43rd GNGTS National Conference
Bologna, 11-14 February 2025

Integrated geological modelling for assessing geothermal potential in the Romagna and Ferrara Folds (Italy)

Finanziato dall'Unione europea NextGenerationEU
Ministero dell'Università e della Ricerca
Italiadomani PIANO NAZIONALE DI RIPRESA E RESILIENZA

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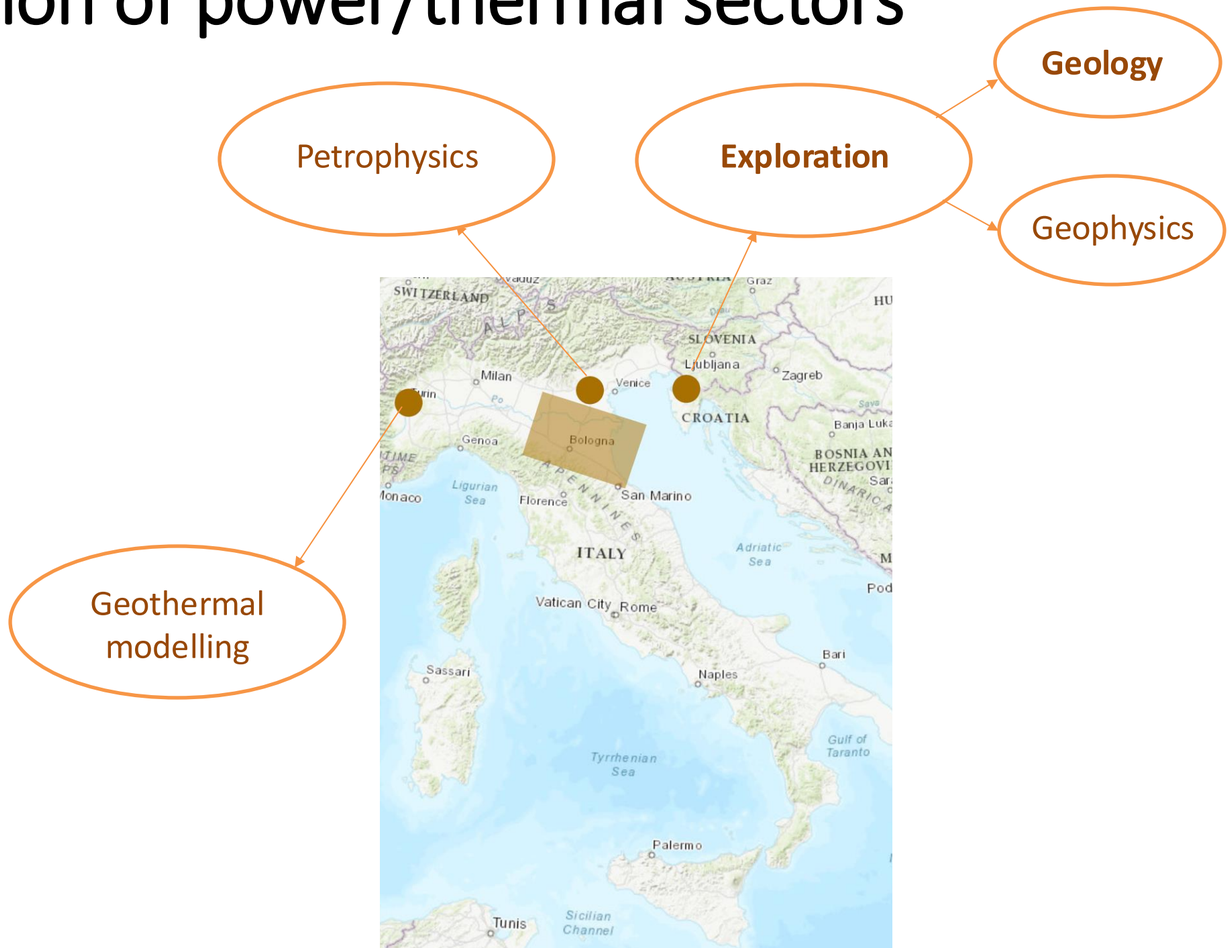
Innovation in GEOthermal resources and reserves potential assessment for the decarbonization of power/thermal sectors

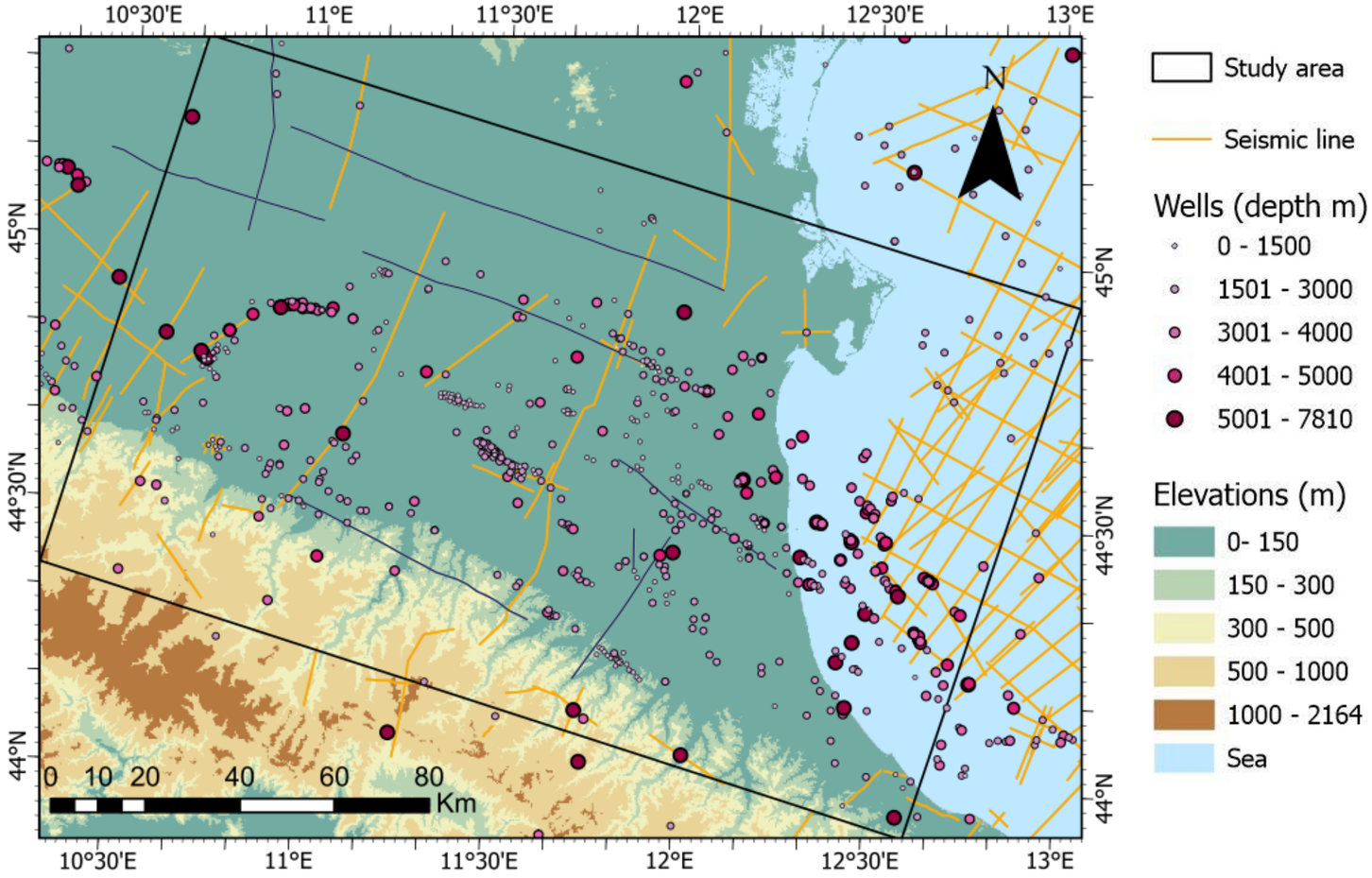
InGEO focuses on developing a method to accurately measure the energy potential of deep geothermal sources.

It is crucial to assess how much energy can be extracted from layers as deep as 10 km regionally (Emilia Romagna) to generate electricity or for district heating.



InGEO is in line with the European Green Deal

Data availability



The study area of the InGEO project on DEM. Location of available seismic lines and wells (colour and size are shown according to their depth).

Sources:

- VIDEPI database (www.videpi.com)

- CNR database

www.geothopica.igg.cnr.it

- ENI support

- Other sources:

-Livani et al. (2023)

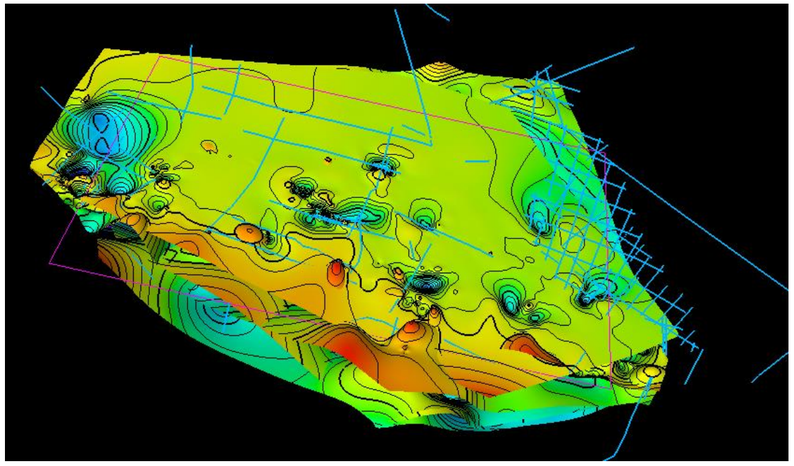
WELLS (1D)

Fm. Tops Lithology

Sonic Logs

SEISMIC REFLECTION LINES (2D)

3D MODEL

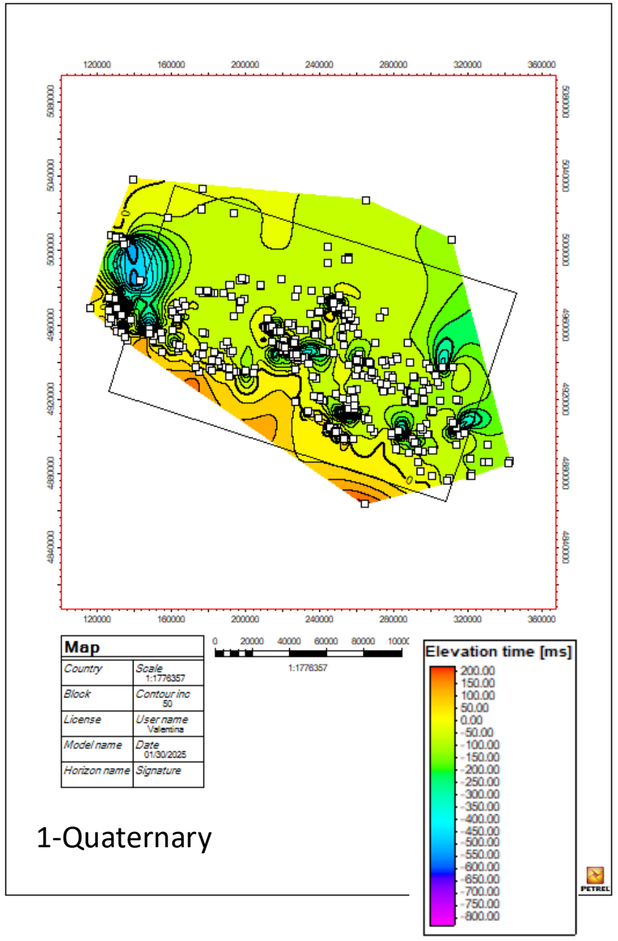


WELLS → Stratigraphic column

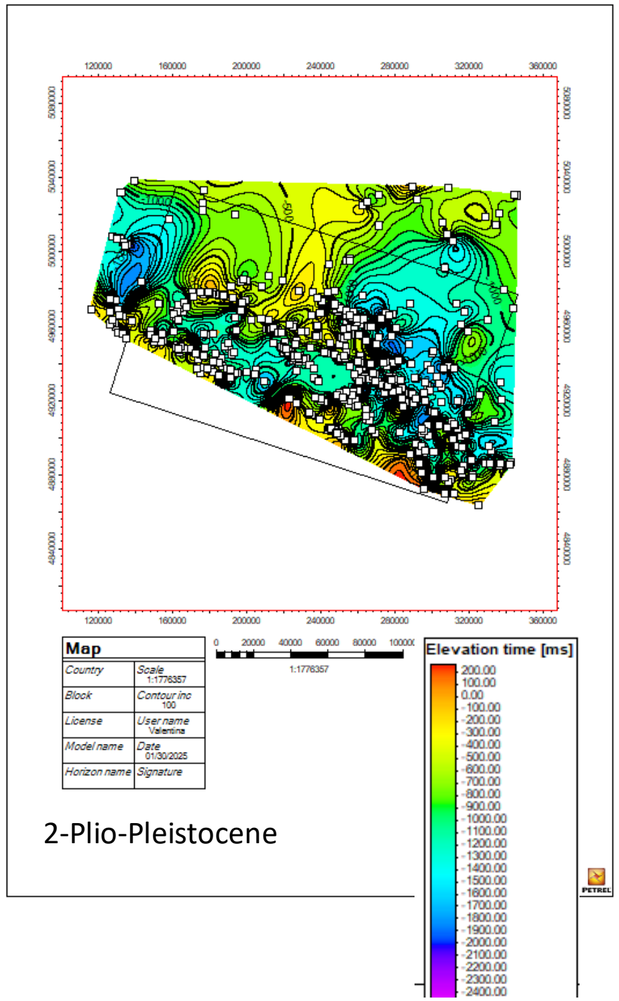
Età	Formazione
QUATERNARIO	DEPOSITI ALLUVIALLI
PLEISTOCENE	SABBIE DI ASTI
PLEISTOCENE	CAROLA
PLEISTOCENE	RAVENNA
PLIOCENE INFERIORE	PORTO GARIBALDI
PLIOCENE INFERIORE	SANTERNO
PLIOCENE INFERIORE	PORTO CORSINI
PLIOCENE INFERIORE	SABBIE DI ERACLEA
MESSINIANO	COLOMBACCI
MESSINIANO	GESSOSO-SOLFIFERA
MESSINIANO	FUSIGNANO
SERRAVALLIANO	MARNOSO-ARENACEA
SERRAVALLIANO	MARNE DI SAN DONA'
MIOCENE MEDIO	SCHLIER
EOCENE	GALLARE
EOCENE	SCAGLIA
CRETACEO	MARNE DEL CERRO
CRETACEO	MAIOLICA
GIURASSICO MEDIO	ROSSO AMMONITICO
GIURASSICO MEDIO	LUMACHELLA A POSIDONIA ALPINA
GIURASSICO INFERIORE	CALCARI GRIGI DI NORIGLIO
CARNICO SUPERIORE	DOLOMIA PRINCIPALE
CARNICO SUPERIORE	FORMAZIONE DI RAIBL
CARNICO SUPERIORE	LEGNARO
CARNICO SUPERIORE	FORMAZIONE DEL CONTRIN
PERMIANO SUPERIORE	FORMAZIONE DI WERFEN
PERMIANO SUPERIORE	CALCARI A BELLEROPHON
PERMIANO SUPERIORE	ARENARIE VAL GARDENA
PERMIANO	VULCANITI ATESINE
DEVONIANO SUPERIORE	BASAMENTO VARISCANO

UNIT	Lithology
1-QUATERNARY	Alluvial deposits
2-PLIO-PLEISTOCENE	Sandstones and shales
3-MIOCENE	Sandstones, Sandy Marls, Marls, Evaporites
4-PALEOGENE	Limestones, Marls
5-CRETACEOUS	Marls, Limestones
6-JURASSIC	Limestones
7-TRIASSIC	Dolostones
8-PERMIAN	Sandstones
9-IGNEOUS/METAM. BASEMENT	Igneous and metamorphic rocks

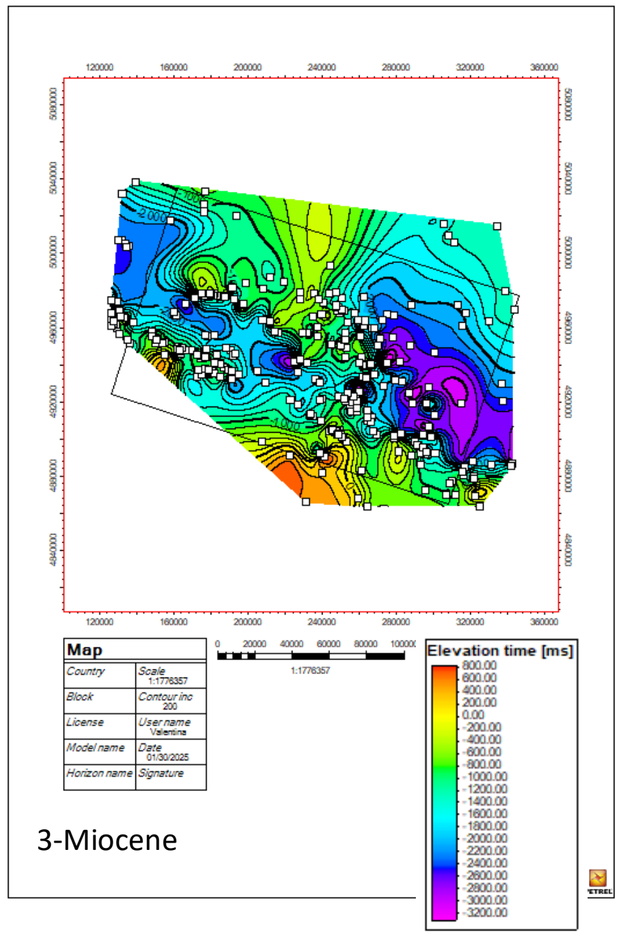
Well Tops interpolations



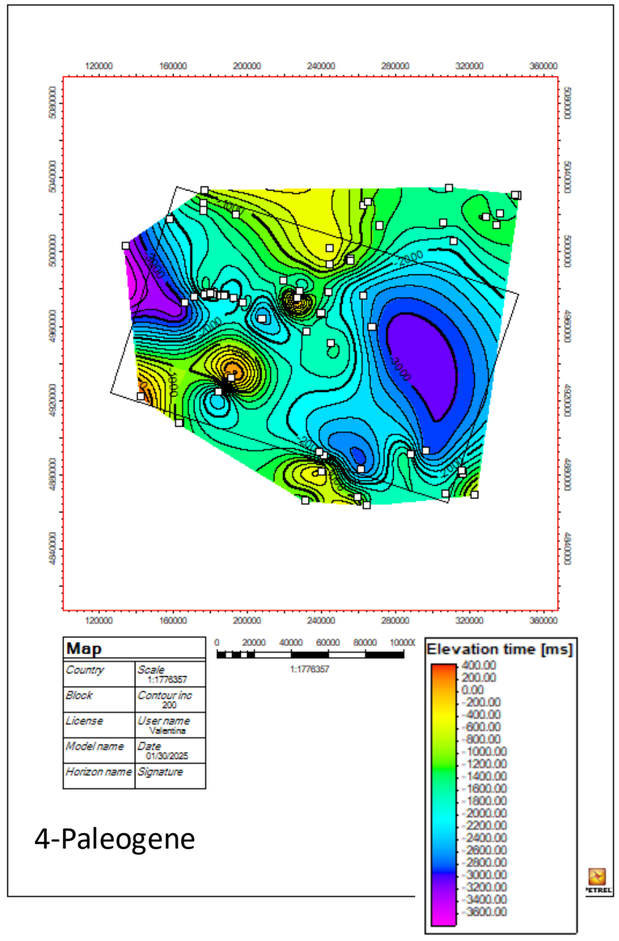
1-Quaternary



2-Plio-Pleistocene

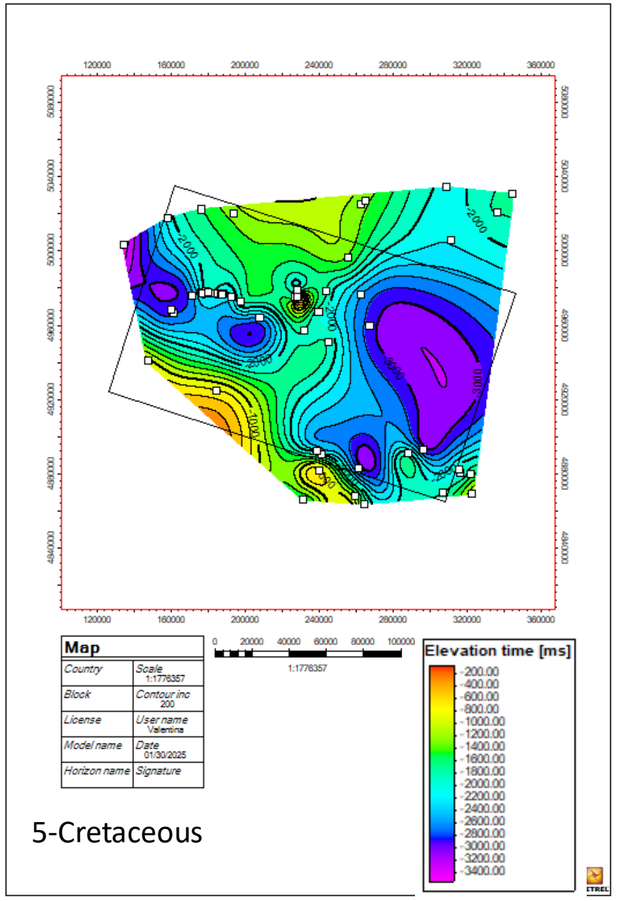


3-Miocene

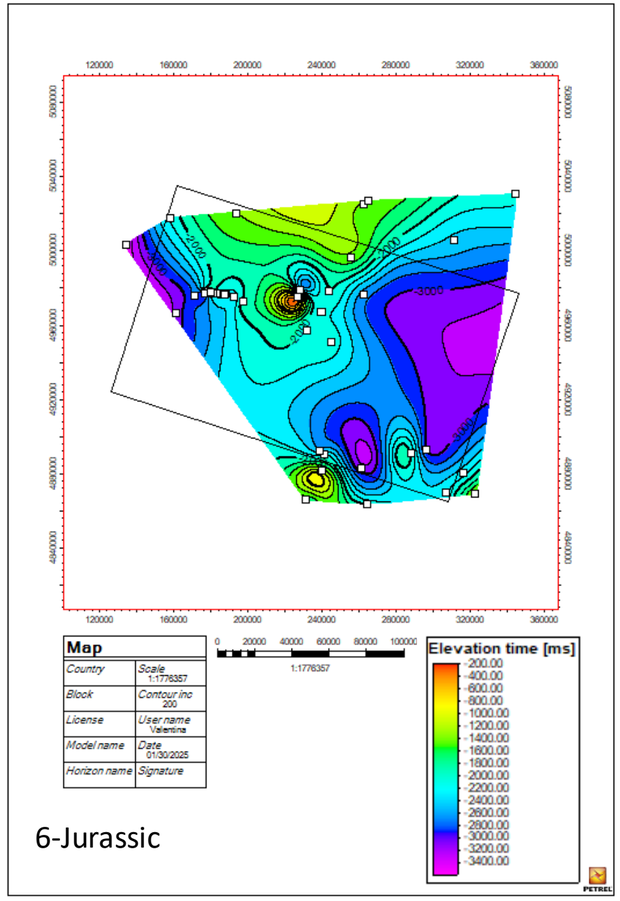


4-Paleogene

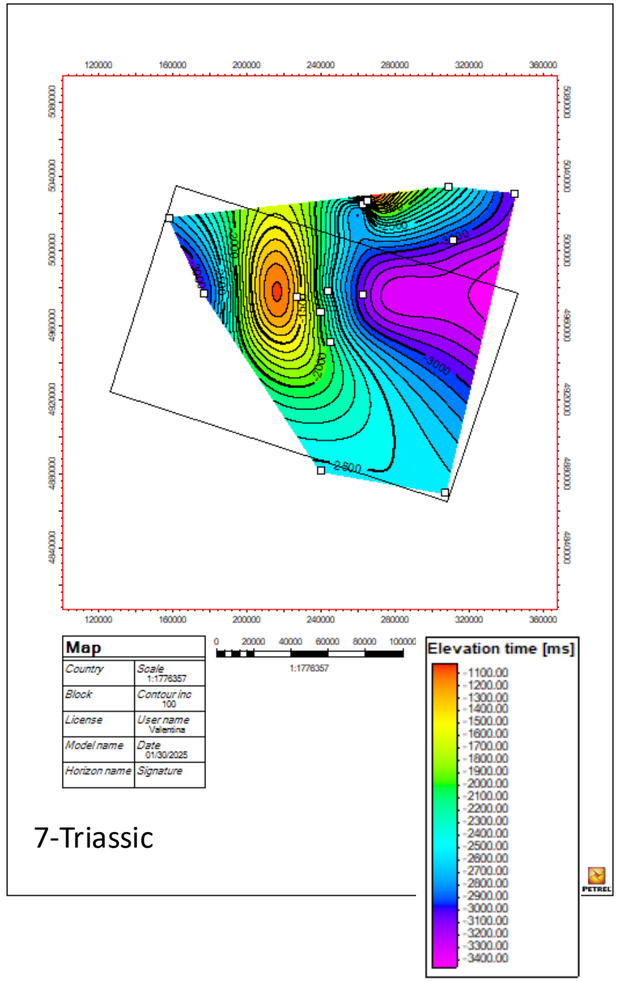
Well Tops interpolations



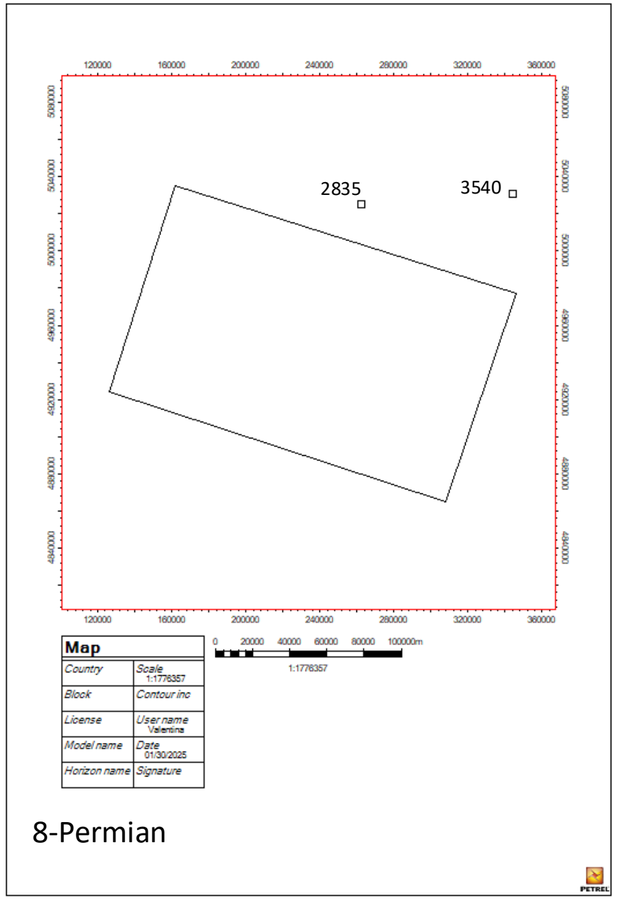
5-Cretaceous



6-Jurassic

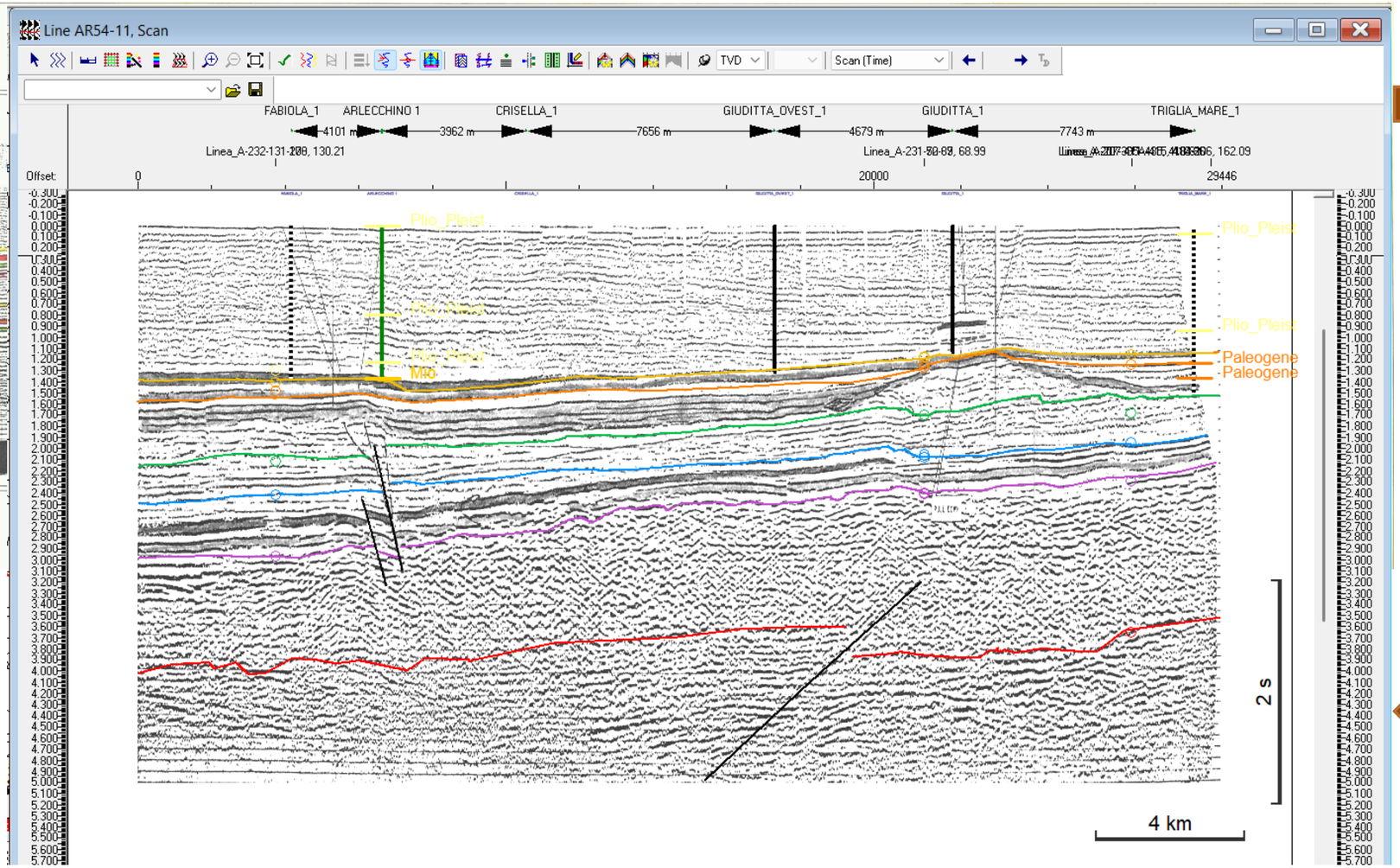


7-Triassic



8-Permian

Seismic lines



PDF to JPEG

JPEG manual cropping and straightening

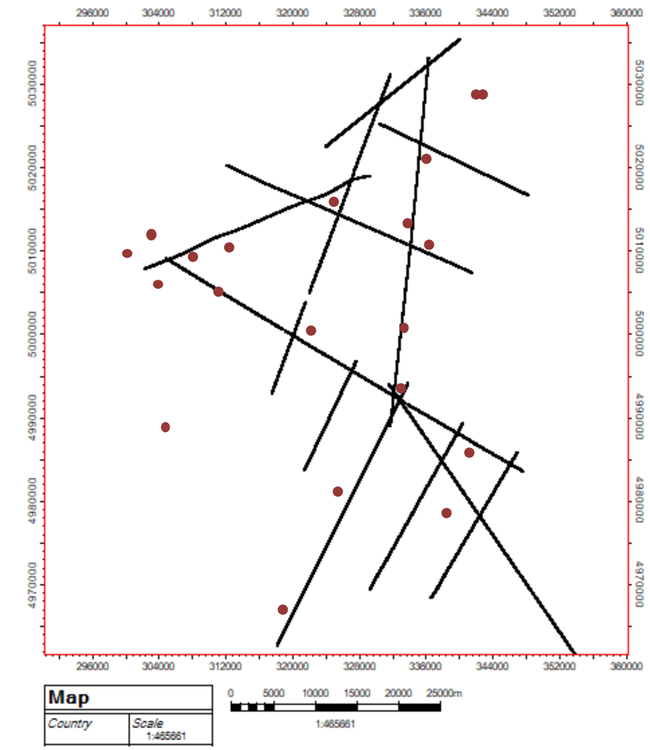
SEGY conversion

kogeo seismic toolkit 2.7

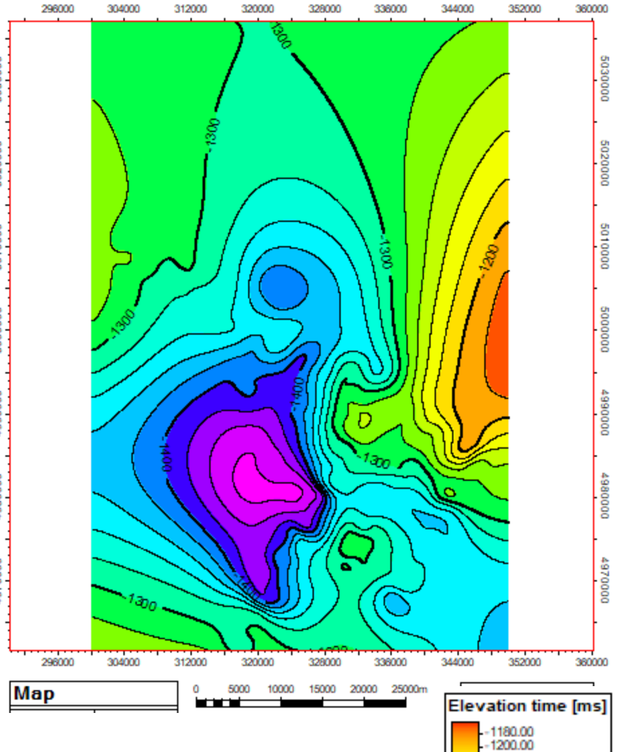
Georeferentiation

IHS™ Kingdom®

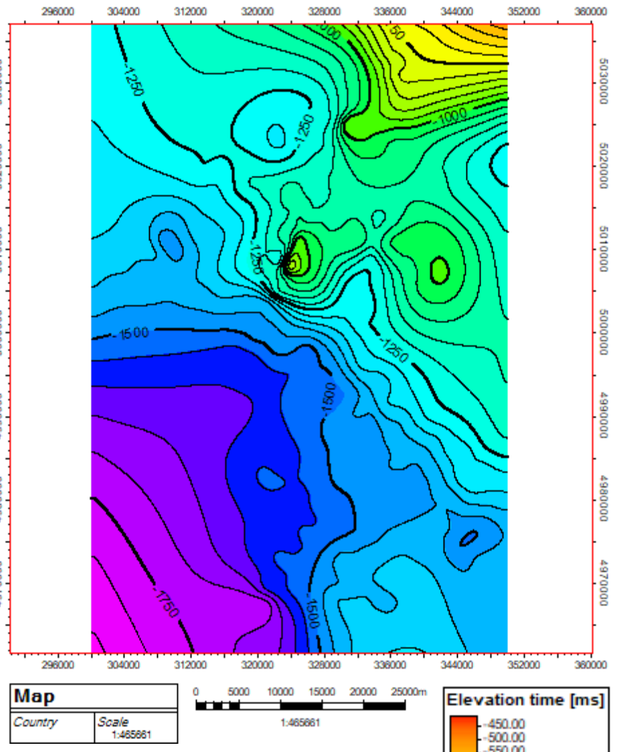
Depth surfaces for each unit



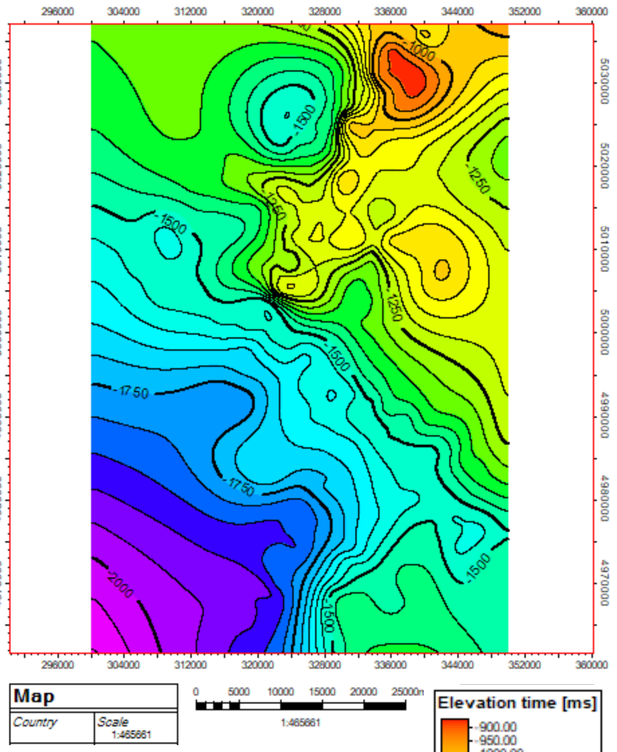
Seismic lines



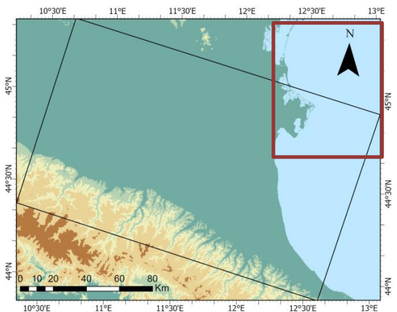
2- Plio-Pleistocene



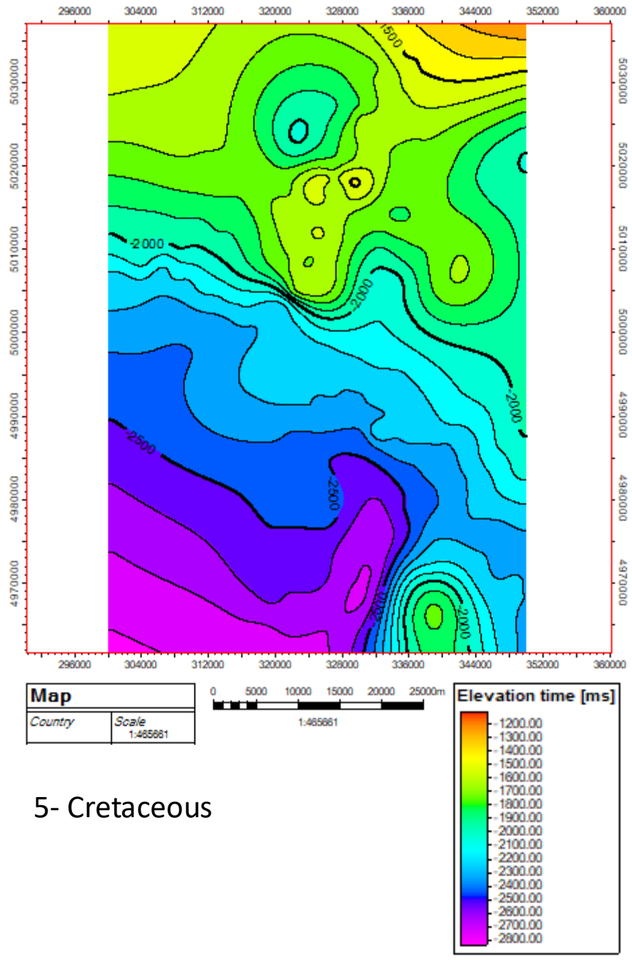
3-Miocene



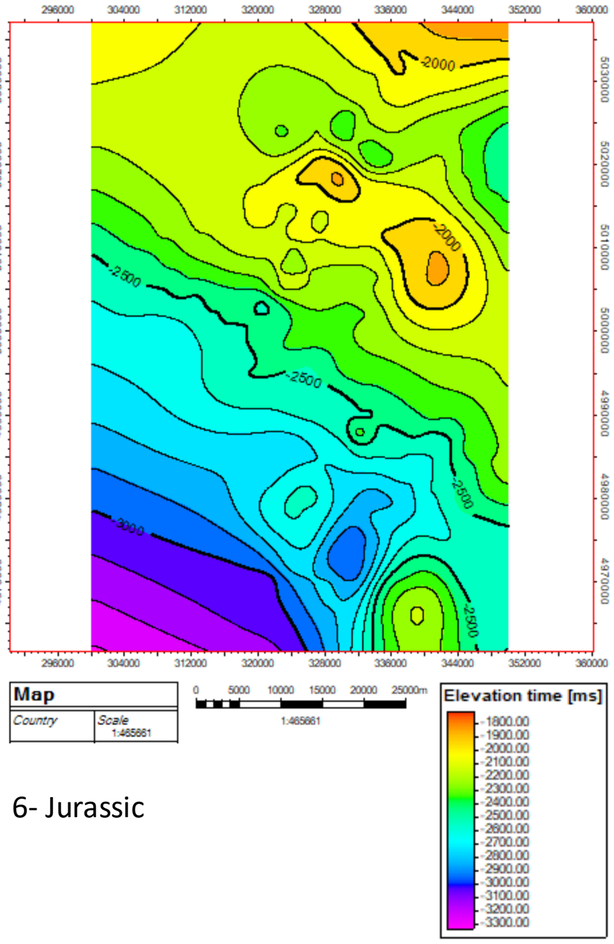
4-Paleogene



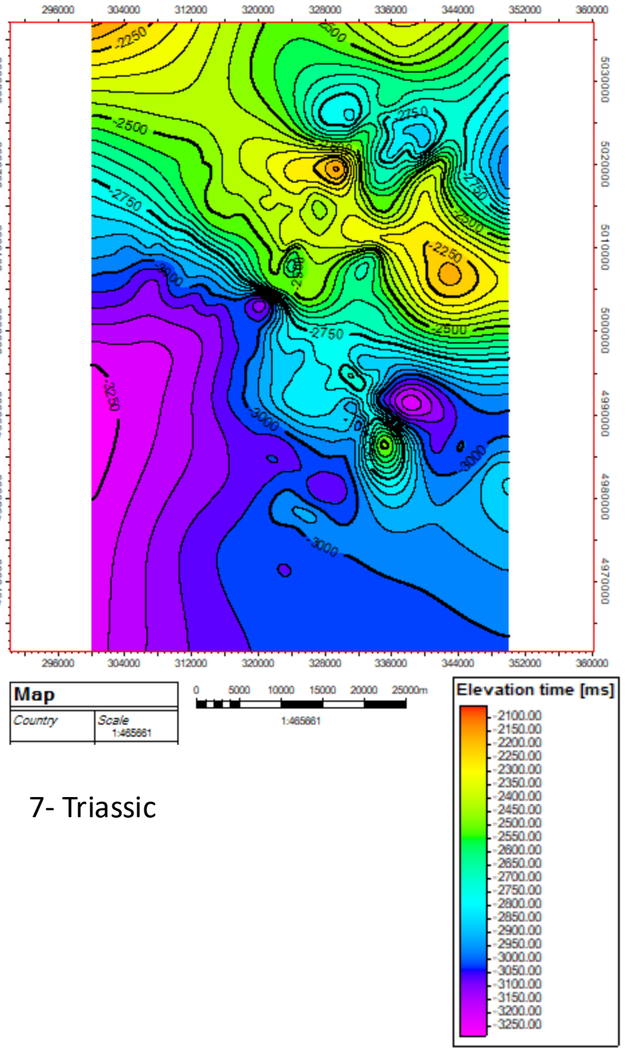
Depth surfaces for each unit



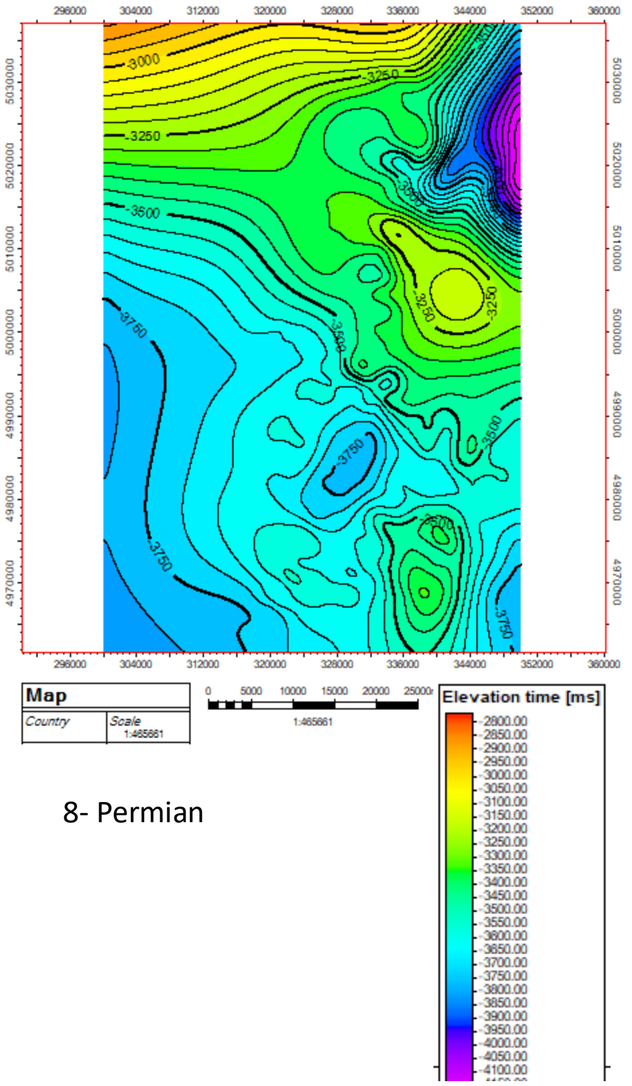
5- Cretaceous



6- Jurassic



7- Triassic



8- Permian

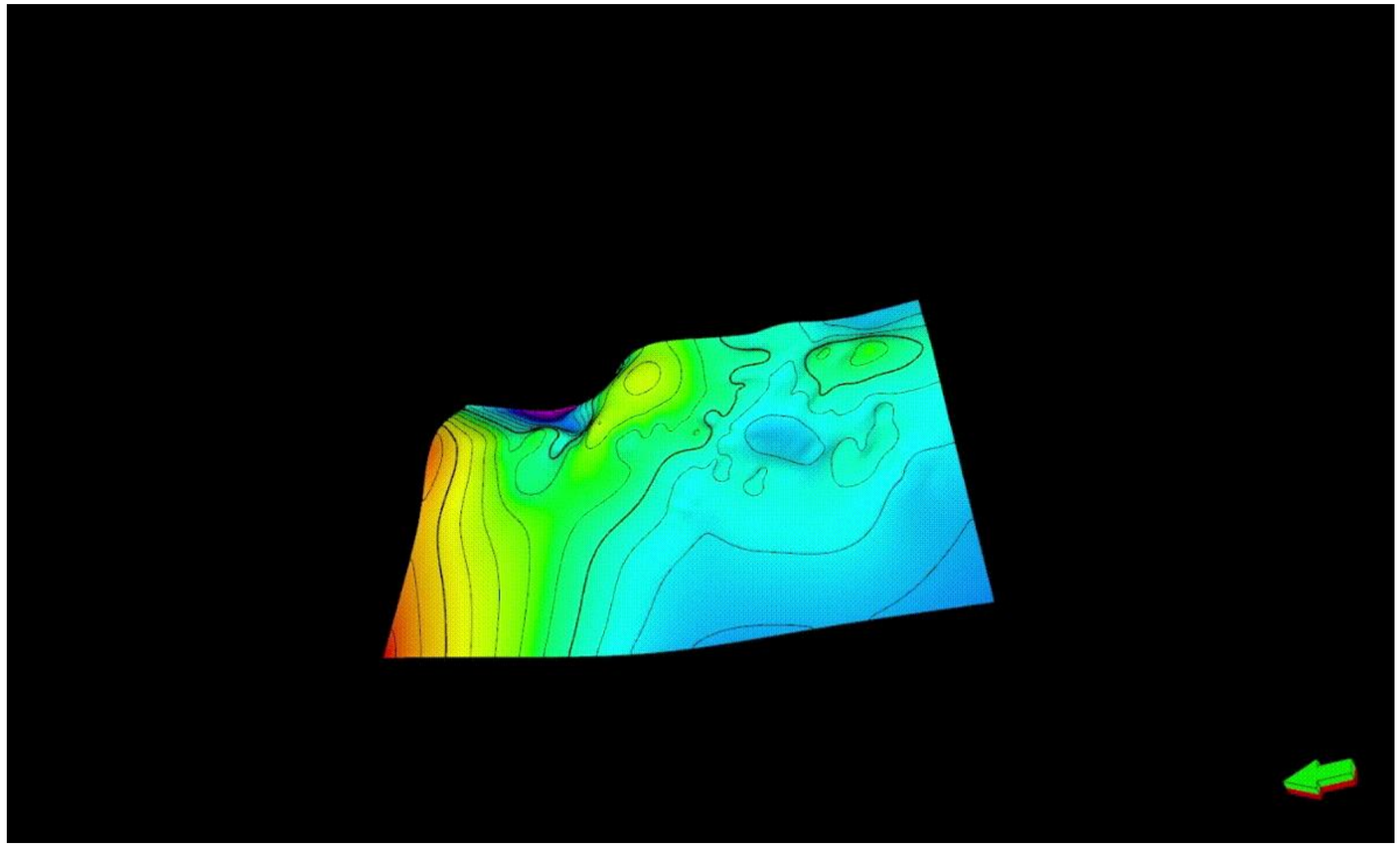
Conclusions and outlook

- We achieved a consistent method for correlating seismic surveys with well tops and creating a 3D model.

- The work in the test zone will be extended to the complete study area.

- The 3D model with the incorporation of lithologies and thermal properties will allow a robust basin characterization.

- The results will be used as input for the thermal model to evaluate the deep geothermal potential of the area.



InGEO is a PRIN 2022 PNRR Project and has received funding from the European Union, Next Generation EU

Thank you for your attention

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