28. *Changes in the Depth of the Crater Floor of Volcano Asama in the Recent Activities.*

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The auther, since the summer of 1934, has been making repeated measurements of the depth of the crater floor in order to study the vertical changes in the lava surface in the crater. As already reported in the previous paper[1], during the inactive period of the volcano in 1934, the floor level slowly rose and fell through the small range of about 1 meter a month. Since the violent outburst of April, 1935, about two hundred explosions occurred during the rest of that year and 1936. His main object was to ascertain the changes brought about in the crater floor with the progress and decline of explosive activitiy, particularly immediatly preceding and following an explosion; for with the elucidation of this phenomenon we should be in possession of an important clue to the mechanism of explosions.

First the depths of two or three points on the crater floor were acurately measured by triangulation, and the form of the crater floor determined by means of photographs taken from several points on the edge of the crater wall. The methods of triangulation and photographic survey are however available only when a very small quantity of vapour and gases is issuing from the crater, and because the crater of Volcano Asama is usually enveloped in these vapours, the methods just described can be employed only on the rarest of occasions. The upper part of the crater wall for a distance of 20～50 m retains a constant slope, beyond which the slope down to the floor gets much steeper. These inclinations of the slopes remainded intact despite the recent activities, as the result of which the inclinations of various points on the upper crater wall were utilized as scale for reference in measuring the depth. Although the values for the depth of the crater wall by means of this method are generally subject to errors of ± 4 m, they can be availed of without serious results during the active period of the volcano, seeing that the crater floor rises and falls within a range of 200 m in the short interval of a few days, when there is also

1) T. MINAKAMI, *Bull. Earthq. Res. Inst.*, **13** (1935), 318.

a large quantity of vapour in the crater.

2. Vertical Changes in the Depth of the Crater Floor.

Generally speaking, the depth changes in the crater floor of Volcano Asama may be classified into two kinds according to their characters. In the one the crater floor rises or falls as a whole, which is caused probably by increase or decrease in the pressure under the floor, while in the other, explosions eject a part of the floor from the crater in the form of volcanic bombs and ash, although when such material falls back again into the crater after ejection and accumulates there the crater floor changes in depth. These two kinds of changes therefore differ greatly in character.

This paper is a study of these two kinds of changes in the crater floor that were observed in both quiet and active periods of 1934, 1935, and 1936.

As will be seen from Figs. 1, 2, 3, and 4, the outline of the vertical change in the crater floor as the result of the recent activities is represented by means of E–W profiles through the center of the crater.

Fig. 1. This shows the changes in the crater floor at the time of transition from the inactive period since 1931 to the recent activity.

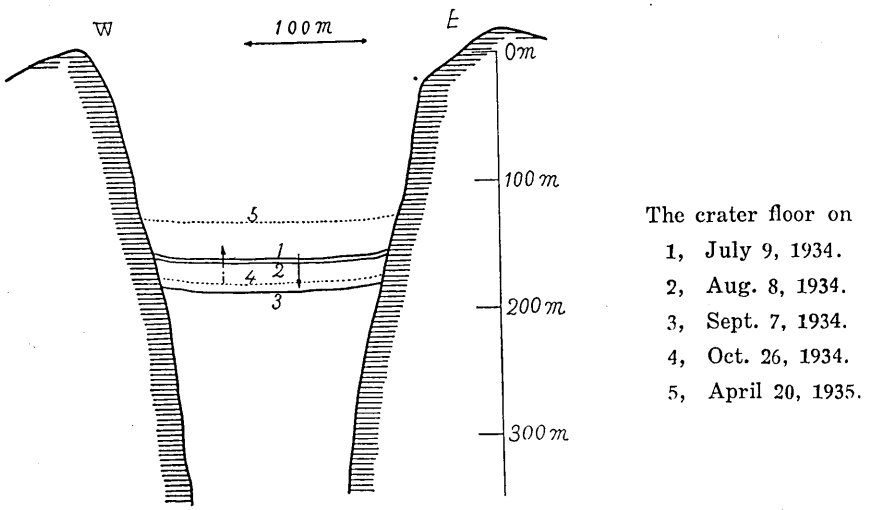

Fig. 1. E-W profile of the crater.

The crater floor, which was sinking from July to October 1934 and began to rise after October, the same year, showed a net rise of about 70 m at the time of the violent explosions on April 20, 1935.

Fig. 2. A mass of lava from the floor measuring 150 m E-W, 150 m N-S, and 100 m in depth, was ejected by the violent explosion on April 20, followed by swarms of explosions in May and June.

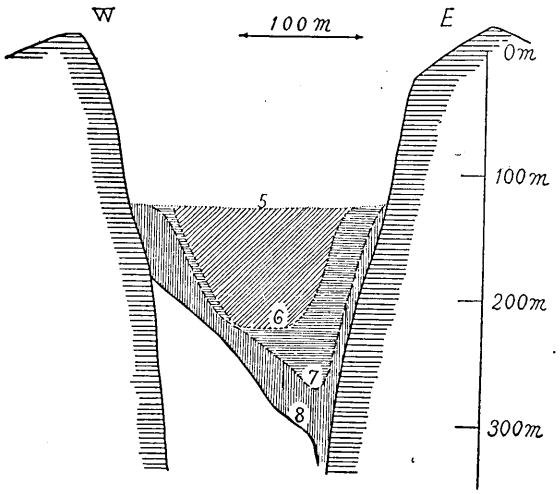

Fig. 2. F-W profile of the crater.

5, the crater floor on April 1935. (before the explosion on April 20, 1935.)
6, the crater floor on April 20, 1935. (after the explosion on April 20, 1935.)
7, the crater floor on June 10, 1935.
8, the crater floor on July 15, 19 5.
the lava ejected by the violent explosion of April 20, 1935.
the lava ejected by the explosions occurred during April, May and June, 1935.
the lava ejected by the explosions occurred during June and July, 1935.

Owing to ejections of the lava that had formed the NE part of the floor, the depth of that part of the floor showed marked increase. Naturally, in these activities, the NE part of the floor appeared to be connected with the center of explosions.

Fig. 3. A part of the lava fragements from the NE part of the

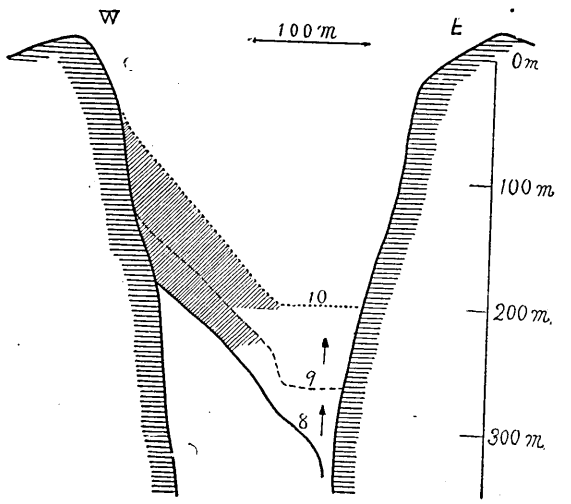

Fig. 3. E-W profile of the crater.

8, the crater floor on July 15. 1935.
9, the crater floor on Aug. 2, 1935.
10, the crater floor on Oct. 23, 1935.
volcanic bombs and ash accumulated on the floor.
↑ elevation of new lava.

crater bottom that was ejected from the crater fell back again on the

SW part of the floor, as the result of which the accumulation of volcanic bombs and ash on the floor formed a slope from SW to NE.

In August, however, from the hollowed NE part of the floor, new lava that appeared to be fairly fluid began to rise. From a survey made, the new lava increased in height, its surface as seen in Fig. 11 being very flat.

Fig. 4. On November 7, 1935, violent explosions began at 11h 50m a.m. and continued for three hours, as the result of which most of the

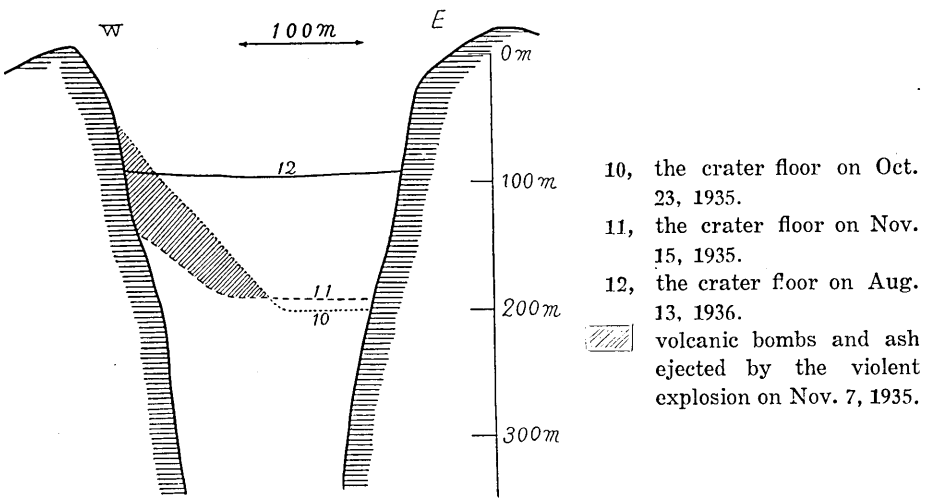

Fig. 4. E-W profile of the crater.

ejected lava fragement accumulated on the SW part of the floor. Part of these fragmental lava fell as volcanic ash in the Kwanto district and on the streets of Tokyo. The amount of this fragmental material is estimated to have been about 10^6 tons.

The new lava that had risen during August, 1935, was ejected by the explosions in February and March, 1936, resulting in marked changes in the crater floor. Since then, the floor continued to rise, its depth according to the triangulation of August 13, 1936, being only 70 m, but the explosions of September, October, November again markedly changed the form of the floor.

According to tilting records obtained with Ishimoto clinographs set at three stations at the foot of Asama, floor elevations of the first kind that were observed during the periods from October 1934 to April 1935, and from November 1935 to March 1936, were accompanied with remarkable tiltings of the ground.

These ground tilts at Volcano Asama however will be dealt with

separately in a forthcoming paper.

From these ground tilts and the vertical changes in the crater floor, it may be concluded that the former was the result of recent activities of the volcano and the elevations of the floors the result of the same cause, namely, increase of pressure underground. It might be added that tiltings of the ground and upheavals of the crater floor were usually preceded by swarms of explosions. Seeing that the main explosion of a swarm is usually very violent, it is probable that once the crater floor has been broken by the main explosion the floor crushes in through lessened weaker pressure, thus permitting a number of other explosions.

In conclusion, the auther wishes to express his cordial thanks to Professor Mishio Ishimoto for his interest and encouragement in this study.

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28. 最近の活動に伴へる淺間火山の火口底深さの變化

地震研究所　水　上　　武

最近の活動に於いて現はれた火口底深さの變遷を見るさ，次の二つに分けられる．

第1は火口底そのものが全體として上昇或は沈下する現象である．第2は火山爆發に依つて火口底熔岩が噴出して火口底の深さを深め，或は，一度噴出した熔岩が再び火口底の一部に堆積して火口底の深さを減ずる爲めに生ずる火口底の變化である．

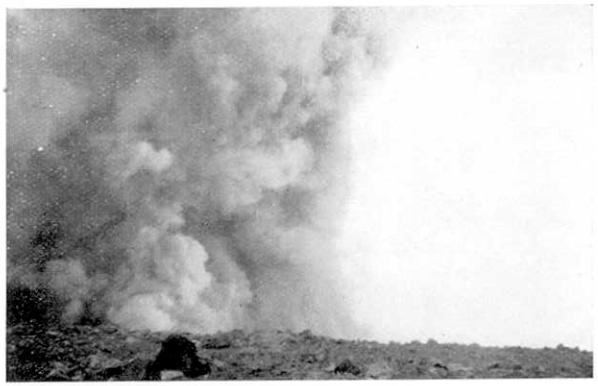

Fig. 5. (a)

Fig. 5. (b)

Fig. 5. (c)

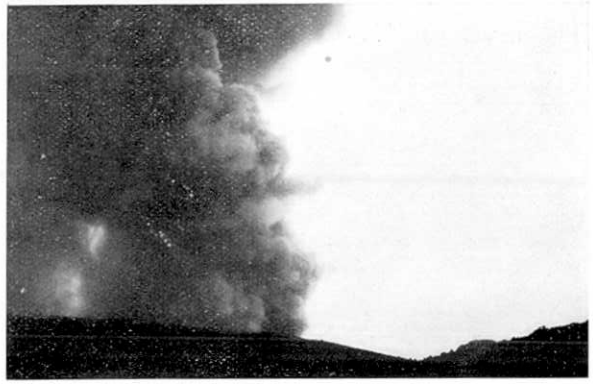

Fig. 5. (d)

The small explosion on Aug. 1935, as seen at a distance of 100 m from the crater.

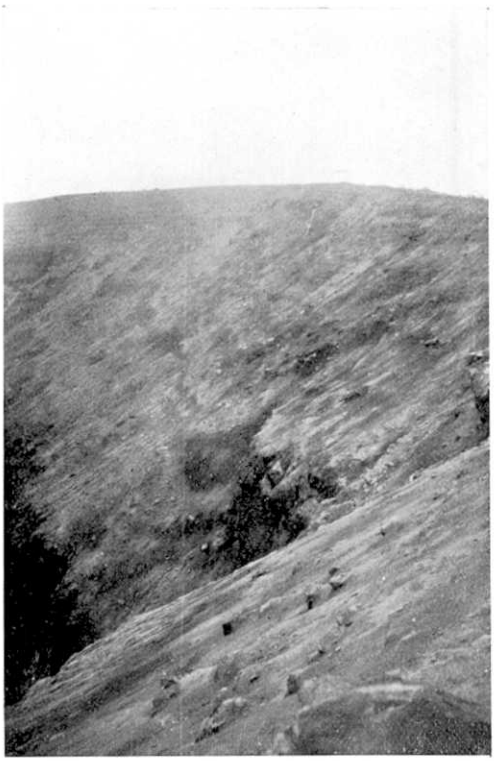

Fig. 6. (a)

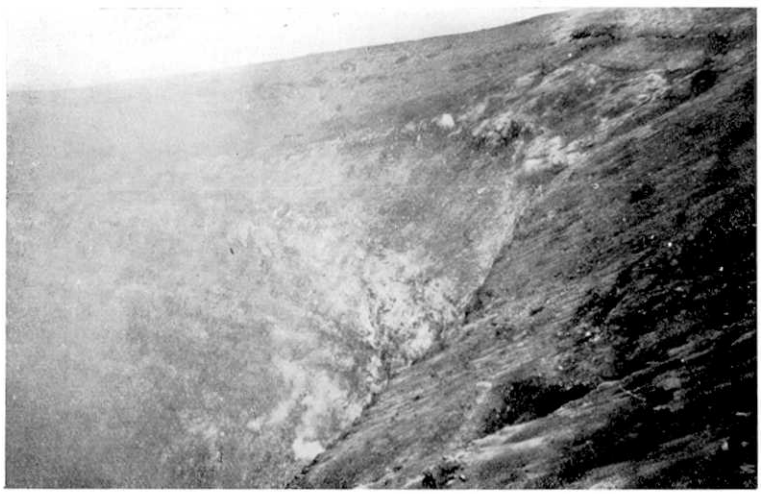

Fig. 6. (b)
The upper part of the crater wall.

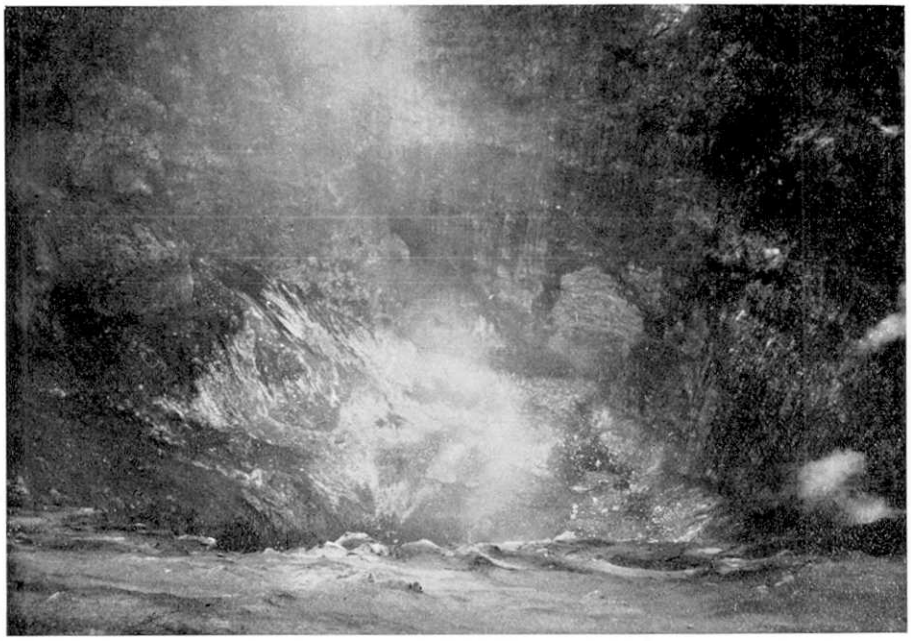

Fig. 7. The crater floor on July 10 1935.

Fig. 8. The crater floor on Aug. 1935.

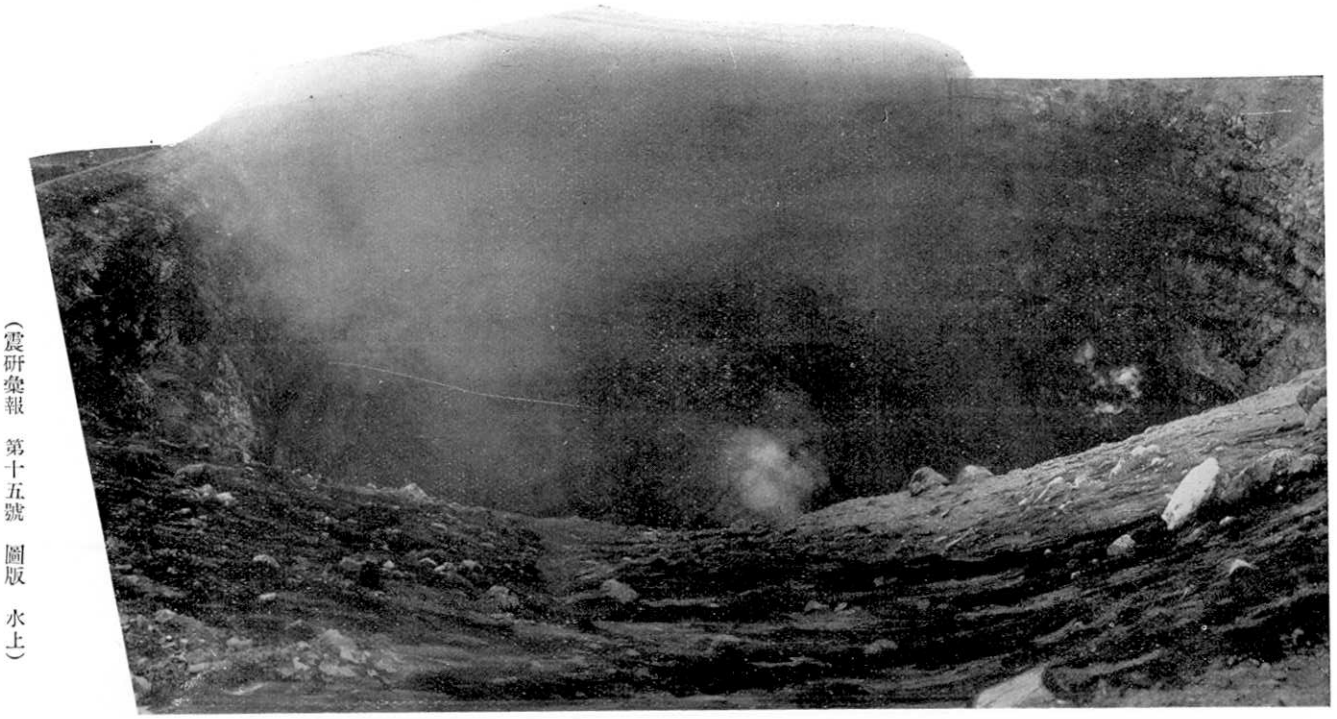

Fig. 9. The crater as seen from the south edge of the crater wall. (Sept. 1935.)

Fig. 10. (a)

Fig. 10. (b)

Bombs and ash accumulated on the west part of the crater floor.

Fig. 11. (a)

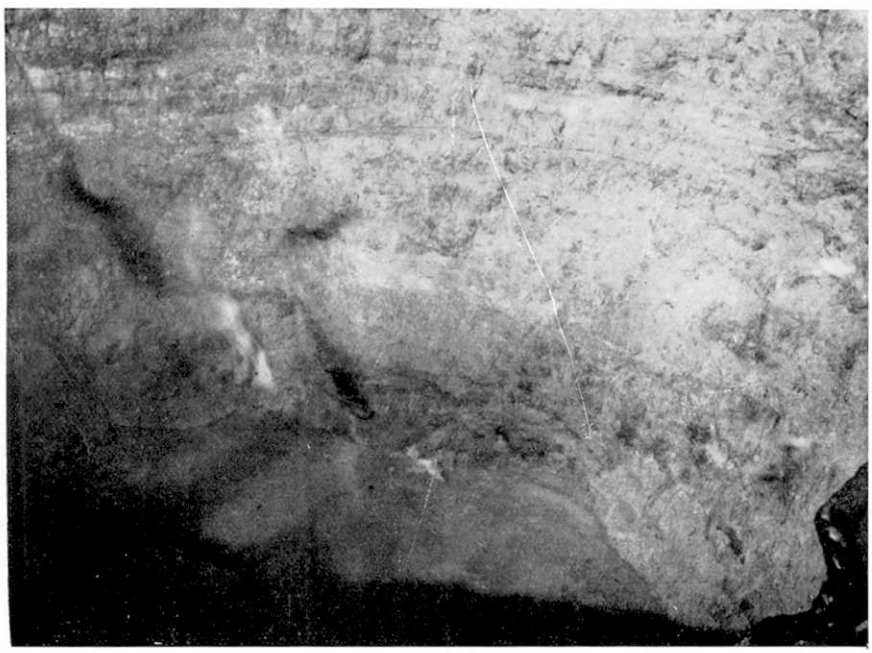

Fig. 11. (b)

The crater floor on Sept. 1935 (elevation of new lava.)

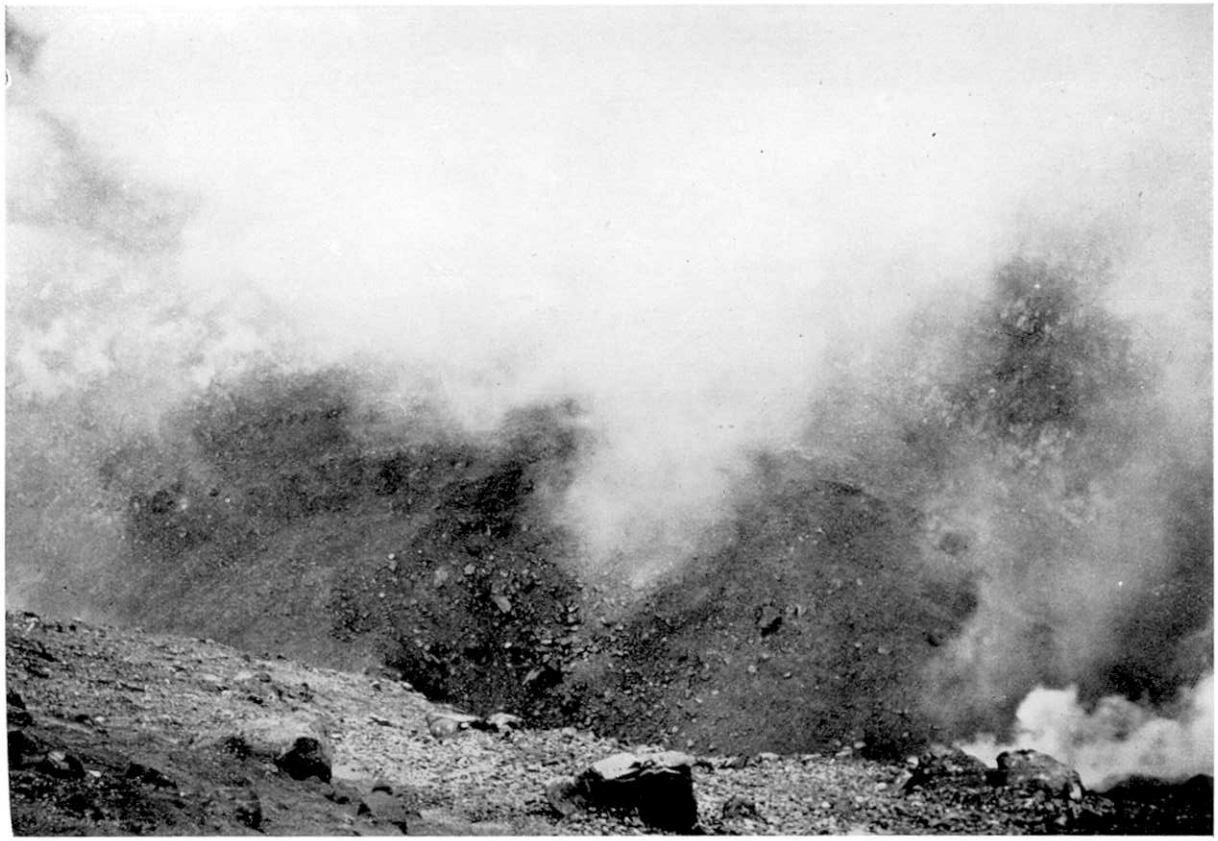

Fig. 12. The crater floor of small depth on Aug. 1936. (seen from east edge of crater wall.)