EGU21-1990
https://doi.org/10.5194/egusphere-egu21-1990
EGU General Assembly 2021

A novel CO_2 storage concept that reduces the leakage risk

Victor Vilarrasa[1,2,3] and **Francesco Parisio**[4]

[1]Consejo Superior de Investigaciones Científicas, IDAEA-CSIC, Barcelona, Spain (victor.vilarrasa@idaea.csic.es)
[2]Consejo Superior de Investigaciones Científicas, IMEDEA-CSIC, Barcelona, Spain
[3]Associated Unit: Hydrogeology Group (UPC-CSIC), Barcelona, Spain
[4]Chair of Soil Mechanics and Foundation Engineering, Freiberg University of Mining and Technology, Germany

Geologic carbon storage is needed to reach carbon neutrality and eventually achieve negative emissions. In the classical concept of storing CO_2 in deep sedimentary aquifers, supercritical CO_2 has a lower density than the resident brine. CO_2 is therefore buoyant and the safety and effectiveness of the storage concept rely on the caprock sealing capacity to prevent CO_2 leakage. To reduce the risk of CO_2 leakage and widen the CO_2 storage options, we propose an innovative concept that consists in injecting CO_2 in reservoirs where the temperature and pressure of the resident brine are above the critical point (373.95 ºC and 22.064 MPa for pure water). At such conditions, which can be found at depths between 3 to 5 km in volcanic areas, CO_2 is denser than the resident water and thus, sinks. The sinking tendency reduces the risk of CO_2 leakage to the surface even in case of damaged or absent caprock. CO_2 storage in supercritical reservoirs can potentially become an additional option to the existing storage concepts aimed at significantly reduce CO_2 emissions. We estimate that every 100 wells drilled into supercritical reservoirs could store between 50 to 500 Mt/yr of CO_2.

REFERENCES

Parisio, F. and Vilarrasa, V. (2020). Sinking CO_2 in supercritical reservoirs. Geophysical Research Letters, e2020GL090456.