Subsurface Gas Storage in Porous Reservoirs: A Pathway to Sustainable Energy?

Large-scale subsurface gas storage in porous reservoirs has the potential to be an important component of a sustainable energy future. Geological carbon dioxide storage can mitigate CO2 emissions, while underground energy storage, particularly in the form of hydrogen, offers a potential solution for balancing renewable energy production and demand. While the concept of storing gases in subsurface reservoirs is not new — natural gas has been safely stored underground for decades — the distinct physiochemical properties of methane, carbon dioxide, and hydrogen could lead to very different behavior in the subsurface. Reservoir simulation is a valuable tool for investigating the feasibility of large-scale subsurface gas storage in porous reservoirs. However, to obtain meaningful results, it is crucial that the input parameters accurately capture the behavior of the gas-brine-rock system, including the impact of small-scale rock heterogeneity. In this lecture, I will look at the differences between methane, carbon dioxide, and hydrogen storage, demonstrate how multi-phase flow in heterogeneous porous rock can be experimentally visualized and characterized from the pore- to the core-scale, and show how meaningful input parameters for reservoir simulators can be derived by integrating these experimental findings with numerical and analytical modeling techniques.

Im Anschluss findet ein Empfang im Foyer des SimTech-Gebäudes statt.

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