Assessment of CO_2 leakage using mechanistic modelling approach for CO_2 injection in deep saline aquifer of Lithuanian basin in presence of fault and fractures

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Abstract. Injecting CO_2 into deep saline aquifers is a prominent strategy for carbon capture and storage (CCS) to mitigate greenhouse gas emissions. However, ensuring the long-term integrity of CO_2 storage is crucial to prevent leakage and potential environmental hazards. This paper investigates the impact of fracture permeability on CO_2 leakage volumes in the context of CO_2 injection into Syderiai deep saline aquifer for carbon capture and storage (CCS) applications. It explores the relationship between fracture permeability and the potential for CO_2 leakage, as well as the volume of CO_2 dissolved in water above and below the cap rock. Furthermore, the study examines how the leakage volume may evolve over time in Syderiai deep saline aquifer. A mechanistic model of Syderiai deep saline aquifer, of Lithuanian basin, was developed based on average permeability, porosity, NTG and thickness (Fig. 1) and is used in this analysis.

Keywords: carbon capture and storage, CO_2 leakage, leakage risk, faults and fractures, modeling, Lithuania.

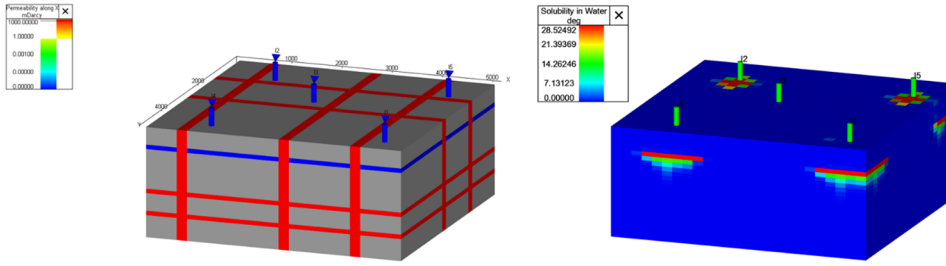

Fig. 1. Permeability distribution Grid block for 1000 md Fracture and Soluble CO_2 in water for 1000 md Fracture after 100 year

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