DEN BROK, S.W.J., (1996): In situ experimental study of fluid-assisted grain boundary migration in very soluble rock analogue materials, 6. Symposum Tektonik-Strukturgeologie-Kristallin-geologie, Salzburg, 10-15 April 1996, Erweiterte Kurzfassungen, S. 82.

IN SITU EXPERIMENTAL STUDY OF FLUID ASSISTED GRAIN BOUNDARY MIGRATION IN VERY SOLUBLE ROCK ANALOGUE MATERIALS

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Little is known about micro physical and chemical processes during fluid assisted grain boundary migration (FAGBM) in rocks. Yet it is a very important process during ductile deformation in the middle and the lower continental crust. FAGBM probably significanty affects the rheological behaviour, has a large effect on the development of the microstructure and may play a determining role in the development crystallographic preferred orientations. It is of great importance therefore to be able to predict and understand the micro physical and chemical processes res-ponsible for FAGBM.

The thermodynamic forces that drive FAGBM and determine its rate and the microstructure developed, include (i) gradients in stress (elastic distortion), (ii) gradients in lattice strain (dislocations, point defects, etc.), and (iii) gradients in local surface curvature. I have recently started a series of experiments in order to study the effect of these different driving forces on the FAGBM rate and on the type of microstructure developed.

An apparatus was built in our laboratory in order to study FAGBM in situ (i.e., under the optical microscope). In this apparatus FAGBM can be studied under constant mechanical load in a little see-through pressure vessel at controlled temperatures in the range 25 to 150°C and fluid pressures in the range 1 to 5 bar. Temperature is continuously monitored at two localities just next to the sample in the fluid in the pressure vessel. Experiments are carried out on very soluble rock analogue materials, notably crystals of NaCl and KDP (Potassium Dihydrogen Phos-phate) at stresses below as well as above the crystal plastic yield point.

The poster will present the deformation apparatus, and will discuss the theory to be tested and the experimental strategy followed .