

**Introduction**

- Hydrothermal systems in oceanic crust are usually studied in situ via dredge samples and drilled holes.
- Their equivalents are also found in ophiolitic complexes (Cyprus, Oman). In the deepest zone, the fluids react with the sheeted diabase dikes at 400°C and 400 bars to form epidotises by enrichment in epidote and quartz [1]. Mineralogy and chemistry of epidotises have been widely studied on fields [1] and hydrology is generally studied using numerical models [2].
- Problem: relations between the emplacement of diabase dikes, their alteration in epidotises and deformation.
- Experimental approach: stress the P-T-fO2 conditions of the reaction of epidotisation and, ii) quantify interrelations between the permeability and the epidotisation during deformation.

**Objectives**

- Hydrothermal epidote in fractures
- Pervasive epidotise in core of dikes

**I. Field observations: two types of epidotisation**

- Hydrothermal epidote in fractures
- Pervasive epidotise in core of dikes

**II. Experimental study of the reaction of epidotisation**

- Products + hedenbergite
- Literature: epidote has never been synthesised below 2 kbars (possible from germs: [6]).
- Problem: kinetics or nucleation (too high activation energy?).
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**Materials & methods**

- Static autoclave with external heating.
- Fluid/rock ratio = 5.
- fO2 controlled by a hematite-magnetite buffer.
- Duration of each experiment: 1 month.
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- Non-epidotised sheeted diabase dikes present very low permeability (10⁻⁶ m²) Main problem = initiation of the circulation of hydrothermal fluid: 2 possibilities: i) fluid flow via fracturation (permeability increases by at least one order of magnitude) and, ii) fluid flow in a late magmatic stage via segregation of porosity during introduction of dyke [7].
- Permeability reduction after failure is explained by mineral precipitation.

**III. Interrelations between permeability-deformation-alteration**

- Samples: metabasalte (quartz, actinolite, chlorite, plagioclase feldspar) and epidote (epidote, quartz, chlorite) from Troodos.
- Temperature: 400°C.
- Por pressure: 500 bars (water VS argon).
- Permeability was measured before, during and after coaxial deformation using the steady state flow method for Darcian flow: K = μLQ/ADP

**Results at 500°C/250 bars**

- Epidotised crushed anorthosite
- Microfractures along epidote grains.

**Conclusions**

- Mechanical behaviour of metabasalte:
- Permeability reduction after failure is explained by mineral precipitation.

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