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A novel CO₂ storage concept that reduces the leakage risk

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Geologic carbon storage is needed to reach carbon neutrality and eventually achieve negative emissions. In the classical concept of storing CO₂ in deep sedimentary aquifers, supercritical CO₂ has a lower density than the resident brine. CO₂ is therefore buoyant and the safety and effectiveness of the storage concept rely on the caprock sealing capacity to prevent CO₂ leakage. To reduce the risk of CO₂ leakage and widen the CO₂ storage options, we propose an innovative concept that consists in injecting CO₂ in reservoirs where the temperature and pressure of the resident brine are above the critical point (373.95 °C and 22.064 MPa for pure water). At such conditions, which can be found at depths between 3 to 5 km in volcanic areas, CO₂ is denser than the resident water and thus, sinks. The sinking tendency reduces the risk of CO₂ leakage to the surface even in case of damaged or absent caprock. CO₂ storage in supercritical reservoirs can potentially become an additional option to the existing storage concepts aimed at significantly reduce CO₂ emissions. We estimate that every 100 wells drilled into supercritical reservoirs could store between 50 to 500 Mt/yr of CO₂.

REFERENCES

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