

Monitoring of active volcanoes by real-time automatic volcanic ash sampler

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For the prediction of volcanic eruptions, it is fundamental to understand the mechanism that generates the diversity and unsteadiness of eruption styles. At present, however, it is difficult to predict the exact vent locality, the magnitude, and sequence of the eruption, even when previous study and observation system are established well. For understanding the mechanism of this time evolution, the most straight forward way would be to collect observation data during an eruption and to deduce some systematic relationship from them. Such methodology has been employed for many years in the geophysical observation of seismicity and ground deformation, and been successful in detecting the motion of magma. However, these techniques are not direct observation, because volcanic eruption is the emission or effusion of magmatic materials.

We are now developing automatic sampling system of eruptive materials. The system consists of two sub-systems; sampling system and observation system. Main purpose of the sampling system is to collect eruptive materials automatically at dangerous localities during eruption, and we developed automatic ash sampler last year that collects 30 samples in one cycle with a time interval that we can preset. The observation system consists of some cameras with three targets; vent condition, in-situ condition of ash deposition, and plume height (VIP), because information of these targets is fundamental for interpreting data of the eruptive products. Since most characteristic phenomena occur at active vents, observation of surface manifestations like jets and thermal activities are very important information to characterize the event. As a whole system, we are going to relate surface observation and eruptive materials in higher time precision than before, and give constraints on the explosion and heat transfer mechanisms of eruptions. Now we developed new automatic sampler that is lighter than before that we can climb volcanoes with it.