Eruptive products of the 2000 Usu eruption (1): their stratigraphy and total amount

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The stratigraphy of the ash fall deposits deduced by the 2000 Usu eruption were constructed. The ash fall deposits are divided into 4 layers; the light gray ash, the brown ash aggregates, the dark gray ash, and the light brown ash aggregates in the descending order. Judging from the observation of the volcanic activities and the wind directions at the time of the eruptions, eruptive dates of these layers were summarized as follows; the light gray ash was deduced from the at 13:08 on 31 March, the brown ash aggregate was the explosions on 1- 2 April, the dark gray ash mainly generated during 3-4 April, and the light brown ash aggregate was after 8 April, respectively. Total amount of these ash fall deposits is estimated to be 9.4 *10^5 ton.

In the 2000 Usu eruption, considerable amount of pyroclasts were fallen around the Usu volcano by numerous explosions. If the stratigraphical characteristics of the pyroclastic sediments can be constructed, we can obtain the variation of the contents of essential materials in the pyroclasts during this eruption. It is necessary in order to evaluate the relationship between the amount of the essential materials in the pyroclasts and the volcanic phenomena, which are plume or cock's tail jets.

The volcanic activity of the 2000 Usu eruption were monitored and reported by the mass media and other workers. Summarizing these observation results, relatively large explosion events which accompanied with the heavy ash fall were occurred at least 35 times during the "ash plume stage"(Takada et al., 2000). In these large events, some of them were huge; the phreatomagmatic explosion at 13:07 on 31 March, large cock's tail jets at 7:31-7:54 and 13:00-14:00 on 1st April, large cock's tail jets at 5:40 and14:00 on 2nd April, and large cock's tail jets at 18:00 in 4 April. The eruptive products which accompanied with these explosions are observed as the ash fall deposits with multi - fall units. These units can be distinguished on the basis of their color and grain size. We explain the characteristics of ash fall deposits in ascending order.

Light gray ash layer is observed at the base of the ash fall deposits derived from the 2000 Usu eruption. This layer has some distribution axes; major of NE, and minor of N and E. On the basis of this distribution area, it is considered that the light gray ash would be derived from the phreatomagmatic explosion occurred at 13:08 on 31 March. The deposit distributed under the NE axis is the stratified fine ash layers, which shows mantle bedding structure on the ground. On the other hand, , the deposits distributed under minor N and E axes are composed by the stratified coarse sand layers, which do not show the mantle bedding structure. Furthermore, the images and photographs taken just after the eruption show that small lateral cloud projected from the base of the main eruption cloud and descend to N direction from the craters. Judging from the occurrences of the deposits and some observation evidences, small scale pyroclastic surge may be occurred in the phreatomagmatic explosion on 31 March.

In the path way located at the south foot of the Kompira peak, two brown ash aggregate layers are observed on the light gray ash layer. Judging from the location of the craters and the wind directions at the time of the eruptions, these ash aggregate layers would be resulted from the explosions occurred on 1- 2 April at the Nishiyama craters.

In the Toya-ko Onsencho town, several dark gray ash layers are observed on the light gray ash layer. In these layers, three reddish brown ash layers are involved, which are good key beds connecting with the ash fall deposits distributed in the Toya-ko Onsencho town. In three reddish brown ash layers, basal one covers directly the light gray ash layers and has clear distribution axis for E direction. Judging from the wind direction and the evidences of the observation of the volcanic activities, this reddish brown ash layer would be generated by the eruption at 14:00 in 2 April. Thus, it is considered that dark gray ash layers in the Toya-ko Onsencho town are generated by cock's tail jets mainly occurred during 3-4 April.

In the Toya-ko Onsencho town, light brown ash aggregate layers cover with the dark gray ash layers. The deposits are muddy and have no lithic fragments. Thus, the light brown ash aggregate layers would be generated in "the muddy or vapor plume stage" after 8 April (Takada et al., 2000).

Total amount of the ash fall deposits is estimated to be 9.4 *10^5 ton (not including in pyroclastic cones) and 22 wt. % of them is the light gray ash which derived from the early phreatomagmatic explosions.