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Geothermal studies and palaeoclimatic implications of the 2.5 km deep Outokumpu deep drill hole, Finland

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A deep research borehole was drilled in 2004-2005 in eastern Finland by the Outokumpu Deep Drilling Project of the Geological Survey of Finland. The 2,516 m deep hole was drilled into a Palaeoproterozoic metasedimentary and ophiolite-related sequence of rocks. The Outokumpu Deep Drilling Project is carried out in an international framework, partly supported by ICDP. Geothermal investigations of the Outokumpu hole are focussed in finding out whether there is vertical variation in geothermal gradient and heat flow density in the depth range of the borehole, and if so, what are the influencing factors. Previous studies in the eastern and northern parts of the Fennoscandian Shield, e.g. in the Kola Super-deep Hole, suggest that there may be significant increase in heat flow density in the uppermost 1-3 km of crust. The great depth of the hole makes it possible to study the effects of the last glaciation on the thermal state of the upper crust and to model the past ground surface temperatures during the Weichselian and Holocene. We present the results based on several temperature logs measured during and after drilling and the first thermal conductivity measurements of the drill core.