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SMP44-P12 Room:Convention Hall Time:May 20 18:15-19:30

# Numerical definition of particle size and shape of volcanic ash by statistical particle image analysis method.

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[1] Introduction

The exact definition of particle size and shape is a factor of importance in many researches connected with several geology sciences which objections are sea sand, soil and volcanic ash. The object of this report is to describe the various methods of defining these properties and to give the result of some measurements made on volcanic ash as model sample by statistical particle image analysis.

[2] Methodology

The statistical particle image analysis is possible to obtain the significant difference evaluated result of particle size and shape information by over the ten thousand numbers of particles projection images from microscopic method. The methodology of this technique is based on the digital binary image processing technology from projection image picture of CCD camera on microscope. In each CCD camera pixels has size. The determinations of particle size and shape parameter are calculated by the particle projection images which are constructed from the number pixels in CCD camera. The most of the advantage of this method is not only possible to described numerical definition of particle analysis but also available to the diverse analysis by two dimensional correlations plot between shape parameter and particle size.

[3] Material and method

Volcanic ash sample was from the Ito Pyroclastic Flow as model sample. This sample was sieved by 5 phi mesh sieve and it was come from under the mesh to isolate small particle from bulk sample. An automated particle characterization system (Morphologi G3,Malvern Instruments) was used to evaluation of statistical particle image analysis. The observation mode was diascopic mode (Transmittance mode) . Volcanic ash sample were dry dispersed using the integrated Dry sample dispersion unit via an instantaneous pulse of compressed air, and measured using Standard Operating Procedures (SOPs) which define the software and hardware settings depending. Measurements were made in an enclosed glass plate as sample carrier, minimizing environmental exposure. The analysis generated high quality images from over ten thousands of sample particles.

[4] Result

Total number of 96,029 particles was measured. Volume based circle equivalent diameter of particle size distribution (VCED) were monomodal and 14.31(d10), 30.32(d50), 45.79(d90) in micro meter. However, the number based percentage of small particles (<3 micrometer) was 74.91%. To concerning shape distribution and shown in Fig.1. Circularity was bimodal, however aspect ratio was monomodal. Recalculation of VCED was shown Fig.2 which was shape distribution data. Represented on amount of volume based percentage , the circle like particles were 3% and the angular like particles were 64% .However , in count based percentage , circle like particles were 55% and angular like particles were 21%.

[5] Summary

This report will be more discuss about application and capability of numerical definition of volcanic ash by the statistical particle image analysis as new approach for this research area.

Keywords: Volcanic Ash, Pariticle size, Pariticle shape, Particle Image Analysys

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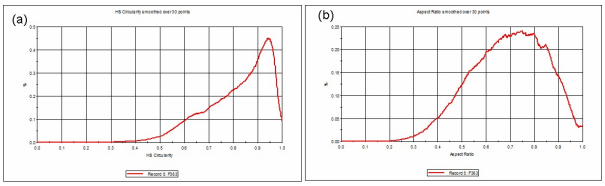


Fig.1 Shape distribution by particle image (a) Circularity (b) Aspect ratio

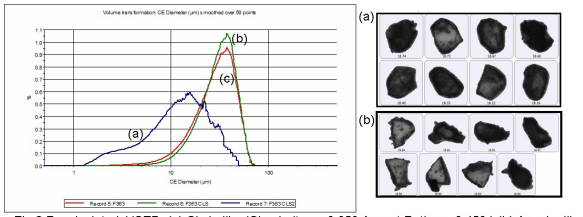





Fig.2 Recalculated VCED (a) Circle like (Circularity >= 0.850 Aspect Ratio >= 0.450 ) (b) Angular like (Circularity Between 0.400 - 0.750 , Aspect Ratio >= 0.450) (c) Total