PilotSTRATEGY

ERE3.1 Secure subsurface storage for future energy systems

Instituto Geológico y Minero de España CSIC

Subsurface characterization of geological CO2 storage sites from gravity, passive seismic and seismic data; a case study from the southern Ebro basin (Spain)

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Introduction: PilotSTRATEGY

- **PilotSTRATEGY** (*CO2 geological pilots in strategic territories*) is investigating geological CO_2 storage sites in industrial regions of Southern and Eastern Europe to support CCS.

- 5 years; 16 research partners from 7 countries (FR, PT, SP; GR, PL; GE; & UK)
- Focus on deep saline aquifers (DSA)
- Final goal: pre-FEED studies for CO_2 storage with a multidisciplinary approach: geological, technical, environmental, economic, social and legal aspects.
- Ebro Basin (Spain): two structures; Lopin (onshore) and another offshore. Only one after Oct22
- First step: a detail 3D characterization of storage sites and storage complexes, based on sedimentology, structural geology and initial field stress.

(1) Paris Basin, FR; (2) Lusitania Basin, PT; (3)Ebro Basin, SP; (4) West Macedonia, GR; (5) Upper Silesia, PL; (6) Fraunhofer, GE; (7) SCCS & Uni of Edinburgh, UK

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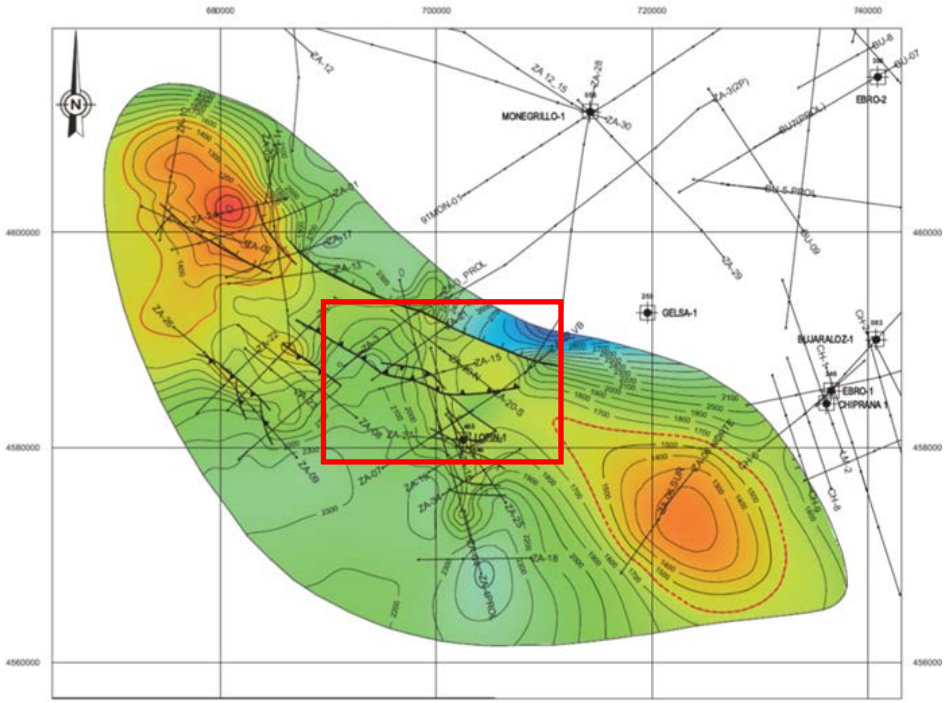
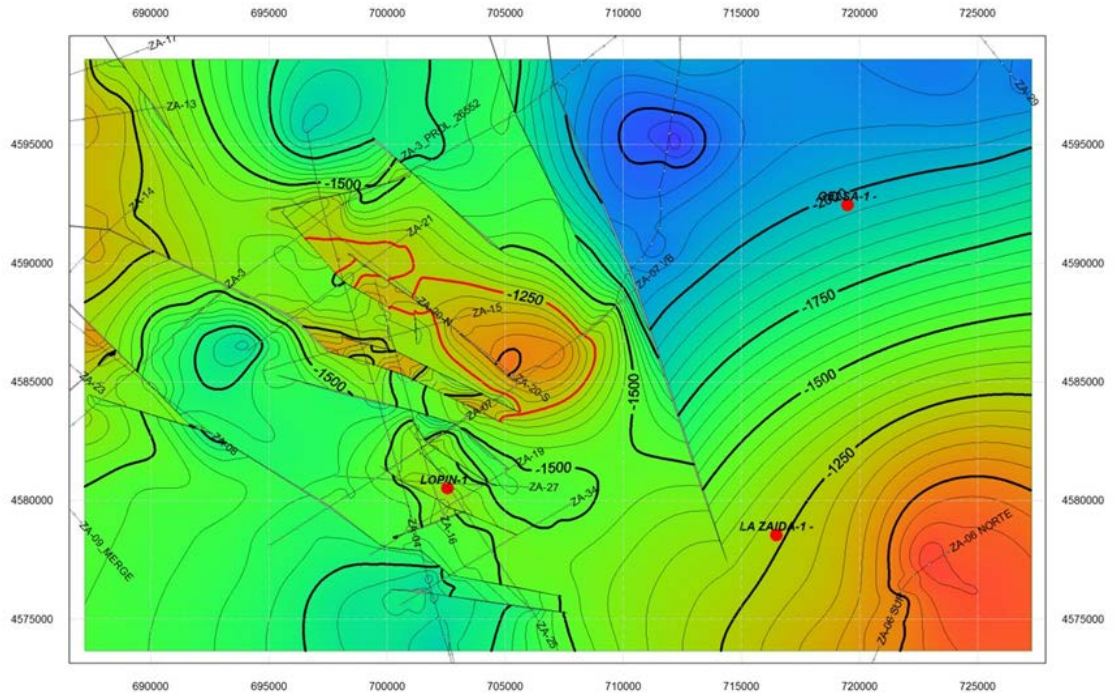
www.pilotstrategy.eu

ALGECO2 project

The two phases program ALGECO2 identified 103 onshore deep saline aquifers as potential CO_2 storages (Arenillas et al., 2014). LOPIN was selected for pilotSTRATEGY based on existing data and high CO_2 storage potential.



1ª phase (2009/10)

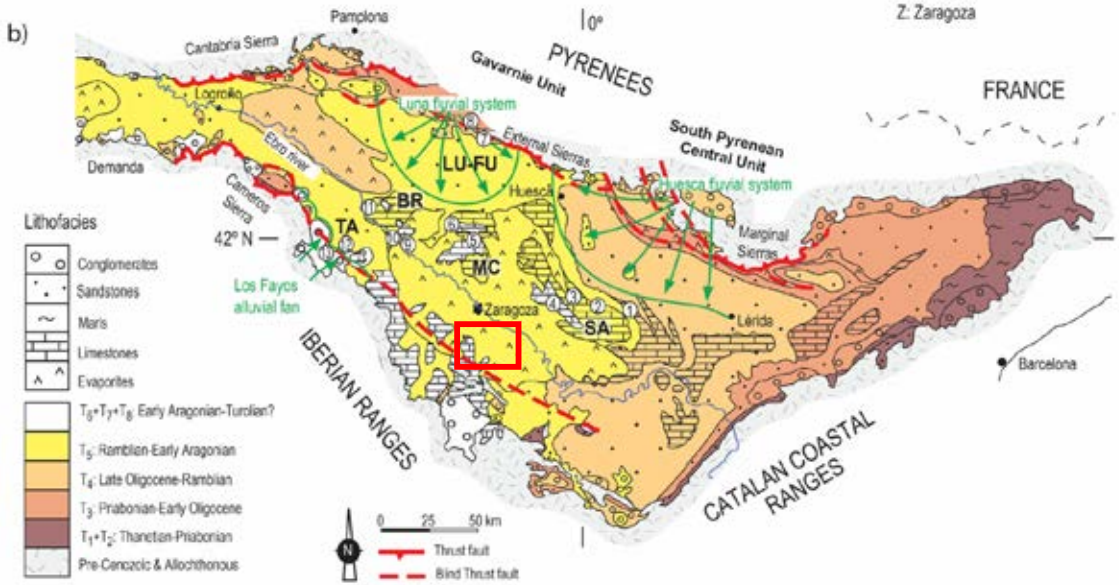


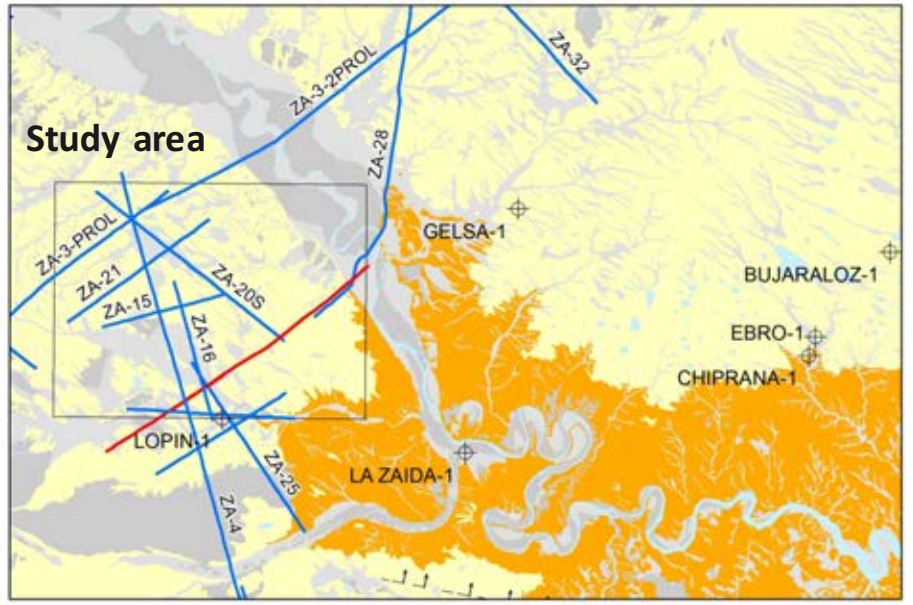
2ª phase (2012/14)

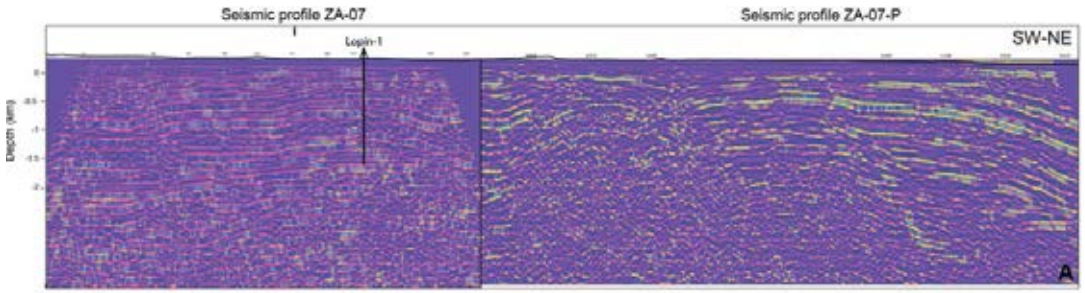
Arenillas, A., Mediato, J. F., García Crespo, J., et al. 2014. Atlas de estructuras del subsuelo susceptibles de almacenamiento geológico de CO2 en España . ISBN: 978-84-7840-935-8; 211 pp.

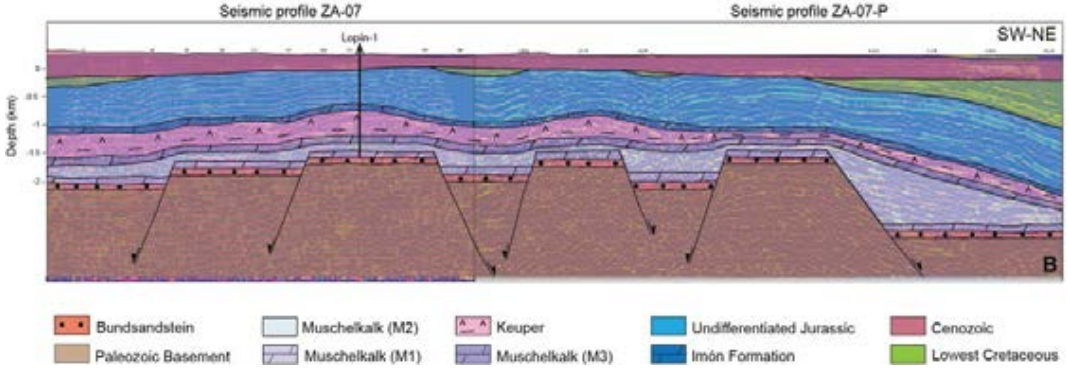
Geological setting

Vintage seismic and exploration wells

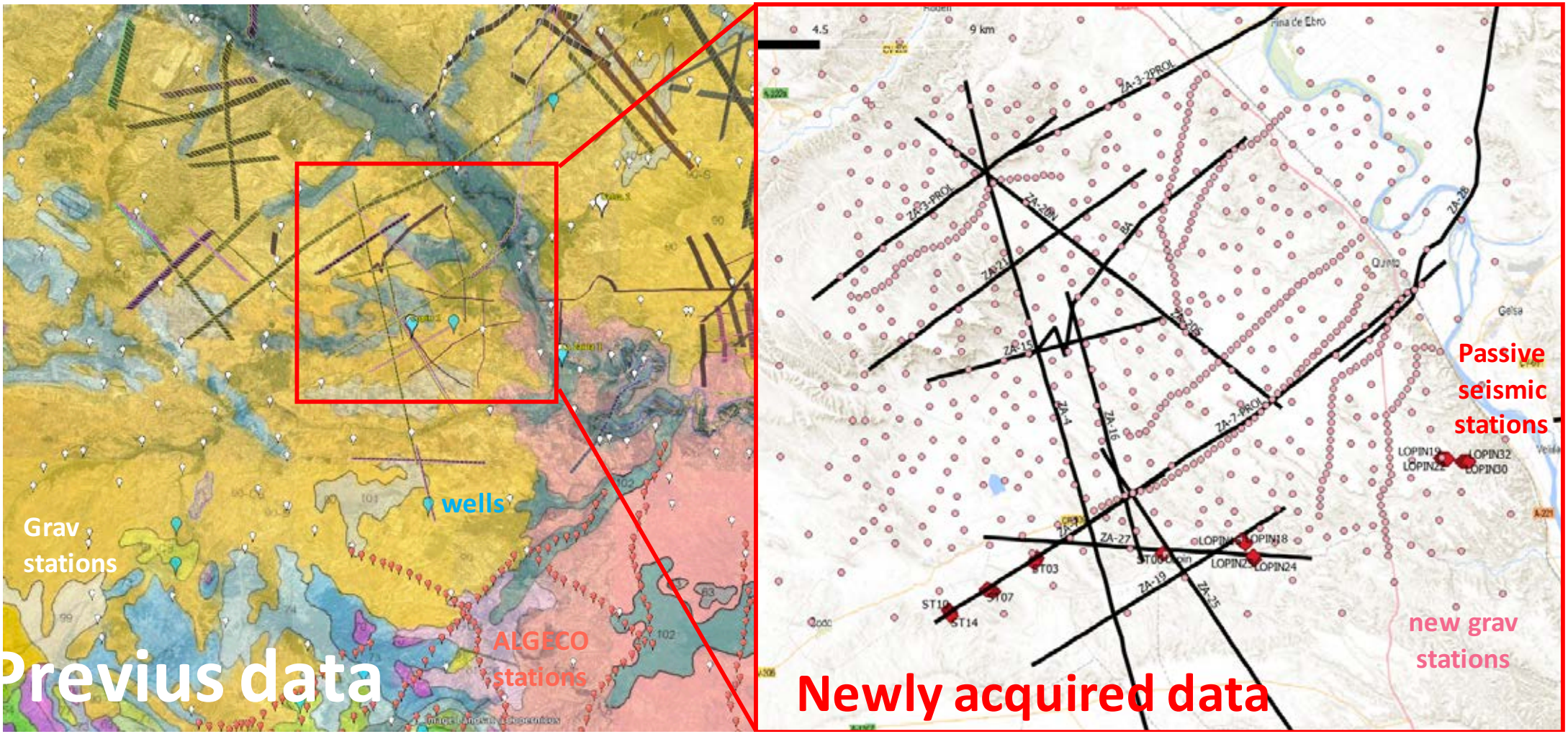




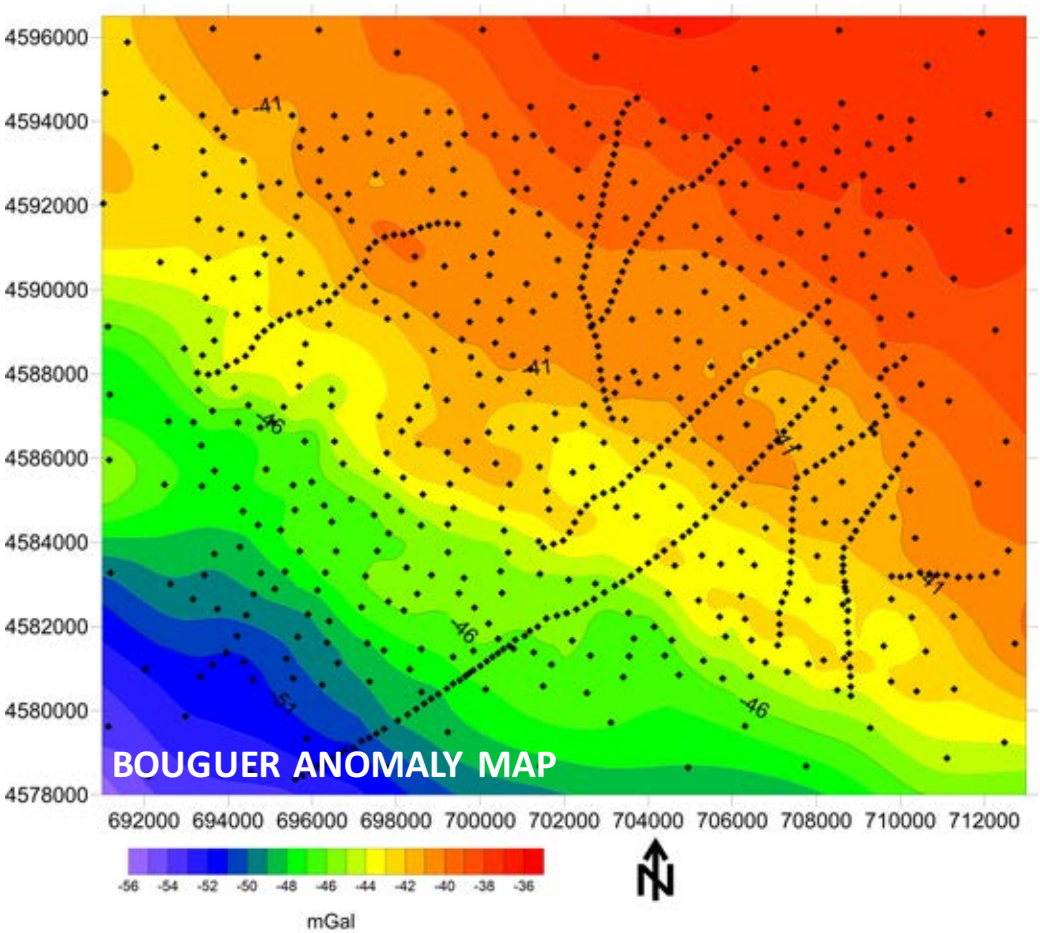


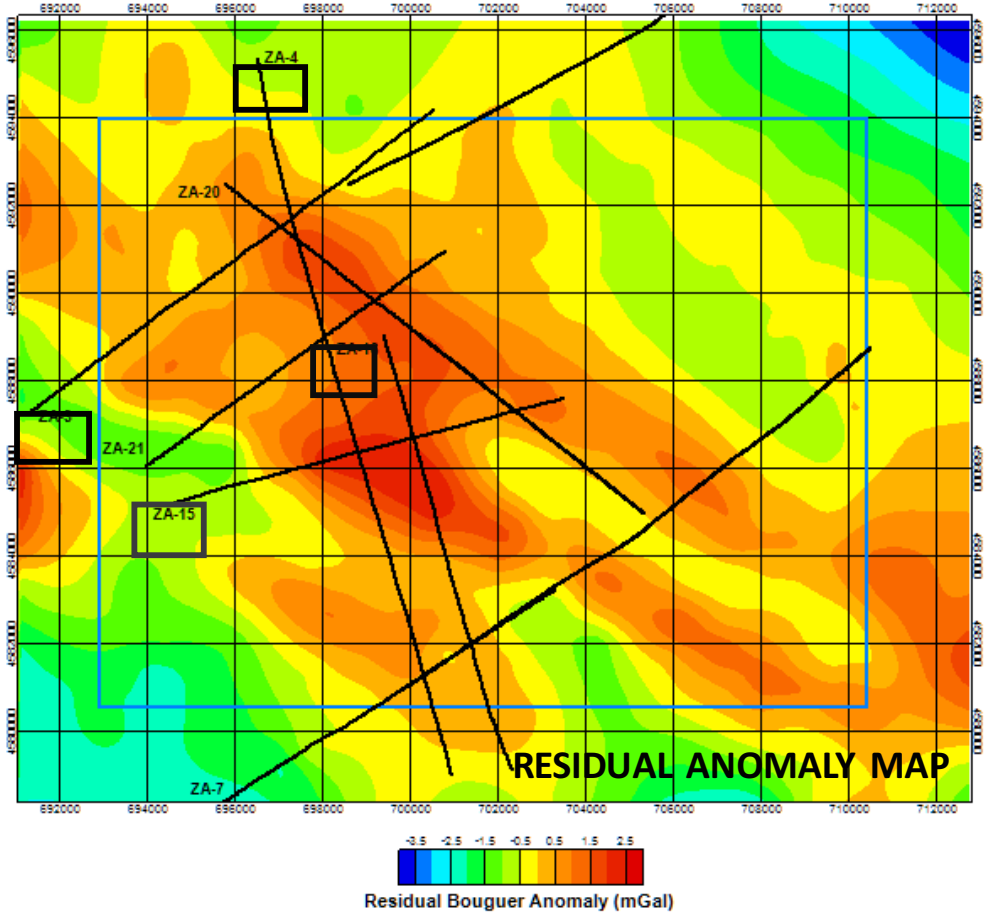


New gravimetric and PS stations



New gravity data

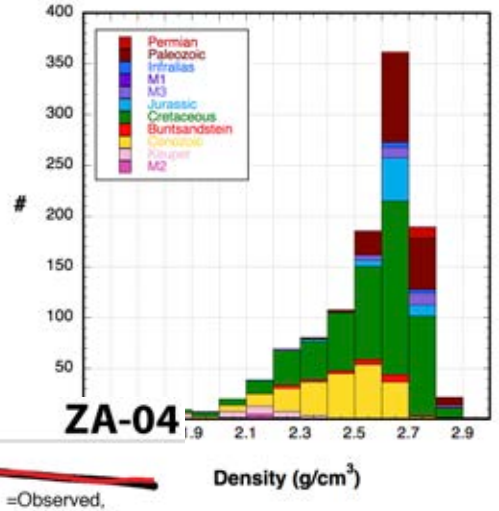


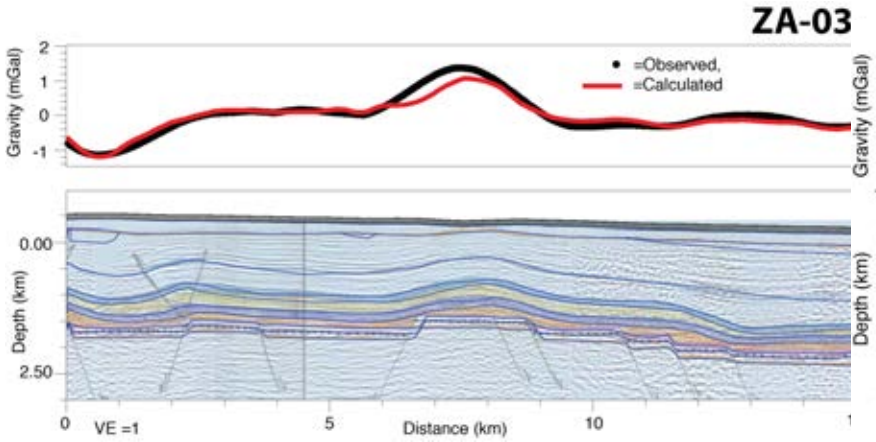


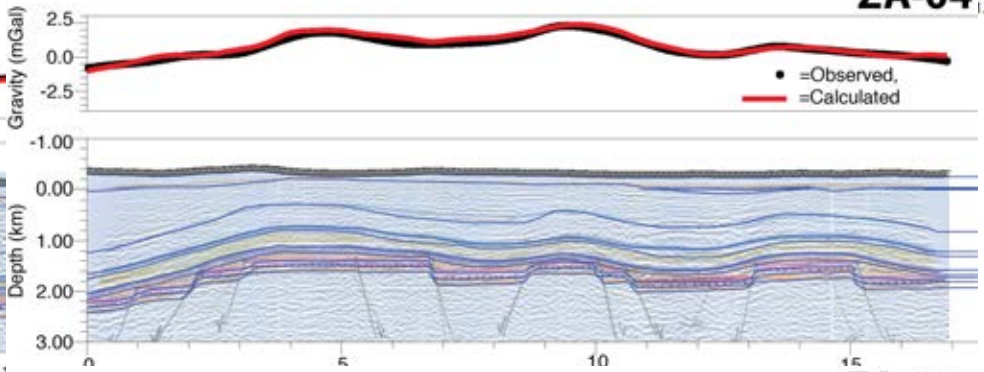
7 gravity constrained cross sections

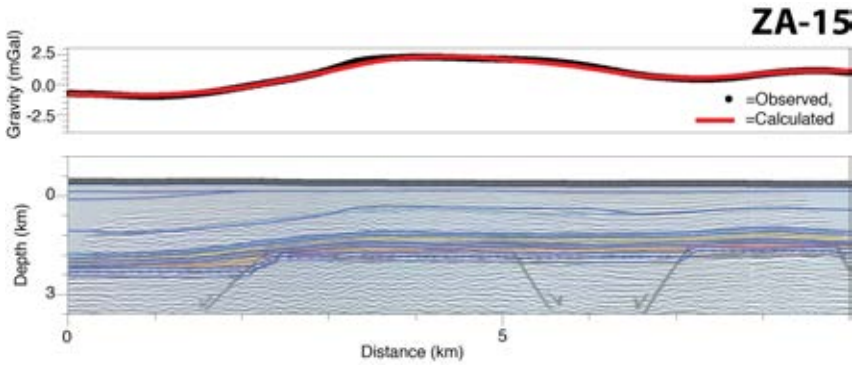
New geophysical data: Gravity forward modelling

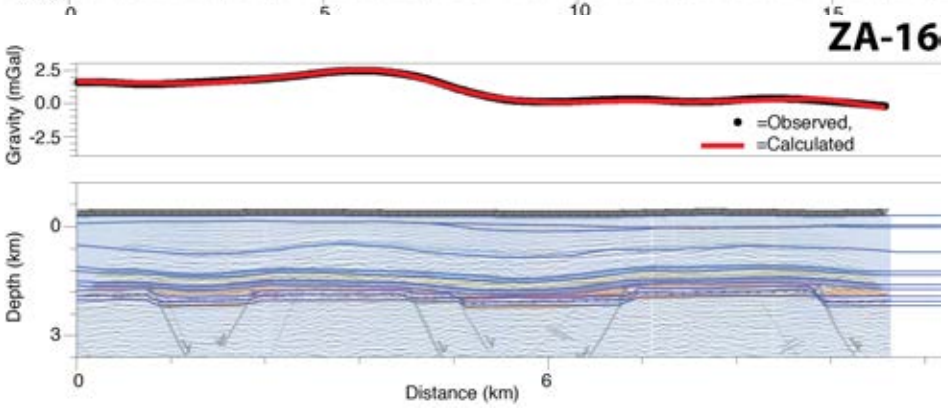
Petrophysics









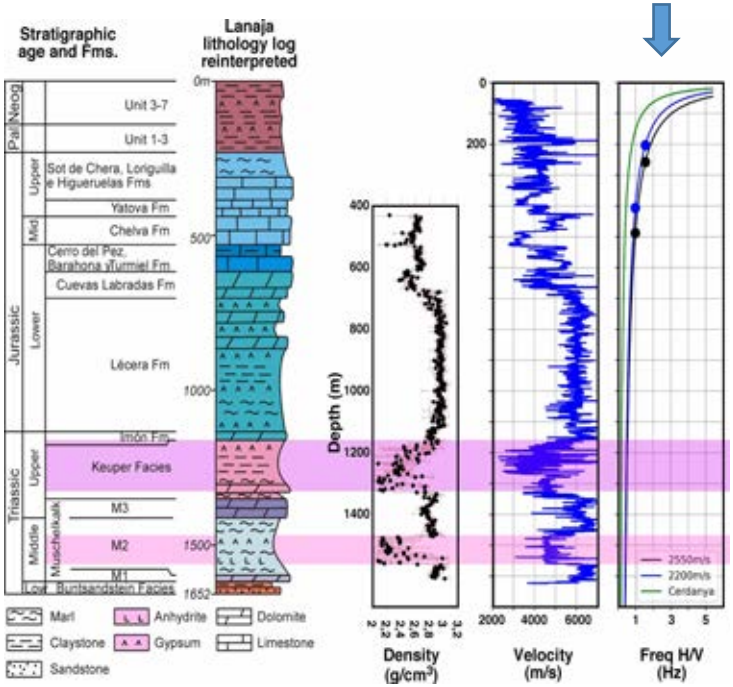


New geophysical data: Passive Seismics

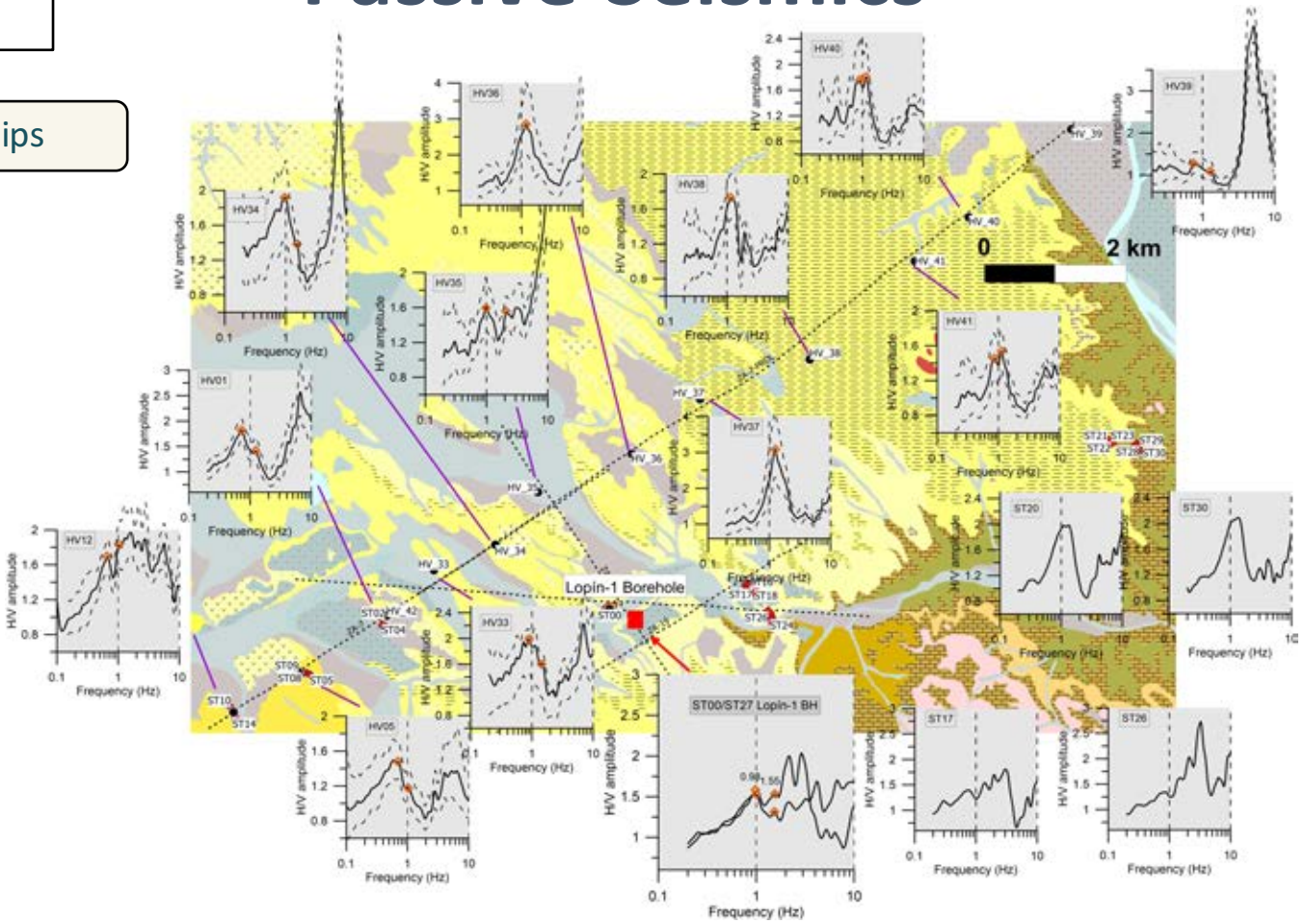
Horizontal-to-Vertical Spectral ratio method

- Frequencies corresponding to H/V maxima indicate seismic impedance contrast (f_r)
- Shear-wave velocity profile is required to convert frequency to depth

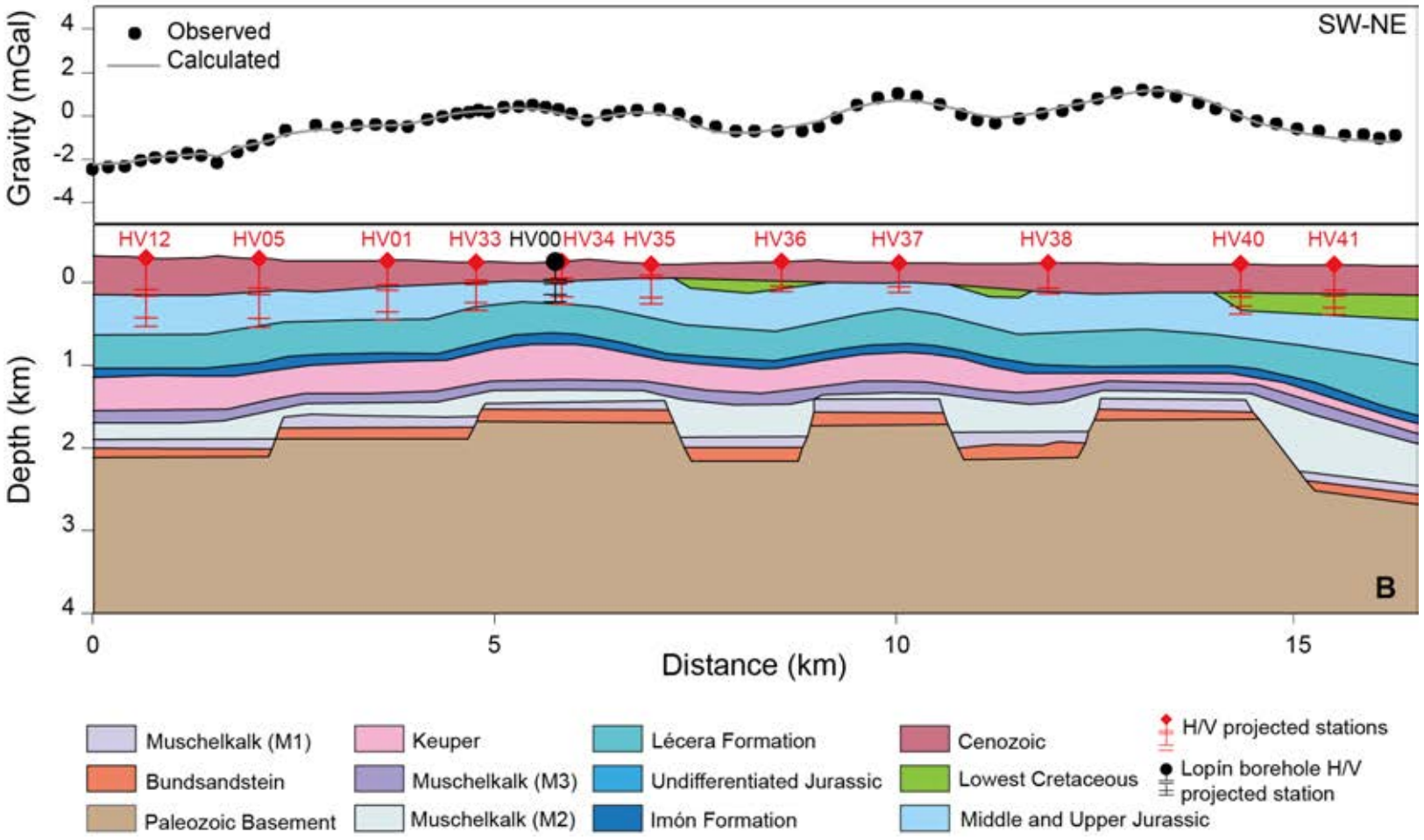
f_r to z relationships



Lopin well logging



Joint modeling in 2D



Conclusions:

- New **gravity and passive seismic** data help adding constraints to the characterization of the Lopín structure (particularly in places without vintage seismics).
- **Joint forward modelling**; geometry (vintage seismics+passive seismics) + gravity data with robust petrophysical constraints (well loging and outcrop data) was useful to improve the 3D geological model in the areas without active seismic data.
- Work **still in progress** (second iteration about to come). The preliminary results indicate the suitability of our workflow for 3D modeling and to help further decision making.