Data integration workflow and interactive visualization of potential salt cavern regions

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Extension of renewable energy in Germany requires the identification of suitable energy storage sites, e.g. for compressed gas in the underground. Selection of such sites depends on a variety of indices from geological data (e.g. rock layers, salt caverns, faults) and energy related surface data (e.g. energy infrastructure, location of power plants) as well as legal obligations (e.g. protected areas).

A GIS-based 3D online planning tool for interactively selecting sites for underground energy storage is developed. Users can intuitively change index parameters while potential storage sites are shown immediately and updated according the users requirements. From then on these generated 3D data sets can be converted to more sophisticated visualization applications as well as virtual reality environments which provide a useful tool to explore and analyze heterogeneous and complex data sets to help in process understanding and to communicate scientific findings to other researchers or the interested public (knowledge transfer / acceptance of storage systems).

An integrated visualization of the ANGUS+ project area with data from a variety of sources has therefore been developed. We focused on the structure model of Schleswig-Holstein showing geological layer and salt formations (from geophysical measurements), possible salt cavern structures (generated by stochastic methods) and regions and simulated gas storage cyclic loading scenarios showing temperature and stress fields. The user can interactively navigate, move to predefined points of interest, toggle through multiple storage scenarios and control the presentation of time-dependent data sets.