



“Gheorghe Asachi” Technical University of Iasi, Romania



FACTORS INFLUENCING THE SAFETY OF CO₂ GEOLOGICAL STORAGE IN DEEP SALINE AQUIFERS

Xiaojuan Qiao¹, Guomin Li^{2*}

¹*Key Laboratory of Computational Geodynamics, Chinese Academy of Sciences, Beijing, China, 100049*

²*Key Laboratory of Engineering Geomechanics, Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing, China, 100029*

Abstract

Carbon capture and storage is one of the critical technologies that can enable the reduction of carbon dioxide (CO₂) emissions of large industrial sites worldwide. The injection of CO₂ into saline water formations is related with many factors and processes that control the safety of its long-term storage. This paper analyzes the leakage risks and the factors that influence the integrity of the cap rock in deep saline aquifer formation. Several pathways have leakage potential risks due to deficiencies in the cap rock, new fracture networks, abandoned wells, and earthquake-induced fractures. The internal factors that influence the integrity of the cap rock include the type of cap rock and the natural parameters of aquifer formations, such as the permeability, porosity, fracture aperture, and so on. External factors, including the multi-process coupling of hydraulic, thermal, chemical, and mechanical processes, are crucial to the stability of the cap rock.

Key words: cap rock integrity, coupling multi-process, geological storage safety, permeability, pressure, temperature

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* Author to whom all correspondence should be addressed: e-mail: guominli@mail.igcas.ac.cn; Phone: +86 010 82998620