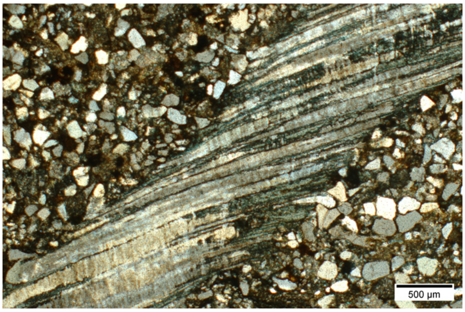


Figure 1: Stretched crystals of quartz and chlorite. Note how the quartz crystal from the matrix gets involved in the vein build up and indicates a distinct direction of grain growth. The dark spotted areas in the vein itself are fluid inclusion trails. What do they tell us about the vein growth? Sample from 1447.5 m TVD.

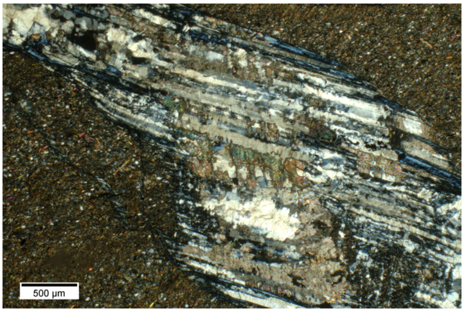


Figure 2: This vein gives an example of a vein on which the 'crack seal' models given so far can be critically tested on. How did the various minerals quartz, chlorite and calcite get deposited in one vein? Sample from 1392.5 m TVD.

## Microstructural analysis of the RWTH-1 cores in thin-sections *Vortrag*

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### Introduction

The Aachen RWTH-1 well was drilled to 2544 m TVD for geothermal purposes and gives substance to extensive geoscientific research. It is located in a hydrothermally and seismically active area of the Aachen Anticline, 500 m NW of the Aachen Overthrust and 420 m ENE of the Laurensberg Fault. The main focus of this PhD work is the structural and microtectonic analysis of the cores sampled.

For 94% of the total well length the collected cuttings give information of the lithology and stratigraphy of the subsurface. A total of 145.5 m was cored in three different intervals. A complete set of wireline measurements including high resolution borehole image allow mapping of fractures and folds, and linking the core to the logs. About 100 core samples were selected for detailed microstructural analysis.

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### First results

Microstructural analysis of veins formed in Mode I and II fractures shows a wide range of structures, depending on host rock lithology, fluid composition and opening history. Four different vein generations have been interpreted based on overprinting relationships (Fig. 1).

The first of these is interpreted to have formed during burial, under conditions of increasing pore pressure. The subsequent generations are interpreted to belong to the Variscan compression event. Microstructures vary considerably, between fibrous antitaxial calcite veins in siltstone, unitaxial streched crystals in siltstone, blocky calcite veins in carbonate, and multiphase chlorite-quartz-calcite veins with spectacular syntaxial fibrous microstructures. This last type of veins which was formed at lower greenschist facies conditions allow a critical test of the available models of crack-seal vein evolution (Fig. 2). We present computer models of syntaxial crystal growth during delocalized cracking in a polyphase vein which may explain the observed microstructures. In a later event part of the veins were deformed into cataclasites under conditions of high shear stress.