Geophysical Research Abstracts
Vol. 13, EGU2011-3553, 2011
EGU General Assembly 2011

Petrophysical characteristics of sandstones dating from the Buntsandstein in the Upper Rhine Graben: case of the borehole EPS1 (Soultz-Sous-Forêts, France)

Haffen Sébastien (1), Geraud Yves (1), Diraison Marc (1), and Dezayes Chrystel (2)
(1) EOST-IPGS, UMR 7516, 1, rue Blessig, F-67084 Strasbourg Cedex, (2) BRGM-BP 36009, Orléans cedex 02, France

This study is based on petrophysical analyses of sandstones from the Upper Rhine Graben, between France and Germany. These sandstones dating from the Buntsandstein (lower Trias) appears to be an easy target for geothermal exploitation, linking sandstone and clay with the regional thermal anomaly. This sedimentary series is composed by different lithostratigraphic levels with coarse and fine grains or conglomerate with high content of clay at the base and the top of the series.

Completely cored between 1008 to 1417 m depth, the borehole EPS1, located in Soultz-Sous-Forêts, offers a continuous cut of the sedimentary series. High resolution petrophysical measurements have been performed on these cores and enable us to characterize the different sedimentary facies properties of the Buntsandstein sandstones. These measurements drive us to analyze thermal conductivity, permeability and porosity at different scales: from milimetric to hectometric.

Porosities determined by mercury injection show variations between 1 and 21 % without tendency with depth. Permeabilities vary between 0.33 and 512 mD. In the Vosgien sandstone, three zones appears with higher permeabilities values and are reliable with sedimentary facies: 1) Playa-lake and fluvial and Aeolian sand-sheet 2) Fluvial-Aeolian marginal erg 3) Braided rivers within arid alluvial plain but only in the basal section where the layers are thick. The upper and the lower parts appear with low porosities and permeabilities. A complete profile of thermal conductivity on dry cores show low values (2.5 W/m/K) in the upper and lower part of the borehole. Measurements performed in the playa-lake facies indicated the higher heterogeneities with values comprise between 1 and 10 W/m/K. Measurements are also performed too on wet samples (78) and compared with geometrical mixing law from mineralogical XRD determination. Thermal conductivity maps made on dry and wet decimetric samples permit to build relative porosity map. Porosity increase around fractured zones and a drastic decrease of porosity is observed near barite precipitation areas.