

## A Study on Cosmic Ray Muon Energy Spectra for Radiography

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Cosmic ray muon radiography provides a powerful method for observing the internal structure of volcanos and large civil engineering structures, such as dams and bridges. Since this method utilizes a natural radiation source, an accurate analysis of the behavior of cosmic ray muons as a radiation source forms a significant part of this method.

It is important for us to know the energy distribution of muons that arrives at the surface of the earth in order to construct a theoretical model accurately since the measurement of the cosmic ray muon energy spectra has previously been performed only within the limited energy regions and zenith angles, and therefore, we have to estimate the behavior in the energy regions where the spectra have not measured.

A fundamental theoretical model for describing the energy spectra has been derived by Matsuo et. al. (1984), but the values of the individual parameters in the numerical formula of the model contains uncertainty intrinsically, and no consensus exists on determining these values.

We have improved the theoretical model that is capable to estimate the cosmic ray muon flux for the energy regions where the measurement has not performed.

We will talk about the derivation process of our model and the role of the model in radiography. This study will contribute to more accurate muography of a volcano.