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

SGL045-P05 Room: Convention Hall Time: May 25 17:15-18:45

ESR dating of quartz wtih Multiple Aliquot Regenerative Additive Dose method

mitsuya Asagoe[1*], ToyodaShin[1], suzukitakehiko[2], UtidaAi[1], C.Falgueres[3], P. Voinche[3], H.Tissoux[3]

[1]Okayama University of Science, [2]Tokyo Metropolitan University, [3]Museum Nationale d Histoire Naturelle,Fr

Electron spin resonance (ESR) dating method is useful for dating quartz in tephra in the age range from one thousand to a million years, which will contribute to absolute chronology of quaternary era.
The additive dose method has been used in ESR dating to obtain the accumulated doses given by natural radiation, of the sample.
The ESR intensities are measured after irradiating the sample aliquots to gamma rays.
The accumulated dose is obtained by extrapolating the dose response to the zero ordinate.
However, the statistical error of the accumulated dose is large because of the extrapolation.
In the present paper, we introduced multiple aliquot regenerative additive dose method which is similar to the single aliquot regenerative additive dose method used in luminescence dating (OSL).
An apparent dose is obtained for each ESR signal intensity of the irradiated aliquot from the regenerative dose response which is obtained for the sample aliquots irradiated after heating, which is to erase the signal.
The apparent doses are plotted against the gamma ray doses.
When the sensitivity in the dose response does not change, the slope of this dose plot is unity, when it changes, the slope is not unity, but sensitivity is corrected by the slope.
Similarly, the accumulated dose is obtained by extrapolating the line in this dose plot to the zero ordinate.
Quartz grains of 250~500 micrometers and 0.5~1.0mm were extracted from the samples of Numazawa-Kanayama tephra, Numazawa-Sibahara tephra, Sirakawa pyroclastic flow taken in Aizu region of Fukushima and prefecture.
Extracted quartz grains were crushed to 250 micrometers~75 micrometers and divided into ten aliquots of 100mg, each, then irradiated to gamma rays.
A part of each sample was heated at 400℃ for 30 min to erase the ESR signals before irradiation.
The regenerative dose response was obtained from this subsample.
The doses obtained by additive, regenerative, and regenerative additive dose methods coincided within the statistical errors for most of the samples.
However, there were some samples with doses, being consistent for these methods but not for different ESR signals and/or for different grain sizes.
The reasons were for these inconsistencies and the ages of the samples calculated from the dose rates will be presented.

Keywords: quartz, electron spin resinance, dating, tephra, quaternary, gamma ray