A novel CO$_2$ 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 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