X-Ray experiments at metamorphic conditions to explain high velocity seismic zones

D. Schönbohm¹, G. Nover¹ and H.-J. Brink²

¹Mineralogisch-Petrologisches Inst. Uni. Bonn, Poppelsdorfer Schloß, 53115 Bonn, Germany
²Inst. F. Geophysik Uni. Hamburg, Bundesstr. 55, 20146 Hamburg, Germany

Recently metamorphic processes within the lower crust were proposed by Brink [1]. They were caused by a Lower Permian heat event and the subsequent basin subsidence. As a result seismic reflections within the lower crust and at the crust-mantle boundary may be seen as indications for metamorphic transition zones (greenschist facies – amphibolite facies – granulatite facies). The repro cessing of the metamorphic event was the goal of investigations at high pressure high temperature device MAX80 beamline F2/1 at HASYLAB. 2 different sandstones, marble and breccie-samples were brought under the different metamorphic conditions and analysed by means of energy-dispersive-X-ray. Changes in d-spacing of major minerals (Quartz, Feldspar and Calcite) of the mentioned rocks were transformed in lattice parameters and hence in density. The pressure was calculated under in-situ conditions by added NaCl [2]. The temperature that was produced by a graphite resistance heater was measured and controled by a Pt/PtRh13 thermocouple and an Eurotherm 900 temperature device.

Figure 1: Energy-dispersive X-ray spectra of sample 504 (sandstone) at different p-T-conditions. The marked peaks of Quartz were used to calculate density

References