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Downhole geophysical data from recent deep drilling in the center of the Thuringian Basin, Germany

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In the framework of the INFLUINS (Integrated Fluid Dynamics in Sedimentary Basins) project, a 1.179 meter deep scientific borehole was drilled in summer 2013. The drill site is situated in the north of Erfurt, in the center of the Thuringian Basin on the crossing point of two seismic reflection profiles, which were acquired in 2011. An almost complete sequence from Keuper to the base of the Buntsandstein was drilled. Drilling, geophysical measurements and well construction were conducted for three depth intervals. First, drilling was undertaken to a depth of 313 m down to the top of the Middle Muschelkalk. Then, the Middle and Upper Muschelkalk were drilled to a depth of 515 m and the third part of the drilling campaign was finished at a depth of 1.179 m at the base of the Lower Buntsandstein. Coring was done in the depth intervals of 285 m to 420 m and 520 m to 914 m. With the help of the borehole geophysical measurements, which were done along the entire depth, stratigraphic information obtained through core samples can be extrapolated from cored sections into those depth sections, where no coring was done.
Immediately after finishing drilling through a certain depth interval, borehole geophysical measurements were conducted in the open hole. Using the caliper and inclination instruments, the geometry of the well was determined. In addition, milieu, gamma-ray, spectral gamma-ray, acoustic borehole television, sonic, susceptibility, dipmeter, gamma-gamma, neutron-neutron and the dual latero-log were measured to get information about rock properties. Within rock-salt bearing depth intervals, embedded cm-thin layers of clay can be geophysically resolved. This will e.g. enable to determine and contrast the physical properties of these alternating sequences with high accuracy. Besides the in-situ well measurements rock-physical parameters of the core samples were acquired with a Multi-Sensor Core Logger (MSCL).
Here, we present the new data set and discuss some preliminary results. Unexpectedly and contrary to them being prominent aquifers, like at the edges of the Thuringian Basin, the Middle Muschelkalk and Middle Buntsandstein sequences are characterized by very low porosities and no macroscopically recognizable fluid transport here.