

Paleo-hydrothermal fluids flow in the geothermal province of Limagne (French Massif Central).

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The use of the geothermal energy is a key to the energy supply of the future. The description of the flow of geothermal fluids and associated mineralization processes is a prime objective for understanding the functioning of current hydrothermal systems.

The Limagne basin, located in the French Massif Central, is a tertiary hemi-graben characterized by an high thermal gradient and numerous occurrences of CO₂-rich thermos-mineral waters. This basin has potential for high-temperature geothermal energy [1].

In order to better localise this potential in the province of Limagne, we studied the flow processes of the paleo-fluids and the associated mineralization. The senses and the velocity of the hydrothermal flows could be estimated from the studies of the growth bands of comb quartz localized in veins (Figure 1) [2].

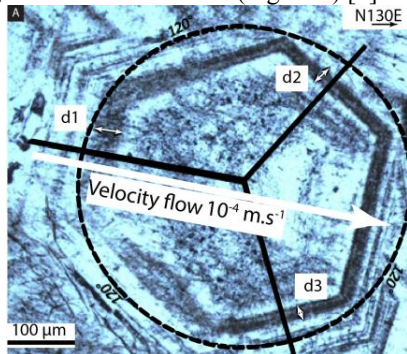


Figure 1: A: Growth bands in quartz with calculated velocity flow.

Preliminary results show discontinuous flow over time with changes in velocities and directions during the growth of a single quartz. Two mains events were identified. The first is a relatively fast upward flow at $10^{-6,-5}$ m.s⁻¹. The second is a downward flow about $10^{-5,-4}$ m.s⁻¹. This study allow us to discuss the processes which control the fluid flows in the Limagne basin, and integrating these variations and propose a method to delimitate the areas with high potential.

[1] Calcagno *et al.* (2014) *Geothermics* **51**, 496-508.

[2] Sizaret *et al.* (2009) *EPSL* **280**, 71-82.