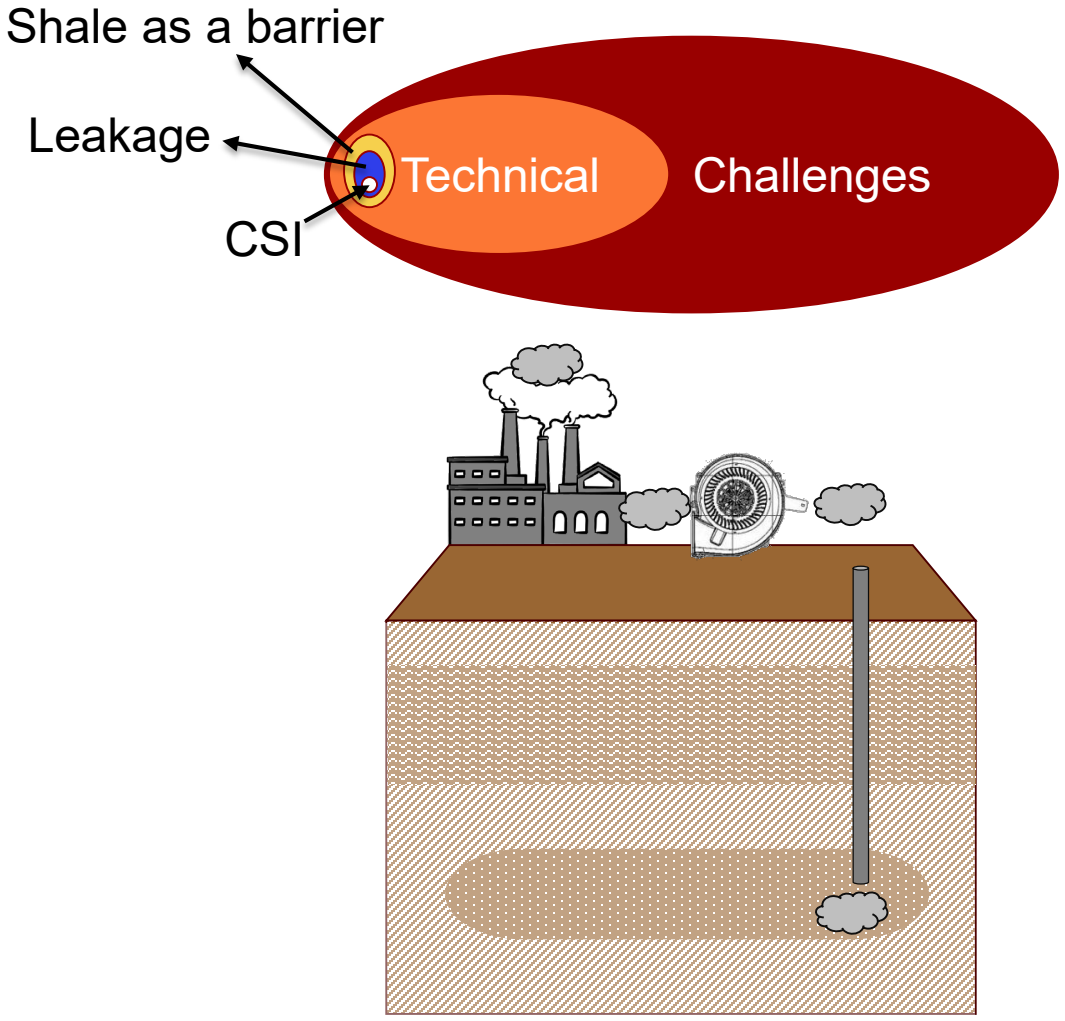
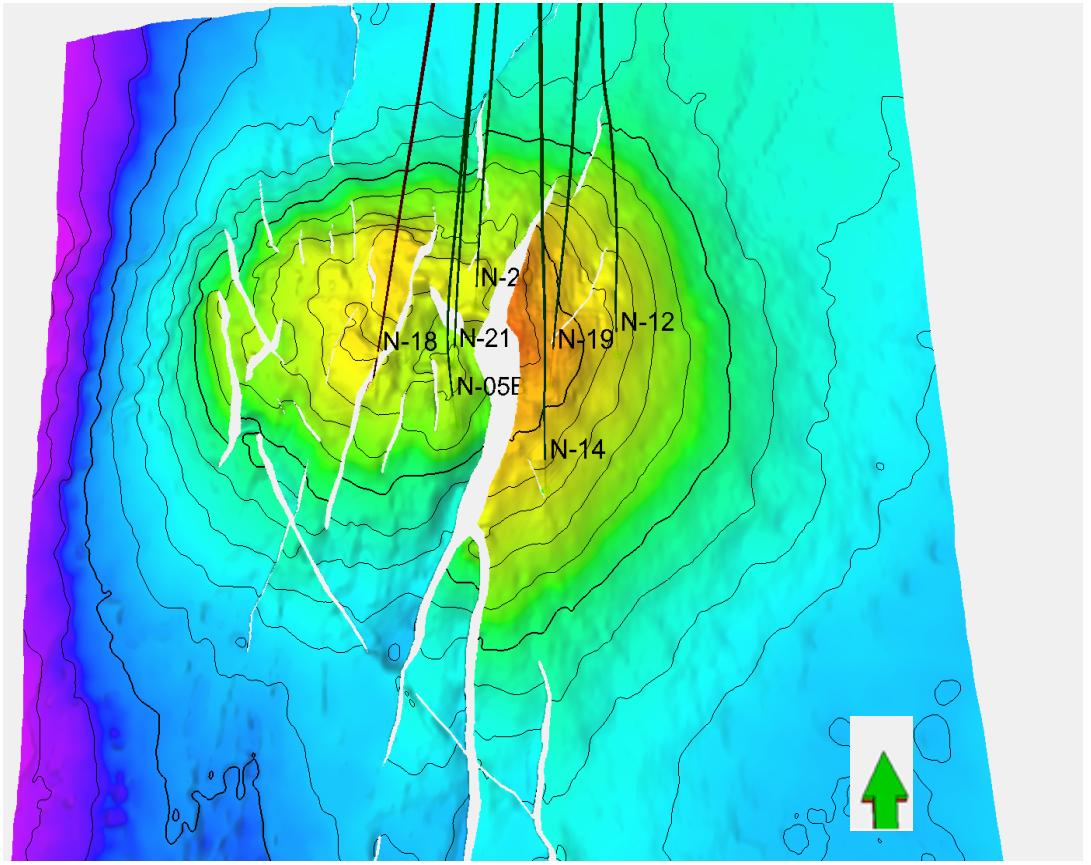
Abandonment break out session

CO_2 Seal Integrity

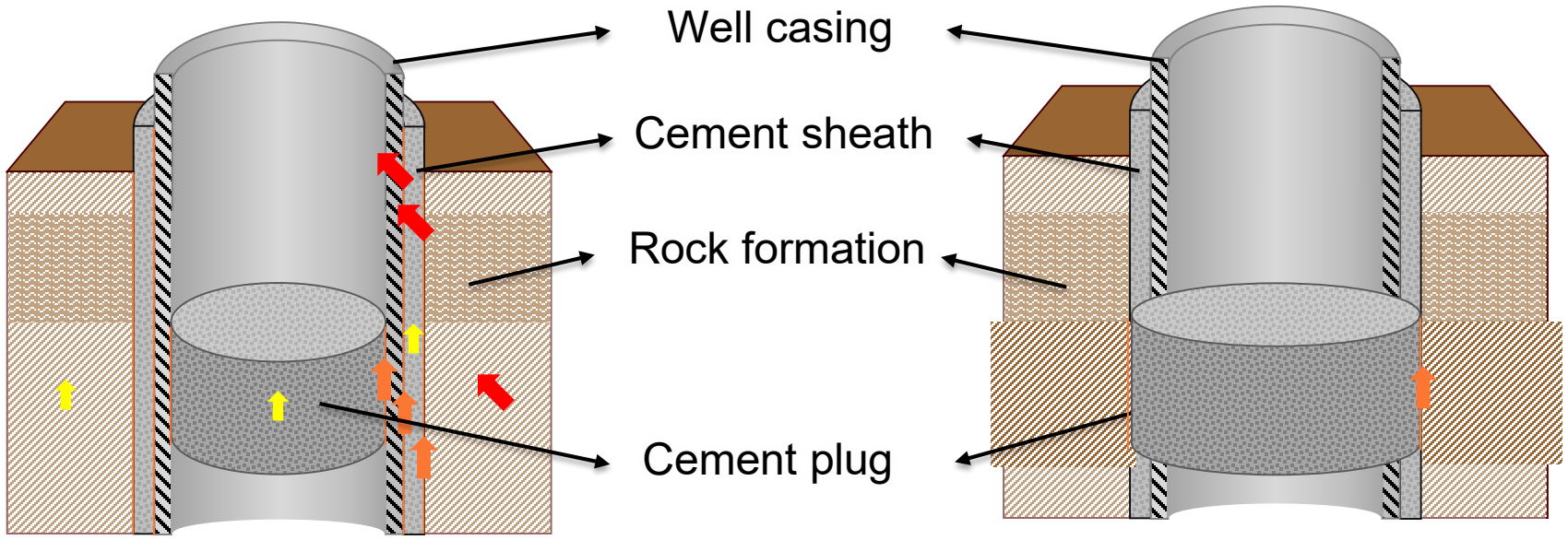
Swelling of clays/shales to ensure underground storage

Challenges to underground carbon sequestration





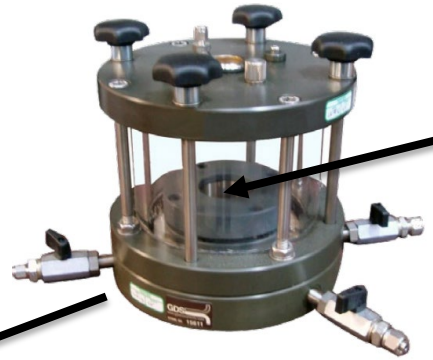
Potential pathways to leakage

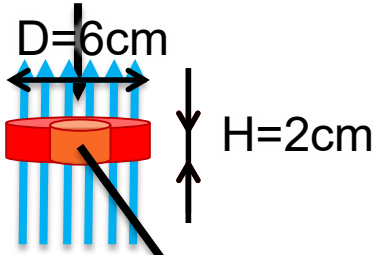


Based on Celia et al. (2004)

- Flow through cracks
- Flow at interfaces
- Flow through materials

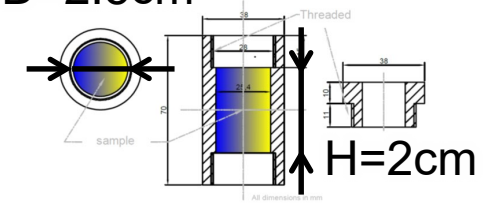
Swelling





- Induce swelling: flow brine designed to induce swelling through the specimen
- Replicate conditions in situ: we adjust axial stress and cell pressure (corresponds to pore pressure)
- Measure macroscopic swelling observed

D=2.5cm

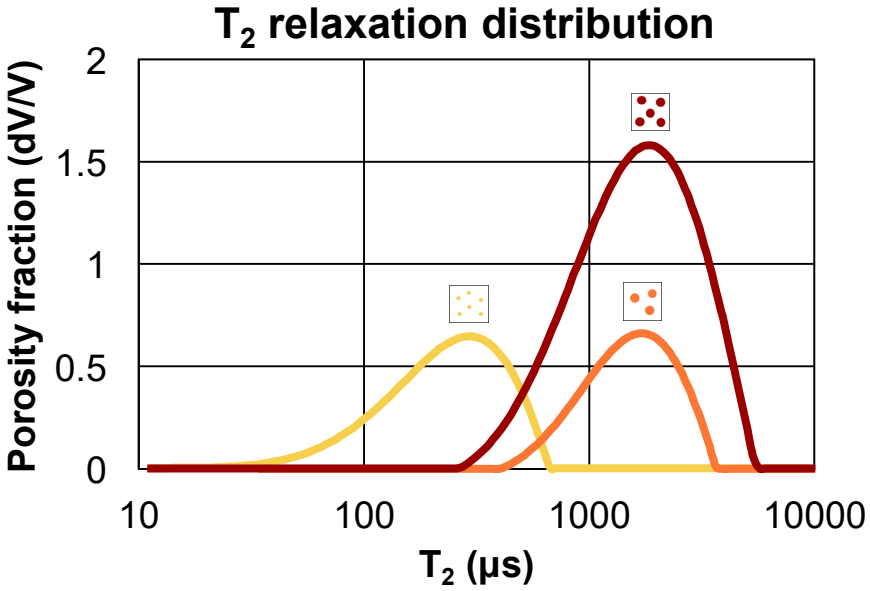


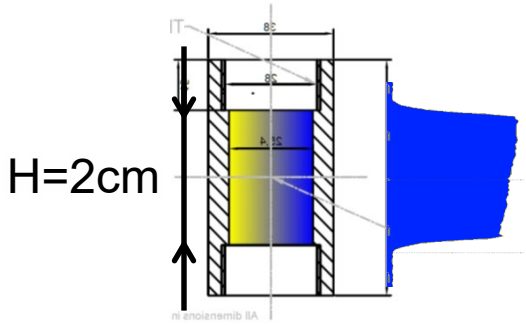
Specimens for Proton (^{1}H) Nuclear Magnetic Resonance spectroscopy

Assessment of swelling

- Measure pore size distribution
- Measure porosity
- Measure water volume profile across specimen

Proton (^{1}H) Nuclear Magnetic Resonance spectroscopy

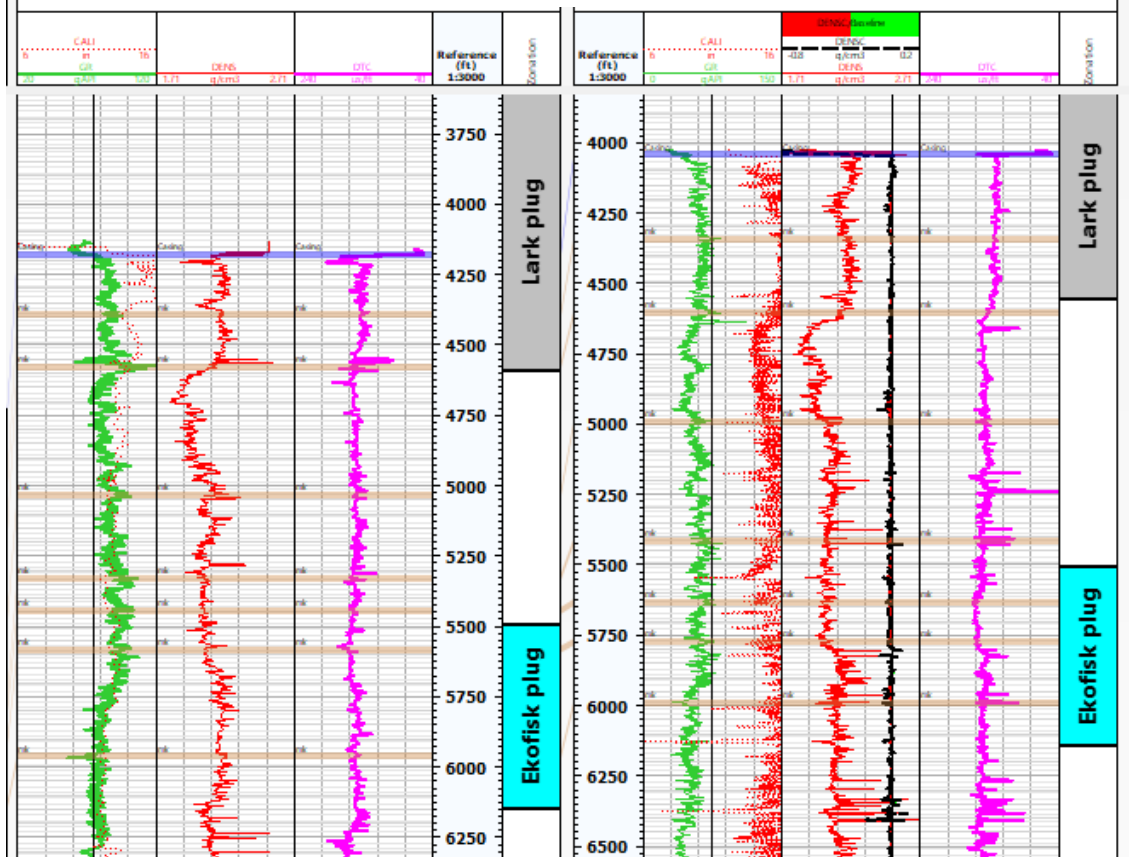




The project:

- Samples from the shales above the Gorm field
- 2 intervals as potential candidates (shales directly above the Danian and Lark formations)

Well abandonment will involve section milling at the intervals to be plugged



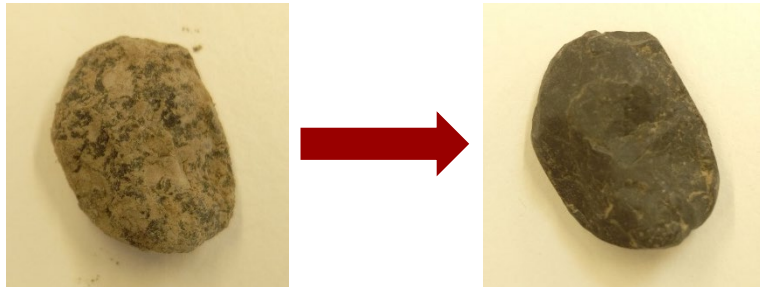

Associate Prof Irene Rocchi


Dr Leonardo Teixeira Pinto Meireles


Prof Ida Lykke Fabricius

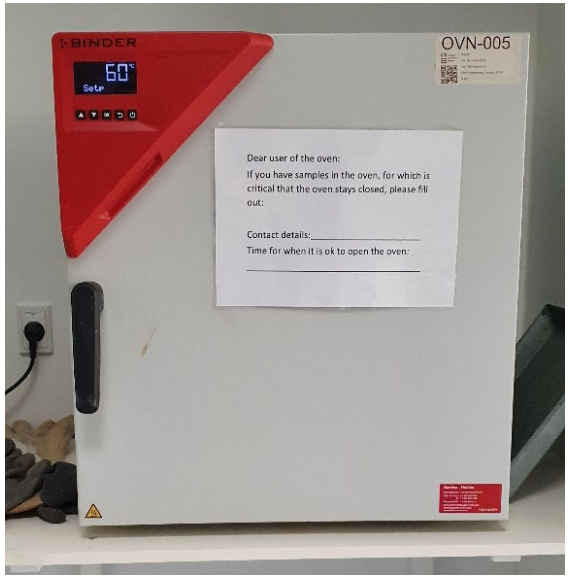
N-11 (Gorm, Water Based Mud)

Cleaning from drilling mud should not induce swelling



TEB-09 (Tyra, Oil Based Mud)

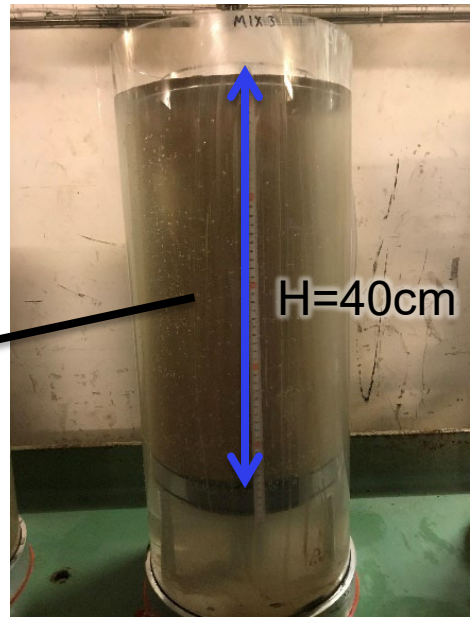
Reflux with toluene to remove oil from pores



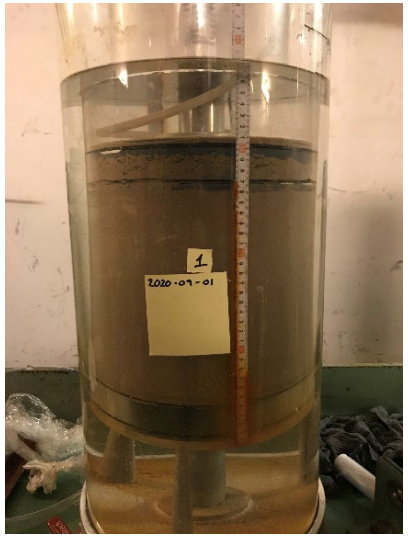
Dry cuttings

Break into <2mm fragments

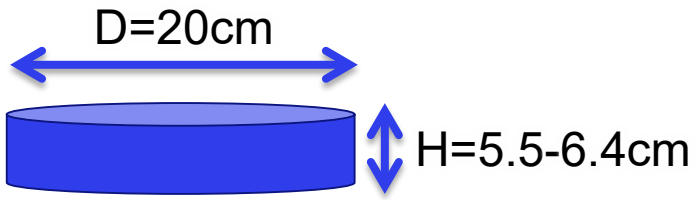
Mix into suspension with synthetic pore water

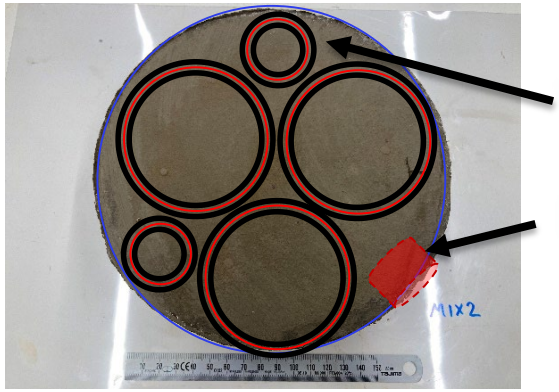


Sedimentation by self weight



Compression to
in situ stress






DTU