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A natural site for CO_2 storage in the Little Hungarian Plain (western Hungary)

C. Király (1), M. Berta (1), Á. Szamosfalvi (2), G. Falus (2), and C. Szabó (1)

(1) ELTE, Geography and Earth Sciences, Petrology and Geochemistry, LRG, Budapest, Hungary (csilla.kiraly.hu@gmail.com, (+36-1) 381 2212), (2) ELGI

Reducing anthropogenic CO_2 emissions is one of the greatest goals of the present and future environmental scientists. A measureable decrease in the atmospheric CO_2 level can be achieved only by applying different solutions at the same time. Carbon capture and sequestration is considered to be an efficient technology in eliminating carbon-dioxide at large, stationary carbon-emitting industrial sources. To ensure the long term stability of the geologically trapped CO_2, behavior of the CO_2-reservoir-porewater system should be predictable on geological timescales. One of the suitable methods to describe a potential future CCS system is to approach it from an accessible system similar in extensions, geophysical and geochemical properties, and characteristic interactions. These are called natural sites; one of them is located in the western part of Hungary: this is the Répcelak-Mihályi Field. However the carbon dioxide is produced since the early 20th century for industrial purposes, the studied system is composed by 38 fields (26 CO_2, 10 hydrocarbon, and 2 mixed gas). The CO_2 is situated in a depth of about 1400 m in the Pannonian sedimentary sequence. These formations are formed by mainly sandstone, siltstone and clay; and were deposited in the late Miocene. In this ongoing research we are summarizing all the available databases from this area, provided by hydrocarbon exploration well logs, and core samples from the studied layers. We are collecting information to have the input data for further modeling projects. These data are about basic petrophysical properties (porosity and permeability), surface and deep zone gas analysis, and pore fluid contents.

Concerning this group of information, we will be able to identify which major processes were taking place in the past in this natural CO_2-H_2O-rock system. These are expected to be mainly fluid-rock interactions.

As a result, we have a close view on what reactions and at what rates are expected at a future CCS storage site in the long-term. Our poster will show the main properties of a CO_2-rock-porewater system which is natural and stable on geological time scale. These achievements can be used in understanding how complex CCS systems (reservoirs, cap rocks, wells, etc.) work, and will provide precious support at designing CCS projects.