Application of static procedures for tephra correlations on geochemistry of volcanic glass shards and a few problems

Kaori Aoki[1]

[1] Faculty of Geo-Environmental Science, Rissho University

Tephrochronologists can select several procedures to correlate and identify tephra beds which sources are unknown, when a sufficiently large number of geochemical database of tephra beds have been obtained. The plot graph can readily and clearly show whatever several tephra beds are similar each other or not. However it is not appropriate to compare a large number of tephra beds, therefore it is recommended that the examiner choose several correlative tephras from database and apply the plot graphs to them.

As numerical techniques to aid the correlation, coefficients of variation (CV; Borchardt, et al., 1971) and similarity coefficients (SC; Borchardt, et al., 1972) have long been used but are subjective in the procedure to select correlatives. It is recommended to apply them the combinations of testing samples and the matrix database.

As statics methods, multi-variance analyses are employed for tephra identifications sometimes. For example, the application of cluster analysis for tephra chemistry was carried out by Sarna-Wojcicki, et al. (1976). The advantage of this method is to find easily how distinct each tephra from one another. The cluster analysis is more useful to classify some tephras in studying area rather than to correlate or identify. The most powerful tool for correlation of tephra is the discriminant function analysis (DFA), comparing any quantitative parameters of geochemistry for the matrix database. DFA can give the probabilities for the all pairs among testing samples and the matrix database, however their reliability has often wavered, because the matrix database dose not always cover all tephra in the studying field and the heterogeneity in each tephra bed.

At least, the correlatives which are chosen on the basis of geochemistry should be crosschecked by other factors, such as mineral assemblage, refractive indices of tephra materials, and their stratigraphic positions.