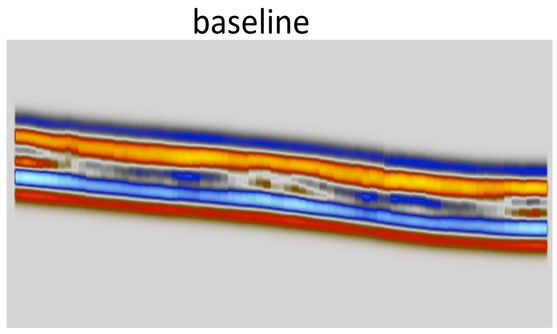
PhD Opportunity

Data-driven imaging for CO2 storage

If you enjoy **solving problems,** want to play a **significant role** in **the decarbonisation** of the society, then this PhD opportunity is for **you !**



Who we are:

Institute of Geoenergy Engineering, Heriot-Watt University

We are a leading centre of excellence in geoenergy engineering and applied geoscience, recognised for the quality of our teaching, training, and research.
Our activities build on our proud heritage of integrating geoscience and engineering to understand the subsurface. We pioneer world-class research and training cross a broad range subsurface energy challenges, for the low-carbon transition, sustainable energy, and responsible resource management.
We offer a range of postgraduate opportunities, all uniquely tailored to the wider energy industry, in a dynamic, multidisciplinary environment which provides a stimulating place for learning and research.

DATA-DRIVEN IMAGING FOR UNCERTAINTY RISK EVALUATION OF CO2 STORAGE IN SALINE AQUIFERS

Safe storage of CO_2 requires an intact caprock to prevent gas or brine from leaking from the storage reservoir. Geophysical monitoring is key in assessing this risk, whereby the following processes need to be detected: (i) possible gas leakage across the caprock and towards the surface, (ii) pressure dissipation in the reservoir and above the caprock, and (iii) migration of the CO_2 plume.

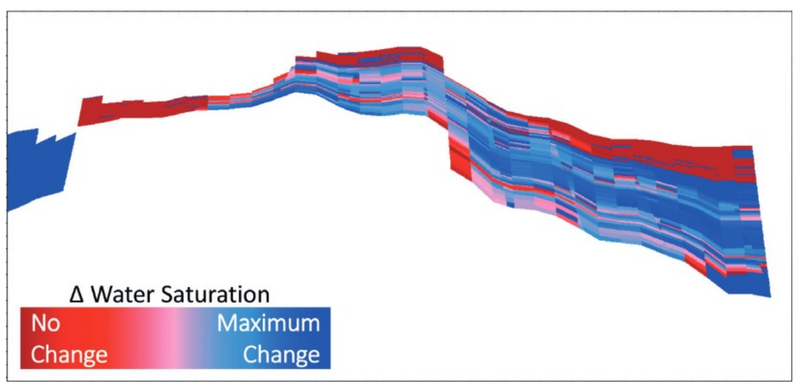
This can be achieved, for instance, by using repeated seismic surveys, providing information on saturation and pressure changes. 4D seismic monitoring is probably the most accurate technology for this very purpose (used in Oil and Gas since 90's). Insights from existing seismic monitoring of CO_2 storage are limited to draw conclusions on the assessment capability of seismic monitoring to inform on the state of the CO_2 plume given the general differences in geological, petrophysical and fluid properties. Indeed, these features will determine the accuracy of seismic anomalies to describe a given storage site. One of the main challenges in seismic monitoring is to relate or transform the seismic anomalies into useful directly interpretable information in a quantitative manner, for a better risk evaluation.
Therefore, a careful assessment of the forward seismic modelling sensitivity and uncertainty quantification is highly required to expand further a robust quantitative risk evaluation.

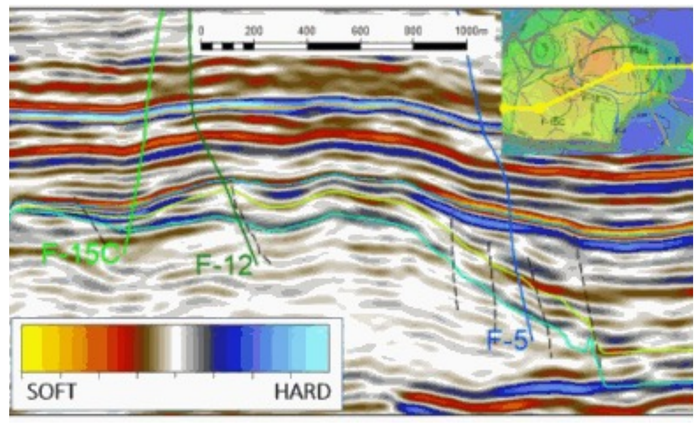
Thus, the PhD candidate will analyse and assess uncertainty in seismic monitoring. In particular, the influence of the mechanical properties' changes, through the rock and fluid physics model, on the interpreted seismic will be studied. Furthermore, we will investigate other geophysical data to complement the seismic and further reduce the uncertainty.

<u>Background</u> and desired skills:

Broad geophysics and programming (python or julia),

Good team player with excellent communication skills





Your supervision team will be :

Dr. Romain Chassagne, Prof. Colin MacBeth and Prof, Andreas Busch

Interested candidates are encouraged to contact:
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c.Macbeth@hw.ac.uk

GeoNetZero CDT
The Centre for Doctoral Training (CDT) in Geoscience and the Low Carbon Energy Transition

HERIOT WATT UNIVERSITY