On the development of mobile observatory for volcanic eruption; MOVE

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Explosive volcanism has sometimes yielded a disaster to the neighboring district. It seems that the scaling law that governs the relations among explosion parameters and the distributions of disaster should be the first class topic that should be solved to mitigate the disaster. Our group has made some field explosion experiments and numerical simulations for the understanding of the scaling law. The observation of real volcanic explosion, however, is much more important to establish the law. Although the observation around crater is very dangerous, to establish the law and to understand the mechanism of volcanic explosion, we need the observation at vicinity of crater of the explosion phenomena including the propagation of volcanic shock wave and the shape of eruption cloud.

Our group is attempting to construct the Mobile Observatory for Volcanic Eruption, MOVE, which make a direct observation at crater possible. The purpose of this presentation is to introduce our planning on the MOVE.

According to our planning, the purpose of observation using MOVE is summarized as follows:

1. Determination of explosion parameters includes explosion energy and explosion depth.
2. The understanding of physical condition within running pyroclastic surge and eruption column.
3. Sampling of rock fragment and volcanic ash.
4. Install of the observation package on the ground.

For this purpose, the MOVE has following function and sensor.

1. Observation of pressure wave form due to volcanic shock wave using piezo blast sensor and low-frequency microphone.
2. Determination of physical condition (dynamic pressure, temperature, density and particle velocity) of running pyroclastic surge using micro differential-pressure sensor, thermometer, metal plate)
3. Observation of eruption column and pyroclastic surge using visible video, high-sensitive video and infrared video camera.
4. Robot arm for install of observation package and sampling of rock fragment.
5. Transmission and save of collected data.
6. Remote control of the MOVE from base station at 2 km distance.
7. MOVE should be against high temperature (about 400 C) and high dynamic pressure (about 0.5 bar) for about 5 minutes.
8. MOVE should be against rough road scattered with about 20-30 cm rock fragments.