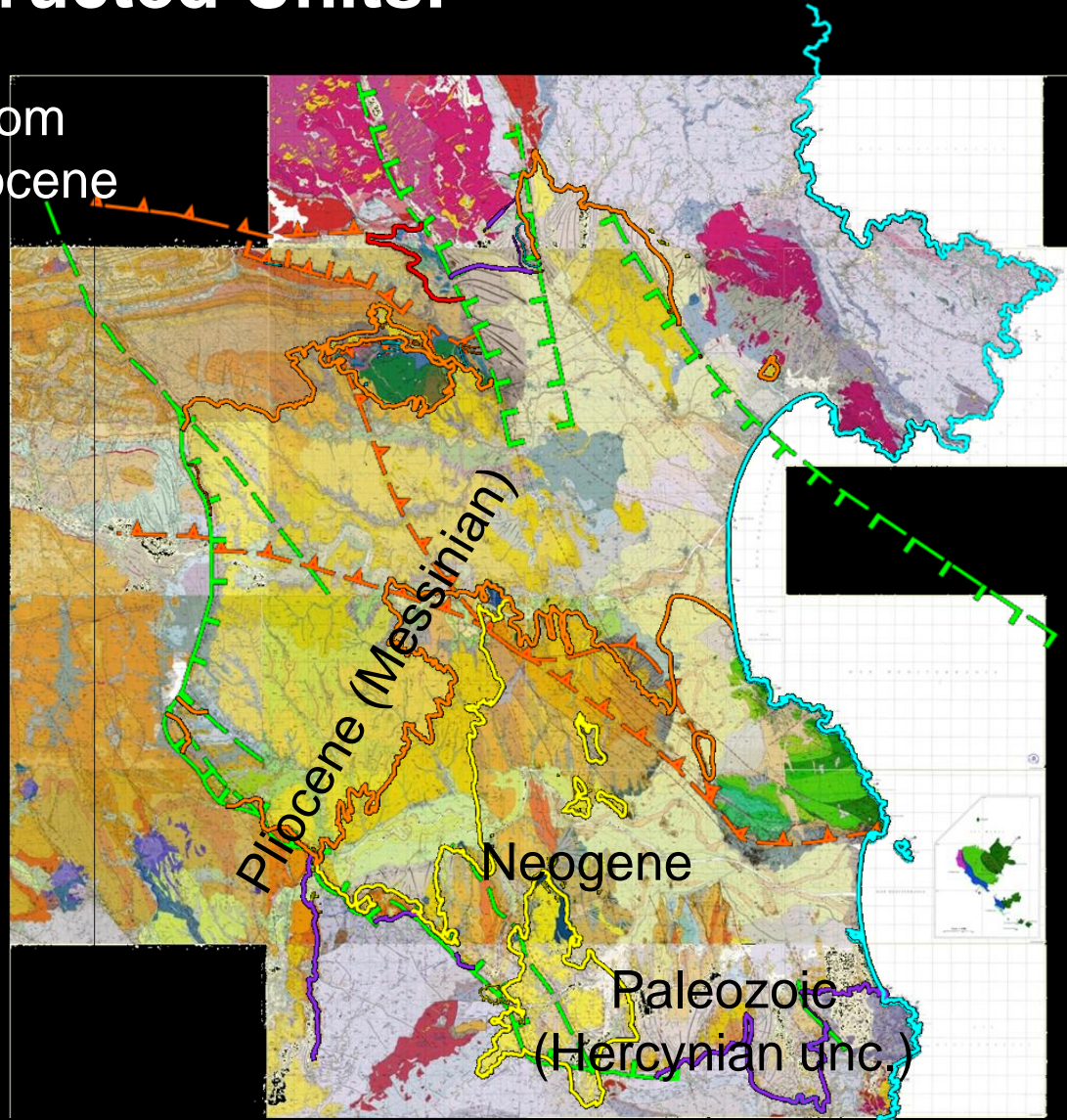
- 1 ✓
- 2 ✓
- 3
- 4



Reconstructed Units:

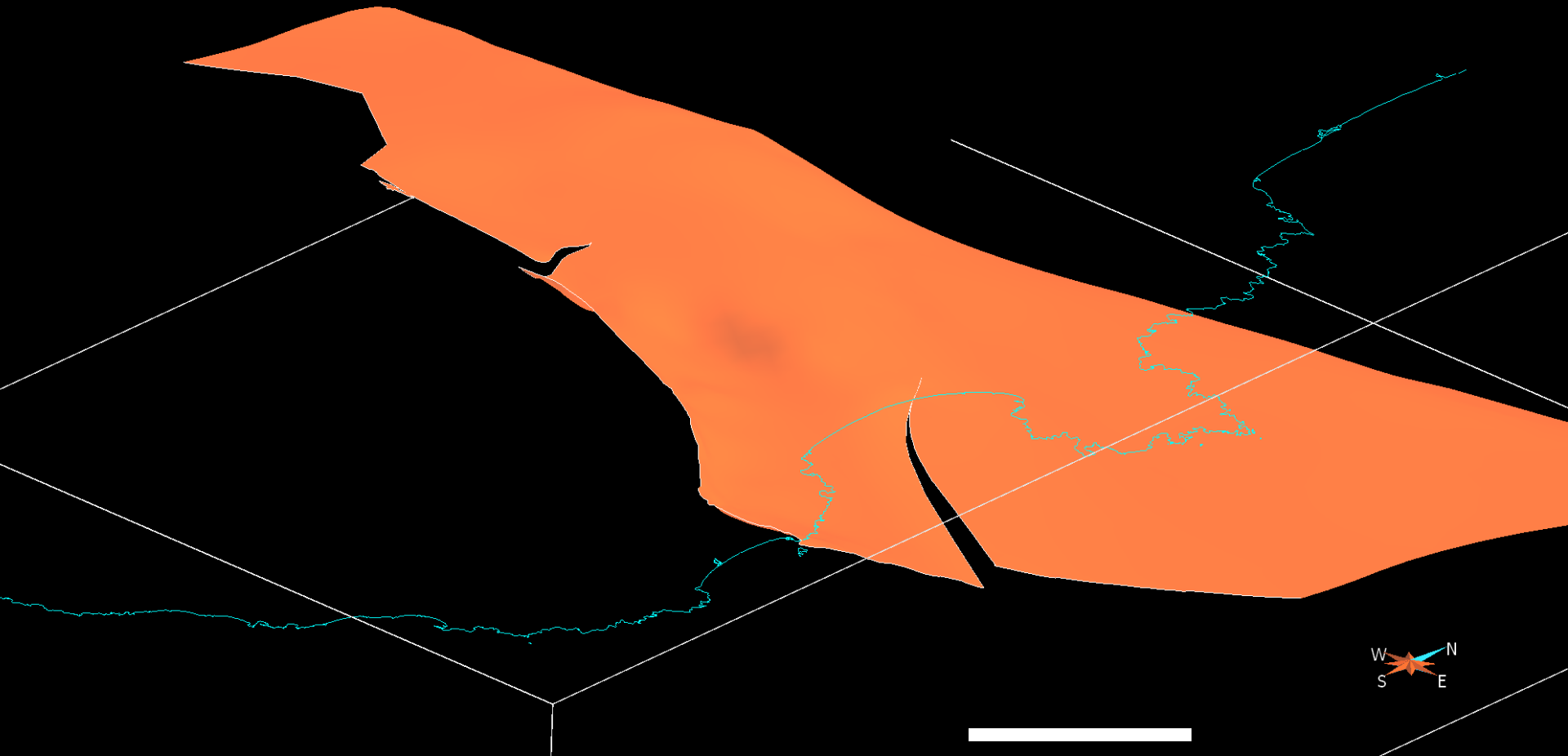
Eocene bottom
Top of Paleocene

- 1 ✓
- 2 ✓
- 3
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The 3D model:

The Basal Thrust

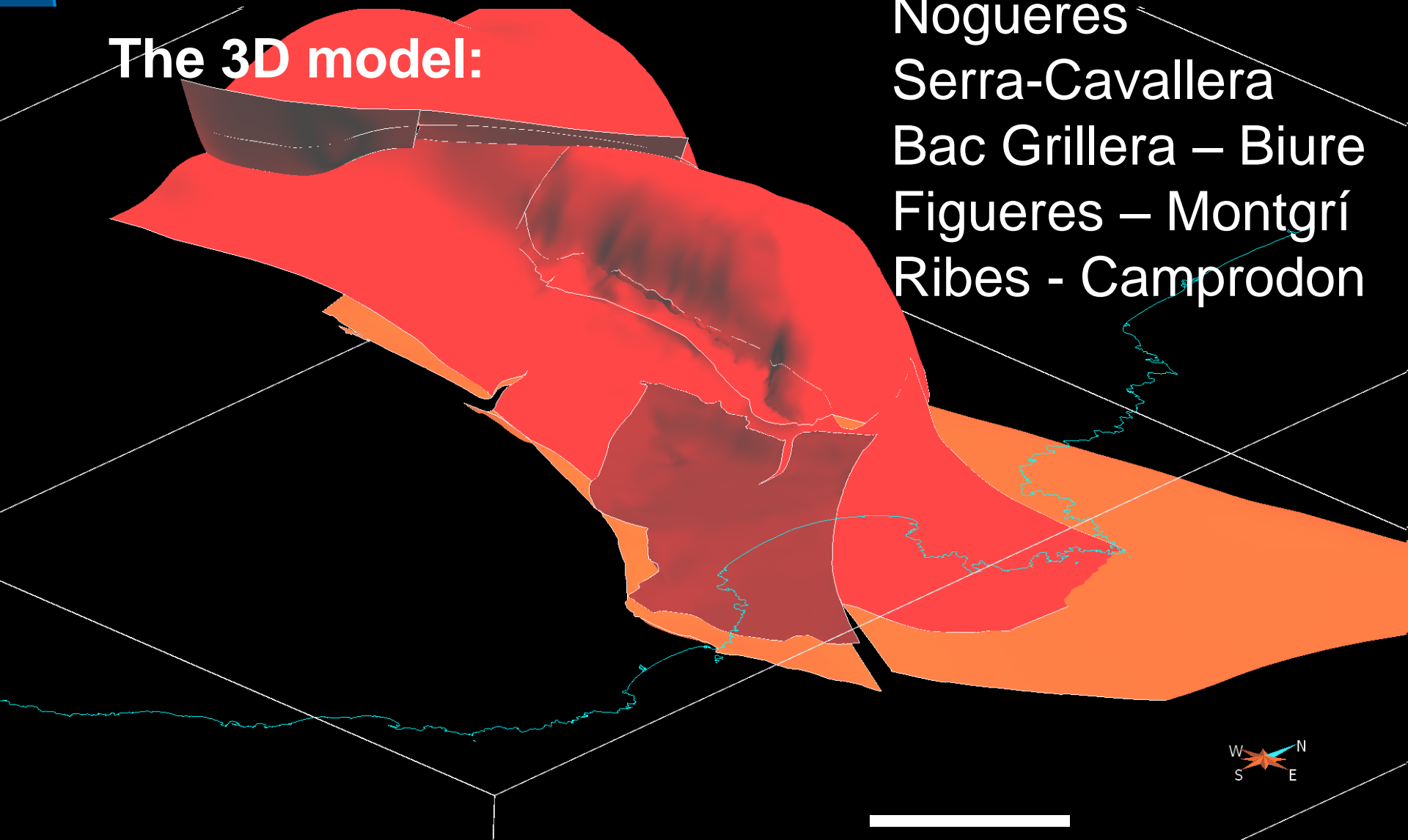


10 km



The 3D model:

Nogueres
Serra-Cavallera
Bac Grillera – Biure
Figueres – Montgrí
Ribes - Camprodon

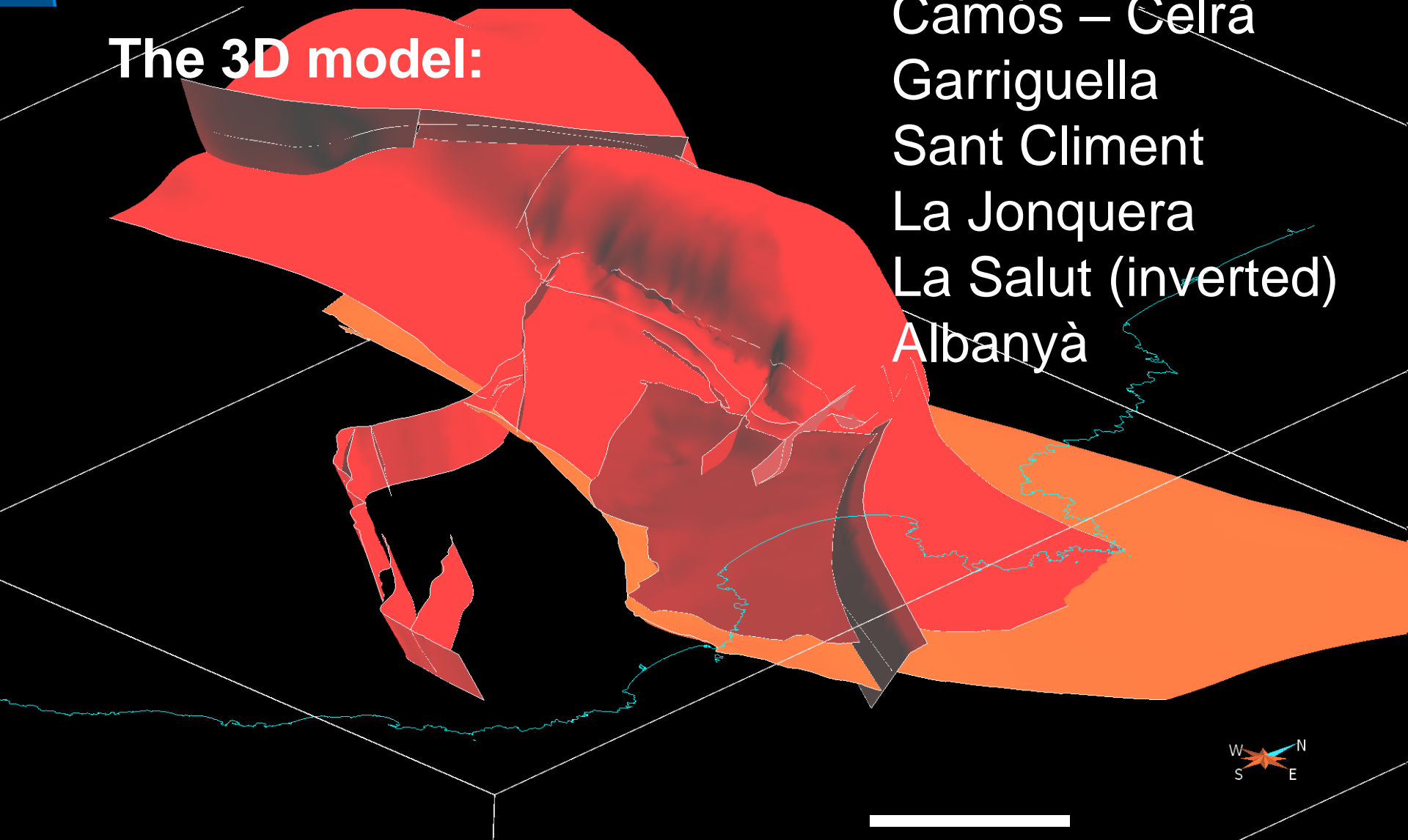


10 km



The 3D model:

Camós – Celrà
Garriguella
Sant Climent
La Jonquera
La Salut (inverted)
Albanyà

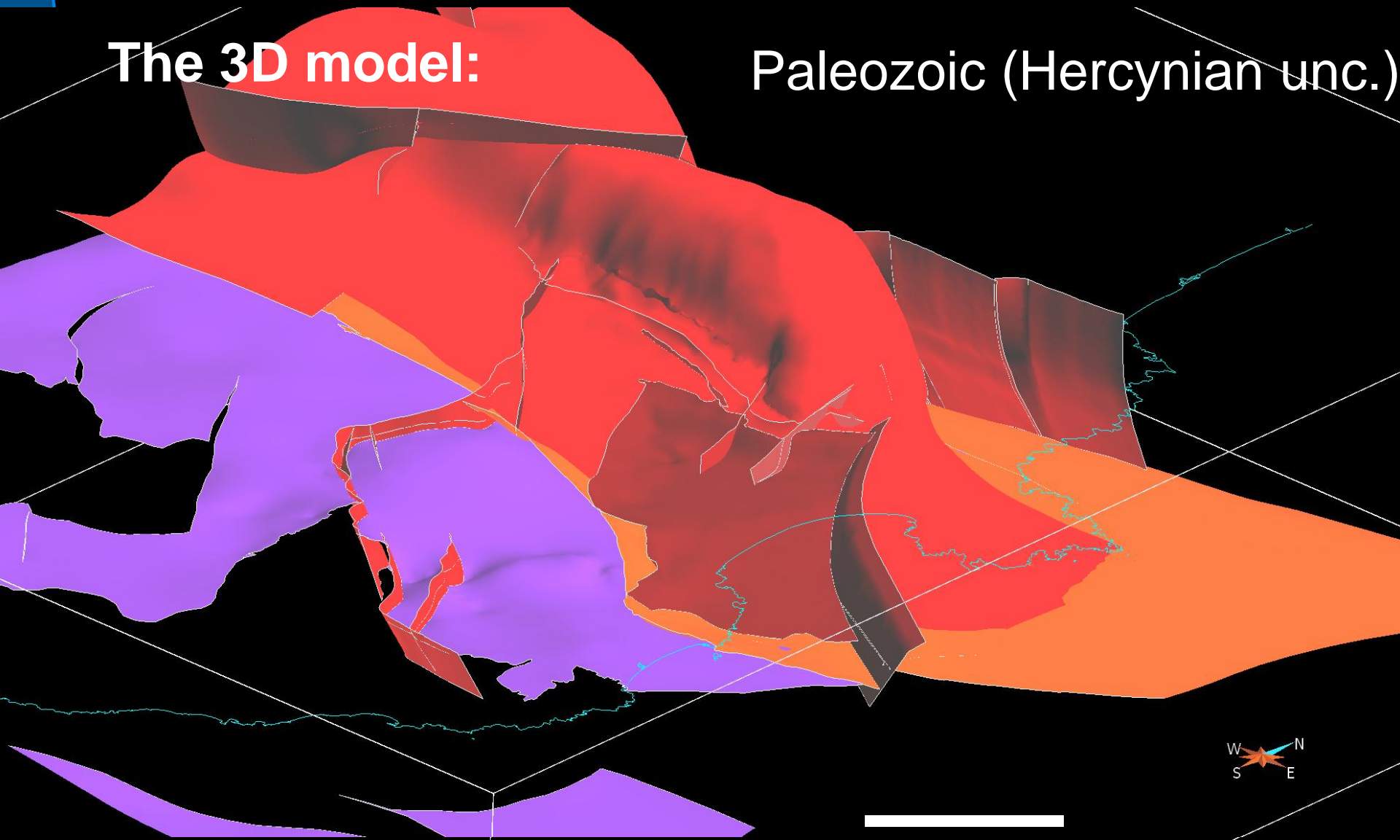


10 km



The 3D model:

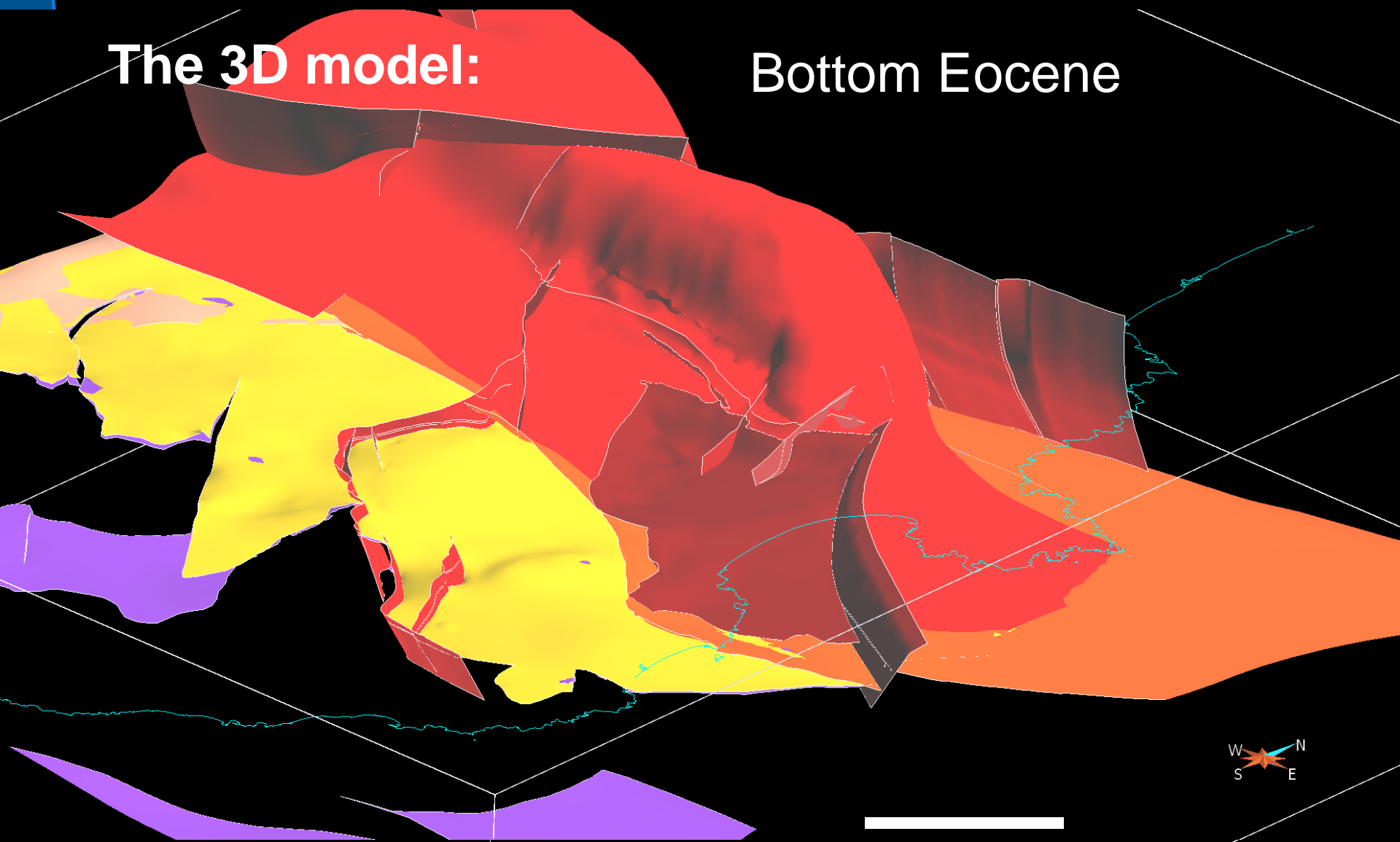
Paleozoic (Hercynian unc.)



10 km

The 3D model:

Bottom Eocene

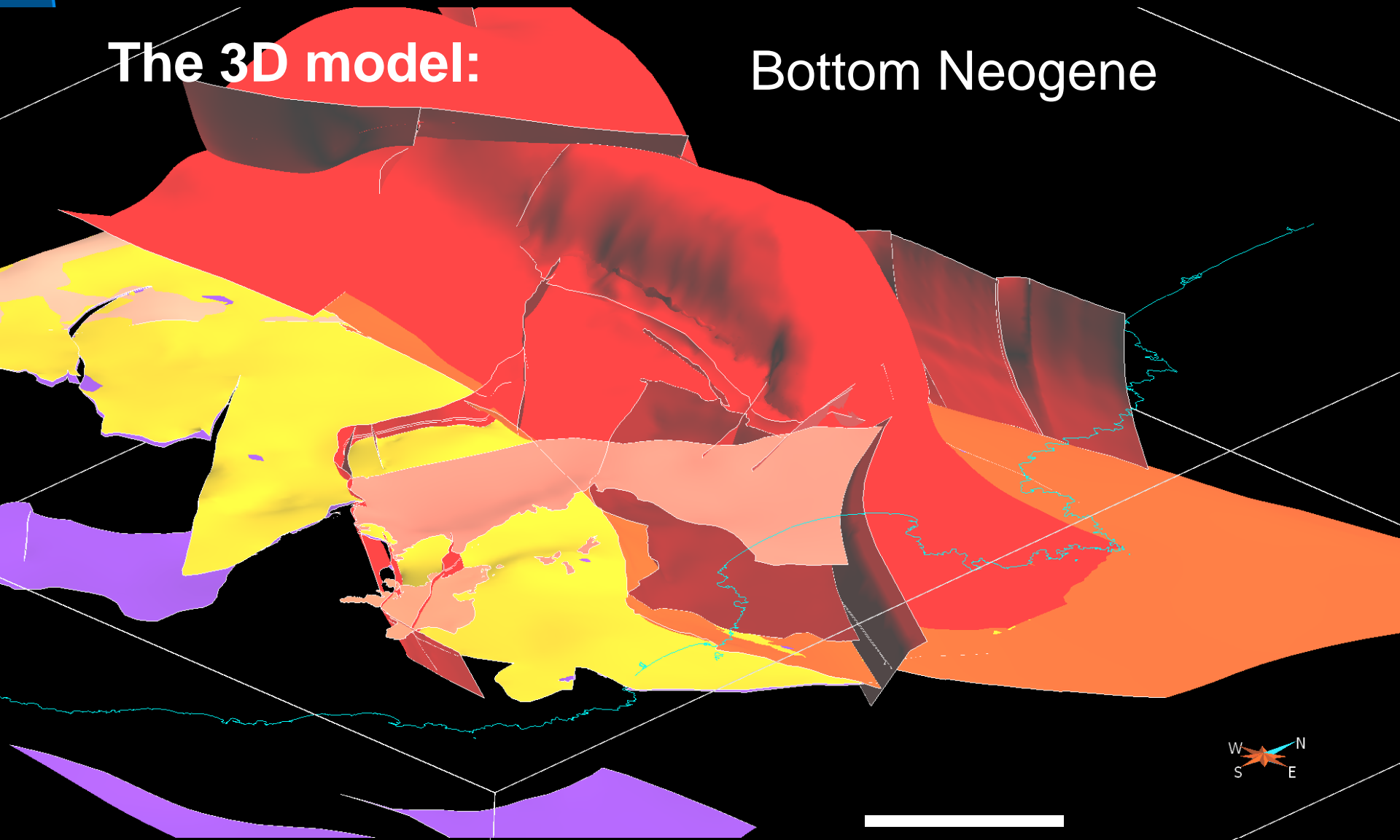


10 km



The 3D model:

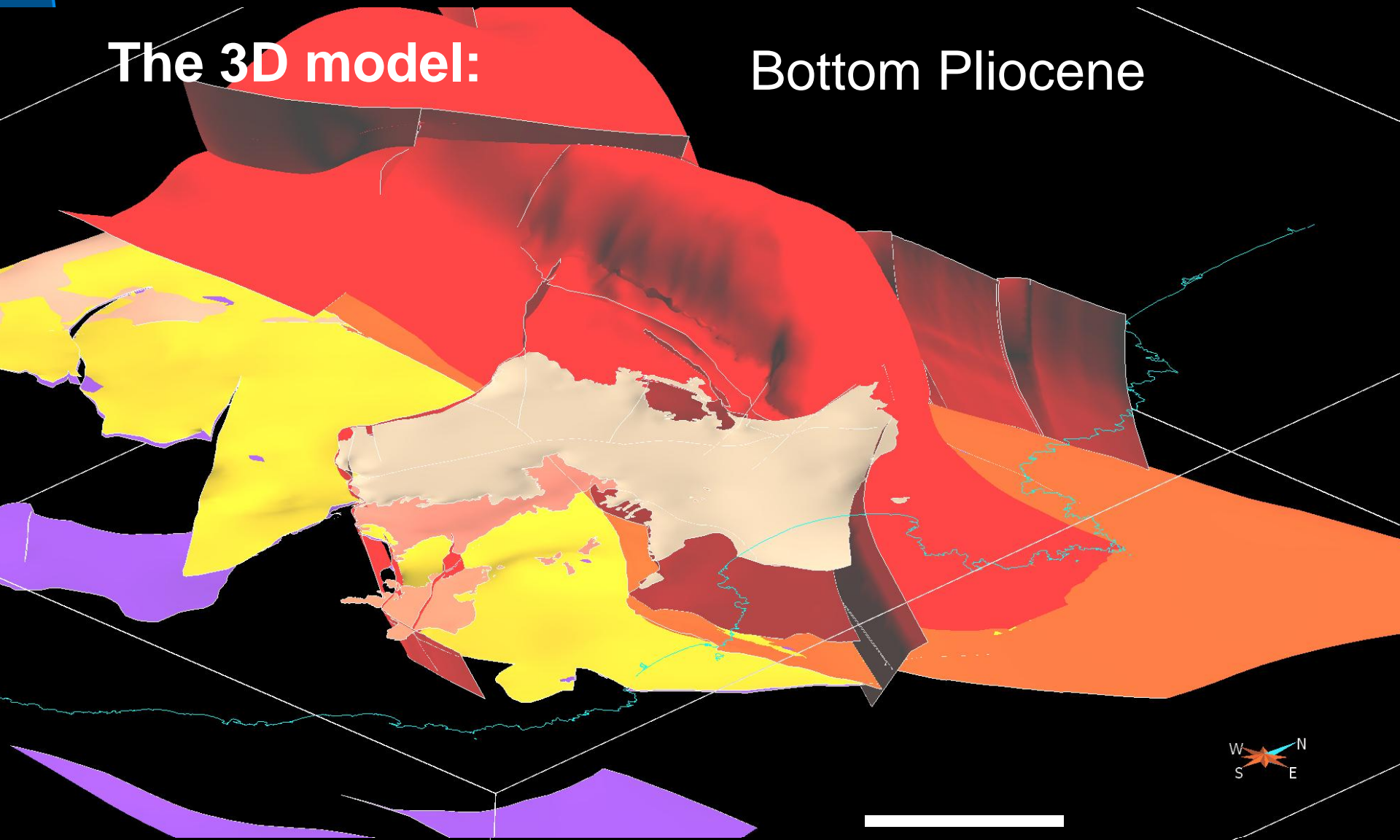
Bottom Neogene



10 km

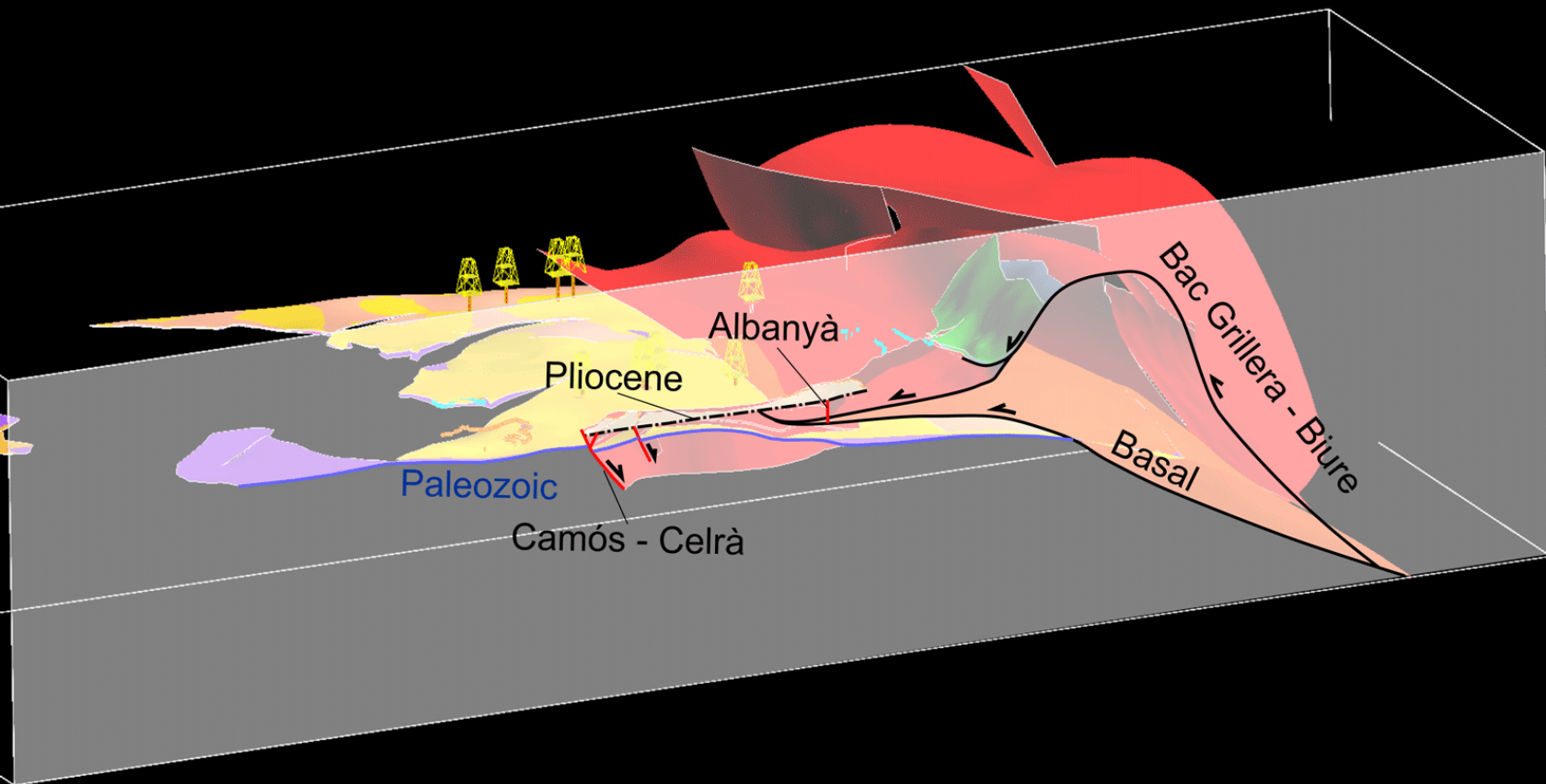
The 3D model:

Bottom Pliocene

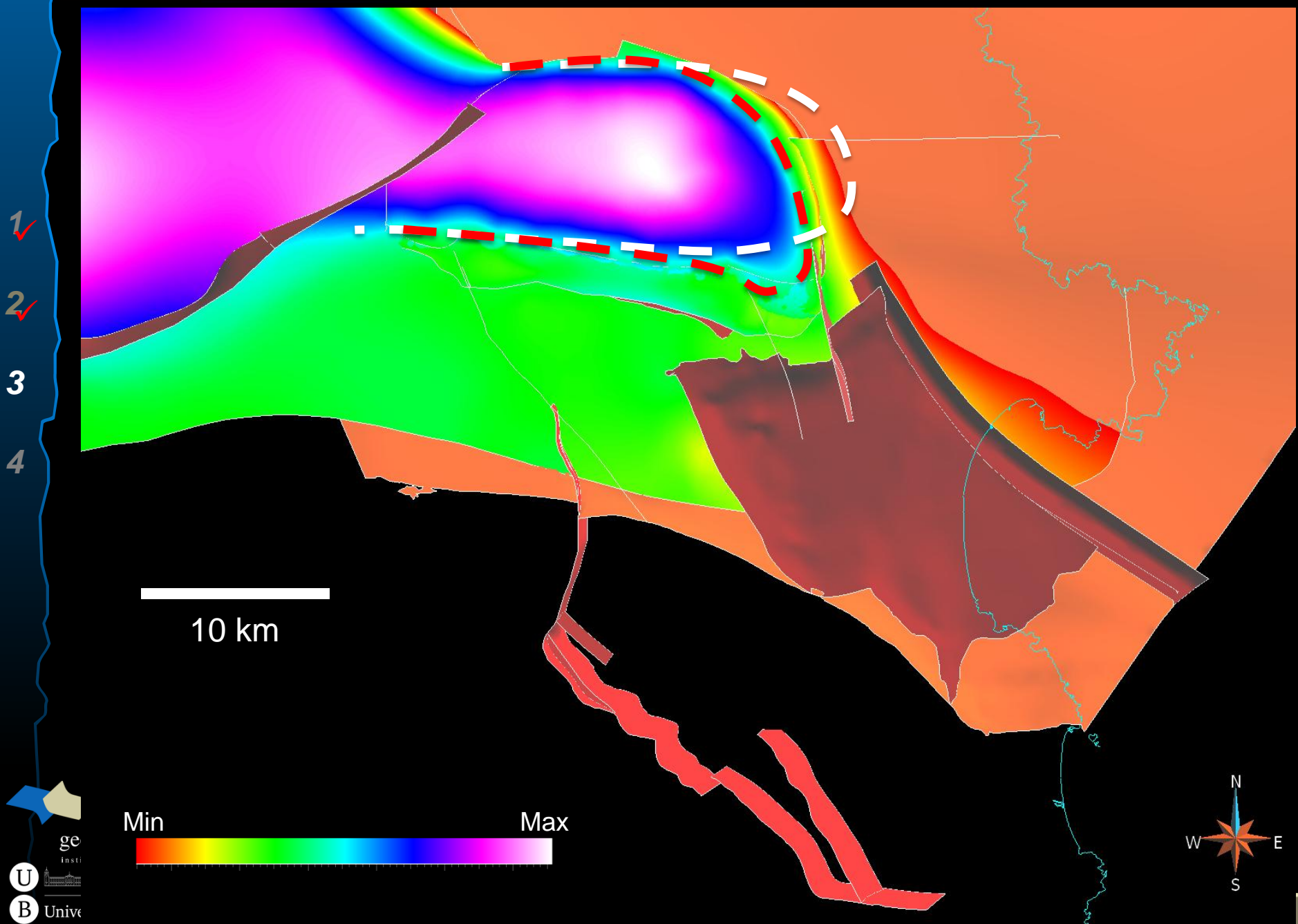


10 km

The 3D model:



3D Model of Empordà Basin



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Conclusions



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- New computer technologies combined with a valid 3-D geological reconstruction methodology, can address the disclosure and understanding geology in a more efficient way.

1 ✓

2 ✓

3 ✓

4



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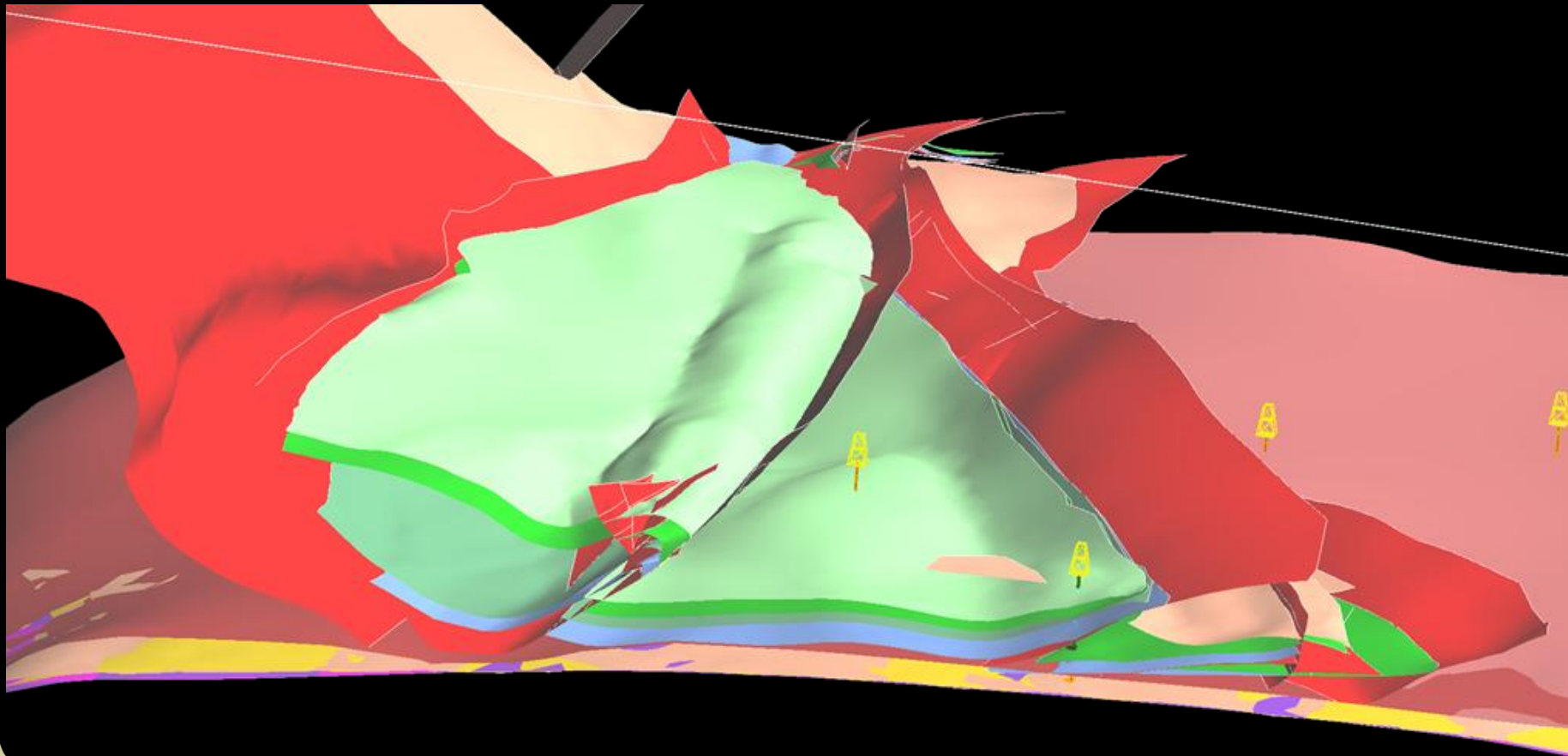


- 1 ✓ • New computer technologies combined with a valid 3-D geological reconstruction methodology, can address the disclosure and understanding geology in a more efficient way.
- 2 ✓ • The use of the described methodology allows to integrate a variety of information with different file format in a common graphic environment. In turn it provides fast and effective access to information and it is valuable to solve data base and geological inconsistencies
- 3 ✓
- 4



- 1 ✓
 - New computer technologies combined with a valid 3-D geological reconstruction methodology, can address the disclosure and understanding geology in a more efficient way.
- 2 ✓
 - The use of the described methodology allows to integrate a variety of information with different file format in a common graphic environment. In turn it provides fast and effective access to information and it is valuable to solve data base and geological inconsistencies
- 3 ✓
 - The proposed 3D model has allowed proposing for the first time a structural model connecting the main thrusts at both sides of the range along their eastern termination. Such termination is characterized by a significant plunge eastward and by dextral oblique faults. These faults tilted and deformed the upper structural units involving Mesozoic successions (Figueres and Bac Grillera-Biure thrust sheets) and were subsequently reactivated at Neogene times by extensional faults.
- 4

Thanks for your attention



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