The hidden CO2 - The occurrence, distribution and composition of fluids in various salt minerals

Bettina Strauch¹, Martin Zimmer¹, and Axel Zirkler²

¹GFZ German Research Centre for Geosciences, Potsdam, Germany (betti@gfz-potsdam.de)
²K+S Aktiengesellschaft, Kassel, Germany

Fluid inclusions are voids enclosed in the rock matrix and contain, depending on their origin and development, various amounts of gaseous, liquid or solid phases. Depending on their occurrence within the crystalline structure or in healed micro-fractures, primary and secondary inclusions can be distinguished. Their characteristics are utilized in various geological settings to reconstruct rock history and fluid involvement. Fluid inclusions could also be considered to be small equivalents to large cavities. As salt is regarded a favorable host rock for the storage of natural gas and other materials in artificial caverns, knowledge on gas migration and retention is crucial.

Here, we present results of a fluid inclusion study in various salt rocks using Raman spectroscopy in addition to conventional microscopic characterization and gas analysis on whole rock samples. This approach allows for a better understanding of fluid generation and migration in different salt lithologies over geological times.

Various salt minerals (halite, sylvite, kieserite and carnallite) from an area of potential overprint of CO₂-dominated gas migration were investigated. Numerous fluid inclusions exhibit chevron structure and are small sized. Large single- or two-phased inclusions are observed with irregular shapes, often indicative for leakage or necking down. Interestingly, although the CO₂ concentrations in whole rock samples were high, fluid inclusions were dominated by an aqueous phase and often contain numerous daughter minerals. This suggests that CO₂-rich gas is stored along distinct fractures or grain boundaries within an otherwise intact rock.