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1 次元準定常的降下堆積プロセスにおける直線的噴煙上昇の影響
The influence of the linear increase in the source height on the 1D quasi-steady state fall and sedimentation processes

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The stratigraphic variation of grain-size distribution (GSD) of pyroclastic fall deposit records the time variation which may reflect the time variation of GSD in the umbrella eruption cloud. In order to relate the stratigraphic variation of GSD and the time variation of umbrella eruption cloud GSD, it is necessary to consider the transportation process of ejecta.

Iriyama and Toramaru (2014, AGU) formulate the mathematical relationship between the depositional structure and the source (the umbrella eruption cloud upward in a vertical direction from the sedimentation point) parameters under the 1D constant height model in which the source height and the source GSD are constant with time throughout a release duration. In this case, we showed that the thickness ratio of the upper and lower layers, which is defined as the ratio of the thickness of the upper layer above the extinction point of the largest grain to whole layers depends on the ratio of the source height, the source GSD, and release duration. In nature, however, the eruption column height or ash cloud height may change even during continuous eruptions such as plinian type. In this study, we numerically assess the influence of the linear increase in the source height on the sorting structure of deposits in the simplest case.

When the linear increase rate in the source height is given as constant b, the increase in b makes the sedimentation duration longer than in the constant height model at the sedimentation surface. The numerical simulations for the linear increase height model are carried out with varying b under the same conditions of the initial source height, the source GSD, and release duration. Results show that the linear increase constant b have a negative correlation with the peak accumulation rate and have a positive correlation with the thickness ratio of the upper layer. These suggest that the increase in the source height (eruption intensity) can be detected from the thickness ratio of the upper layer which can be observed by the geological survey.

キーワード: 降下火砕堆積物, 粒子サイズ分布, 噴火推移
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