Geophysical Research Abstracts
Vol. 19, EGU2017-2347, 2017
EGU General Assembly 2017

Quantitative Analysis of Thermal Anomalies in the DFDP-2B Borehole, New Zealand

Lucie Janků-Čápová, Rupert Sutherland, John Townend, and the DFDP-2 Science Team
Victoria University of Wellington, New Zealand

The DFDP-2B borehole, which was drilled in the Whataroa Valley, South Island, New Zealand in late 2014, provides a unique opportunity to study the conditions in the hanging wall of a plate boundary fault, the Alpine Fault, which is late in its seismic cycle. High geothermal gradient of > 125°C/km encountered in the borehole drew attention to the thermal structure of the valley, as well as of the Alpine Fault's hanging wall as a whole. A detailed analysis of temperature logs measured during drilling of the DFDP-2B borehole, reveals two distinct portions of the signal containing information on different processes. The long-wavelength portion of the temperature signal, i.e. the overall trend (hundreds of metres), reflects the response of the rock environment to the disturbance caused by drilling and permits an estimation of the thermal diffusivity of the rock based on the rate of temperature recovery. The short-wavelength (tens of metres to tens of centimetres) signal represents the local anomalies caused by lithological variations or, more importantly, by fluid flow into or out of the borehole along fractures. By analysing these distinct features, we can identify anomalous zones that manifest in other wireline data (resistivity, BHTV) and are likely attributable to permeable fractures. Here we present a novel method of quantitative analysis of the short-wavelength temperature anomalies. This method provides a precise and objective way to determine the position, width and amplitude of temperature anomalies and facilitates the interpretation of temperature logs, which is of a particular importance in estimation of flow in a fractured aquifer.