SUBSURFACE GEOTHERMAL
FLOW PATTERNS DERIVED FROM

TEM soundings

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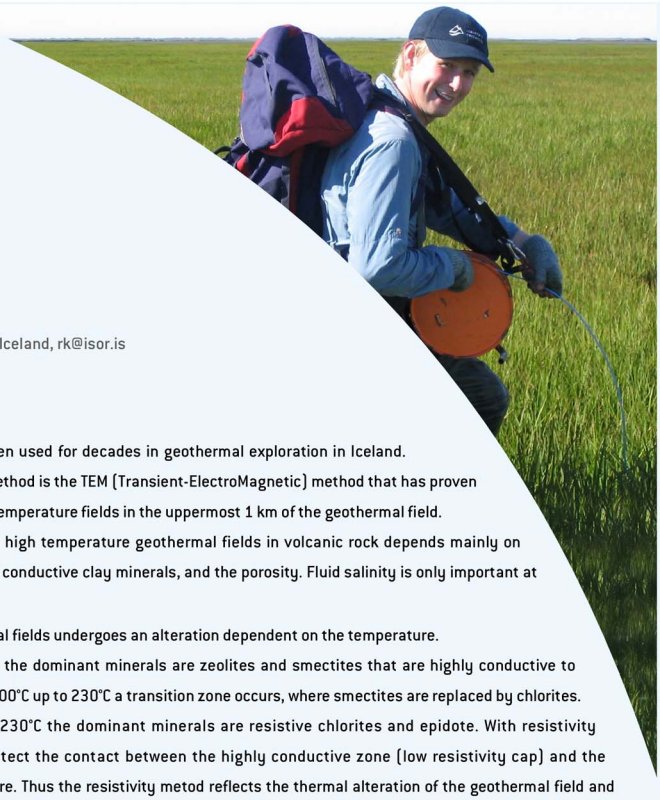


Resistivity methods have been used for decades in geothermal exploration in Iceland.
The most extensively used method is the TEM (Transient-ElectroMagnetic) method that has proven effective in delineating high temperature fields in the uppermost 1 km of the geothermal field.
The subsurface resistivity in high temperature geothermal fields in volcanic rock depends mainly on temperature, the presence of conductive clay minerals, and the porosity. Fluid salinity is only important at high salinities.

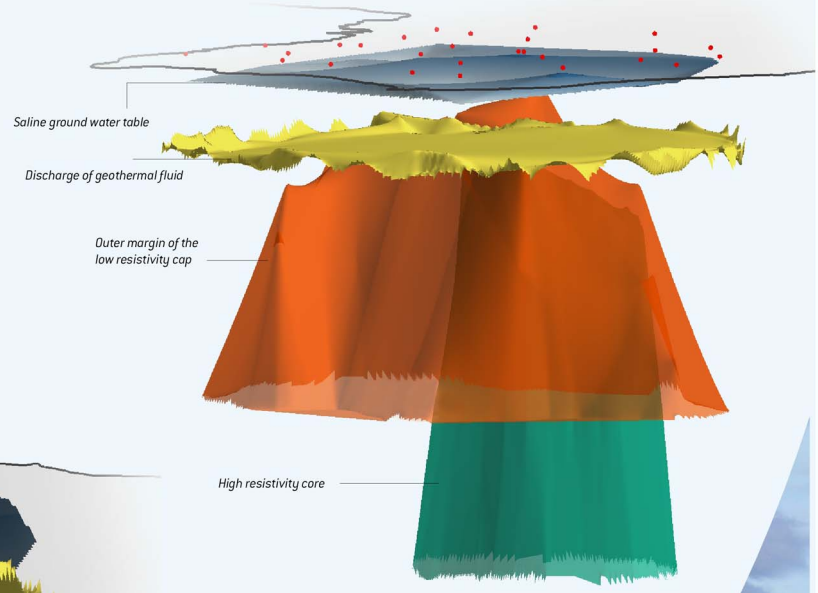
The rock within the geothermal fields undergoes an alteration dependent on the temperature.
At temperatures up to 200°C the dominant minerals are zeolites and smectites that are highly conductive to electricity. At temperatures 200°C up to 230°C a transition zone occurs, where smectites are replaced by chlorites.
At temperatures exceeding 230°C the dominant minerals are resistive chlorites and epidote. With resistivity methods it is possible to detect the contact between the highly conductive zone (low resistivity cap) and the underlying high resistivity core. Thus the resistivity metod reflects the thermal alteration of the geothermal field and hence the temperature, provided there is equilibrium between alteration and present temperatures.

Reykjanes

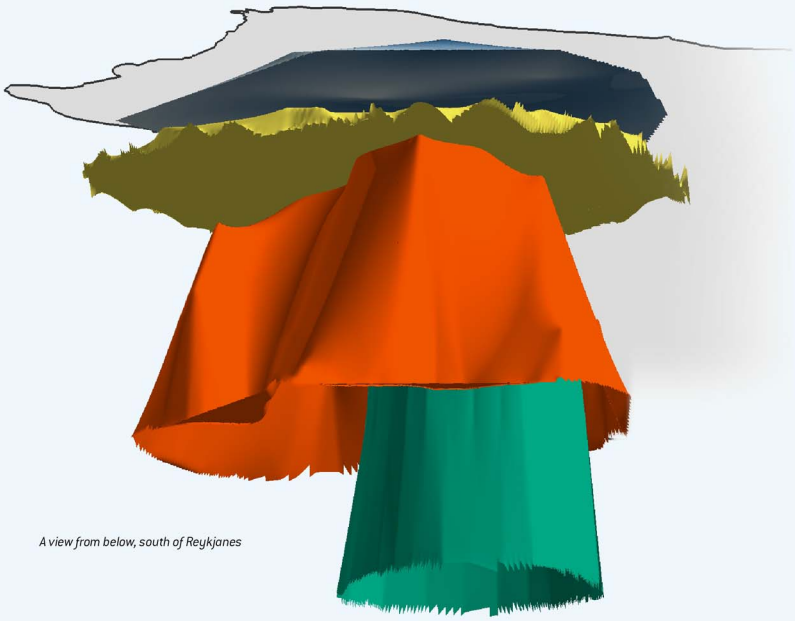
Results from the Reykjanes brine geothermal field show more features than the conventional low resistivity cap with underlying high resistivity core. In these saline environments, the conductive minerals of the low resisitivity cap are present at temperatures up to 300°C

A TEM survey in the Reykjanes brine geothermal field shows:

- ***A thick low resistivity cap.***
- ***A high resistivity core at the centre of the geothermal field, it's shape indicating an intersection of two fissures causing the upflow of the geothermal fluid.***
- ***A low resistivity layer at 100-200 metres depth interpreted as a warm lateral discharge zone from the upflow zone.***
- ***A thin low resistivity layer near surface, caused by the saline ground water table.***



A view from southwest of Reykjanes



A view from below, south of Reykjanes

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