Geophysical Research Abstracts, Vol. 7, 06104, 2005
SRef-ID: 1607-7962/gra/EGU05-A-06104

Nonlinear bulk alteration of hydrothermally altered tuffs at high PT loading

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Experiments with tuff samples in close and open system from borehole on hillside of volcano Baransky (Kuril Islands) have been performed at high pressure (P) and temperature (T). Sampling depth varied from young superficial sediment layers to deeply hydrothermally altered layers (up to 1500 m). The main aim of studies was investigation of evolution of pore space during long sedimentation and further subduction in deep interior. First type (open system) loading-heating experiments have been carried out in recess type anvil high pressure device. In second case the samples of tuffs were tested in a piston-cylinder type high pressure apparatus (channel diameter – 12 mm) with external heater. It was found that the samples collected nearby surface were nonlinear enlarged with increasing temperature (up to 300 ˚C) under isobaric conditions (P = 0.7 GPa) whereas deep samples have linear expansion. Analyze of this results and additional studies of pore space showed that the nature of this process is found in deformation and reconstruction of rock framework. The main effect of tuff sample compacting occurs due to closing of pores as a result of deformation at high *PT* parameters. The reason of residual porosity near 5-15 % was to all appearance elastic reestablishment of pore space due to removing stresses. At *PT* experiment conditions (Tup to 400 ºC and $P$from 0.7 to 1.7 GPa) considerable alteration of mineral composition is not observed. Maximum compacting took place in the samples, which had minimum initial densities or maximum initial porosity. Passed in hydrothermal system of Baransky volcano high temperature processes decreased compacting of tuffs at high *PT* experiments. Investigation of pore space by nitrogen vapor adsorption method confirmed the conclusions.