



9 Heat test



- Objective:** How does Opalinus Clay behave when it is heated? What is the maximum temperature it can withstand before losing its retention properties?
- Procedure:** Borehole with heating element (7 m deep). Wrap the heating element with bentonite rings and saturate with artificial pore water. Alternative: leave the heating element in direct contact with Opalinus Clay. Heat in stages up to 200°C, followed by a cooling phase. Measure and record heat energy, temperature spread, change in pore water pressure, mechanical deformations, and changes in electrical conductivity.
Dismantle the experiment and analyse corroded materials.
Predict the spread of heat; calibrate the model on the basis of the parameters derived by field measurements.
- Results:** If the clay is heated too much, it loses its ability to retain radionuclides and to self-seal fractures.
What temperatures will Opalinus Clay tolerate? This depends on the location. Argillaceous rock should not be heated to a temperature significantly higher than the maximum temperature the rock has 'experienced' in its geological past. In the case of Mont Terri, that is around 85°C.
Rule of thumb: Opalinus Clay should generally not be heated beyond 100°C. This can be reliably achieved by allowing the appropriate amount of space between canisters in the layout of deep geological repository.
Investigation of in-situ parameters: thermal conductivity in different directions (anisotropy), thermal capacity, coefficient of expansion of pore water and rock.
- Start:** 1997
End: Large-scale experiment finished in 2005.
THM experiments still ongoing.
Project Partners: BGR, ENRESA, GRS, NAGRA, Obayashi
Cost: CHF 6 million