MAPPING THE TEMPERATURE OF THE AUSTRALIAN CRUST FOR EGS POTENTIAL

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ABSTRACT

The International Geothermal Association and the Executive Committee of the International Energy Agency Geothermal Implementing Agreement earlier this year both officially endorsed a Protocol for Estimating and Mapping Global EGS Potential. Hot Dry Rocks Pty Ltd (HDR) has applied that Protocol to estimate the potential for EGS to contribute to Australia's future energy mix. A necessary step in that process was the development of maps of estimated temperature at depths in the Australian crust down to 10 kilometers.

Following the Protocol, HDR first gridded the country into approximately 100,000 cells of 5' x 5' area. The approximate average depth of sediment in each cell was estimated from the SEEBASE™ database produced by FrOGTech Pty Ltd. Average thermal conductivity and heat generation properties were then estimated for the sediment and basement section of each cell, based on available geological information and HDR's database of thermal properties. Mean annual surface temperature was derived from Australian Bureau of Meteorology data, and approximate surface heat flow was assigned based on approximately 1000 data points and previous published interpretations of heat flow provinces.

Again following the Protocol, temperature was then estimated at one kilometer depth intervals in the basement down to 10 kilometers depth, with an assumption of conductive heat flow. The estimate suggests that large areas of the Australian crust are at a temperature greater than 300°C at a depth of 10 kilometers (Figure 1). This is supported by measurements in the Cooper Basin, where temperature profiles confirm conductive heat flow and temperatures greater than 250°C shallower than five kilometers.

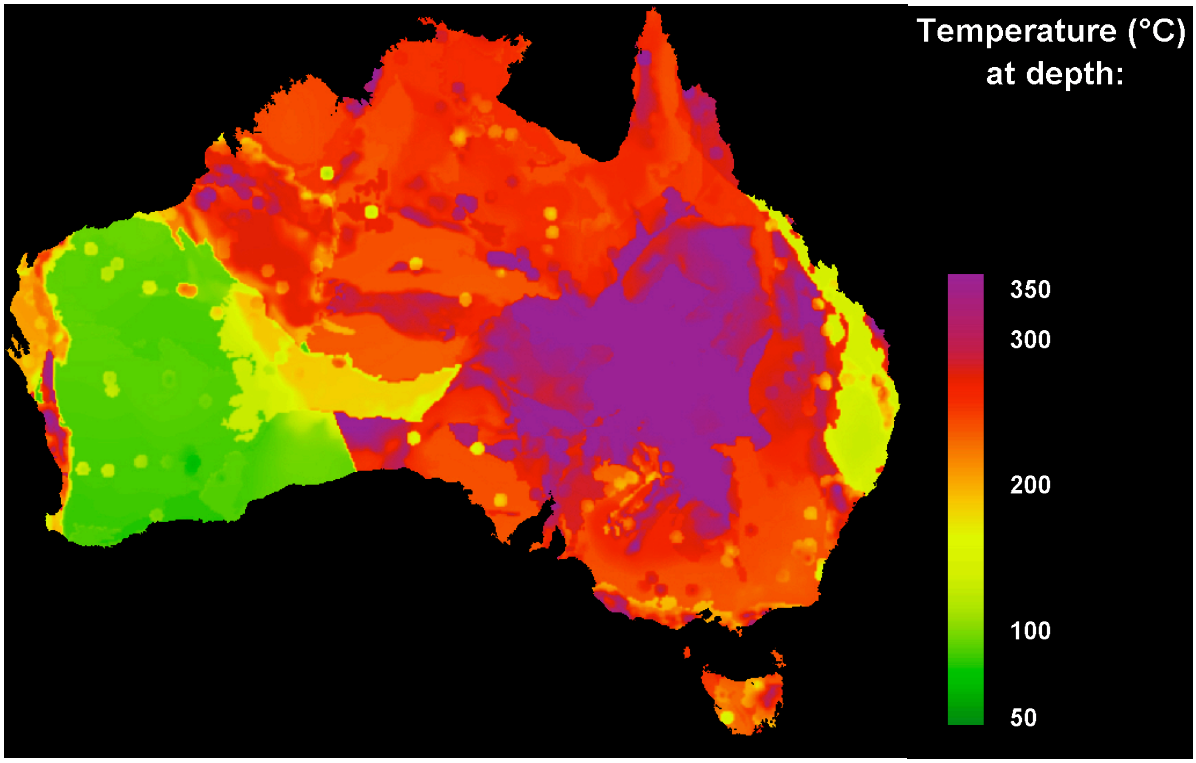

Figure 1. Estimated temperature at 10 km depth beneath Australia