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Potential of Deep Heat Mining in the Austrian Alps – a Preliminary View on Chances and Difficulties of energetic utilization of the Thermal Regime at the Alpine Thrust Zone and its Nearby Vicinity

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In Austria geothermal utilization is gaining importance. Currently installed capacities reach approximately 61 MWth.and 1.2 MWel, while extensive energetic use is yet limited to the Upper Austrian and Sytyrian Basin. Beyond, deep heat mining systems based on HDR- or EGS- technology have not yet been established in Austria. Knowledge about geothermal reservoir conditions could be partly achieved in sedimentary basins at the margins of the Austroalpine Orogeny. Nevertheless the orogen itself remains poorly investigated. Thus no geothermal power plants based on direct hydrothermal utilization are yet realized within the eastern Alps.

Due to an intensive hydrocarbon exploration activity in the surrounding basins and partly in the area of the alpine thrust zone, an acceptable density of deep drillings is available. Studies show that the thermal regime in the Eastern Alps is poor to moderate showing thermal gradients between 15 to 30deg.C/km. According to thermal and hydraulic information gained from more than 30 deep drillings situated within or nearby to the Alpine Thrust Zone, inflowing “cold” surface-waters have an important impact on the thermal regime, especially within the thrusted calcareous nappes. Beyond the sphere of influence of these juvenile, hydrodynamic systems, a thermal barrier has to be considered, determined by changing hydraulic conditions. Hydrodynamic systems and the tectonic history (thrustening) of the region as well as deep crustal structures (crustal thickness – respectively Moho depth) control the terrestrial temperature field in the Apine Thrust Zone. Therefore, the aim of our study is to clarify the parameters

influencing the observed thermal conditions and to determine the possible appliance of geothermal power generation using EGS technology.

Thermal, hydrogeological and petrophysical formation parameters, mainly gained from deep drillings, were processed to qualify the coupled thermal – hydraulic conditions of the investigated litho-tectonic units. The following model approach was used: Considering a steady state approach, we first established simple thermal models by compilation and and progression of measured temperature data (bottom-hole temperatures / BHT, temperature data gained from formation tests and continuous logging). Possible advective zones have been analyzed by comparing of synthesized profiles with measured temperature data. In addition the impact of deep crustal structures on the thermal regime of the alpine thrust zone has been quantified by compiling thermal data of adjacent basin regions (Molasse Basin, Vienna Basin). We are aiming to create a support-matrix, which will provide a decision making instrument for geothermal utilization in consideration of thermal- as well as of hydraulic conditions in possible geothermal reservoirs at the Alpine Thrust Zone. This offers possible chances for geothermal utilization within a region, which is hardly developed yet.