Geophysical Research Abstracts, Vol. 7, 00300, 2005
SRef-ID: 1607-7962/gra/EGU05-A-00300

Thermal and deformation properties of quartzite at the temperature interval of polymorphic $\alpha - \beta$ transition by means of neutron diffraction and acoustic emission

A. N. Nikitin (1), G. A. Sobolev (2), A. V. Ponomarev (2), R. N. Vasin (1), A. M. Balagurov (1)

(1) Frank Laboratory of Neutron Physics, Joint Institute for Nuclear Research, Dubna, Moscow Region, Russia, (2) Schmidt Institute of Physics of the Earth RAS, Moscow, Russia (nikitin@nf.jinr.ru / Phone: +007 0962163856)

The process of preparation and development of an earthquake source cannot be completely understood and described without creating more accurate and complicated physical models of the geological medium. The phenomena of instability of the rocks under influence of high temperatures and pressure are insufficiently investigated, including during phase (polymorphic transition). So, studying of abnormal physical properties of the rockforming minerals at high temperatures and pressure, for example, of the nature of abnormal behaviour of polycrystalline quartz at the temperature interval of $\alpha - \beta$ transformation (560 - 600 ^{o}C) is actual. The behavior of natural polycrystalline quartz (Shokshinskiy quartzite) was investigated by means of time-of-flight neutron diffraction and acoustic emission at the SKAT-TKOS measuring complex installed at the beamline 7a of fast pulsed reactor IBR-2. Also, the neutron diffraction measurements were performed with the quartz powder sample at the HRFD diffractometer. The changes of the lattice spacing of quartz during the $\alpha - \beta$ transition were measured and values of lattice stresses were estimated. It is shown that the transition occurred at the temperature interval 540 to 573 ^{o}Ñ and the sample was completely consisted of β-quartz at a temperature above 600 Ñ. Short splashes of acoustic emission (AE) were observed when the phase transition was completed. The intensity of splashes exceeds by two orders the level of AE, caused by the thermal bursting of quartzite under heating; dynamics of these splashes may be described by dependence of the relaxation type. The behaviour of AE splashes is similar to the known sequence of seismological events: main event – aftershocks. It is possible, that such phenomena

can promote the development of earthquake source due to the stress state changes in medium or to the trigger effect.