

Estimate of the origin of the river sediment in the Kurobe River basin using TL and the ESR

Msanori Yoshida^{1*}, Shin Toyoda¹, Kiyotaka Ninagawa¹, Masashi Takada², Aiko Shimada³

¹Department of Applied Physics, Faculty of Science, Okayama University of Science, ²Department of History, Sociology and Geography, Faculty of Letters, Nara Women's University, ³JEOL RESONANCE, Inc

While the ESR signals of the E1' center in quartz was used to investigate the origin of the loess in MIS 1 and 2 (Toyoda and Naruse, 2002) and these diments in the Sea of Japan (Nagashima et al., 2007), Shimada (2008) showed that TL CI (thermiluminescence color image) may be useful for similar qualitative study on river sediments. In the present study, the wavelength-temperature two dimensional thermoluminescence measurement was employed, together with the ESR measurements, to investigate the origin of the river sediments quantitatively.

Sediment samples were collected from the 23 locations at the prefectural border of Nagano and Toyama and the Kurobe River basin. Eight samples of these were sieved to obtain four grain size fractions of 2-1mm, 1-0.5mm, 0.5-0.25mm, 0.25-0.125m. Quartz grains were extracted using chemicals, heavy liquid, and an is dynamic separator. The obtained quartz grains were heated at 300 degree celsius for 1 hour to erase the inherited signals. Each sample was then separated into 9 subsample aliquots for gamma ray irradiation up to 2640 Gy, which are for ESR measurements. Another separate aliquot for TL measurement was given a dose of 857 Gy where the sample glass tube was wrapped by Al foil to prevent from giving any light.

TL measurements were performed the two dimensional TL apparatus which measures the TL emission spectra during heating up to 450 degree celsius. Red emission (538 to 658 nm) was observed between 90 and 390 and Blue emission (379 to 538 nm) was between 70 and 370 . The integrated counts were taken as the intensities of the red and blue emissions. The intensities of the blue emission are roughly constant for all samples of river sediments and river terrace samples while red emission tends to increase with age, i.e., lower in higher terraces and higher in lower terraces and present river sediments. The results of ESR measurements will be given in the presentation together with the TL results.

Keywords: ESR, TL(thermiluminescence), Quartz, river sediment