**Universität Stuttgart**
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Fakultät 2: Bau- und Umweltingenieurwissenschaften
Sonderforschungsbereich SFB 1313

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

Einladung zur Antrittsvorlesung von Jun.-Prof. Maartje Boon

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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.

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