National Oceanography Centre
NATURAL ENVIRONMENT RESEARCH COUNCIL

UNIVERSITY OF Southampton

Monitoring and Impacts of Leakage from Sub-Seafloor CO_2 Storage Sites

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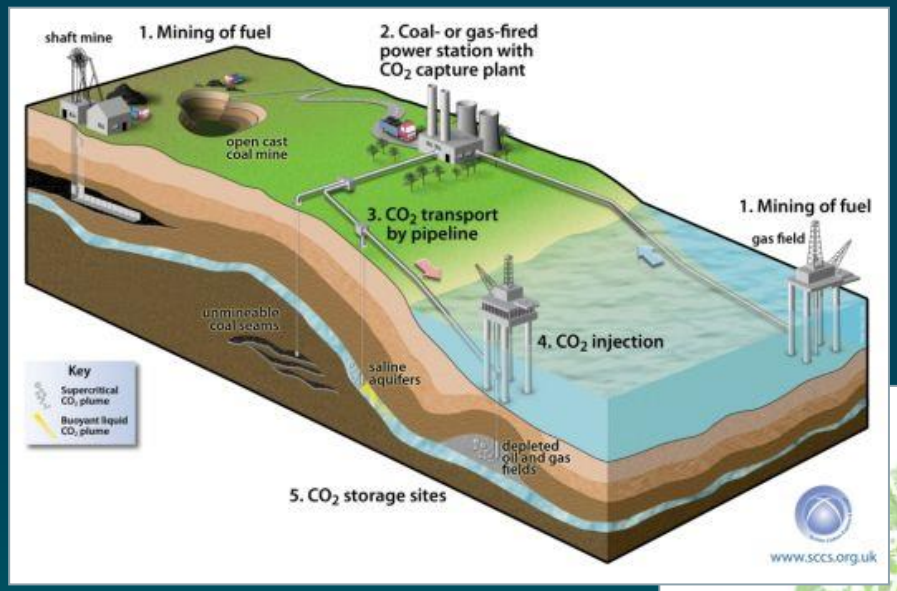
Carbon capture and storage (CCS)

on shore <-> off shore



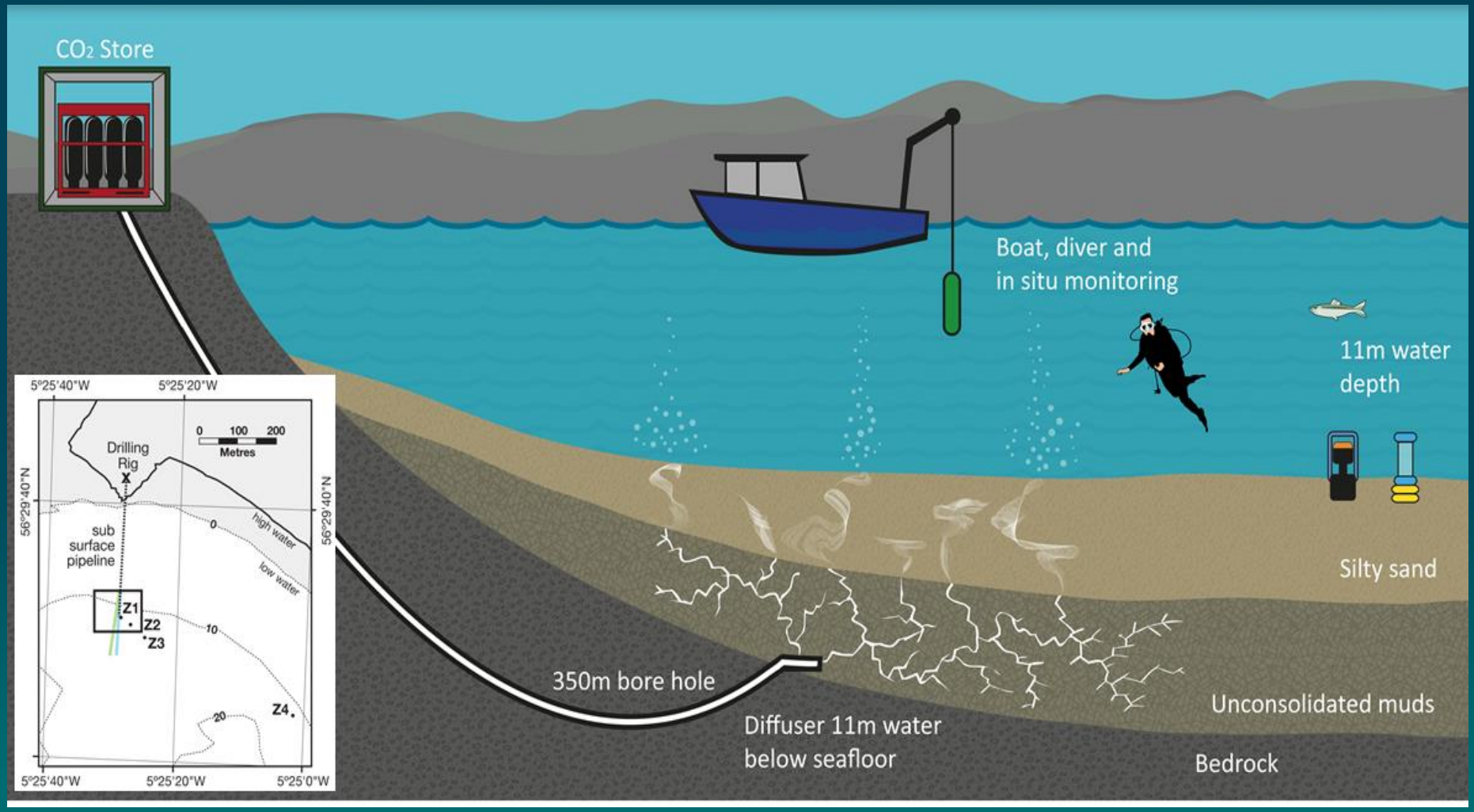
worldwide > 60 CCS projects identified
17 active projects
Europe:-> offshore storage

Longest operated site (since 1996)
1 Mt CO_2 a^{-1}

shore C

off

Barriers to CCS: CO_2 storage → CO_2 leakage?



May 2012 — Pre-release — Injection — Recovery — Sept 2012

Summary of key findings

- CO_2 leakage was detectable at relatively low flow rates (20–210kg CO_2 d^{-1}):
  - Geophysical imaging (chirp/boomer/multibeam)
  - Biogeochemical sensors (pCO_2/pH/ORP)
  - Direct observation (camera, video, divers)

- CO_2 bubbles were:
  - Easily recorded (pCO_2, hydrophones, imaging)
  - Sensitive to hydrostatic pressure
  - Represented only a fraction (<15 %) of injected CO_2
  - Reached shallower depths than expected
- Pore water and bottom water chemistry was impacted by CO_2 release, but:
  - Limited to release epicentre (~25 m diameter)
  - Quick recovery (within 20 days of termination of release)
  - Dissolution of $CaCO_3$ buffers pH
- Biological impacts appear to be limited