

On the geothermal potential of Crustal Fault Zones (CFZ): a case study from the Pontgibaud fault zone (French Massif Central, France)



Qualitative and quantative approach of permeability and porosity

Thin-section observations



Permeability and porosity measurements







2D (Thin section) and 3D (micro-tomography X-ray) observation of sample taken from "Peyrouses" 1 borehole show that fluids can circulate along the **fracture** and within the **matrix** in the fault zone.

The connected porositiv and permeability measurements were performed on seven samples (according to Heap & Kennedy, 2016). The measured permeability values varied between 2 × 10⁻¹⁸ and 7 × 10⁻¹³ m² while the connected porosity values varied between 6 and 22%.

References

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X-ray Micro-tomographie observations

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Take home message(s)

First observations have shown that:

 Pontgibaud hydrothermal system is a dual permeability matrix-fracture reservoir.

The results of the parametric study, compared to the natural Pontgibaud system, show that:

• Vertical structure provides the largest thermal anomaly at the shallowest depth.

• The depth of positive thermal anomaly is shallow for high permeability contrasts

Finally, we were able to observe that for a permeability value of **8 x 10⁻¹⁵ m²** the fluid circulation belongs to the **bicellular** strong convection zone type. For these values the isotherm **150°C** is at a depth of **2.5 km**.

Temperature anomalies in the Pontgibaud Fault Zone



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Overlap of the resistivity model on temperature anomalies



Perspective(s)?

