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SCG63-P01 Room:Poster Time:May 2 16:15-17:30

Cooling history of a fracture zone in the Kojyaku granite, Tsuruga area: Constraints from multi-system thermochronology

SUEOKA, Shigeru[1*] ; YASUE, Ken-ichi[1] ; NIWA, Masakazu[1] ; SHIMADA, Koji[1] ; ISHIMARU, Tsuneari[1] ; UMEDA, Koji[1] ; YAMADA, Ryuji[2] ; DANHARA, Tohru[3] ; IWANO, Hideki[3] ; GOUZU, Chitaro[4]

[1]Japan Atomic Energy Agency, [2]National Research Institute for Earth Science and Disaster Prevention, [3]Kyoto Fission-Track Co., Ltd., [4]Hiruzen Institute for Geology and Chronology Co., Ltd.

Ages of faulting are generally estimated from ages of displaced geomorphic markers, e.g., terrace surfaces, alluvial deposits, or artificial structures. However, these markers are not always available, such as for faults in basement rocks. Such faults have been attempted to date by detecting chronological anomalies (e.g., Ikeya et al., 1982; Murakami and Tagami, 2004; Yamada et al., 2013; Gansawa et al., 2013) or dating hydrothermal veins or clay minerals formed after faulting (e.g., Zwingmann et al., 2004; Watanabe et al., 2008; Siebel et al., 2009; Yamasaki et al., 2013). However, definitive procedures to determine faulting ages based on such geochronological methods have not been established because thermogenesis and mass transport along fault zones are not simple. More basic and case studies are desirable to improve these methods.

We introduce an attempt to date a fracture zone observed in the northwestern part of the Tsuruga peninsula, southwest Japan, by constraining its cooling history from fission-track (FT), K-Ar, and U-Pb thermochronometries. In the northern part of the Kinki Triange, including the Kohoku and Tsuruga bay areas, NE-SW or NW-SE strike-slip faults such as the Kohokusanchi and Nosaka-Shufukuji fault zones, are dominant (e.g., The Headquarters for Earthquake Research Promotion, 2003a, b). Strike-slip faults in mountainous areas are generally difficult to date by using geomorphic markers. The fault we study is a strike-slip fault formed in the Tsuruga body of the Kojyaku granite (Kurimoto et al., 1999), along which no gromorphic marker is available. We dated 1) the fault gauge, 2) uncrushed host granitic rock, and 3) dolerite intruding within a few meters from the fault. The dispersions between zircon U-Pb ages and zircon fission-track ages of 1) and 2) are not significant at 2 sigma level and both of the zircon fission-track lengths are not shortened, implying 1) and 2) shared the cooling histories between closure temperatures of zircon U-Pb (>900 deg. C) and zircon fission-track methods (210-350 deg. C). On the other hand, apatite fission-track ages of 50.8 +/- 18.5 Ma for 2) and 28.4 +/- 13.6 Ma for 1) may be interpreted to be reflections of different cooling histories below 90-120 deg. C, closure temperature of apatite fission track method. Although the younger age of a) is attributable to the faulting during the Neogene/Quaternary or intrusion of the dolerite at 19.1-18.8 Ma inferred from plagioclase and whole-rock K-Ar ages, definitive conclusions are difficult to be drawn because of the wide error bars of the apatite FT ages and luck of apatite fission-track length data. In this presentation, we are going to give more precise discussions based on apatite fission-track length analyses.

Keywords: dating of a fault, fission-track thermochronology, K-Ar dating method, U-Pb dating method, Kojyaku granite

SCG63-P02 Room:Poster Time:May 2 16:15-17:30

Chemical and isotopic examinations of Arima-type high saline hotspring water in south-west Japan

TANAKA, Hidemi[1*] ; TERUSAWA, Shuji[1] ; SUGAI, Shuto[1] ; TSUNOMORI, Fumiaki[2] ; MURAKAMI, Masaki[3] ; KAWABATA, Kuniyo[2]

[1]School of Science, University of Tokyo, [2]Geochemical Research Center, Graduate School of Science, University of Tokyo, [3]OYO Corpoartion

Many researches have been conducted to explore component source, heat source and water source of hot spring in Japan. Matshubaya et al.,(1974) classified hot springs into four types by isotopic ratio of hydrogen and oxygen in water and geology (1) volcanic type, (2) Arima type, (3) coastal type, (4)Green tough type. Of these, Arima type is said to have deep origin source because hydrogen and oxygen isotope ratios suggests that the origin is mixture of meteoric water and magmatic water, and dissolving gas have abnormally high He isotopic ratio.

Sugimoto (2012) selected 180 hot springs that seem to be classified as Arima type from 6058 hot springs in Japan, using Li/Cl and Br/Cl values. Li/Cl is used as index of temperature of water was experienced (You et al., 1996). Br/Cl expresses influence from sea water and biological effect (Hurwitz et al., 2005: Uemura et al., 1988). He selected hot springs which have more Li/Cl and less Br/Cl as Arima type. But, his discussion was only about dissolving ion and not discussed hydrogen and oxygen isotope ratios used in the definition of Arima type.

So, we reselected 185 hot springs that seems to Arima type by Sugimoto (2012) method from 9887 hot springs in Japan and sampled 67 hot springs for isotopic analysis and ion analysis. As a result, the hot spring with the isotope shift in the same way as Arima hot spring is found along Median Tectonic Line (MTL) at Kinki, Western Shikoku and Central Japan (Kashio) districts. All mixing lines are converged to one point. Thus, we refer the fluid with this isotopic composition as origin water of Arima type. Since they converge to one point in the relationship of the hydrogen isotope ratio of the chloride ion concentration, the composition of the original water is as δD = -35 ‰, δ18O = 5 ‰, Cl- = 42g/l. The method to determine the isotopic composition and the resultant value of δD and δ18O is more convincing than those from previous results. Because shift lines from several regions are coincided at one point.

Keywords: Arima hot spring, Oxygen Isotope, Hydrogen Isotope, Brine fluids, original composition