Geoscience-informed evaluation of U.S. natural gas storage reservoirs, aquifers and salt caverns

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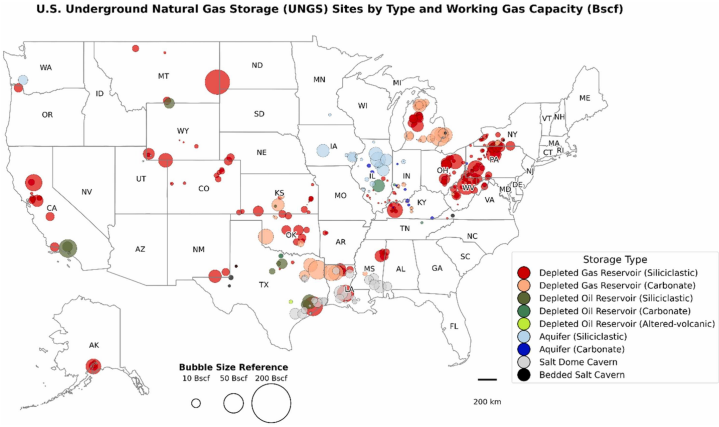

Study Summary

In the United States, underground natural gas storage (UNGS) represents the world's largest and most established subsurface storage network, with a total capacity of 9.2 trillion cubic feet, including 4.7 trillion cubic feet of working gas and a deliverability of 117.3 billion cubic feet per day. UNGS ensures the reliability and efficiency of the natural gas supply by storing surplus gas during low-demand periods and releasing it during peak demand. Despite their critical role, systematic geoscience-based evaluations of these reservoirs, aquifers and salt caverns, including assessments of lithology, petrophysical properties, and other key subsurface and operational characteristics, remain limited. Here, a national-scale evaluation of U.S. UNGS is presented based on an integrated synthesis of subsurface characteristics, operational attributes, and performance metrics compiled from 131 publicly available and reported sources. Sites are first classified into nine storage classes based on the dominant subsurface controls for each storage setting, including lithology and native fluid for depleted hydrocarbon reservoirs, lithology for aquifer-based storage, and cavern type for salt storage systems. Subsurface, operational, and performance characteristics are then evaluated within and across storage classes and geographic regions. The resulting insights provide a geologically grounded framework to guide new UNGS development, assess the potential repurposing of existing facilities for alternative gases such as CO2 and hydrogen, and inform the deployment of other gases in analogous geological settings, including CO2 sequestration and underground hydrogen storage (UHS).

Why is this research important and why do the results matter?

- Presents a geoscience-informed, nation-wide evaluation of U.S. UNGS
- Develops a new integrated database combining subsurface, operational, and performance data
- Establishes benchmarks linking geological and operational factors to storage performance
- Proposes a framework to guide new developments and repurposing of existing facilities
- Informs potential deployment of hydrogen and CO_2 storage

Link(s)

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