Parameterization requirements for the underground land-use planning

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Accepted for publication on 2\textsuperscript{nd} June 2014

The transformation of the energy sector in Germany, the so called “Energiewende”, implies successively reducing the use of fossil fuels and abandoning nuclear energy production, while the use of renewable energy production is increased. Wind or solar power facilities depend on the fluctuating availability of these natural forces and the energy production may therefore not be adapted to the needs of the energy consumers. Consequently technologies to store and later recover the produced energy become essential. Research is for instance focusing on the potential of using geological reservoirs to store methane, hydrogen, pressered air, or heat which all can be produced by using excess renewable energy. Extending these forms of energy storage can trigger competitive aspects of the underground land-use due to the mutual influences of the individual storage sites with other existing types of use, as e.g. hydrocarbon extraction or groundwater abstraction. An investigation of these interactions of different subsurface uses requires a thorough system and process understanding as well as numerical simulation tools able to represent the ongoing coupled processes. Consequently and in contrary to the current first come, first serve principle of the German Federal Mining Act, the foresighted planning of the underground land-use is essential to minimize disadvantageous decisions for future uses of the underground.

The parameterization of numerical models is crucial for sound modeling results and consequently for prognoses regarding the impact of simulated underground uses. It has to be clarified what data are needed to simulate significant processes, what data are available, and in what way the available data can be regarded as representative. Depending on the amount of available data of the respective parameter, model parameterization has to be performed by utilizing different data qualities such as general literature values, regionally or spatially typical values, or (geo-) statistical calculations. Evaluating the impact of using different data qualities on prognosis results of induced effects is the overarching goal of this study. In this way, we plan to support the further development of concepts such as the underground land-use planning.

\textbf{Keywords}: parameterization, land use planning, data quality, geo-statistics
能源挑战与力学国际研讨会摘要模板

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