Characterisation of European CO_2 storage

Estimating the storage capacity: the first but still challenging step

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Objectives

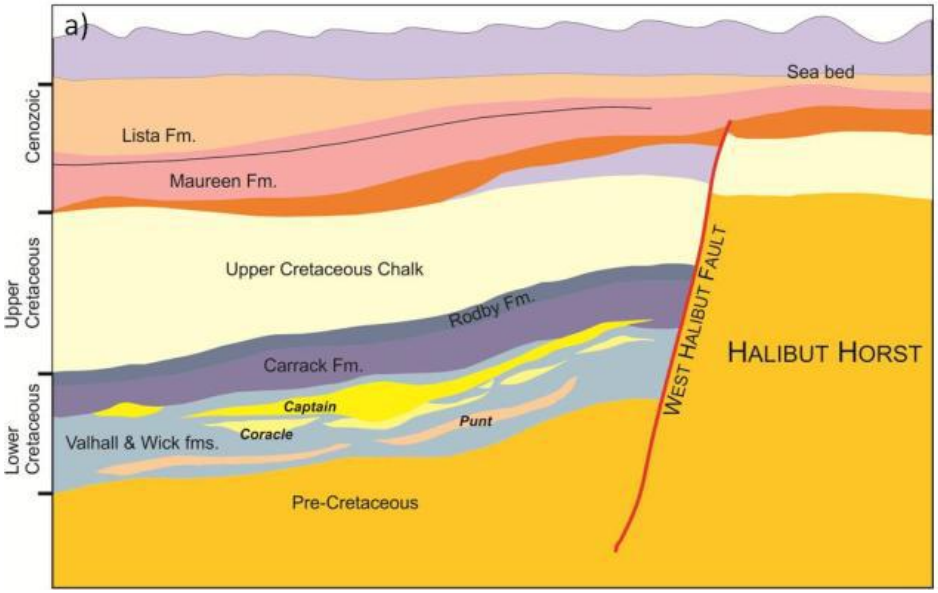
- **Secure sufficient storage capacity**
- **Evaluate containment security**
  - **Retention time: tens of thousands of years**
  - **Evaluate possibilities for failure and leakage**
  - **Evaluate integrity of old wells**
  - **Estimate trapping mechanisms (solubility, capillary, mineralisation)**
- **Evaluate migration path ways for injected CO_2**

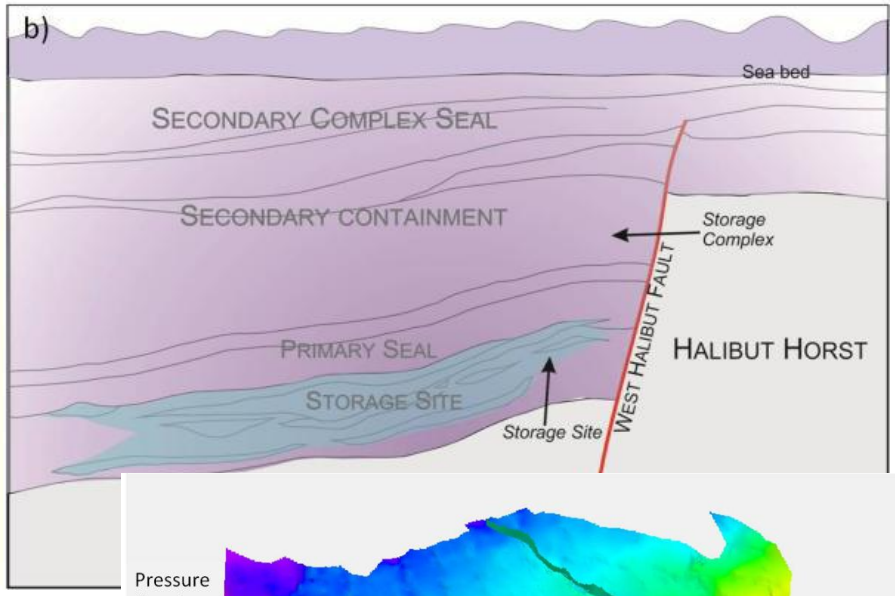
Challenges

- **Each storage site is unique!!!**
- **Often a challenge with *little data* available**
  - **How to construct a 3D model e.g. facies distribution?**
  - **How detailed should your fault interpretation be?**
  - **Up-scaling from wells to basin scale**
- **Could it be simplified without reducing the quality?**
  - **Heterogeneities can be very important… (pressure communication/injectivity/dissolution rate)**
- **Need good interpretation of the top reservoir layer – to get the lateral migration of CO_2 correct**

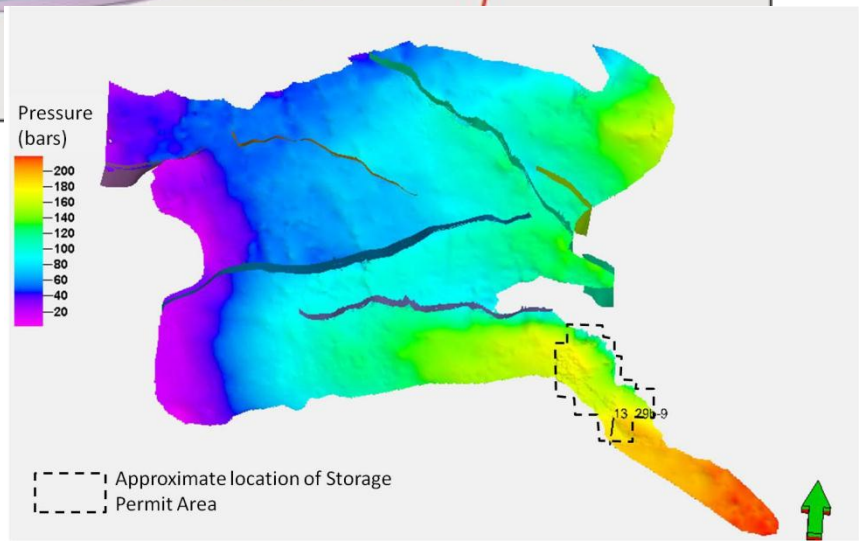
Highlight on some specific success/issues

- **The outer Moray Firth**



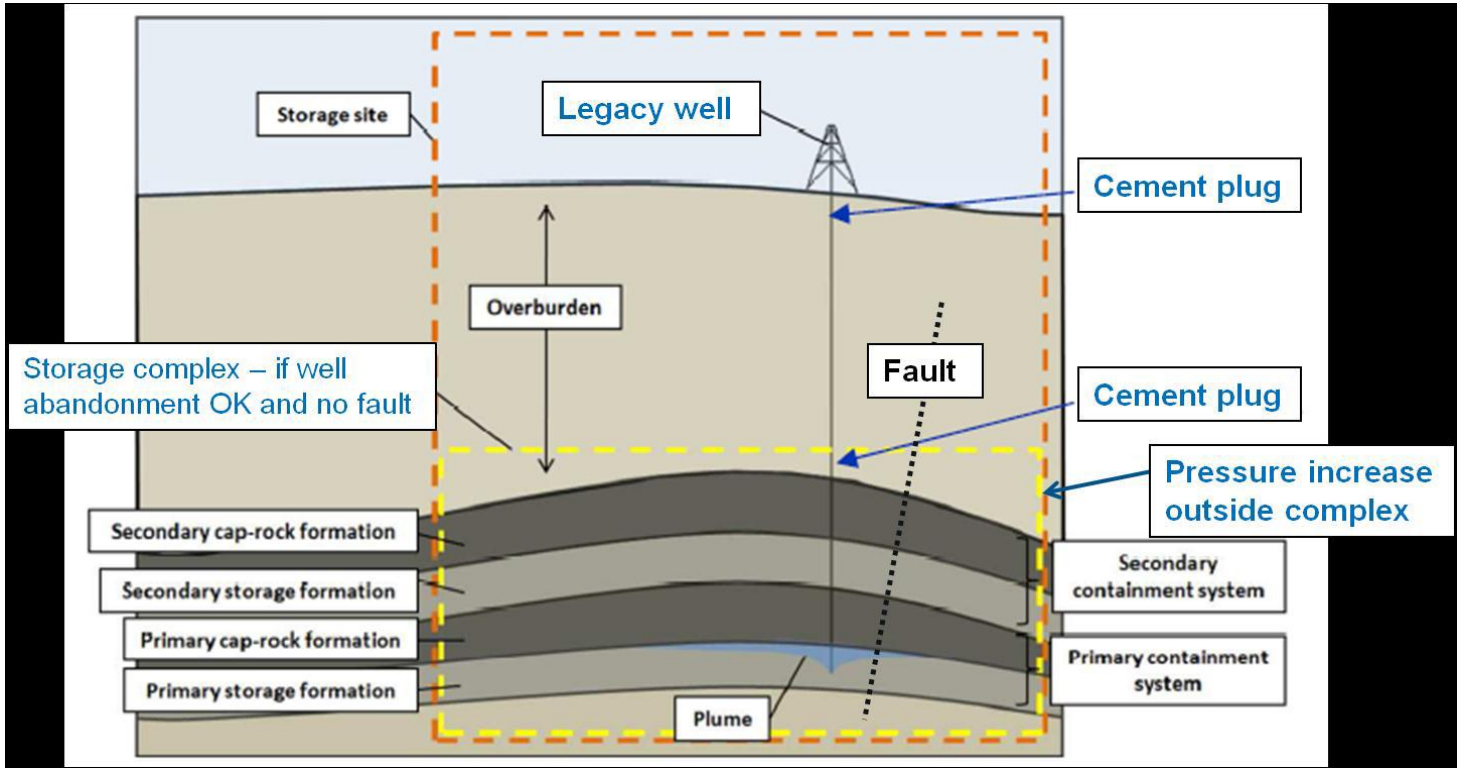


- **CO_2 storage in a depleted oil field**
- The dynamic capacity, calculated by simulation of CO_2 injection into the Blake Field Channel facies and water production down-dip from within the saline aquifer, accommodates 100 Mt injected over 20 years.

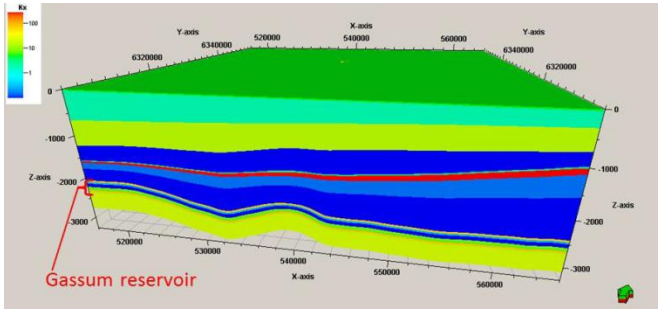


Highlight on some specific success/issues

- **Vedsted**



Primary containment: Gassum Fm. with the Fjerritslev Fm acting as seal.
Secondary containment: Haldager Fm. with the Boerglum Fm. acting as seal



Highlight on some specific success/issues

- **Poland**

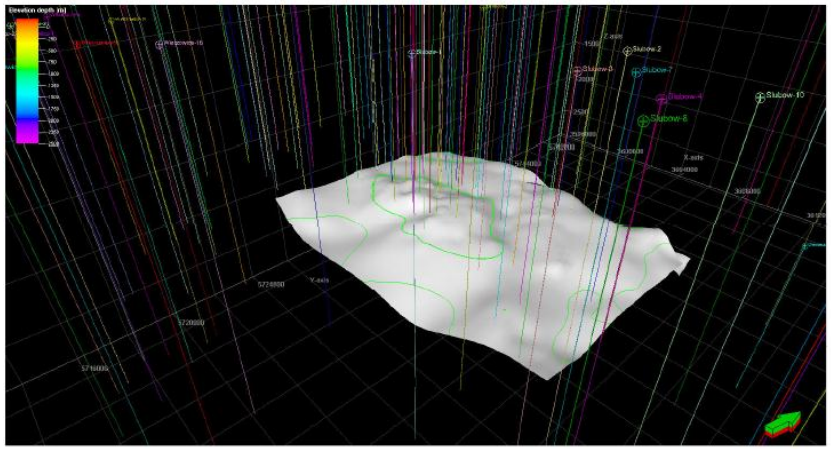
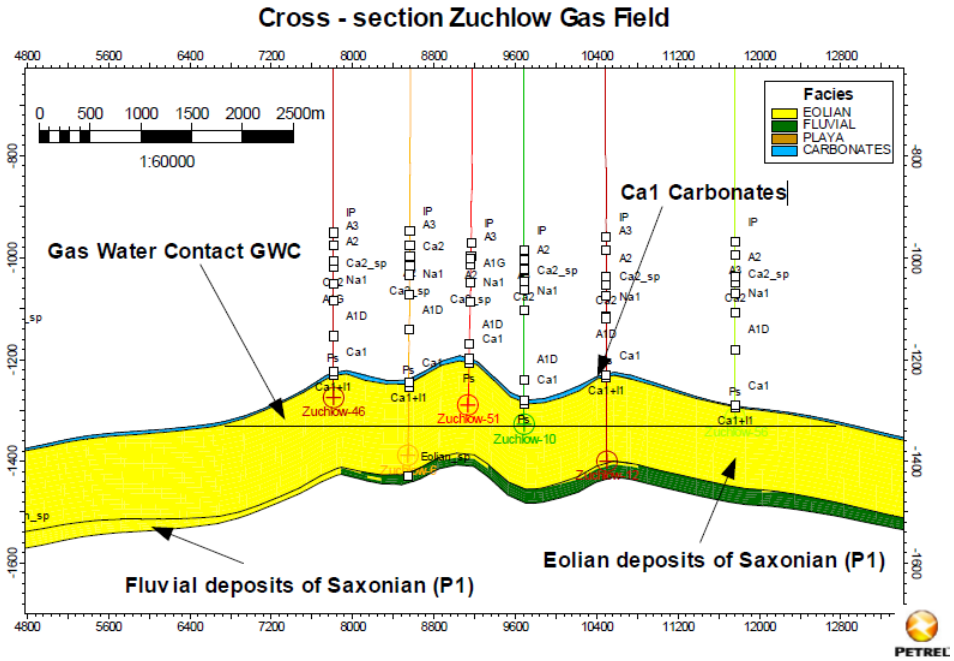


Figure 29: The top of basal Zechstein Carbonates Ca1 - Zuchlow.

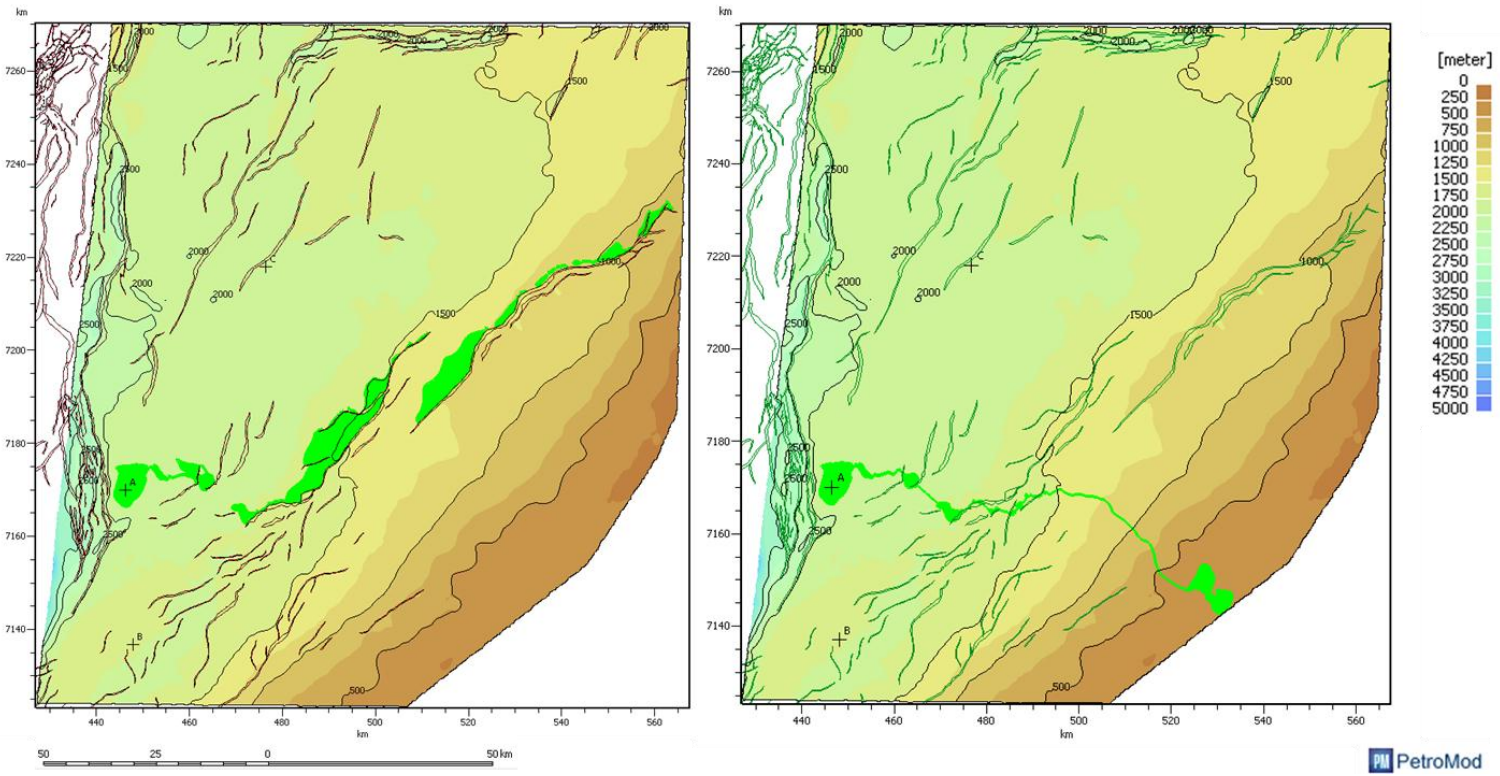


- Onshore depleted gas field

The estimated total storage capacity of both sites is about 230 Mt of CO_2, *i.e.*,123.6 Mt at Żuchlów and 106.6 Mt at Załęcze).

Highlight on some specific success/issues

- **Trøndelag Platform – Using basin modelling approach**
- **Migration route – with open or sealing faults**

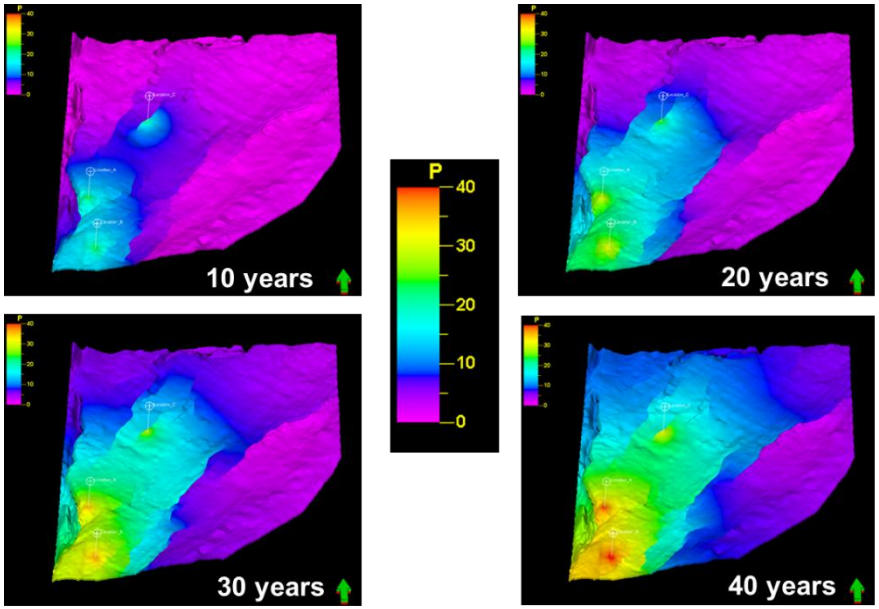


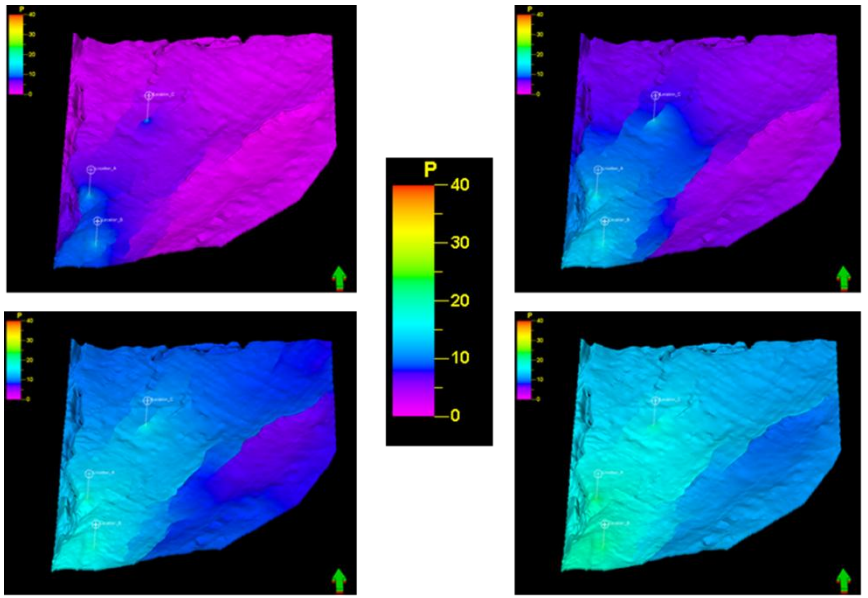
Sealing faults

Open faults

Highlight on some specific success/issues

- **Trøndelag Platform – Reservoir model**
- **High and low permeability**



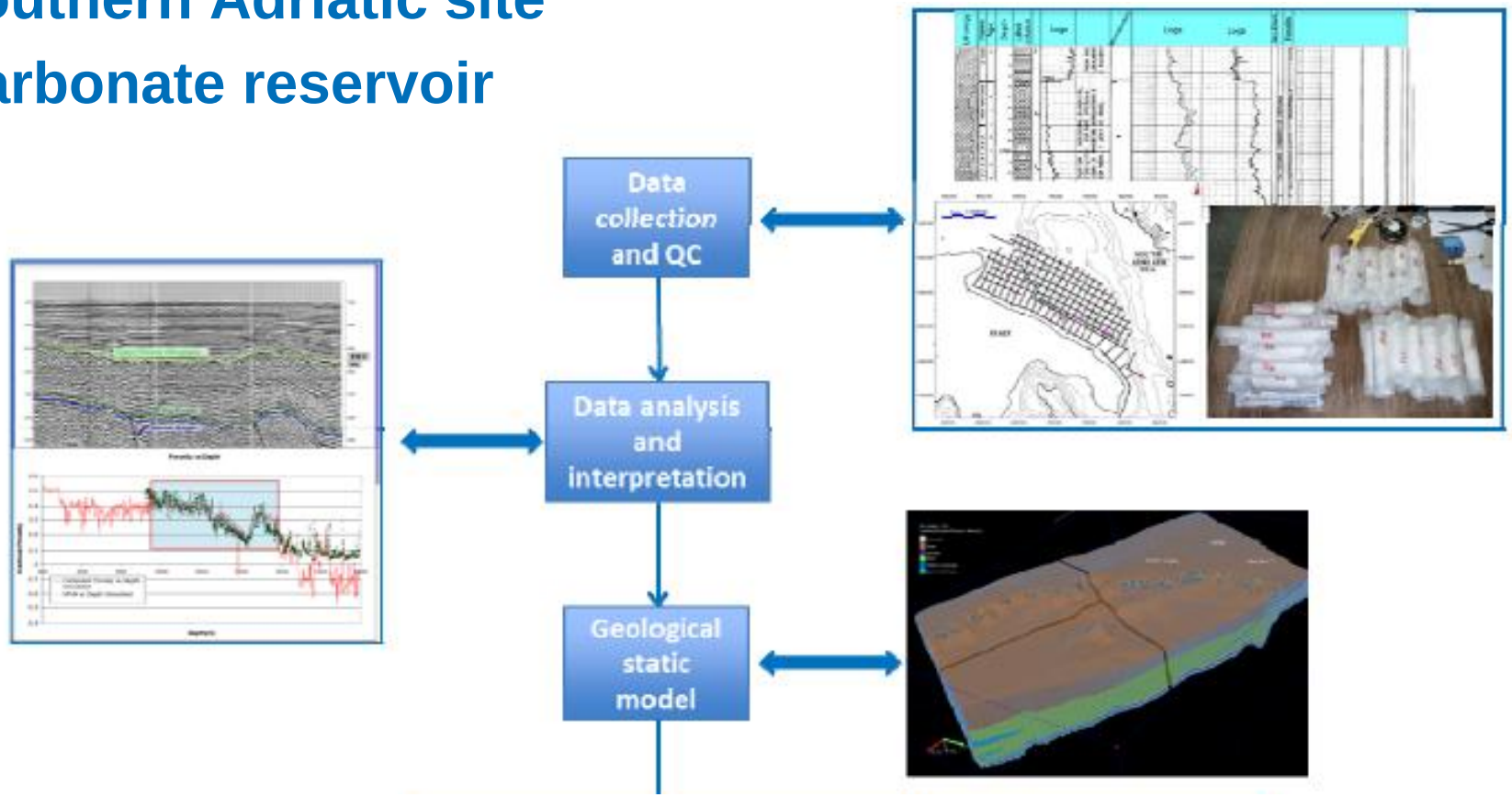


Low permeability (500mD)

High permeability (2000 mD)

Highlight on some specific success/issues

- **Southern Adriatic site**
- **Carbonate reservoir**



- **Effective porosity difficult to measure – need modelling**

Key learnings from the SiteChar experience

- **Every site is unique**
- **Level of detail in models is dependent on available data**
- **Models are important to predict the storage capacity and visualise the CO_2 behaviour**

Remaining issues

- **New data is always welcome to improve the models**

Recommendations

- **The better data that is available, the better models can be contrained**
- ***Size and resolution of the model* should fit with the resolution of the available data**
- ***Possible software incompatibility* induces difficulties in defining a data exchange format. This requires a close interaction between geologists and engineers from the beginning of the project**

Acknowledgments

Many thanks to

the European Union, ENEL, PGNiG, STATOIL, Vattenfall, Veolia Environnement, Gassnova and Scottish Government

for participating and funding the project

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