

Petrographic description and density analysis of fall deposit by the May 18, 1980, eruption of Mount St. Helens.

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The May 18, 1980, eruption of Mount St. Helens, Washington, erupted white pumices that have the same composition from 08:32 to 18:15 LT. Characteristics of eruption of Mount St. Helens are represented by the dramatic land slide and subsequent plinian eruptions. Phenocrysts and pheno-bubble textures of fall deposits record state in the conduit just before the plinian eruptions. In this study, correlations between texture of fall deposit and time evolution of eruption are examined. Samples of this study were taken from fall deposits divided into seven layers with 2 cm in thickness. The uppermost layer is referred to as layer 1, layers below are identified by following sequential integers. Measurement of bulk density and description of texture were carried out for white pumices with 8~16mm in radius in each layer. Bulk density was calculated on the basis of bulk volume by 3D image. Thin sections were made for white pumices with the average in mass, bulk volume and bulk density in each layer and the maximum and minimum bulk density in layer 1. Measured bulk density ranges 0.495~1.01g/cm³. Statistical made of bulk density is 0.7~0.8g/cm³ in the intermediate bin for layer 1 and 2, whereas that is in the smallest bin 0.5~0.6g/cm³ and the abundance of pumices monotonically decrease with bulk density for layer 3 and 4. Layers 1 and 2, as well as layers 3 and 4 resemble in bulk density distribution and petrographic texture. Specifically in the petrographic texture, there are more phenol-bubbles for layer 3 and 4. The maximum and minimum bulk densities **in layer 3** are 0.888g/cm³ and 0.505g/cm³, respectively. From backscattered electron images, pumices samples with minimum density include more coalesced bubble than those with maximum one. If we assume the inverse relationship between eruption intensity and pumice bulk density, we can suggest that pumices with the smallest bulk density in layer 4 may be eruption products when the plinian column grew up to the maximum height. We should confirm the trend in texture of pumices by more detail analysis for sufficient numbers of pumices samples with different bulk densities in each layer including bubble size distribution measurement and chemical analysis microlites. Furthermore, from BSD data we should calculate the average bubble nucleation rate and growth rate to infer how bubbles were formed, in addition to the estimation of buoyancy state of the conduit prior to eruptions by pheno-bubble abundance.

Keywords: vesicularity, plinian eruption, density, pheno-bubble