

Total grain-size distribution of pumice fallout deposits (Kj-P1) from 54 ka plinian eruption at Kuju Volcano

*Tomohiro Tsuji¹, Kishimoto Hiroshi², Fujita Kouji², Chisato Nakamura³, Nagata Tomohiro³, Kimura Kazunari³, Michiharu Ikeda¹, Naoki Nishizaka⁴, Kozo Onishi⁴

1. Shikoku Research Institute Inc., 2. Asia Air Survey Co. Ltd., 3. Naiba, 4. Shikoku Electric Power Co. Inc.

Constraining physical parameters (e.g. Total grain-size distribution; TGSD) of tephra dispersion and deposition from explosive volcanic eruptions have been studied using observation and analyses of deposits of recent eruptions. However, TGSD of old tephra deposit is a significant challenge and has been rarely studied, because of the difficulty of measuring grain size of altered pumice particles and lack of observation. In this study, to estimate TGSD of VEI5 dacitic plinian explosive eruption occurred at 54 ka at Kuju volcano, we conducted geological survey and grain size analyses for the Kj-P1 pumice fall deposit.

Based on grain-size distribution, maximum pumice size and components, Kj-P1 pumice fall deposit is divided into finer lower and coarser upper layer. We analyzed each grain-size distribution for the lower and upper layers.

Generally, sieving and laser-diffraction analysis have been used for measuring grain-size of tephra and we also used these methods. However, because the upper layer of Kj-P1 has been altered and lumped, it can be hardly separated. In addition, because the altered pumice particle could be broken into finer particles under water, we cannot measure accurate grain sizes. Then, we challenged a new method, image analysis, outlining pumice particles on photographs of outcrops and measure the sizes and area ratio of each pumice particles. We combined the results of the image analyses, sieving and laser-diffraction analyses at 15 and 20 localities for the lower and the upper layers. Using volcano distribution, Md phi and sigma phi are calculated to be -1.5 and 2.5 for the upper layer and 0.5 and 2.6 for the lower layer. The result fit the observation of altered pumice particles at the outcrops better than the result without the image analyses. To verify this method, analytical methods such as numerical simulation are needed.

Keywords: grain size distribution, Kuju Volcano, plinian eruption, pumice fall deposit