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Wet deposition of low temperature pyroclastic surges in Bandai 1888 eruption.

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Mt. Bandai is an active andesitic stratovolcano located in the southern part of NE Honshu, Japan. The latest eruption of Bandai occurred on July 15, 1888. On the day, many times phreatic eruptions had occurred accompanied with large collapse. Low temperature pyroclastic surges were originated from the phreatic eruptions, and traveled about 7km along Biwasawa valley. We investigated the proximal facies of the low temperature surge deposits based on results of disaster record analysis. Since the proximal deposits probably reflect even faint transition in the activities. Three flow units are identified in the low temperature surge deposit, described as Unit-1 to Unit-3 from base, and two fall units inter-bedding in the surge deposits. These flow units have the difference of the depositional structure, particle size, sorting, component, or clay mineral assemblage. Unit-1 and Unit-2 deposit are main deposit at summit region, unit-3 and other deposits are discontinues and sparsely distribution. Unit-1 deposit indicates wet deposition; few millimeter vesicles and coated clasts by fine ash are common. In this study, we clarify the factor of the wet deposition in Unit-1 deposit.

Wet deposition occurs in three phase (particle, gas and particle) current called wet surge. The air temperature is likely to below 100 degree. Unit-1 is the coarsest and thickest flow unit in the 1888 low temperature surge deposit. Abundant non-altered clasts are contained. 1888 eruptive deposits are composed of fresh accessory rock fragment and hydrothermally altered materials e.g. clay mineral and friable white siliceous rock. These altered materials were originated from hydrothermal system which existed in Ko-bandai edifice. The ratio of non-altered / altered rock is different among 1888 deposits. The non-altered rock fraction is high in Unit-1 deposit. Compared with the chronology of the 1888 activity, Unit-1 was generated before large collapse. Accessory rocks were fragmented and erupted by explosive activities. Non-altered rocks were so rigid that these rocks erupted without enough fragmentation, thus Unit-1 deposit contains abundant non-altered clast. These large amounts of non-altered clasts lower the whole current temperature of Unit-1. The extreme change of the component was caused by large collapse.

We examined simple calculation to evaluate the effects of cooling by clasts modified the calculations proposed by Marini (1993). The eruptive temperature lowers by increasing non-altered rocks. This result agrees with the feature of the 1888 low temperature surge deposits. For further researches, other factors to lower the current temperature should be considered, for example, initial temperature of the eruptive source, the ratio of water / rock, and eruptive mechanism.