Introduction

The Spanish research programme on Carbon Capture and Storage ("CCS") includes the development of a research facility in Hontomín (North of Burgos, Spain), dedicated to the underground geological storage of CO_2. This research program is being developed by CIUDEN Foundation, an initiative of 3 Spanish state departments (Science & Innovation, Enviromental Issues and Industry). Within this project a 3D research oriented seismic reflection survey was carried out. The main objectives of this data acquisition project are: to develop a structural model of the storage site; to identify most important structures, faults, lithologies etc; and to obtain a three-dimensional block model of physical properties

The resulting products of this high resolution data set will be used by researchers of all disciplines involved in the project. The first use of the structural block obtained was the location of the final location of the injection and monitoring boreholes.

As this site will hold a research (non-industrial) facility, its size and shape will represent an unique natural-scale laboratory for testing new methods and techniques related to characterization, injection and monitoring. Its complexity provides relevant scientific challenges.

Method and/or Theory

The 3D seismic reflection survey covered ~35 km^2. The main characteristics of the data acquisition are:

- Mixed source used: Vibroseis (74% of the source points) and explosives (26% of the source points).
    - 16 seconds per Vibroseis sweep, and 2 sweeps per shot point. Sweep frequency bandwidth: 8-80Hz.
    - 150g of explosives per shot point.
- 5000 source points shot, distributed along 22 source lines (crosslines) with 25m of distance between source points and 250m between crosslines.
- 4.5 million traces recorded, distributed along 22 receiver lines (inlines) with 25m of distance between receiver points and 275m between inlines.
- 200000 CDP with 13m x 13m bins.
- Average (maximum) CDP fold of 36 traces per CDP.

A conventional processing sequence was used in order to enhance the signal-to-noise (S/N) ratio and to obtain a 3D image suitable for interpretation. The main features of this processing include static correction calculation, frequency filtering, trace amplitude equalization, rms velocity modelling and stack. Due to the heterogeneities in the topography and in the upper-most layers of the subsurface of the site, a special emphasis was put in the static corrections calculation; the huge amount of traces recorded made necessary to apply an automatic first break picking method. A bandpass (BP) frequency filter was designed in order to restrict the frequencies to use, and to avoid noise-related frequencies. The resulting filter used is BP 15-20-75-90Hz. Trace amplitudes were equalized using three methods: a) spherical divergence correction, b) offset-based amplitude scaling and c) trace amplitude balance. They all helped to counteract the loss of amplitude in depth, and c) also aids to obtain a finer image for interpretation after processing. Finally, a rms-velocity model was built after testing different possibilities. This velocity model was used for the nmo corrections before the stack.

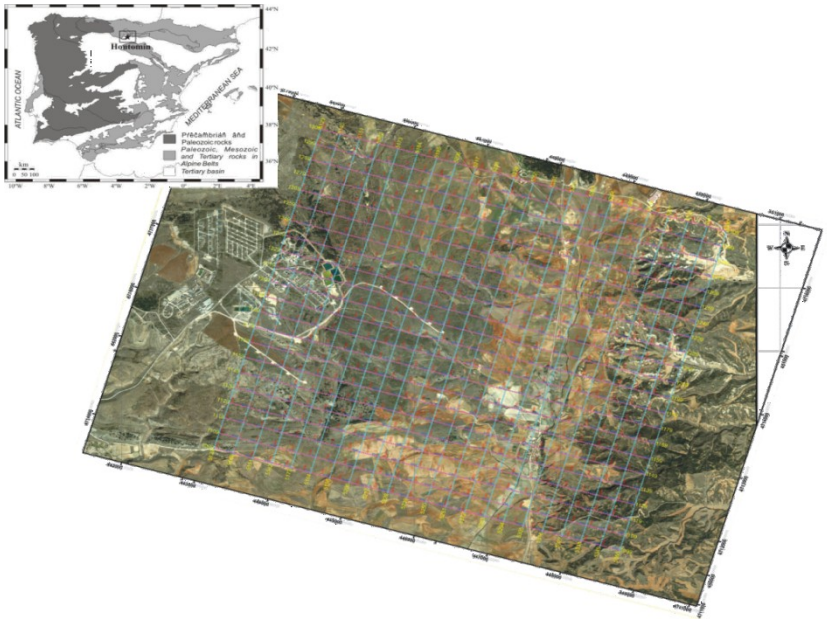

Figure 1. *Location of*

Conclusions

This work presents the initial stage seismic reflection characterization of the storage site of Hontomin (Spain). The high resolution characterization of the subsurface of this survey provided a good quality image of the global site structure. It reveals that the long wavelength structure is dominated by a dome-shape feature. The asymmetric shape of this structure is constrained laterally. The reservoir and the seal can be easely identified (structure, volume etc). The geometry of the fault system was also constrained. The seismic block obtained serves as baseline model for all future characterization and modelling experiments that will be carried out in the study area. Furthermore, the 3D seismic images provided the location of the future injection and monitoring boreholes, taking into account that the image in its present processing stage shows little or minimum interaction between faults and reservoir-seal systems

Acknowledgements (Optional)

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