

ENOS WP3 WORKSHOP

STORAGE SITE SOLUTIONS: MONITORING AND VERIFICATION

“GAPS IN CURRENT MONITORING STRATEGIES BASED ON EXPERIENCE AT HONTOMÍN”

POST-13TH CO₂GEONET OPEN FORUM

SAN SERVULO ISLAND, VENICE 26TH APRIL 2018

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Outline

- Workshop target
- Hontomín TDP
- Main potential leakage pathways identified on site
- Deep monitoring existing on site
- Surface monitoring at the pilot area
- Existing gaps and technological solutions

Workshop target

“Discussion on research and technology development opportunities to meet the needs of storage operators in terms of effective monitoring of the storage site complex”

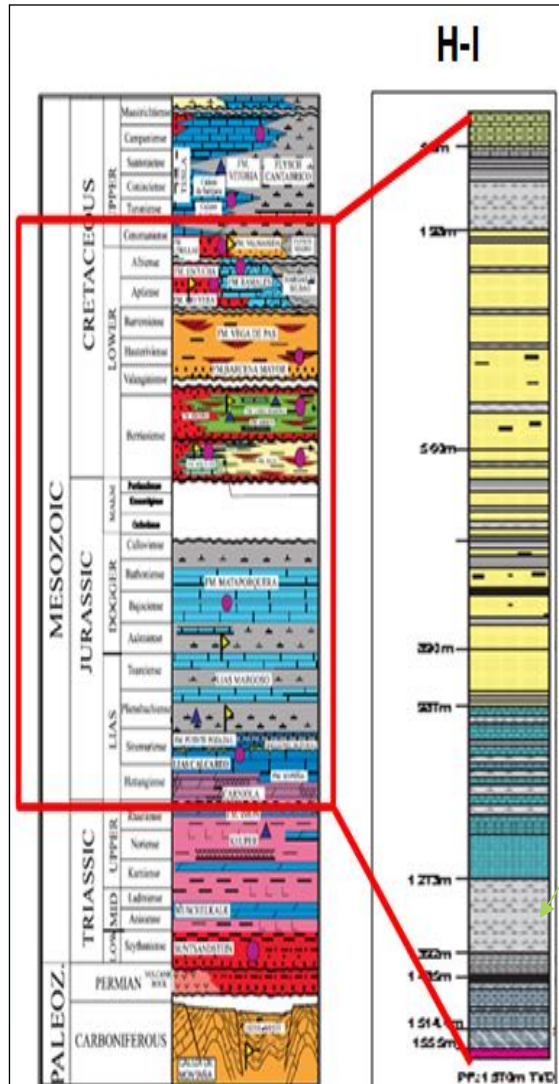
Hontomín Technology Development Plant



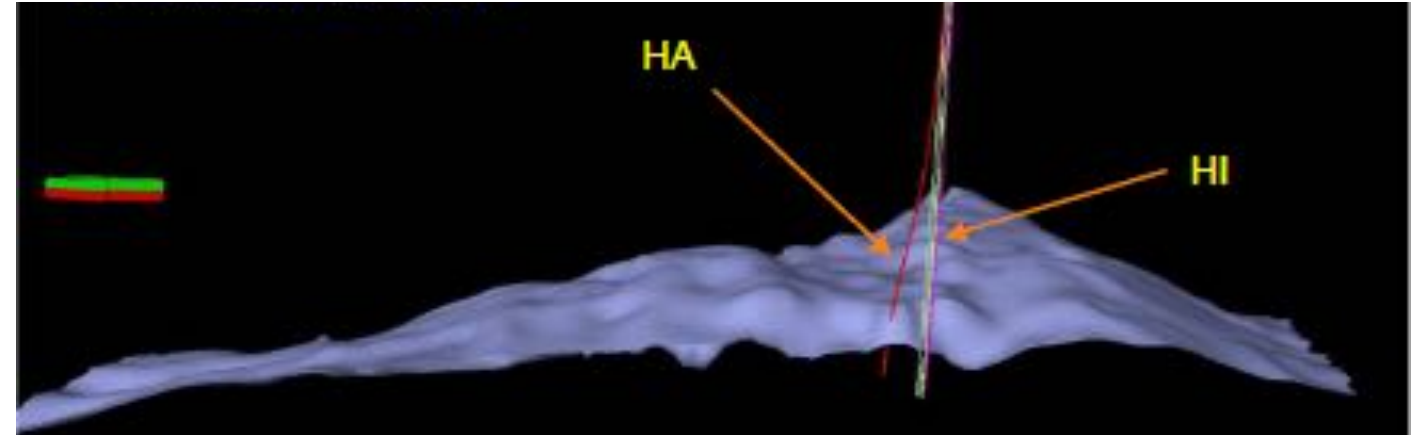
Unique onshore injection site in the EU, **recognized by the European Parliament as a key test facility** (*E.P. Resolution 2014*)



Hontomín TDP



Deep saline aquifer
Seal-Marly Lias
Reservoir-Sopeña Fm
 Fractured carbonates
 with low matrix porosity



Seal-Marly Lias

Reservoir-Sopeña Fm

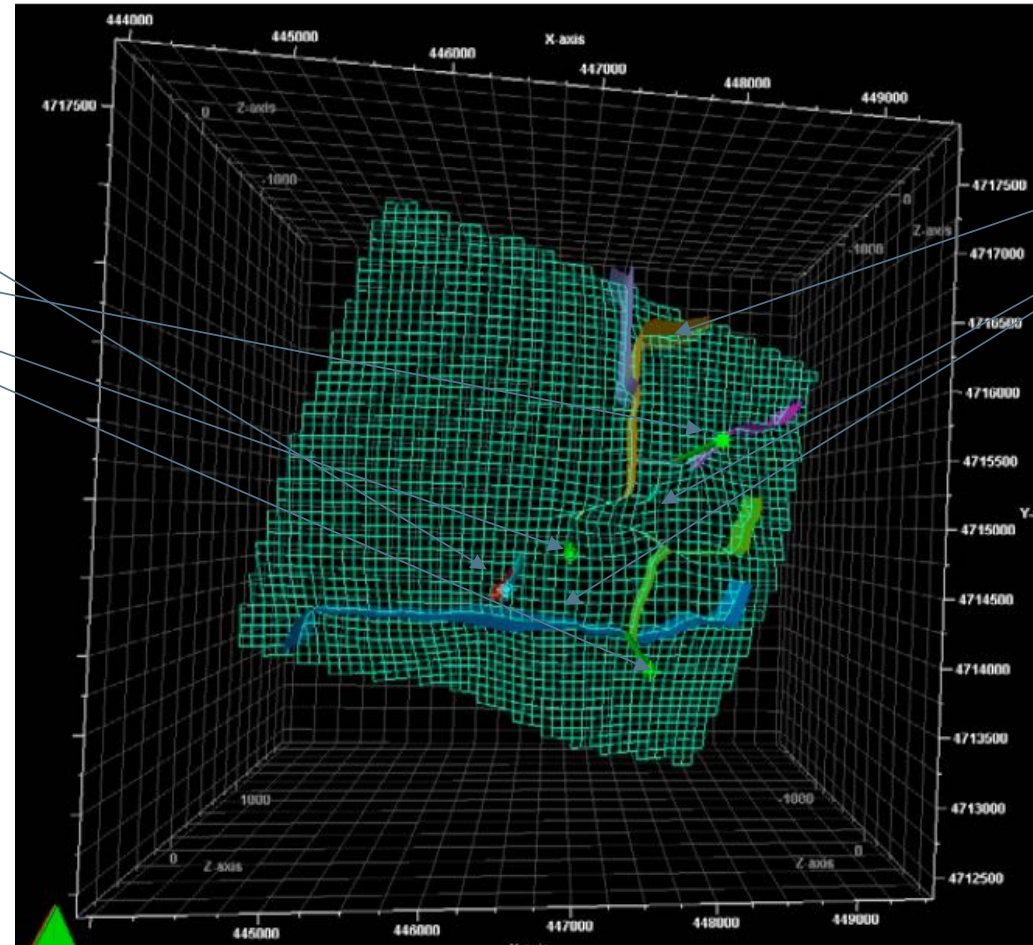
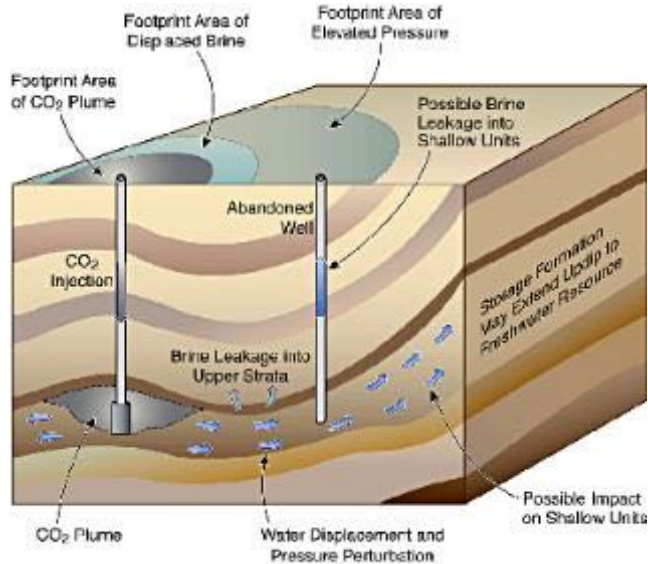


Main potential leakage pathways identified on site

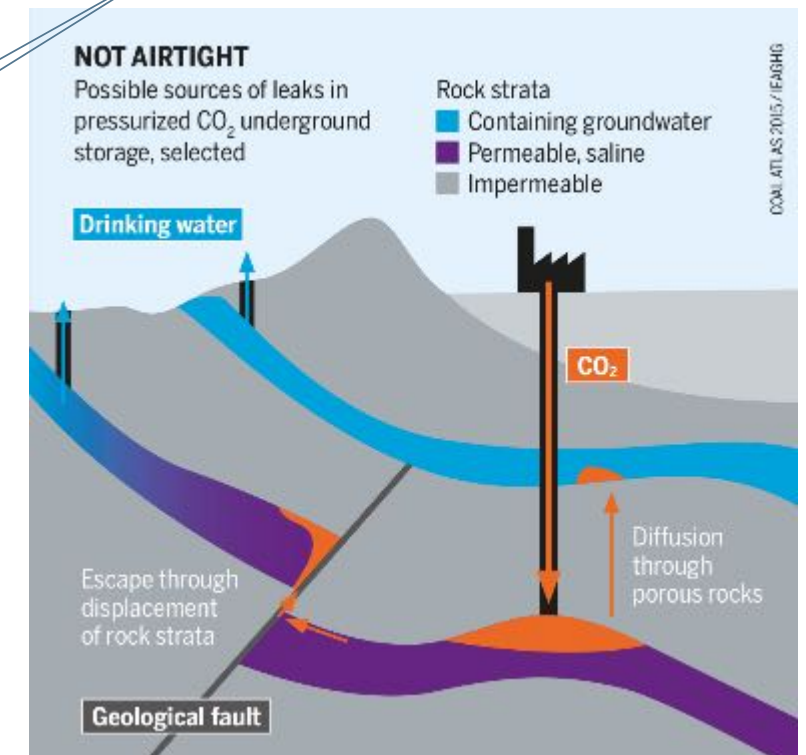
Wells

2 Injection/observation wells

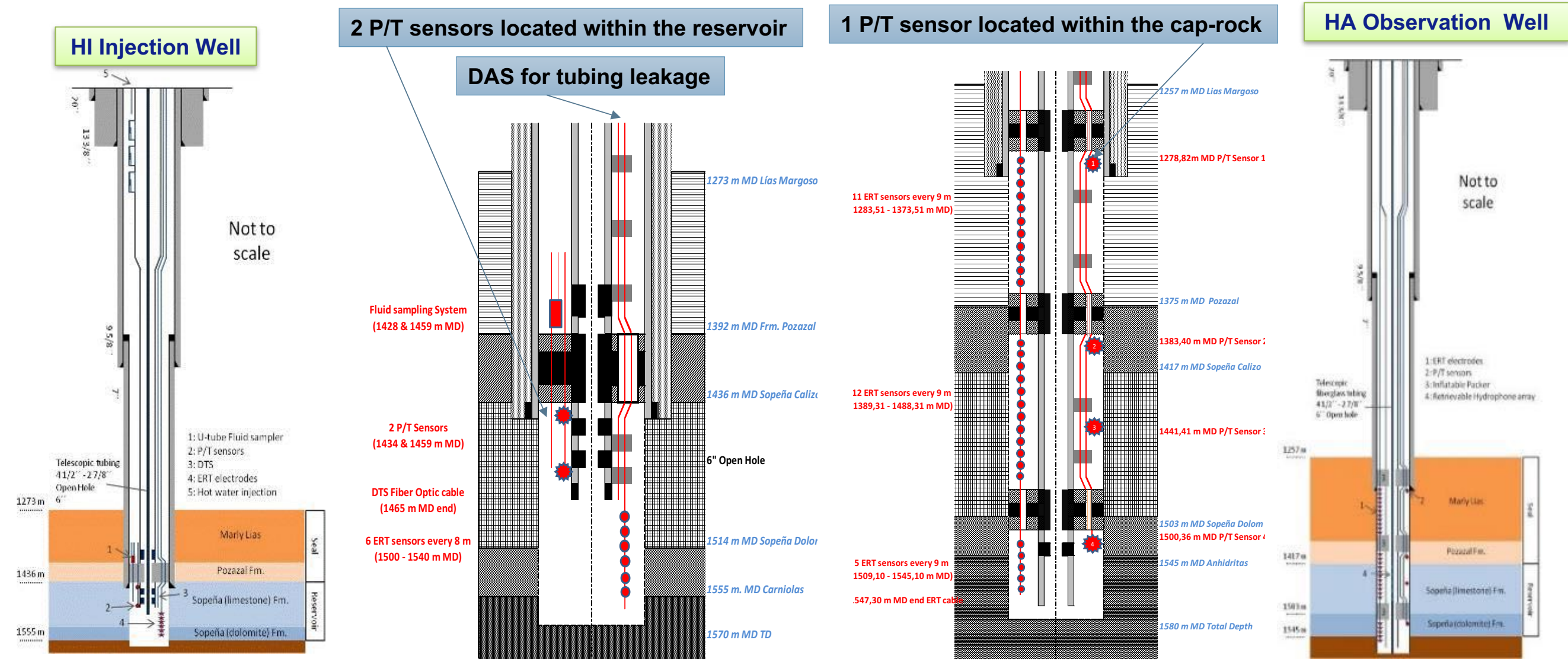
4 Legacy wells



Faults

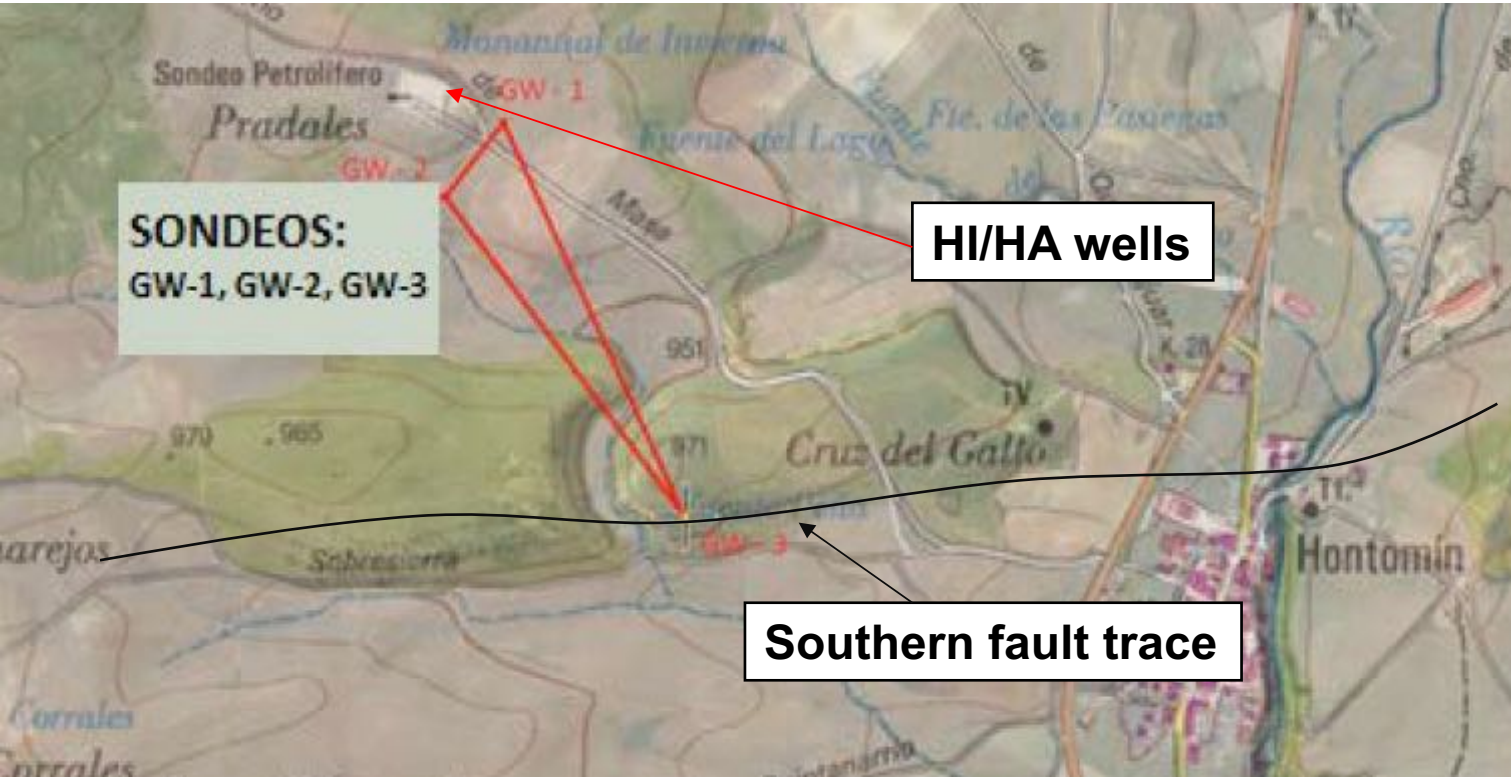


Deep monitoring existing on site (no direct leakage control except iDAS)



Surface monitoring at pilot area. Hydrogeological monitoring network

- 8 wells (150-400 m depth), three of them drilled for the project, with water level control and water features monitoring



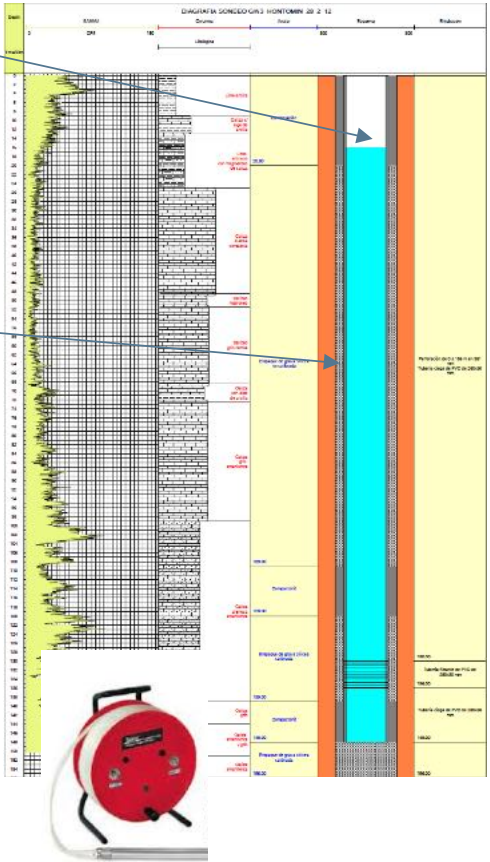
Water level gauge



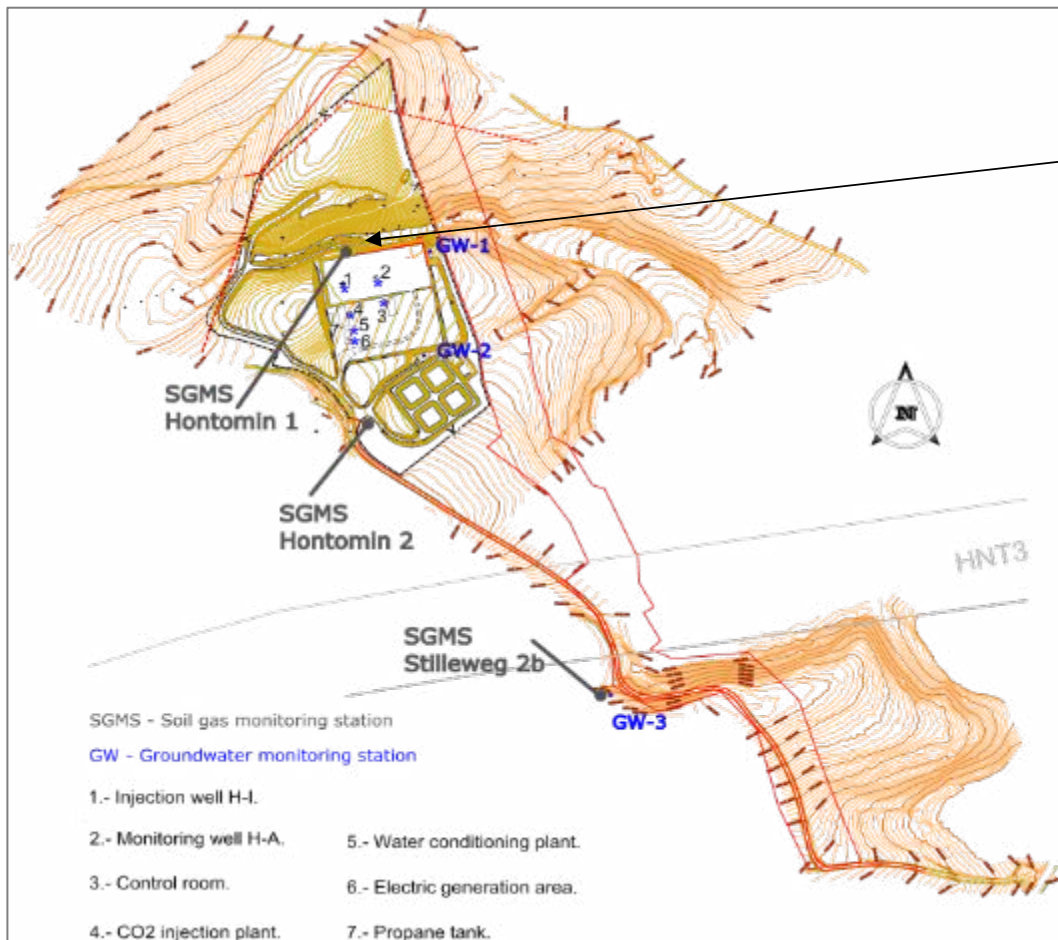
Water features sensor:

- pH
- Conductivity
- Temperature

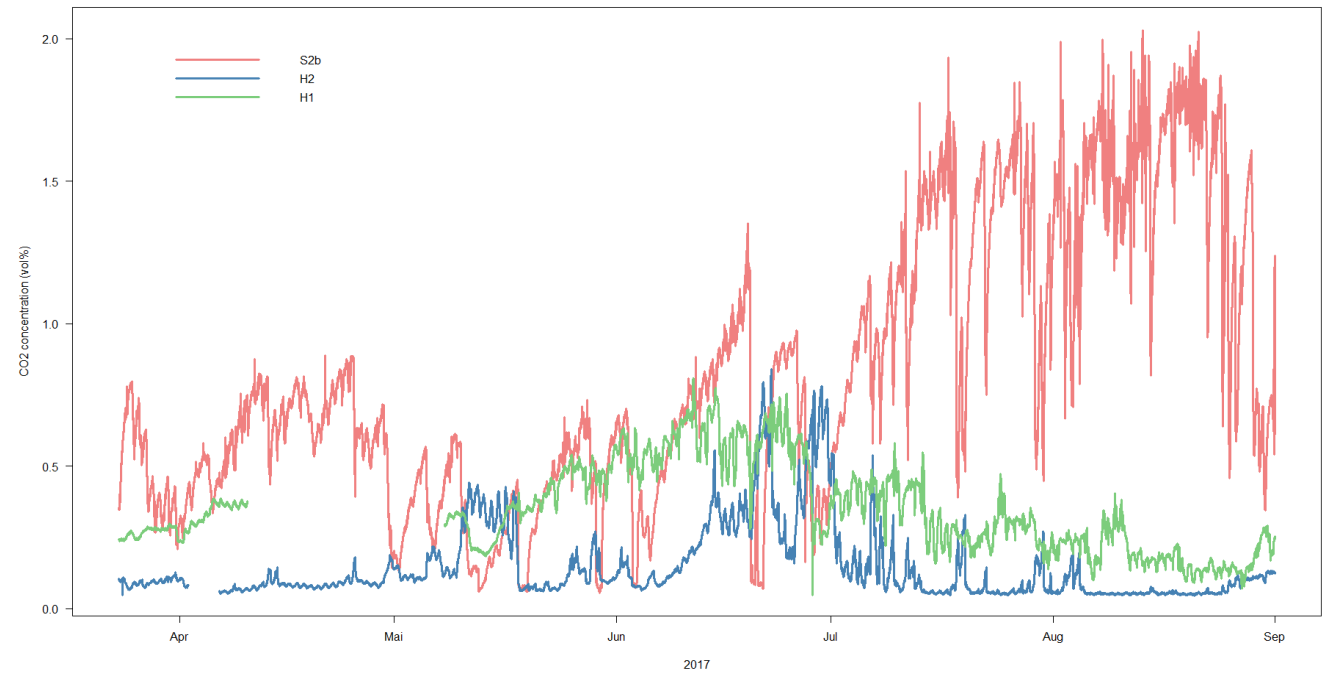
Water sampler
Composition lab analysis



Surface monitoring at pilot area. Soil gas monitoring stations

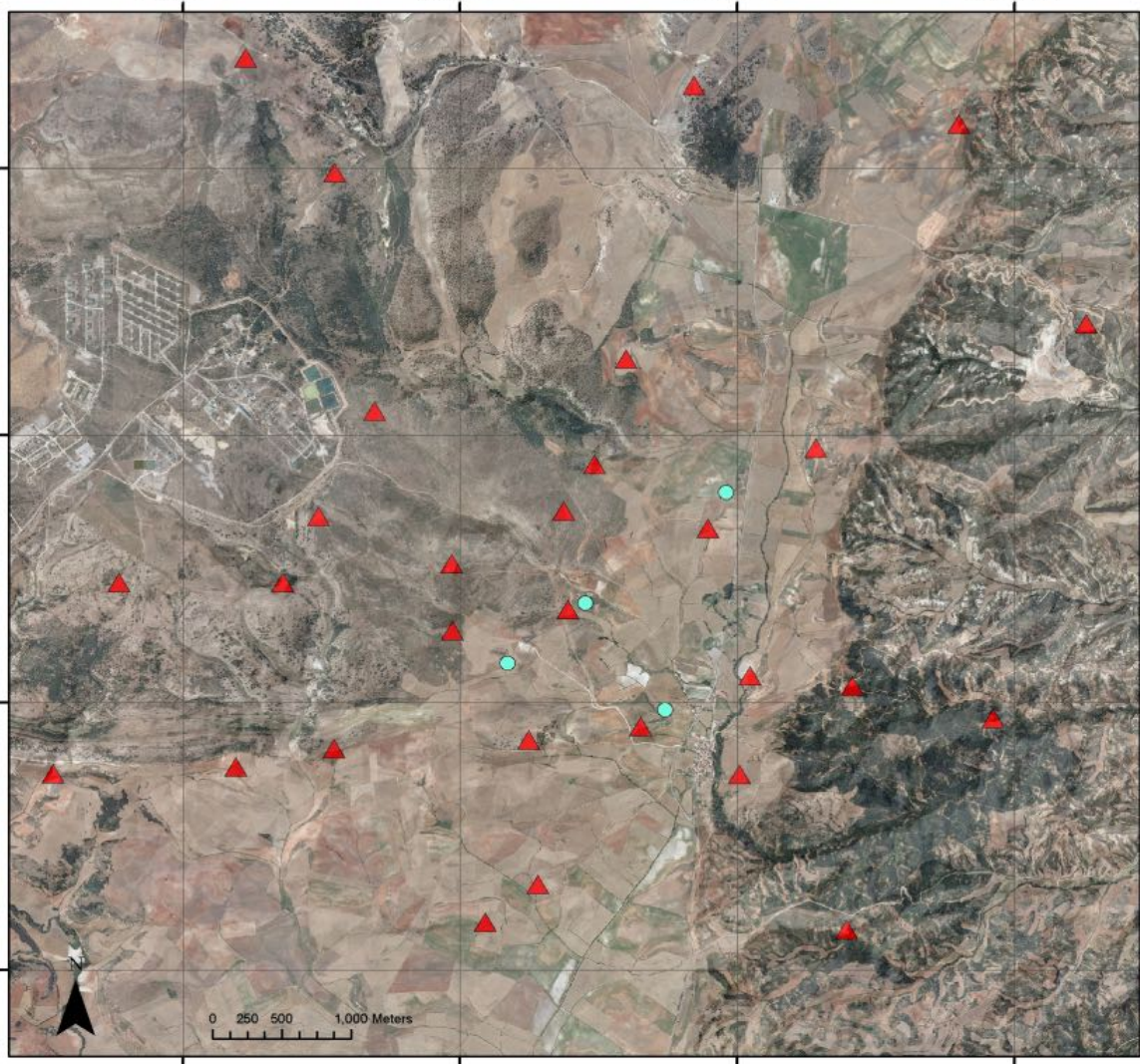


Comparison of the Hontomin Soil Gas Monitoring Stations
- Development of the CO2 concentration over the time -



(Möller, Schlöemer, Seeger, 2017 BGR)

Surface monitoring at pilot area. **Microseismic monitoring network** (no direct leakage control)

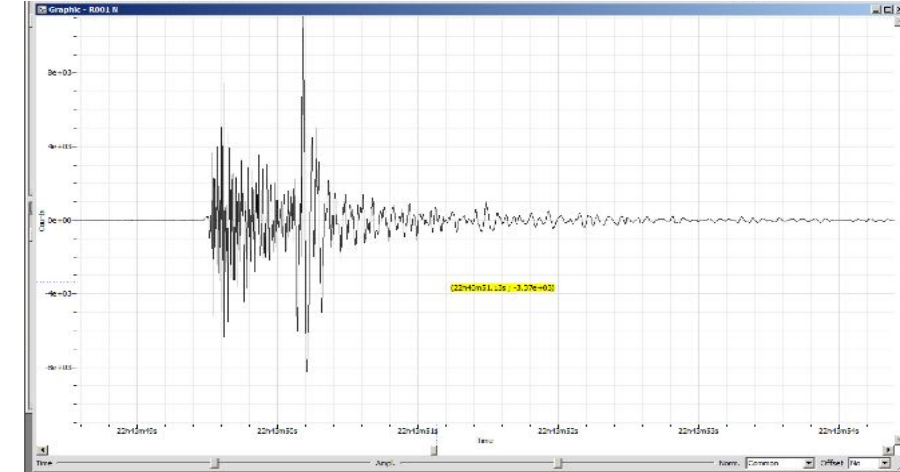


30 passive seismic stations on Surface (~2 m depth):

- 20 sensors SARA SS 45 (4,5 Hz)
- 10 sensors Lennarzt LE 3D (20 seconds period)
- 1 accelerometer
- Specific software (Control Room)



RED HONTOMÍN, ESTACIÓN HO01



Existing gaps and technological solutions

Main gap: Current monitoring to detect leakages at Hontomín warns the alert when CO₂ reaches the surface (fresh water aquifers and soil layers)



Lack of predictive and pro-active technological solutions

Get ahead of problem: The leakage should be detected in the early stage if possible, for quick apply of mitigation process

Search for solutions:

- Detect CO₂ leakages in the surrounding area of the injection and observation wells (mainly in the cemented interphase rock-completion)
- Specific solutions for legacy wells
- Measure BHP data in enough points of cap-rock
- Detect CO₂ leakages by geophysical tools in the fault plane (correlation with geochemical data)
- Deep ground water monitoring through innovative tools and the use of tracers

Thank you for the attention

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ENOS

Enabling Onshore CO₂ Storage

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