Japan Geoscience Union Meeting 2010
(May 23-28 2010 at Makuhari, Chiba, Japan)

SGL045-03 Room: 202 Time: May 25 14:15-14:30

Ultra short-term or hydrothermal retention experiments of zircon (U-Th)/He age

Kunimi Yamada[1*], Masaki Murakami[2], Takahiro Tagami[2], Ryuji Yamada[3]

[1]Japan Atomic Energy Agency, [2]Kyoto University, [3]NIED

Scientific drillings of active intra/interplate fault zones are performed at present. Accompanying these researches, it is required to reveal how heating, water or others come or move following fault motions, and when/how the active faults move, with fault rock samples. Thermochronology, the use of radioisotopic dating to constrain thermal histories of rocks and minerals, can answer these questions through spatial distribution of thermal histories around the fault. So-called "closure temperature" is important parameter for these researches and it is assumed from, in general, thermal diffusion experiments under dry atmospheric or vacuum conditions for each methods and minerals. Experimental durations are from a few to a few thousand hours and the assumed temperatures are compared with natural long-term heated samples to verify the validity. However, thermal processes concerned with the faulting are probably less than one minute with water or hydrothermal conditions. In fact, although so-called "closure temperature" of fission-track age is higher than that of (U-Th)/He, resetting (zeroing) condition will be vice versa under ultra short-term heating. Therefore, we need to perform ultra short term and hydrothermal heating experiments primarily to investigate thermal histories around faults accurately.
In this study, we indicate a relation between heating conditions (temperature and duration) and helium retentions using zircons heated under ultra short term or hydrothermal conditions. It is important that samples heated in less than one minutes for fault samples. Because the durations of hydrothermal heating are from 10 to 100 hours constrained by technical limitations, the effects of water and pressure are examined through comparison with same durations of dry heating.
We also report new JAEA helium quantify method with QMS and helium-3.

Keywords: (U-Th)/He, thermochronology, annealing, hydrothermal, zircon