

## Flashing arc on Izu-Oshima 1986 eruption

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Volcanic eruption sometimes produces a change of atmospheric pressure. The change is believed to relate to the propagation of shock wave induced by a volcanic explosion, a release of vigorous energy in a short time. In spite of many studies on the relation between pressure wave and a volcanic explosion, a little is known on the essentials of this phenomenon such as the generation mechanism and the dynamics of propagation of the wave. The purpose of this study is to understand the dynamics of pressure wave induced by volcanic explosion. Special attention should be given to the flashing arc (naturally visualized volcanic shock wave) that is one of the typical evidence of the presence of volcanic pressure wave. Flashing arc was recorded at Vesuvius volcano in 1906 (Perret, 1912) for the first time, and several observations have been done later. Nairn (1976) and Ishihara (1985) concluded that this phenomenon was the result of phase change of H<sub>2</sub>O due to compression and rarefaction phases of shock wave, and they analyzed it using one dimensional shock tube model.

Many flashing arcs were observed on 19 November 1986 at Izu-Oshima volcano (JMA, 1988). Single explosion at Izu-Oshima eruption produced plural flashing arcs. Because it is difficult to explain this phenomenon based on the shock tube model, the author attempted the numerical simulation using point source explosion model (code by Saito and Glass, 1979). The effect of phase change of vapor to water was also considered in this simulation code. The simulation suggested that there existed plural conditions where flashing arc were formed. They are at negative phases of nth shock wave, i.e., primary, 2nd and 3rd shock waves, and the back part of contact surface that is the boundary between expanding volcanic gas and an ambient air. The comparative study using the movie of Izu-Oshima 1986 eruption and the numerical simulation indicated that the flashing arcs were formed at the negative phase of volcanic shock wave. It was, however, only limited at just before the pressure rise of following nth shock wave. This study also suggested the following conclusion for this volcanic explosion. The probable source is the bubble bursting, which is the sphere of about 20 m in diameter with H<sub>2</sub>O steam of 1100 degrees Celsius and 10<sup>11</sup> J in explosion energy. The bursting should be occurred at almost the surface of lava lake. These estimations were in harmony with the other estimations based on the maximum height and trajectories of ballistic fragments, effusion rate and water content of magma.

### [References]

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