Scientific Observations at Soufriere Volcano, St. Vincent
from 16-19 April, 979 (Report No. 2)

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INTRODUCTION

This report is the sequel to a similar one for the period 12-16 April 1979, and describes scientific observations since that period.

16-17 April

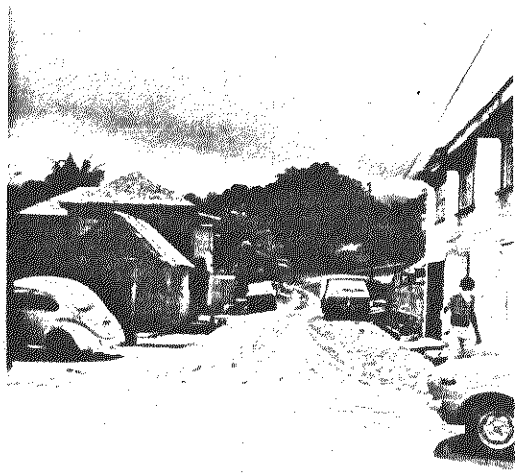
During the afternoon of 16 April, activity continued at the level of around 30 clearly identifiable earthquakes per hour. These earthquakes were mostly of explosion type. From about 00.00 hours local time on 17 April, the character of the earthquakes changed and the majority had the signature of fracture-type events.

THE VIOLENTLY EXPLOSIVE PHASE OF 17 APRIL

The same style of seismic activity, without any visible explosive activity in the crater, continue through the day of 17 April until 16.57 hours when the seventh violently explosive phase of the eruption began. This was preceded by 70 minutes of low-amplitude tremor wnih emerged gradually but only built up to high amplitude over the last 15 seconds prior to the onset of the explosive blast. The initial blast was accompanied by a rumble clearly heard at the Belmont Observatory, 9 km. from the crater, and the eruption column rose vertically above the crater, ascending to about 4,000 metres above the crater rim within two minutes before it began to mushroom. Three minutes after the explosive phase began, pyroclastic flows were seen to descend the Larikai River valley, and continue almost as far as the coast at a distance of 3 km. from the crater. This pyroclast flow covered the first 2 kilometres towards the coast in about 2 minutes, and then decelerated. By 17.10 hours, ash was falling at sea to the west of the volcano. Lightning was everywhere in the ash cloud. Hundreds of flashes hit the ground and some danced along electric power lines around the Observatory. The Observatory building was struck three times. By 17.17 hours, lapille up to 1 cm. in diameter were falling at the Observatory. At 17.19 hours, the volcanic tremor on the seismographs declined, apparently marking the end of the explosive phase. In most respects, this explosive phase resembled the previous six on 13 and 14 April. Because it was daylight, no glow was seen during the explosive activity of 17 April, but there is little doubt that fresh molten rock was involved.

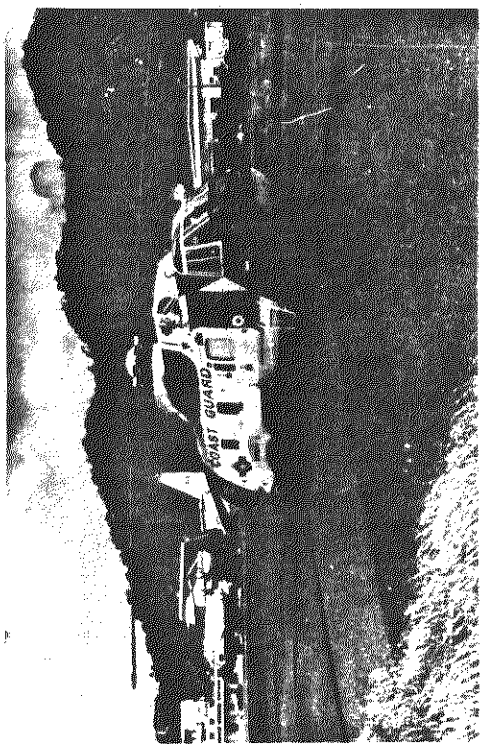
17-19 APRIL: MILD EXPLOSIONS

Following the violently explosive phase at 17.00 hours on 17

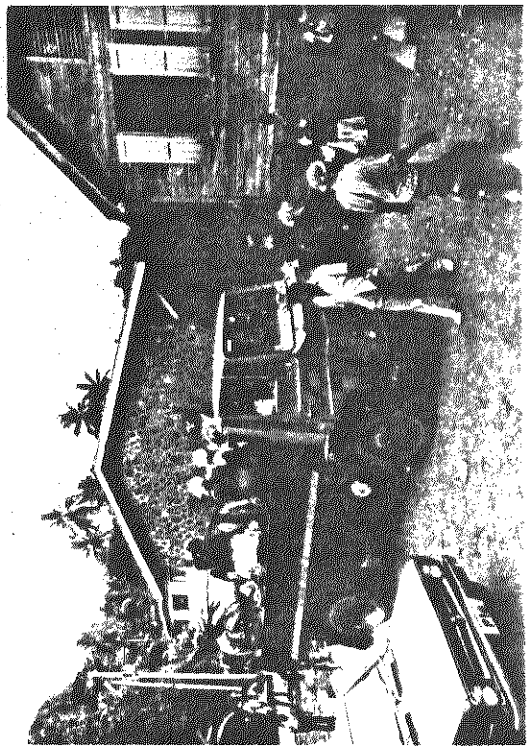


GEORGETOWN UNDER HEAVY ASH FALL

ERUPTION — 17TH APRIL 1979



U.S. COAST GUARD HELPED IN TRANSPORTION



April, the volcano became very quiet with practically no earthquakes (short duration), and with only a single period of about 20 minutes of intermittent, low-amplitude tremor during the night of 17-18 April. From 08.00 hours onward on the morning of 18 April, earthquake activity began to develop again, with continuous background tremor and brief, stronger explosion-type earthquakes of short duration superimposed on this background. By late morning, mild activity developed in thecrater with small explosions, some faintly audible from the Observatory, producing cauliflower clouds of steam of which some were lightly laden with ash. By 11.00 on 18 April, earthquakes of explosion type were occurring at about 50 clearly distinguishable events per hour on the Observatory seismograph. On seven occasions between 11.18 hours and 12.30 hours on 18 April, and at intervals during the afternoon when the crater was visible through the normal weather clouds, gently swirling clouds of steam were seen to rise to a maximum of about 600 metres above the crater rim.

FUTURE INSTALLATIONS

The plan to install a seismograph at 300 m. above sea level on the eastern flank of the volcano on the morning at 18 April was postponed due to uncertainty over the behavious of the volcano, and was finally abandoned until 19 April. In the evening, a third radio-linked seismograph was installed at Richmond Beach.

On the morning of 19 April, the station on the eastern flank of the volcano, at an elevation of 300 metres above Lot 14, was put into successful operation.

SUMMARY

The volcano has passed through a number of widely differing phases of activity. Monitoring is being progressively improved and events are now being followed and documented carefully.

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REPORTS OF ACTIVITIES OF
SOUFRIERE VOLCANO
13th APRIL - 11th MAY, 1979

REPORT FROM DR. TOMBLIN, BELMONT OBSERVATORY AT 9.00 P.M.

Activity has continued along the same lines as we reported this morning with about 30 larger earthquakes per hour. At the crater visible activity has consisted of cauliflower clouds mainly of steam but some of them dark grey in colour and obviously heavy with ash. These clouds were rising to a maximum of 500 metres above the crater rim. Further seismograph stations have been installed and linked by Radio with the Belmont Observatory, so that a good network of instruments now surround the volcano and precise measurements can be made of the Seismic activity.

The same general pattern of activity has now continued since Wednesday, 18th April.

20TH APRIL, 1979

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10.15 A.M.

An explosive eruption column of the same type of Tuesday evening, but much smaller in size also rose rapidly to about 100metres above the crater rim and then began to mushroom and dissipate.

The column was white in colour and largely steam; but a fine haze of ash developed over the western flank of the volcano indicating that the column also contained volcanic ash.

21ST APRIL, 1979

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7.05 P.M. - 22ND APRIL, 1979

"Report on activity at Soufriere volcano 6.00 p.m. 21st April to 6.00 p.m. 22nd April, 1979.

From 6.00 p.m. on 21st April, 1979 to 5 00 a.m. on 22nd April, 1979, seismic activity remained at the same level as it had been since the last explosion at 10.16 on 21st April. Between 5.00 a.m. and 6.15 a.m. the level of seismic activity increased slightly but declined again at 6.15. At 6.34 a low rumble was heard at the observatory and an eruption cloud rapidly ascended from the crater to a height estimated to be 40,000 feet. By 6.54 a large black cloud was seen drifting to the west of the volcano and over the sea, blanketing the coast as far south as Chateaubelair. One centimeter of wet gray ash fell at the mout of the Wallibou River and less than one millimetre at Belmont. The eruption was accompanied by continuous volcanic tremor which lasted until 0734. We judge that the eruption was of the same magnitude as that of Tuesday 17th April, 1979.

Tremor recommenced at 9.00 a.m. and has continued with only short breaks until 6.00 p.m. The volcano has been kept under

continuous observation throughout the day and several minor explosions at the crater have been observed. Because of the long continued heavy tremor, we regard the present situation at the crater as critical."

7.05 A.M.

"Report on activity at Soufriere volcano 6.00 p.m. 21st Arpil, 1979 to 7.00 a.m. on 23rd April, 1979.

The strong volcanic tremor which continued throughout the day on 22nd April stopped suddenly at 7.05 p.m. There was a complete absence of seismic activity until 10.20 p.m. when the seismographs began to record small earthquakes again. Throughout the night these small earthquakes increased in number and at 7.00 a.m. on 23rd April are occurring at a rate of about one every three minutes. The earthquakes are very small and none has been felt.

The seismograph stations on the Leeward and Windward flanks of the volcano recorded several signals during the night which may have been generated by mudflows. It is possible that these mudflows have been caused by heavy rain falling on the loose ash deposits which mantle the volcano. This possibility will be checked by field reconnaissance today.

23RD APRIL, 1979

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6.00 A.M.

Since the last report (6.00 a.m. on 23/4) seismic activity has continued in the same pattern increasing slightly towards late evening. No significant explosions have been observed during this time, although steam venting with occasional ash emissions continue.

Visits were made to the Windward and Leeward sides on Monday 23rd. The total minimum airfall thicknesses of ash from 5mm at Byera Village to a maximum of 44mm at Overland Village, decreasing to 20mm at Fancy to the North.

On the Leeward side at Baleine Point airfall thickness of ash is 20mm with little physical damage to vegetation.

Trois Loups Bay had thick mudflows varying from 8cm to 55cm.

Trees were knocked down, and the vegetation is affected by ash fall. At Larikai Bay the nuee deposit remains warm - (about 40 ^{o}C) and recent mudflows cover it by 30cm to 90cm in the North.

Vegetation is devastated.

On the basis of these measurements a rough estimate of the total volume emitted during this eruption has been made and this to date is much less than that of 1902, and is probably less than that erupted in 1971.

24TH APRIL, 1979

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REPORT FROM DR. SHEPHERD

Activity at the Soufriere today remained at the same level as it has since yesterday. Seismic activity continued to increase slightly. There were two brief periods of volcanic tremors between 2.37 p.m. and 2.39 p.m. and between 5.14 p.m. and 5.16 p.m.

The crater is steaming strongly and there have been occasional minor steam explosions but no major explosions.

24TH APRIL, 1979

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7.30 P.M.

In the 12 hours since the last report no explosive activity has been observed at the summit. The day had been the most hazy and dusty since the eruption began, and on many occasions the view of the crater rim was completely obscured from Belmont. There has been no noteworthy seismic activity during the day. A new seismograph station has been installed to link Campden Park to Belmont. A report of an aerial inspection by Duncan Richardson was received. In summary, he states, there is no water in the crater; only a small crescent of the island remains. Strong continuous steaming from the central depression was taking place. This was heavily sulphurous. Much light grey ash covers everything within the crater and on the outside rims of the crater.

Drs. Smith and Tomblin visited the Roseau and Larakai valleys this morning. They confirmed the presence of a glowing avalanche deposit in the Roseau valley as well as that in the Larakai. Monitoring and observations continue at this time.

25TH APRIL, 1979

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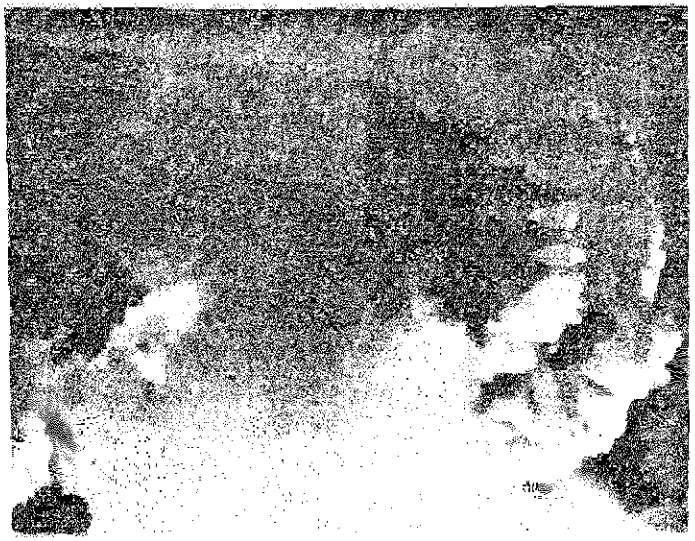
8.00 A.M. to 6.00 P.M.

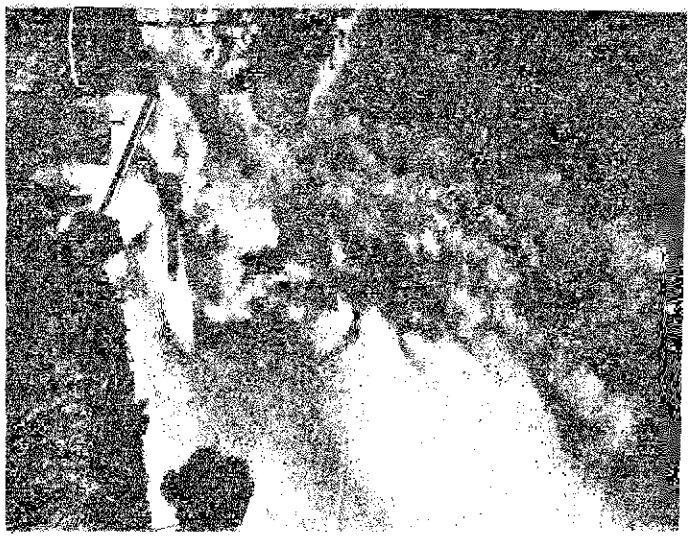
The strong volcanic tremor which began after the explosion of 11.53 last night continued until mid-day when it began to subside. It has now returned to the level it was at before the explosion and continues to subside. There has been intermittent emission of steam from the crater throughout the day with minor amounts of ash.

A thorough survey has been made of the deposits from last night's explosion. The main axis of the airfall ash deposits runs due south from the crater passing very close to Kingstown. Ash thicknesses range from 3-4mm along the axis thinning to 1mm along both coasts. No pyroclastic flows were generated. The total amount of ash deposited on St. Vincent was about half a million tons. This compares with about 5 million tons from the explosion of Sunday, 22nd April. The maximum height of the eruption column measured from HMS GURKHA was 25,000 feet compared with 60,000 feet for last Tuesday's explosion. These figures show that last night's explosion was much smaller than that of last Tuesday despite the contrary impression conveyed by the relatively heavy ash fall on Kingstown.



RABACCA LIKE A DESERT UNDER ASH

ERUPTION — 18TH APRIL 1976



LA SOUFRIERE MOUNTAINS FROM LARIKAI BAY