



Distribution and activities of microorganisms in the reservoir and around gas wells in a long-term used gas field in the Altmark, Germany

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As part of a joint research project, microbial communities in the area of the second largest natural gas field in Europe in the Altmark, Germany are analyzed. The Altmark gas field operated by GDF SUEZ E&P Germany GmbH is located at the southern edge of the Northeast German Basin. The reservoir horizons belong to the Permian Rotliegend formation (Saxon) and have an average depth of about 3500 m. CO₂ injection is planned to enhance the recovery of gas in this with conventional extraction methods nearly depleted gas field (Enhanced Gas Recovery – EGR, BMBF project CLEAN).

For baseline-monitoring of the deep reservoir microbiological, molecularbiological and isotopic analyses are used to investigate the microbial community. The $\delta^{13}\text{C}$ of CO₂ and CH₄ collected in situ in production waters indicate a thermogenic origin. The reservoir fluids represent a hypersaline (up to 420g/L) and hot (120-130°C) environment. Results of microbial activities, cell numbers and the identification of microorganisms in these reservoir fluids will be presented.

Microbiological analyses are used to supplement a continuous gas monitoring program at the soil surface above the EGR-site. Microbial production and consumption of CH₄ and CO₂ are determined together with the carbon isotopic compositions to separate these indigenous biological activities from possibly upward migrating reservoir gases including CO₂. The $\delta^{13}\text{C}$ of CO₂ collected in situ was similar to those in incubations, confirming a biological origin. Archaeal cell numbers were approximately one magnitude lower than bacterial cell numbers. In all samples the total number of detectable microorganisms was high in contrast to a generally low activity for CO₂ and CH₄ production and oxidation.