

# The importance of a realistic leakage evaluation to support public awareness and acceptance for carbon capture and storage

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**Abstract.** Carbon Capture and Storage is not only highly recommended by the IPCC as a mechanism to significantly lower carbon emissions to the atmosphere, it is now also gaining traction in terms of large-scale implementation. Its importance is increasing in many parts of the world to directly decrease emissions from industrial sources, but also to lower the carbon footprint of blue hydrogen production.

With most CCS projects being planned for offshore locations, public acceptance is less of a determining factor than it used to be 10-20 years ago, where discussions were rather for onshore locations. CO<sub>2</sub> leakage has always been a risk highlighted in the public debate, while no or minimal leakage has been reported for current CCS projects worldwide. However, as scientific community, we need to realistically highlight the risk of leakage across sealing units for CO<sub>2</sub> stored to inform various stakeholders like regulators, the public and of course also operating companies.

Caprock leakage needs to be studied across various length and time scales, considering the undisturbed matrix as well as fracture networks and faults; we need to consider advective and diffusive flow and transport and incorporate mineral alterations, potentially leading to changes in hydraulic or mechanical properties.

This talk will highlight the current state of research, advancements and future research required for a realistic evaluation of caprock leakage. It will be based on past research related to matrix transport as well as current research focusing on single and multiphase flow along faults and fractures.

**Keywords:** caprocks, matrix, faults, public acceptance, advective and diffusive transport.