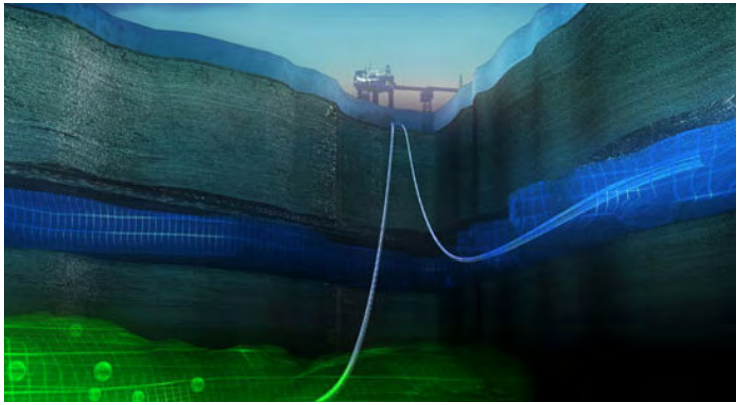
Principles of CO2 Geological Storage

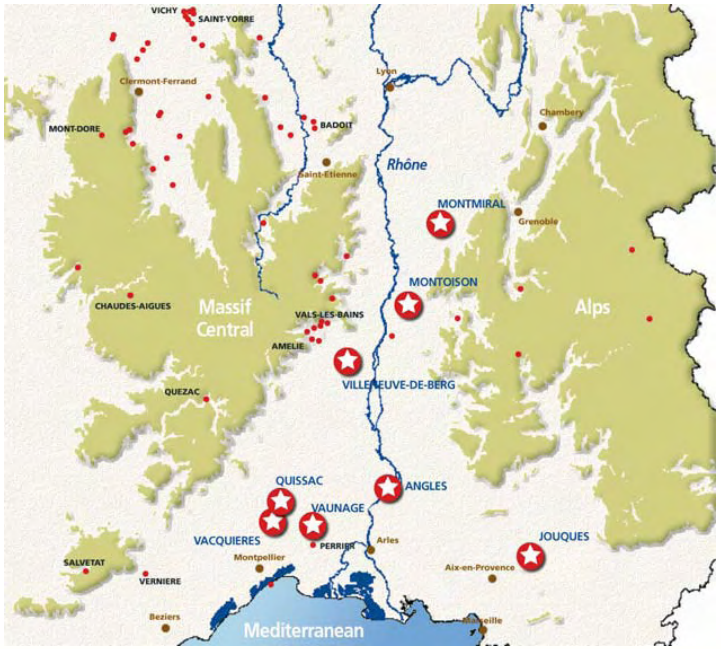
Marie Gastine
BRGM - CO2GeoNet

A simple idea

To recreate a gas field like those found in nature.
by pumping down the CO2 into rock.

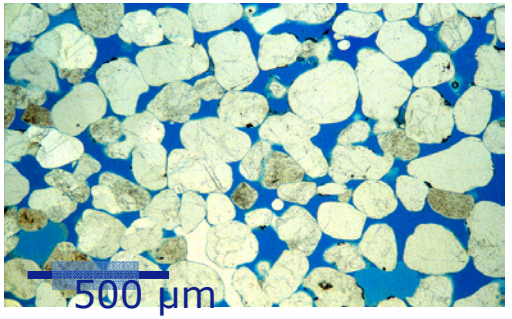


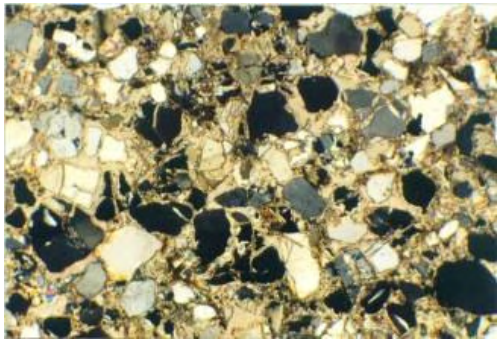
Statoil



To store CO2 you need…

- Porous rock, to have space where to store

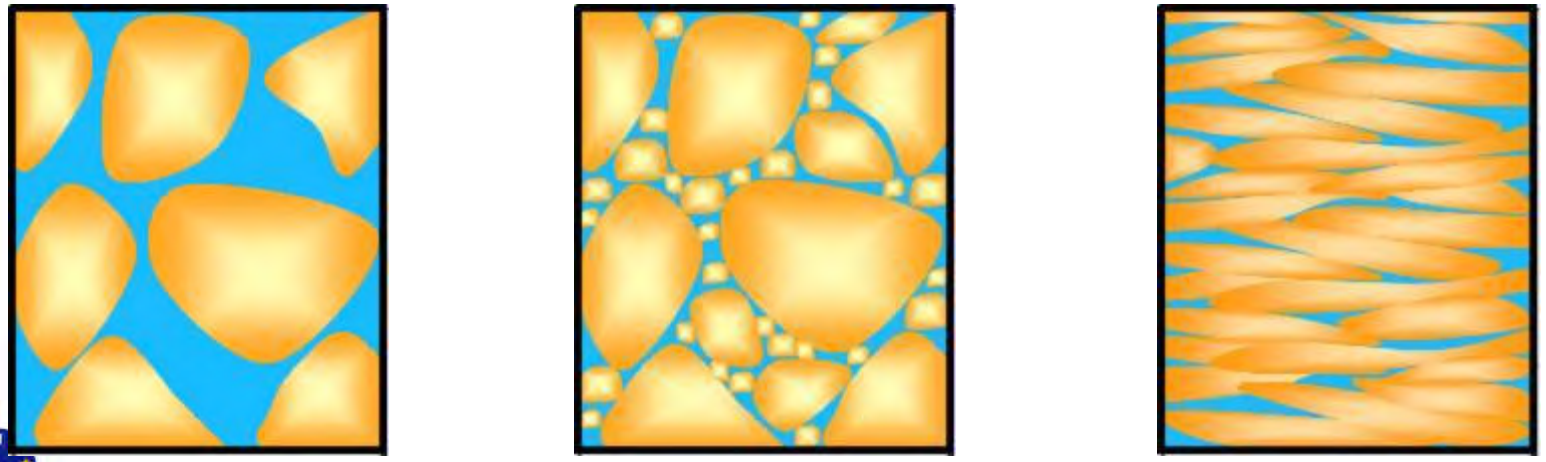




To store CO2 you need…

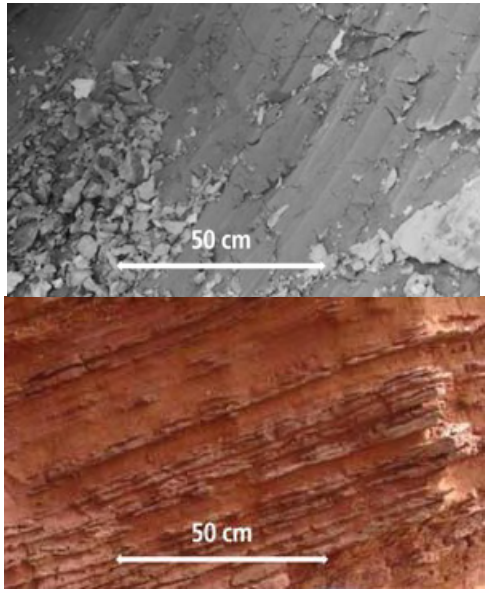
- Porous rock
- Permeable rock, to be able to inject large quantities of CO2

Very permeable → Litlle permeable



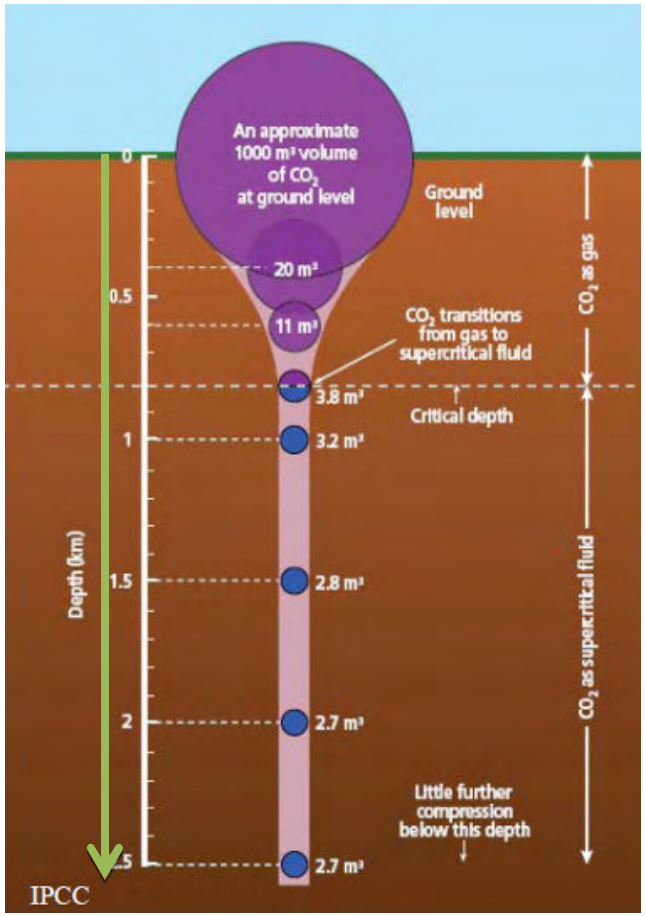
To store CO2 you need…

- Porous rock
- Permeability
- A cap rock, to be sure the CO2 will stay there



To store CO2 you need…

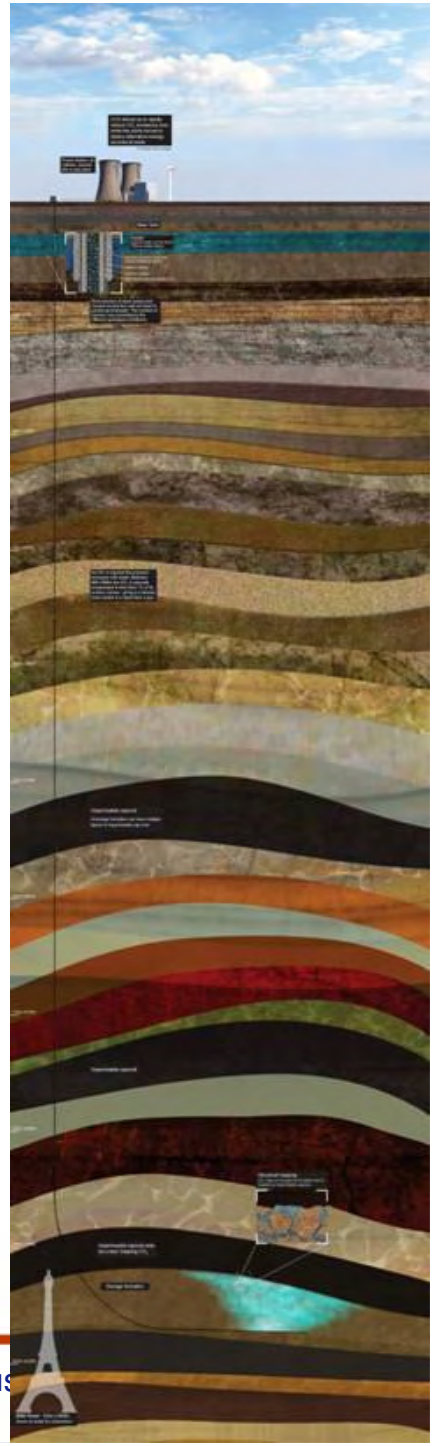
- Porous rock
- Permeability
- A cap rock
- Depth below 800m, to maximize the quantities stored



Pressure, Temperature

Storage site

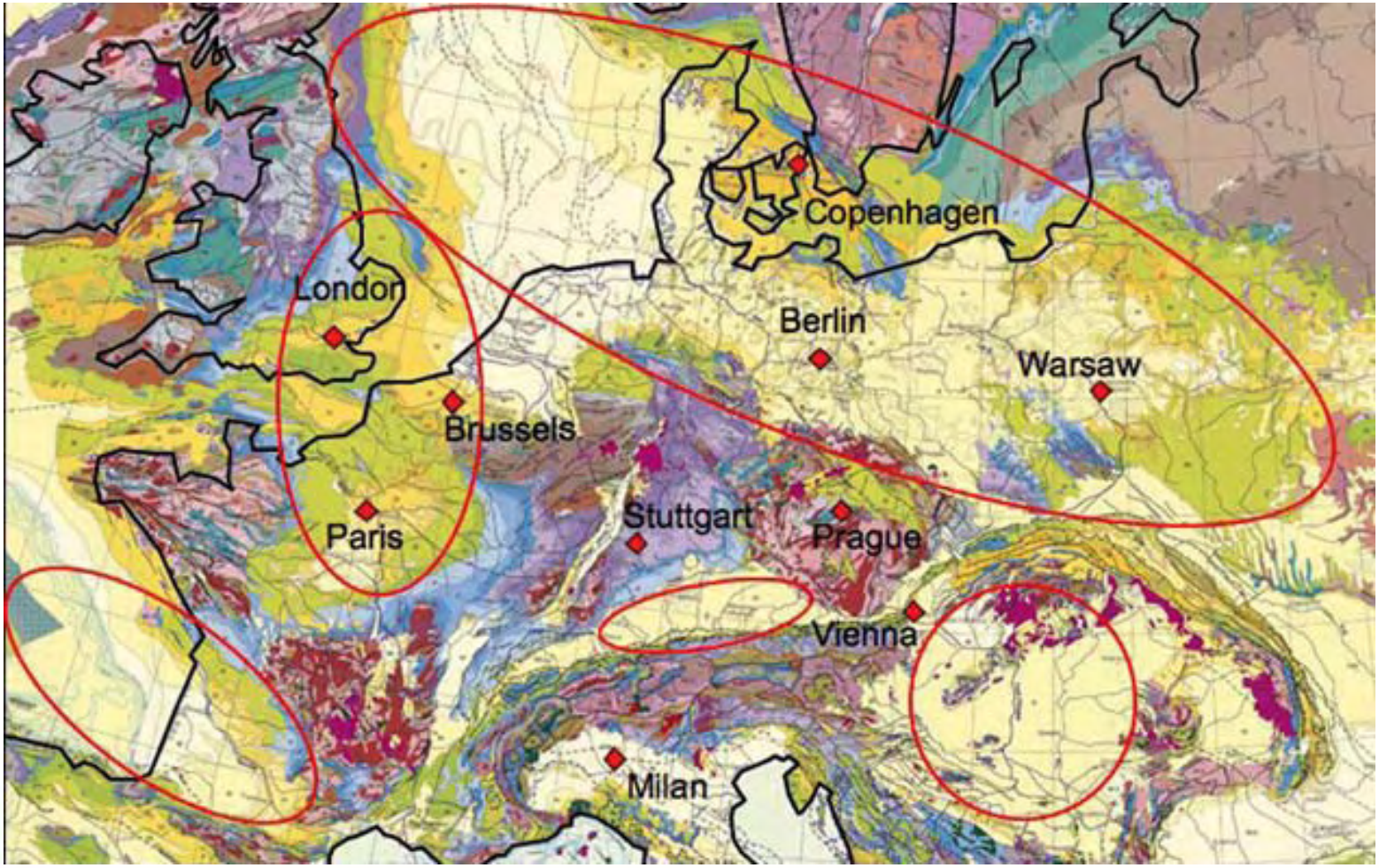
- Porous rock
- Permeability
- A cap rock
- Depth below 800m



Where can you find a site?

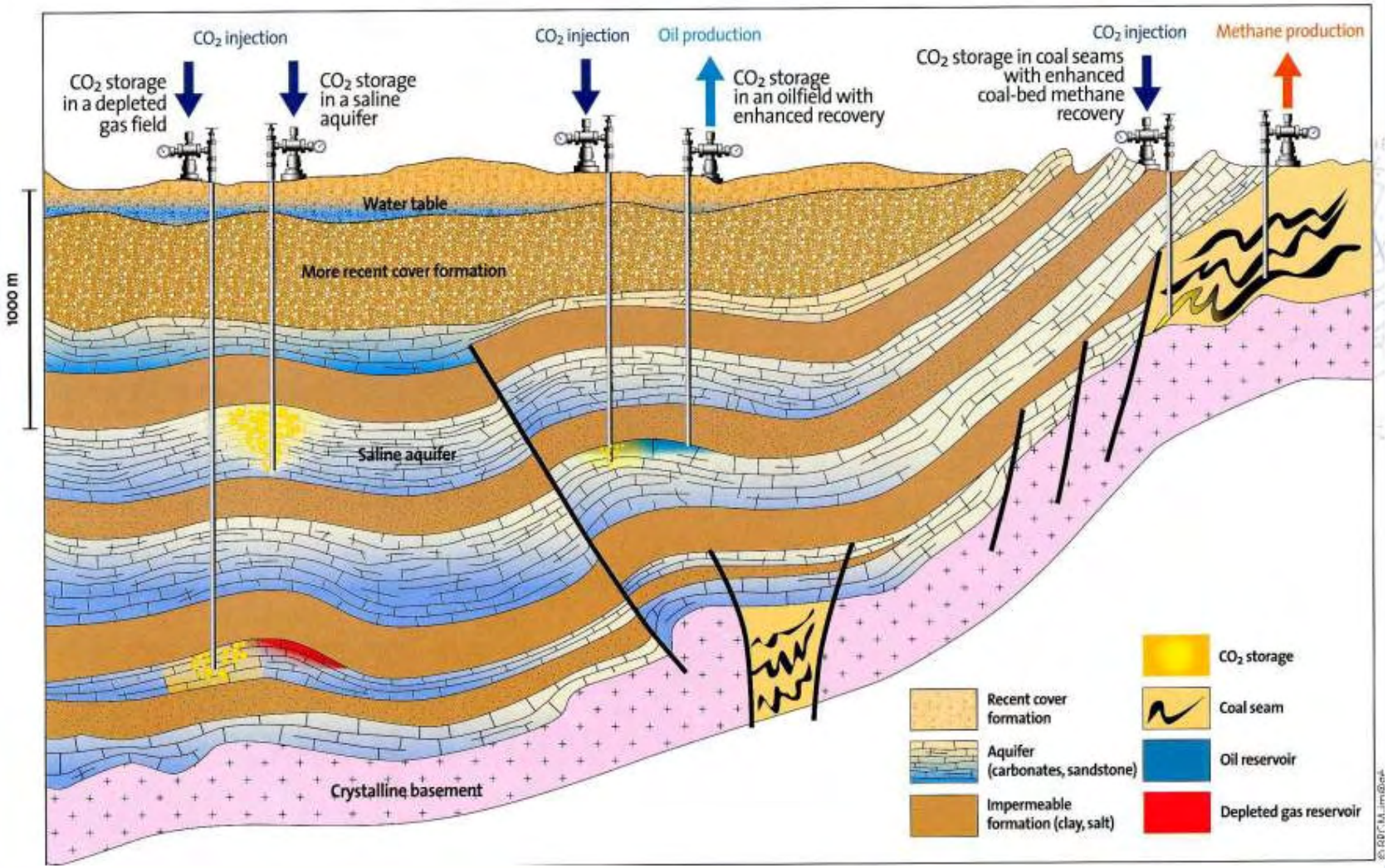
In sedimentary basins

Where in Europe?



BGR

3 types of storage



Running injections

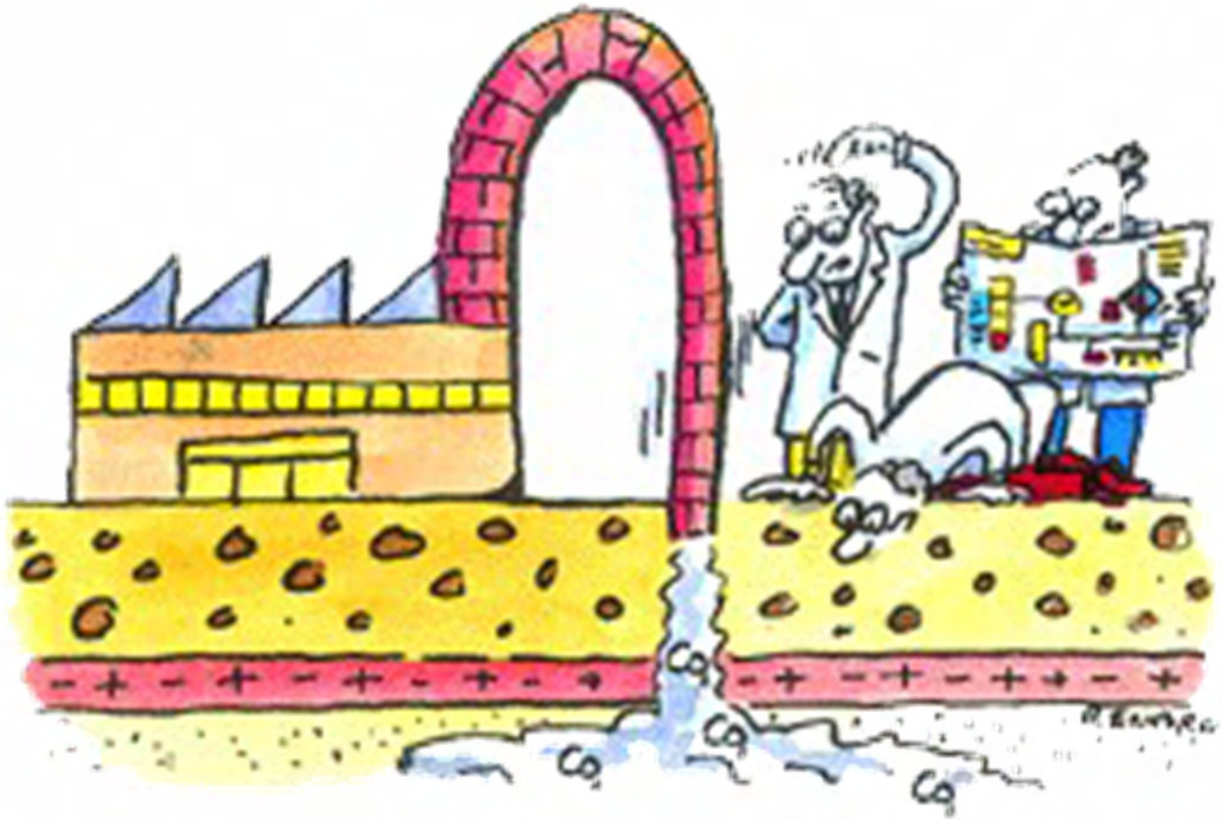
Sleipner, deep saline aquifer, Norway, 1 Mt CO_2/y since 1996

Weyburn-Midale, oil reservoir, Canada, 1.8 Mt CO_2/y since 2000

In-Salah, gas reservoir, Algeria, 1 Mt CO_2/y since 2004

Snohvit, deep saline aquifer, Norway, 0.7 Mt CO_2/y since 2007

What happens to the CO2?



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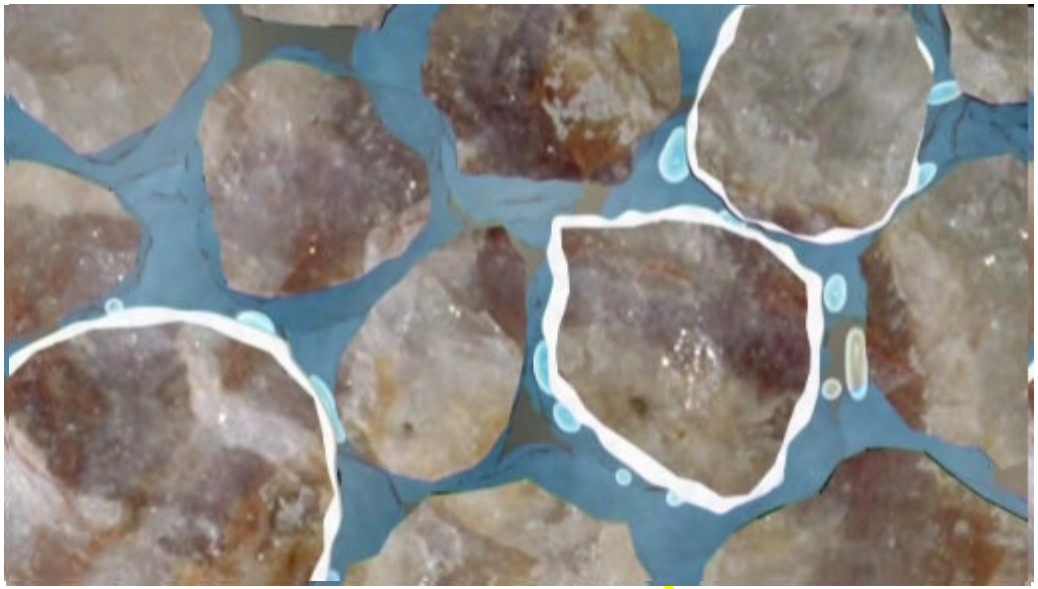
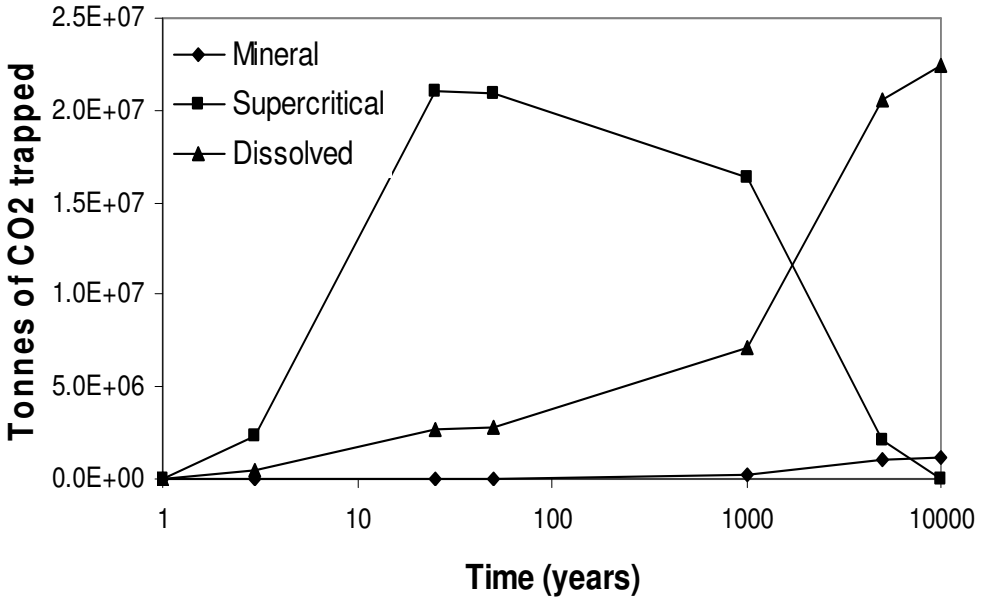


Moving CO_2

What happens to the CO2?

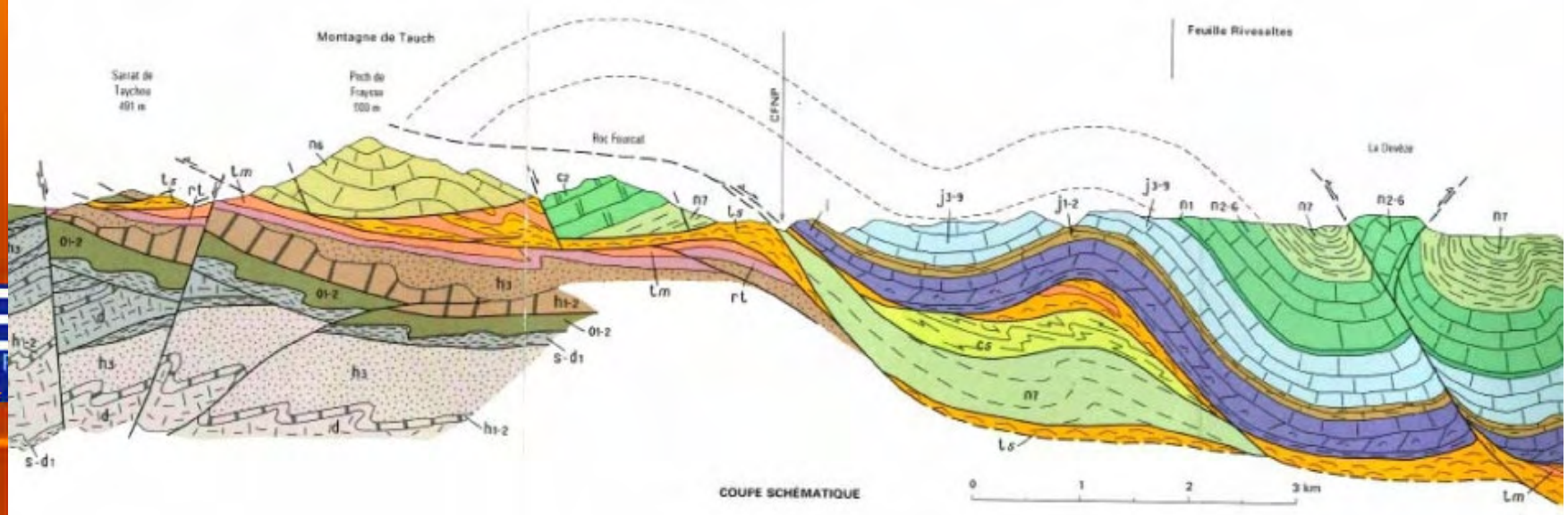
When injected in the rock reservoir the CO2:

- Raises and accumulates along less permeable layers
- Dissolves
- Mineralises



So where is the problem?

- Geology is complex:
  - Faults
  - Irregular surfaces
  - Rock heterogeneities
- "Extreme" conditions (high P, T, salinity)
- You need to have a good understanding of the underground



How can we know what is underground?

Main tools

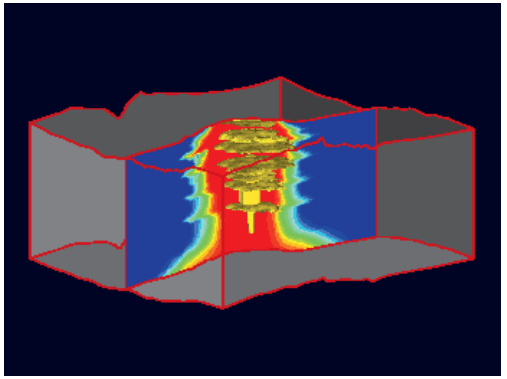
- Wells
- Seismic lines

Understanding the geology gets you whole image

- Geological models

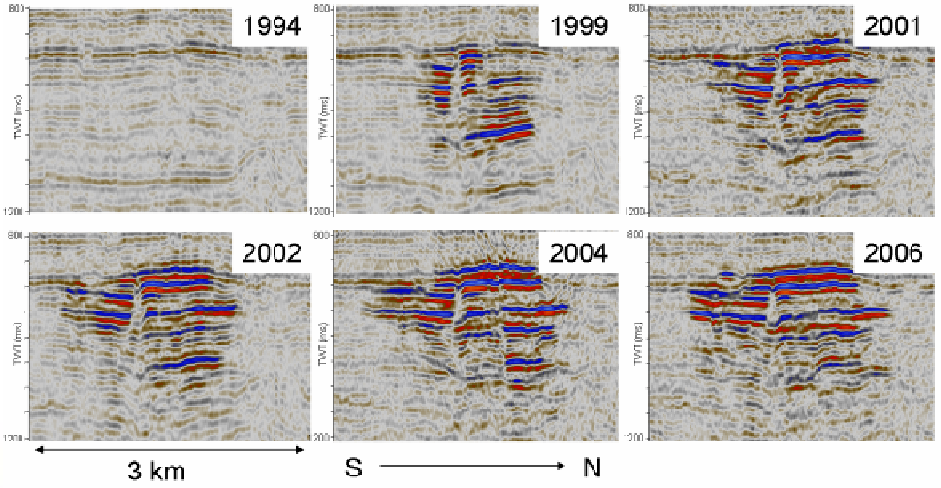
How do we know what happens underground?

- Lab experiments, analogues study
  - Dynamic models



Courtesy Statoil/CO2STORE project

- Monitoring



Safe storage

- Legislation has to ensure everything is done in a proper way.
  - *Next session*