Workshop on deformation of polymineralic rocks in nature and experiment

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Owing to the high abundance of polymineralic rocks in the earth's crust an mantle, knowledge of their deformational behavior and associated rheology is fundamental for a profound understanding of deformation in the lithosphere in general and the localization of strain in shear zones in particular. In this light, this workshop will deal with the following three major subjects:

(i) Microstructural evolution and related processes in the case of polymineralic rocks undergoing static overprint and/or deformation under natural conditions.

(ii) Detecting the rheology of polymineralic rocks using high temperature and high-pressure rock deformation experiments.

(iii) Extrapolation of experimentally obtained flow laws to natural conditions.

The participants will be introduced into these topics by the presentation of the theoretical backgrounds and selected key examples. Open questions and problems of the state of the art approaches will be discussed. Furthermore, there will be the opportunity to present own research results or questions related to the topic of polymineralic rocks. In this way we hope to rise a stimulating ambiance and fruitful discussions.

(i) Microstructures and their changes in space and time provide the key to unravel a polymineralic rock's geologic evolution. For the field geologist it is therefore crucial to have suitable tools and criteria for the reading of such microstructures. Based on the thermo-mechanical interaction processes between different minerals, we will discuss the resulting microstructures in the case of static and deformation conditions and their use for the interpretations of different geodynamic settings.

(ii) Exploring and modeling the Earth's crust and mantle dynamics requires a profound knowledge of the underlying physical deformation processes. High temperature, high pressure deformation experiments in combination with detailed microstructural analysis allow to determine the rheology of rocks at the laboratory scale. Selected types of deformation machines designed to study brittle and ductile rock deformation will be discussed in conjunction with examples of flow laws for important mono- and polyphase rocks.

(iii) The inference of deformation mechanisms from microstructural observations and the quantification of material parameters allows under certain circumstances to extrapolate experimentally derived flow laws into nature. However in the case of polymineralic rocks additional assumptions have to be made regarding, e.g. the distribution and the mechanical coupling between the different phases and changes of the former with increasing strain. These aspects will be discussed with regard to the development and evolution of shear zones in granitoid rocks.