

Surge and chronology of 1888 eruption of Bandai volcano

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Mt. Bandai (Bandai-san), famous for the large-scale collapse of a volcanic edifice triggered by a phreatic eruption on July 15, 1888, is an active volcano in Fukushima Prefecture. It is one of the most tragic volcanic disasters in Japan since Meiji-Jidai, killed 477 people. There were little precursor activity, and very short time between the beginning and climax of the eruption. That made the disaster of this eruption terrible. Almost dead caused by debris avalanche flew down to the northern foot of Bandai-san, and pyroclastic surge. The pyroclastic surge produced from phreatic eruption, hit villages on the eastern foot of Mt. Bandai. The pyroclastic surge were products of phreatic eruption, and thought to have precious information of 1888 eruption.

Previous studies have focused on the surge deposit, and have showed the characteristics of the pyroclastic surge and yielded an eruption model. However, there are many paradoxes between the models arrived at and the disaster records. For example, the timing of the generation, the number of flow units, and the depositional area of the pyroclastic surge. In this study, I compare the surge deposits with disaster records, and discuss the pyroclastic surges and chronology of the 1888 eruption.

The surge deposit of the 1888 eruption is made up of massive or cross-laminated beds with reverse or normal grading of pyroclastic materials. The deposit tends to distribute more thickly on the topographically low land. Sometimes accretionary lapilli and pieces of non- or a little-carbonizing wood are contained in the deposit. The depositional structure and the pattern of the size distribution of the deposit are in good agreement with those of a typical surge deposit. I found the surge deposit at wilder area, for examples on the debris avalanche deposit, which gave us new evidence for understanding the past. Microscopic and X-ray diffraction investigations indicate that some layers in the deposit have different components. That shows some flow units were different origin. Some of these flows had wet conditions, and the depositional temperature was relatively low (about 260 degree in particle).

Since many inhabitants survived the disaster of the surge, many testimonies and records have been accumulated. According to these; (1) after the sound of the eruption, it took several dozen seconds for the surge to reach the foot of the mountain which was about 5km distant; (2) some victims were burnt; (3) some victims were overcome two times by the surges. And we estimate velocity and dynamic over pressure of the surge. The distribution of overpressure shows force destructive power of the surge was strongly influenced by topography. And maximum average velocity of first surge unit is 70-150m/s.

Based on the character of the surge deposit and the summary of the victims' testimony regarding the timing, it was concluded that a surge was generated at least twice; before and after the collapse of the volcanic edifice. It supported a past report Sekiya and Kikuchi (1889).