

Development and influence of fluid pathways in rocks

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The development of fluid pathways within the rocks of the Earth's crust lead to significant changes in the permeability and composition of crustal rocks. Grain boundaries, inter-connected porosity and fractures act as reactive fluid pathways enabling processes such as mineral replacements, the formation of new minerals and dissolution of others, resulting in element mobilization, variations in rock density, changes in stress distribution and mass transfer. These can be observed in many rock samples as well as in laboratory experiments.

Here we present our first analyses on different rock samples where fluid-rock interactions have been induced through hydrothermal laboratory experiments, using either Carrara Marble (calcite) or plagioclase samples. Additionally the evidence for such interactions, having previously occurred in natural rocks, has been investigated in a sequence of granulite rock samples from the Bergen Arcs in Norway. Using light microscopy as well as SEM, EDX and Electron Microprobe analysis, we have investigated how fluid pathways allow the fluids to react with minerals within the rocks that result in mineral replacements and how at the same time these reactions affect the fluid pathway network of the whole system, as well as the mechanisms that could explain such processes.