

Microseismic detection at CaMI.FRS (CO₂ injection in a shallow target)

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Summary

CaMI.FRS is a project to inject limited CO₂ amount into the shallow layers, and the goal is to detect CO₂ plume and migration in the reservoir using high-resolution geophysical methods. Our studies demonstrated that activities are in different depths, mainly in shallow formations near the surface. We are describing the possible relationship between injection and microseismic activities that are recorded in 1- the near-surface and 2- the well, and 3- recorded in both. This research used frequency analysis for event discrimination from the noises.

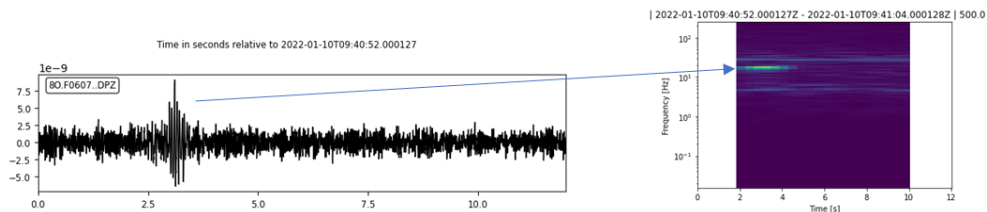


Figure 1. An event and frequency content of it.

Introduction

Injecting or producing fluids into/from the underground basins and formations always causes a change in their stress habit. The earth's response against stress change due to CO₂ injection is induced and shown by microseismic activities. The study of microseismic events can be a method to detect geomechanical stress change and fluid migration inside the reservoir or through cracks and fractures. Through this paper, we studied the type of events in the project area. The steps for event detection are demonstrated in the following diagram.

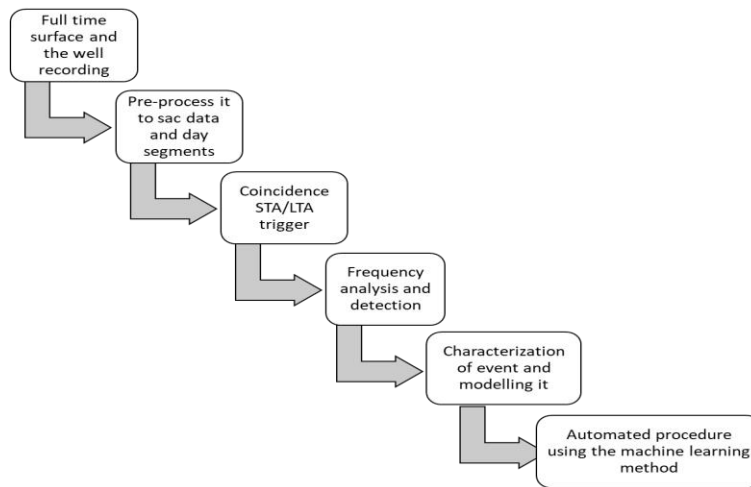


Figure 2. The processing steps for event detection.

Results, Observations, Conclusions

We concentrate on event recognition and counting, finding the relation between possible injection and the event count.

Also, we estimated the events' magnitude and location for more geological interpretation and geomechanical study.

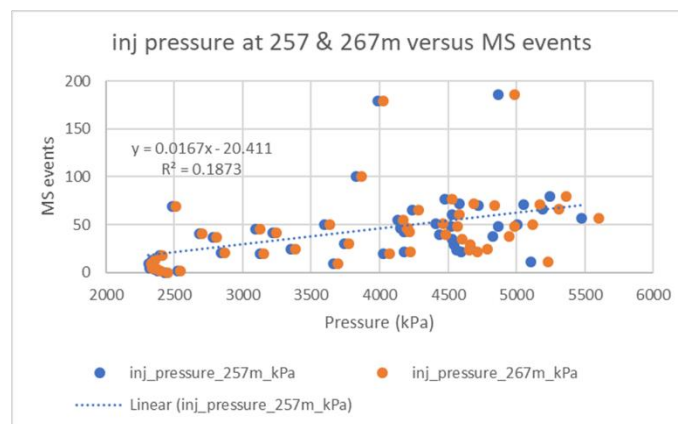


Figure 3. Correlation between counting events and pressure change.

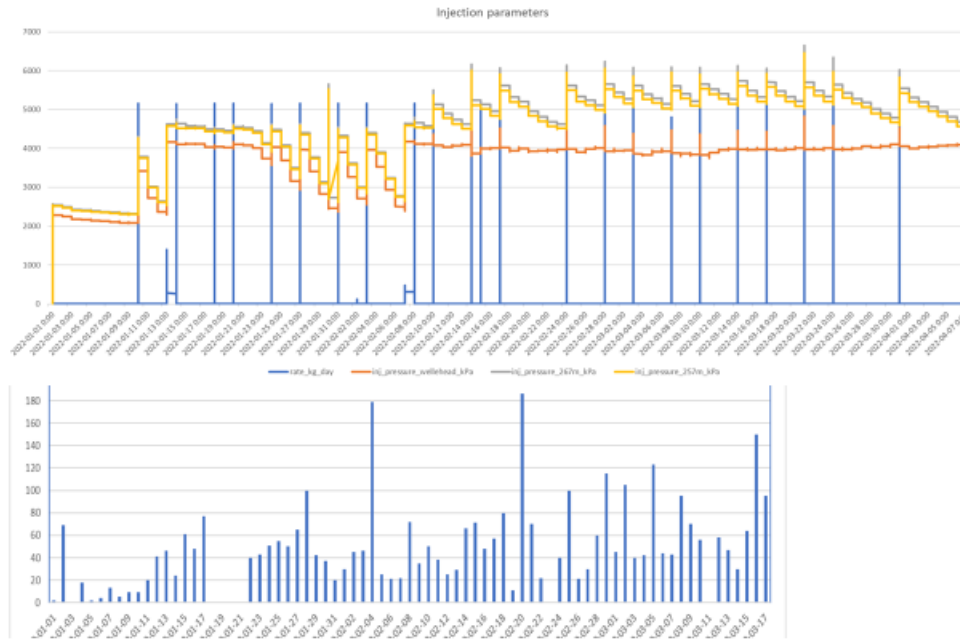


Figure 4. The event number versus pressure change for Jan 2023 to 18th March.

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