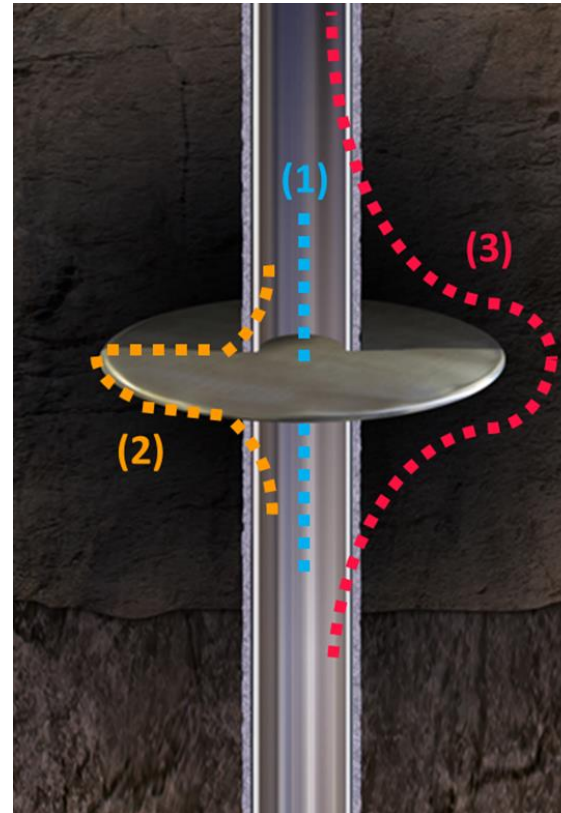


# Short formation lengths as part of annulus barrier – test results and experiences

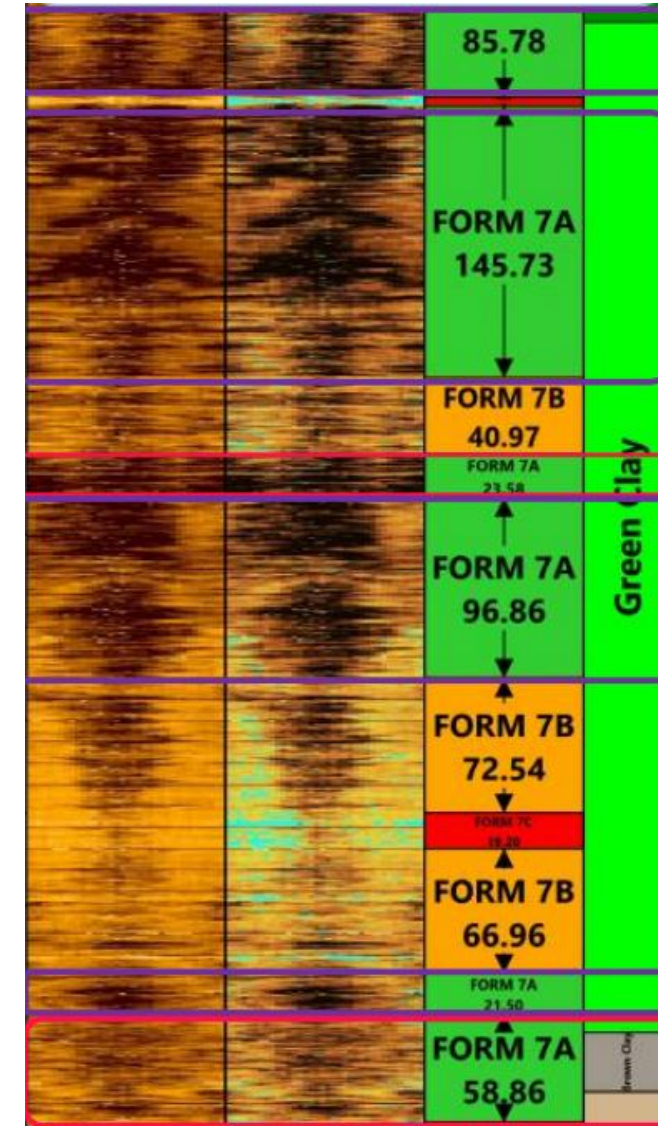
Håvard Reitan, Rock Mechanics Equinor  
Tormod Fossdal, Leading Advisor P&A Equinor

## WHY?

- P&A and Slot Recovery cost.
- Assessment of shorter barrier intervals
- New P&A solutions
- Potential accumulation of shorter intervals
- Representative field conditions not available in lab.



- **What's the barrier capacity of a short length of annulus cement or formation creep?**



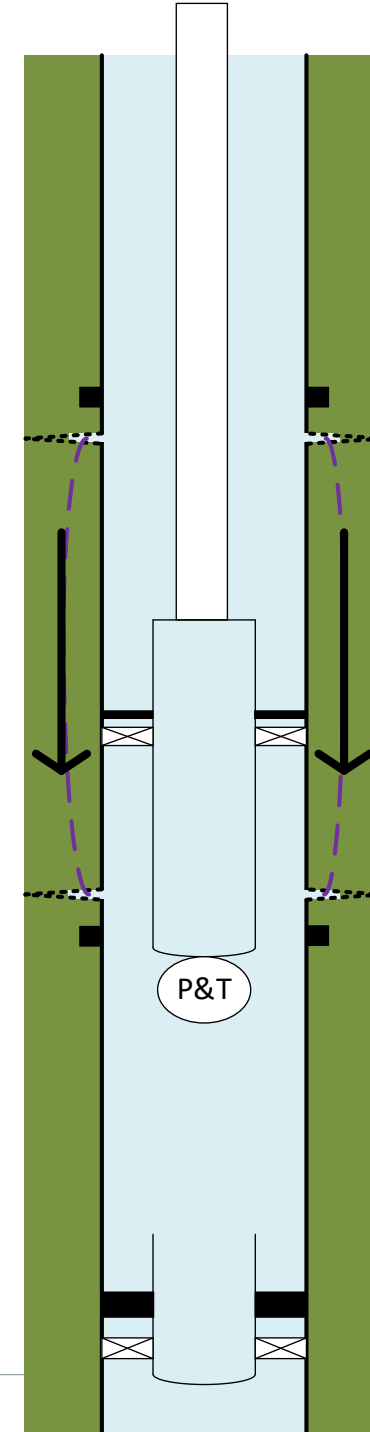
# How to measure the barrier quality?

- Multiple testing methods and tools available today.
- Although properties of both cement and crept formation can be measured in lab, validation towards insitu conditions is important.

**Successfactor:** Sensitivity

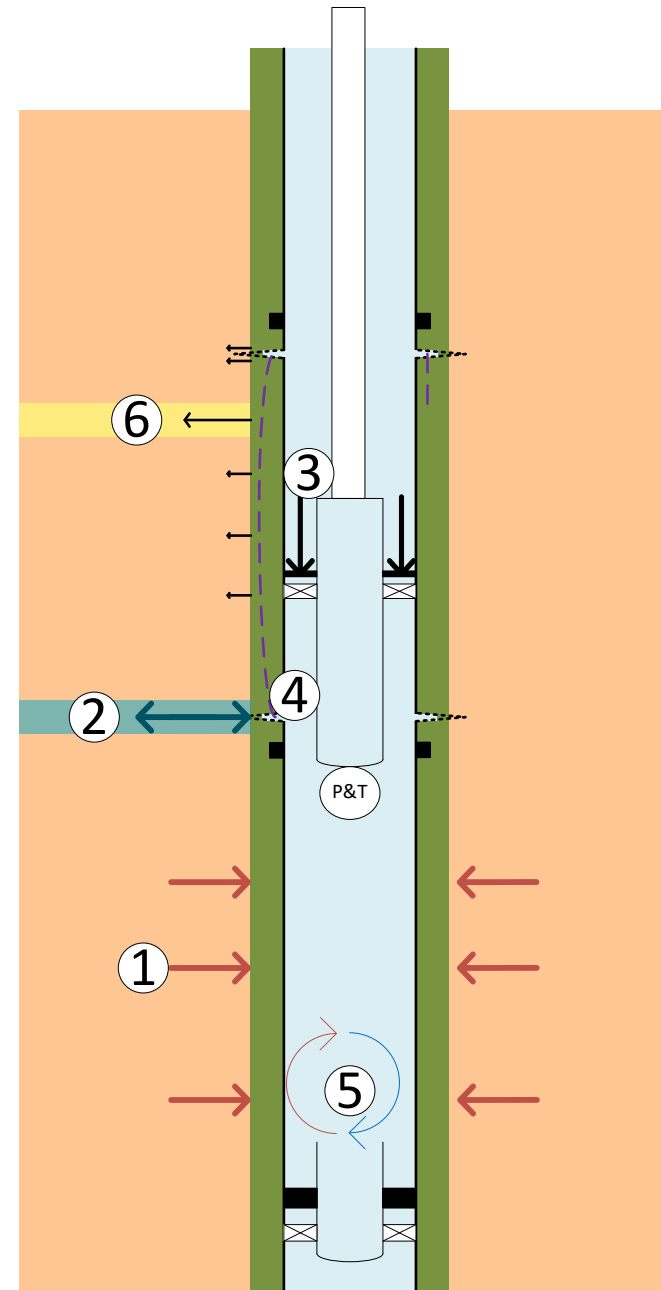
## The communication test

- Conveyance: DP or Wireline
- Sequence: lower plug, lower perf, upper plug, upper perf (combination runs available)
- Differential pressure applied from above, monitoring below plug.

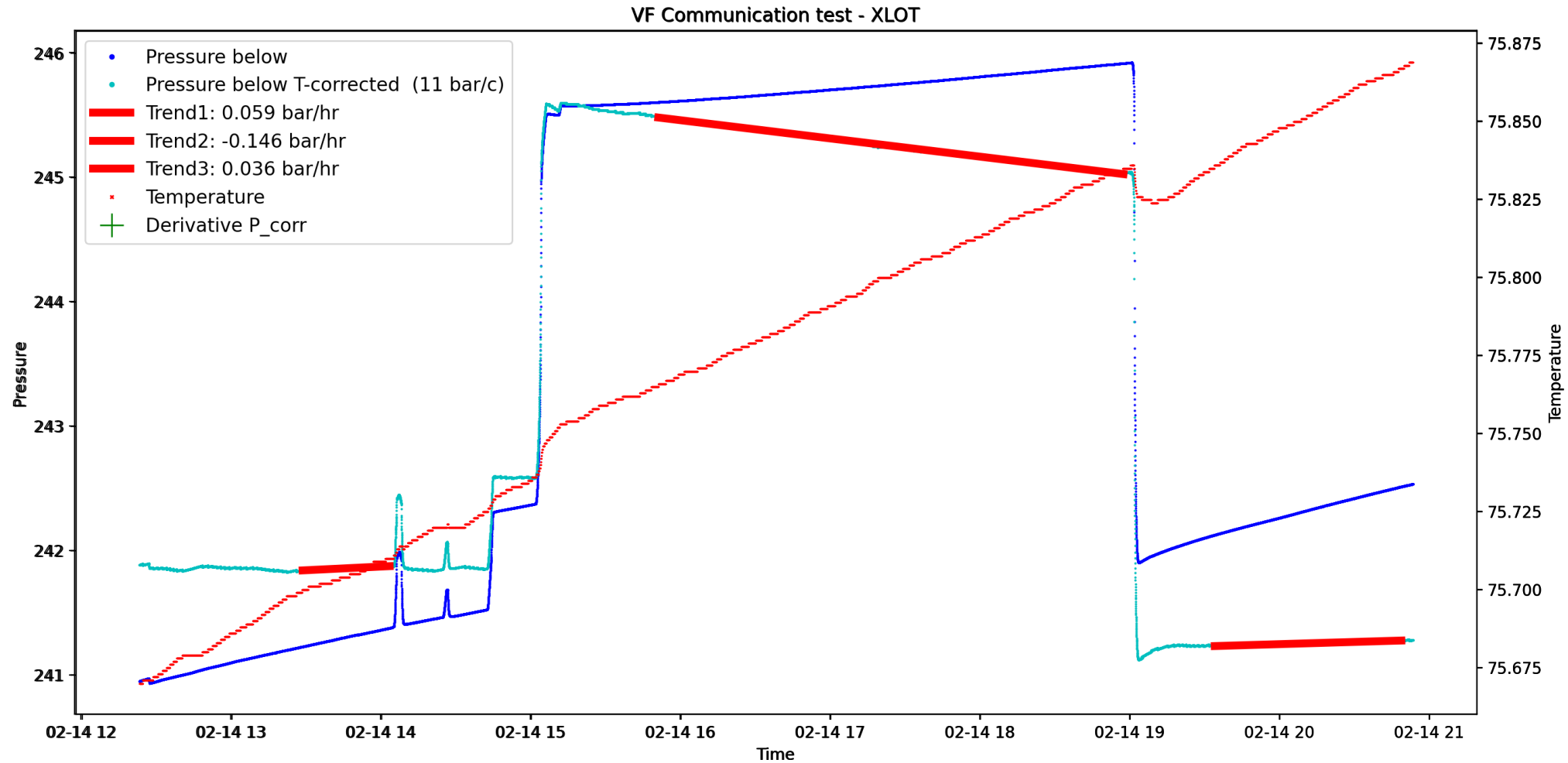


## Setup and factors affecting results

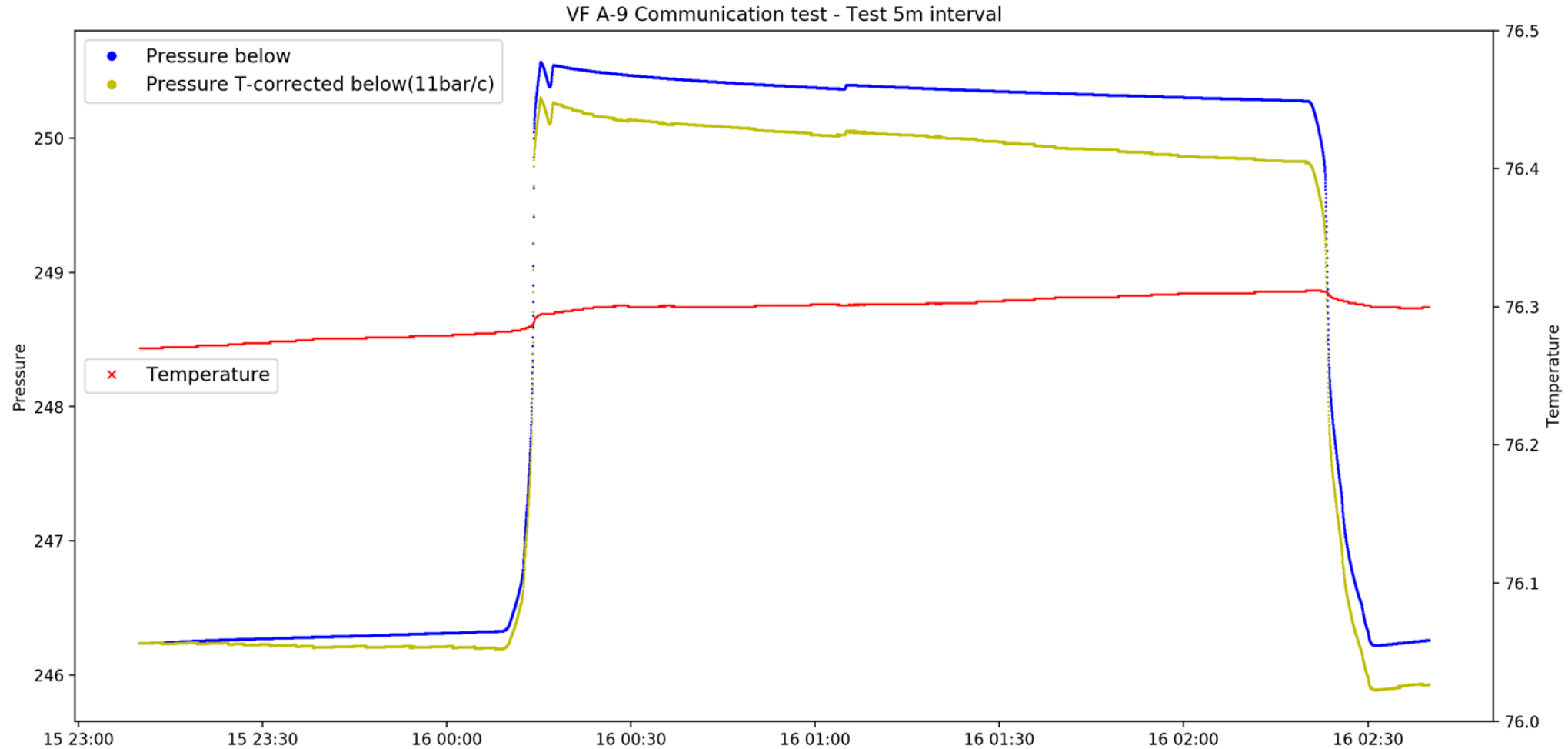
1. **Heat transfer from formation to monitoring volume.**
2. **Formation hydraulic interaction.**
3. Pressurizing plug – compression of monitoring volume.
4. Clay swelling / shrinking
5. Temperature convection within monitoring volume
6. **Horizontal fluid loss along test interval**



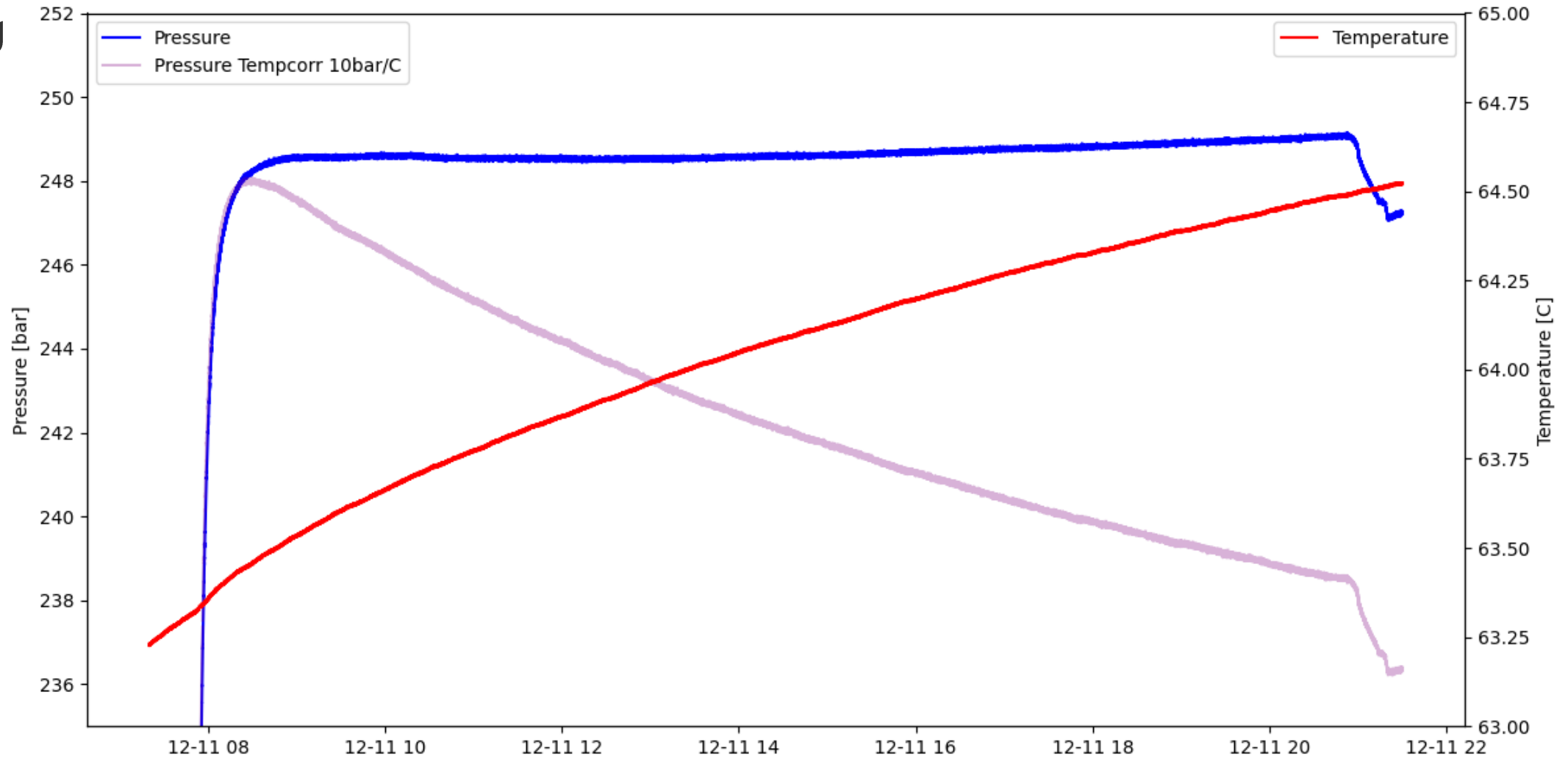
# Veslefrikk – 10 m test



# Veslefrikk – 5m Test

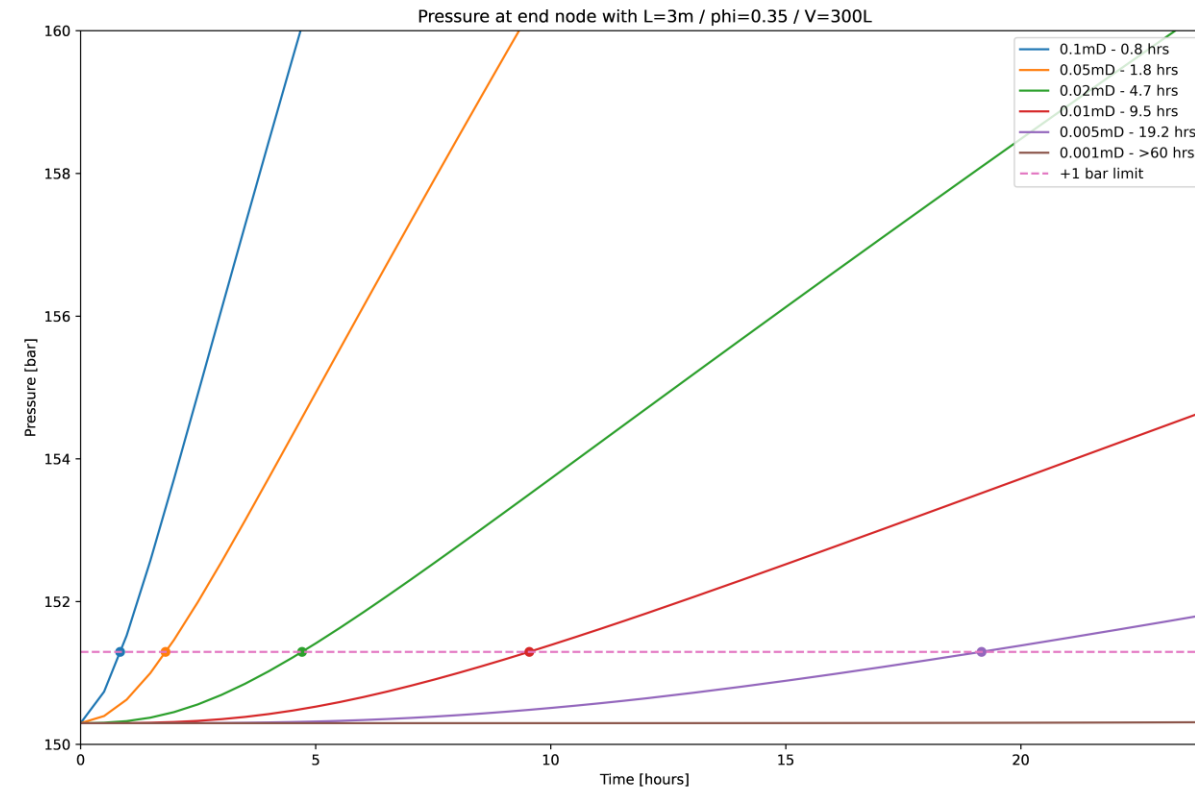


# Oseberg



## Where are we now!

- **No leak** along annulus is proven in the cases analyzed.
- **Shortening the test length** is still favorable for data collection.
- Formation interaction is larger than anticipated.
- Simulation models assist in showing what cases are feasible to detect.
- **In order to improve - data collection and data sharing is required.**



- Thanks for **Veslefrikk** partners (Petoro, Repsol, Wintershall Dea and Equinor) and **Oseberg** partnership (Petoro, TotalEnergies, ConocoPhillips and Equinor) for allowing to share test data.



QUESTIONS?

## Short lengths with formation as annulus barrier – test results and experiences

Håvard Reitan, Rock Mechanics