

VOLCANIC EVENTS

Possible submarine eruption, Mariana Islands, W Pacific. All times are local (= GMT + 9 hours). A report on this activity also appears in the 7 November issue of EOS.

An intense episode of apparent submarine volcanism was recorded 21-22 September by an 11-channel hydrophone array on Wake Island, an ocean bottom seismometer off Japan's Boso Peninsula, and the Polynesian Seismic Network's Pomariorio station, on Rangihoa atoll. Strong activity began at about 1100 and peaked between 1230 and 1520, with several hundred distinct events detected before the episode ended abruptly at about 0755 the next morning. During the activity, continuous noise levels in the SOFAR channel remained at least 20 dB above normal ambient values, at frequencies of 5-30 Hz. T-Phase arrivals at the 3 sites were used to determine a rough location for the activity at 21.9°N, 145.9°E, with a typical potential error of about ± 100 km. However, the calculated position is displaced more than 200 km E of the northern Marianas volcanic arc, falling on the W edge of the trench.

The nearest known submarine volcanic site is frequently active Farallon de Pajaros (Uracas) at 20.53°N, 144.90°E. Activity was last reported from the area on 2 September 1985, when a 3-km zone of discolored water near the 1969 eruption site (about 30 km S of Farallon de Pajaros) was observed from an aircraft. Between 2 August and 5 September 1985, the Polynesian Seismic Network's Rangihoa station recorded 109 T-Phase events, with characteristics typical of submarine eruptions, originating from the NW Pacific. However, no other seismic stations were known to have recorded the activity and a precise location was impossible (see SEAN Bulletins v. 10, nos. 9 and 11).

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Ambrym Volcano, Vanuatu (16.25°S, 168.08°E). The following is a report from J.P. Eissen, M. Monzier, and C. Douglas.

"After our previous report of the April-May 1989 eruption (see SEAN Bulletin v. 14, no. 4), activity apparently declined in early May to the normal level in the cone complex near Marum (figure 1). The previous report of a possible extra-caldera flow turned out to be erroneous, with the 1989 lava flows staying strictly confined inside the caldera. However, a pilot indicated that on 25 May a white plume was rising to 6000 m, associated with an ash cloud that rose to 3000 m, showing that the volcano remained active.

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Ambrym Volcano (continued)

"There was no further report until two of us visited the volcano 26-30 September, gathering complementary information about the recent eruptions and the present level of activity (Monzier and Douglas, 1989). The 1988 and 1989 lava flows originated from an area on the S flank of Marum formed by one crater and two cones, one of which was already visible during a 1943 photographic survey. The flows are basaltic aa, 1-3 m thick, highly vesicular and aphyric in 1988, and slightly vesicular and plagioclase sub-aphyric in 1989. The lava contours have been mapped; one of the 1989 flows partially covered a 1988 flow, while the other (eastern) one rejoined the 1988 flow in the SE sector and extended farther E, but stayed inside the caldera. Observation of the main craters was limited by poor weather. The Benbow pit was occupied by a gently bubbling lava lake, evident at night by a red glow visible from Sesivi, on the S coast of Ambrym. Marum was slightly degassing. The Mbuelesu pit was also occupied by a strongly bubbling lava lake but no large explosions were observed. The crater just S of Mbuelesu was in a fumarolic stage, as were the craters from which the recent flows originated.

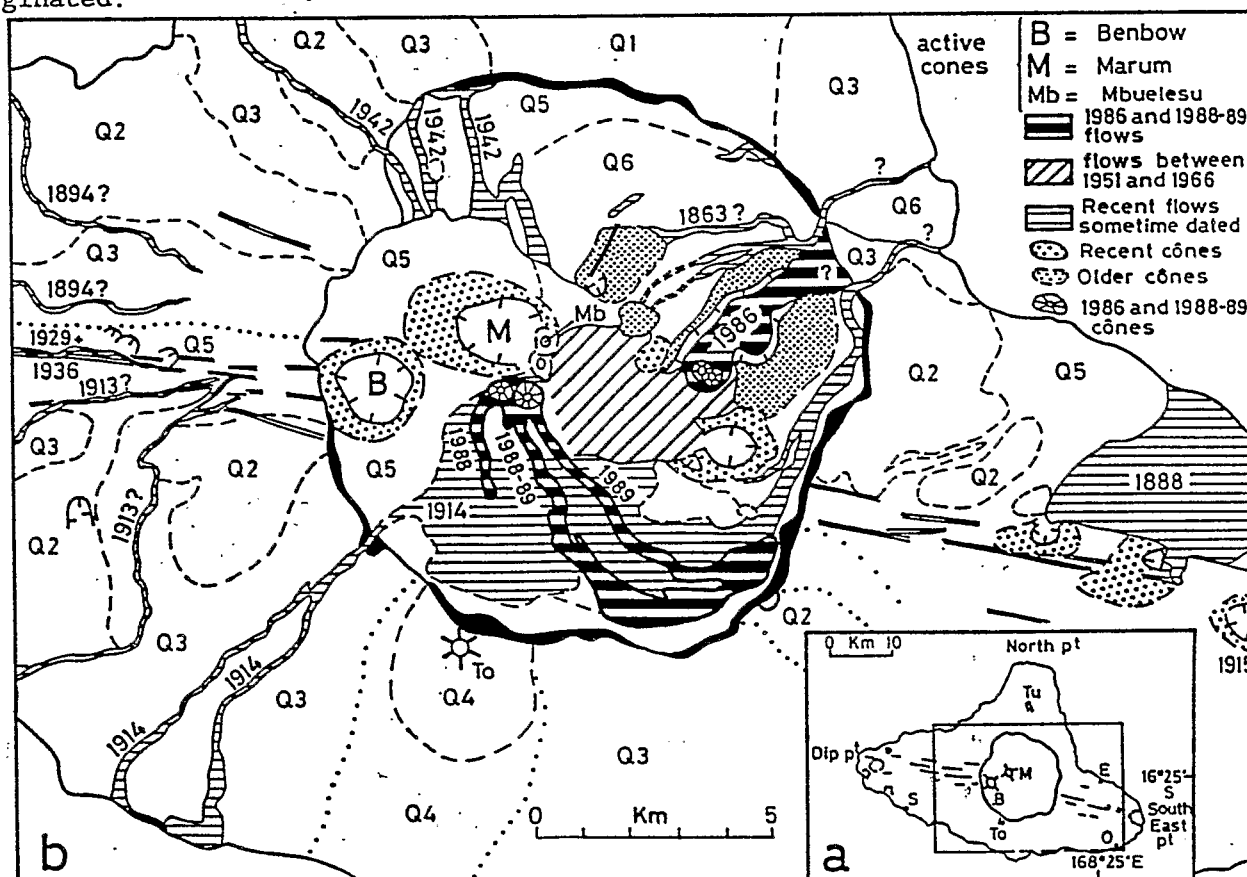


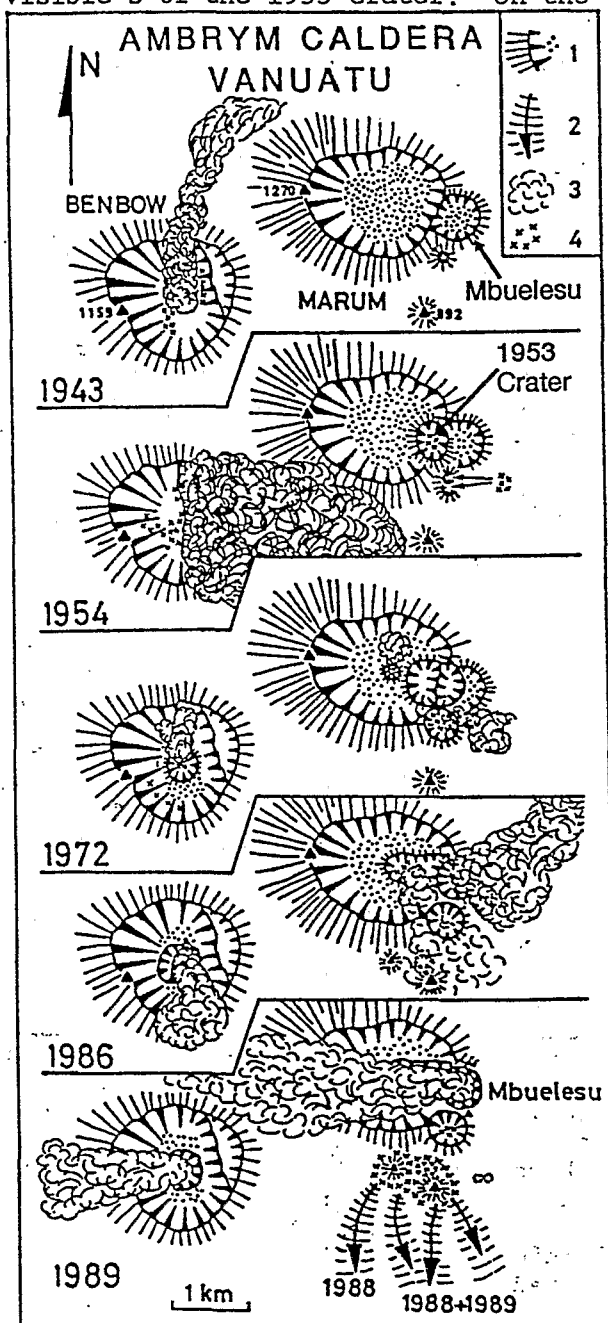
Figure 1: Geologic features of Ambrym caldera from Eissen et al., 1989. The 1988 and 1989 lava flow paths have been modified after Monzier and Douglas, 1989. Q1 = Tuvio volcanics (old northern Ambrym volcano), Q2 = older flank volcanics, Q3 = younger flank volcanics, Q4 = Tower peak volcanics, Q5 = undifferentiated recent caldera and flank volcanics, Q6 = NE and E Marum basaltic flows and related old cones. The area shown is outlined on the index map (inset) of the main topographic features of Ambrym Island. B = Benbow, M = Marum (active cones), To = Tower Peak, Tu = Mt. Tuvio (old volcanic centers), E = Endu village, O = Otas village, S = Sevisi village. Maps modified after geological (New Hebrides Geological Survey, 1976) and pedomorphological (Quatin, 1978) maps of Ambrym.

Ambrym Volcano (continued)

"The series of photographic surveys done periodically between 1943 and 1989 allows us to compare the evolution of the morphology of the craters (figure 2). Benbow, source of the major historic eruptions (figure 3), does not show any major morphological changes. In contrast, the morphology of Marum and adjacent cones changed substantially during this period. In 1943, Marum and its eastern neighbor Mbuelesu were both clogged with detrital material. Note that the small '892' cone, from which the recent flows originated, already existed in 1943. In 1953, Marum resumed its activity (Eissen and Louat, in preparation). On the 1954 photos, one new crater ('1953') underlain by fumaroles had formed across the edges of Marum and Mbuelesu Craters. Two smaller cones were also visible S of the 1953 crater. On the 1972 photos we can note: 1) the opening of a gently smoking pit in the center of Marum Crater; 2) the enlargement and division of 1953 crater, inactive at this time; 3) the formation of a new active crater S of 1953 crater, at the site of the 2 small cones visible in 1954. In 1986, the central pit of Marum and the W part of the 1972 double crater had merged and were slightly smoking. The E part of the 1972 double crater had enlarged at Mbuelesu and was strongly active and smoking. The 1989 situation is described above.

"Thus, whereas Benbow has remained almost unchanged morphologically during the last 46 years, Marum and its adjacent craters strongly evolved during the same period, and recent activity seems concentrated in this area, restricted to the caldera. Although testimony is fragmental since 1980, strong activity seems to have resumed, the presence of 2 lava lakes indicating that the magma column is presently very high. Ambrym has had at least 7 eruptions accompanied by extra-caldera lava flows, sometimes with resulting destruction and casualties. Part of the population has been evacuated several times (in 1913-15, 1929, and 1951) on adjacent islands. Careful study, observation, and eventually monitoring of this volcano should be encouraged to help prevent further destruction due to extra-caldera lava flow(s) that could reasonably be expected within the next few years."

Figure 2: Morphological evolution of the main intra-caldera craters of Ambrym from aerial photographic surveys done in 1943 (US Air Force), 1954 (Institut Géographique National), 4 August 1972 (Royal Air Force), and 22 September 1986 (Royal Australian Air Force), and from ground observations 27-28 September 1989 (Monzier and Douglas, 1989). Symbols: 1 - volcanic cone with detrital filling (dots); 2 - lava flow; 3 - plume (white or gray); 4 - fumaroles.





Ambrym Volcano (continued)

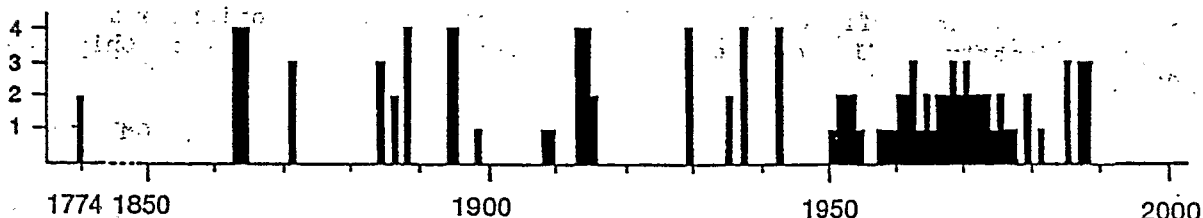


Figure 3: Tentative chronology of historical eruptions of Ambrym (Eissen and Louat, in preparation). 1774 corresponds to Captain James Cook's report of activity. The 1850-1950 period corresponds to miscellaneous reports, mainly about extra-caldera eruptions, the only ones that are a significant threat to the local population. 1950-1980 observations were by the New Hebrides Geological Survey, before Vanuatu's independence on 1 August 1980. Levels of activity: 1 = low level, without precise details; 2 = high level, with heavy ashfalls and/or lava lake; 3 = eruption with intra-caldera flow(s); 4 = eruption with lateral extra-caldera flows.

References: Eissen, J.P. and Louat, R. (in preparation), Chronology of the Historic Volcanic Activity of the New Hebrides Island Arc from 1774 to 1989.

Monzier, M. and Douglas, C., 1989, Rapport de Mission à Ambrym (Vanuatu) du 26 au 30 Septembre 1989; Rapport de Mission Géologie-Géophysique no. 10, Document ORSTOM Nouméa, 30 pp.

New Hebrides Geological Survey, 1976, Geology of Pentecost and Ambrym; 1:100,000 Sheet 6.

Quantin, P., 1978, Archipel des Nouvelles Hébrides; Atlas des Sols et de Quelques Données du Milieu; Cartes Pédologiques (1:50,000-1:100,000), des Formes du Relief, Géologiques et de la Végétation (1:100,000-1:250,000), 18 feuilles et 11 notices; ed. ORSTOM.

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Sakura-jima Volcano, Kyushu, Japan (31.58°N, 130.67°E)

Ten explosions were recorded in October (table 1), raising the 1989 total to 21. The activity caused no damage. Maximum plume height was 2200 m above the crater, on 14 October. The month's ash accumulation at Kagoshima Local Meteorological Observatory, 10 km west of the crater, was 111 g/m² (table 2).

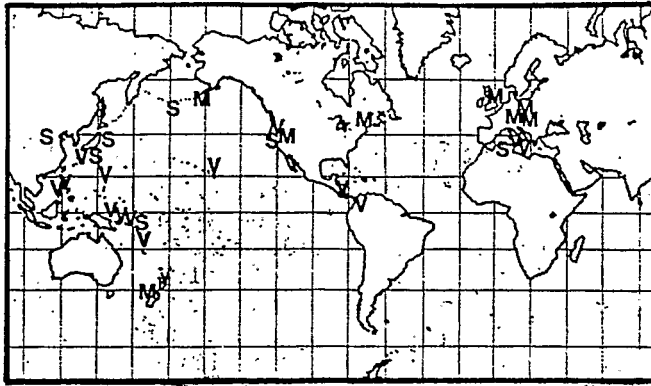
| Date: | 10 | 11 | 13 | 14 | 16 | 22 | 23 | 25 | 27 | 29 | total |
|---------|----|----|----|----|----|----|----|----|----|----|-------|
| Number: | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 10 |

Table 1: Number of recorded explosions per day at Sakura-jima, October, 1989.

| Date: | 2 | 3 | 5 | 6 | 7 | 10 | 11 | 14 | 15 | 16 | 18 | 19 | 21 | 24 | 25 | 27 | 28 | 30 | total |
|--------------------------|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|-------|
| Ash (g/m ²): | 2 | 0 | 1 | 0 | 0 | 1 | 5 | 1 | 8 | 1 | 11 | 4 | 8 | 5 | 5 | 9 | 24 | 26 | 111 |

Table 2: Daily October ash accumulation at the Kagoshima Local Meteorological Observatory, 10 km W of the crater.

Smithsonian Institution



M-Meteoritic S-Seismic V-Volcanic

SEAN

Scientific Event Alert Network

BULLETIN

VOLUME 14, NO. 10, OCTOBER 31, 1989

VOLCANIC EVENTS

| | |
|--|-------|
| Possible submarine eruption (Mariana Is.): 21 hours of volcanic seismicity | 2 |
| Ambrim (Vanuatu): Lava lakes in 2 craters; changes since 1943 described | 2-5 |
| Sakura-jima (Japan): Explosions increase | 5 |
| Aso (Japan): More explosions; stronger tremor; new vent | 6-7 |
| Canlaon (Philippines): Mild ash ejections to 1200 m | 7 |
| Taal (Philippines): Increased seismicity; main crater inflation | 7-8 |
| Rabaul (New Britain Is.): Seismicity increases slightly; no new deformation | 8 |
| Ulawun (New Britain Is.): Weak-moderate vapor emission | 8 |
| Langila (New Britain Is.): Vulcanian explosion; ash to coast; night glow | 8 |
| Manam (Bismarck Sea): Intermittent vapor release; decreasing seismicity | 8 |
| Bagana (Bougainville Is.): Frequent rockfalls; weak explosions; glow | 9 |
| White Island (New Zealand): Tephra ejections; possible new vent | 9 |
| Kilauea (Hawaii): Lava flows into sea at 3 sites; breakouts from lava tubes | 10 |
| Ruiz (Colombia): Seismic energy release declines | 11 |
| Galeras (Colombia): Seismic activity remains strong; high SO ₂ | 11-12 |
| Poás (Costa Rica): Continued thermal activity from crater lake; sulfur flows | 12-13 |
| Arenal (Costa Rica): Volcanic seismicity and recorded explosions increase | 14 |
| Mt. St. Helens (Washington): Earthquakes in magma conduit | 14-15 |
| Etna (Italy): Details of September-October eruption | 16-26 |
| Stromboli (Italy): Frequent incandescent tephra ejection similar to 1988 | 26-27 |
| Vulcano (Italy): Fumaroles deposit sulfur | 27-28 |
| Atmospheric Effects: New aerosols seen Aug/Sept no longer evident | 28 |

EARTHQUAKES

| | |
|--|-------|
| Aleutian Is. (M 6.7) 7 Oct.; Japan (M 5.3) 13 Oct.; California (M 7.1) 18 Oct.; China (M 5.3) 18 Oct.; Solomon Is. (M 7.1) 27 Oct.; Japan (M 6.6) 29 Oct.; Algeria (M 6.0) 29 Oct. | 28-29 |
|--|-------|

FIREBALLS

| | |
|---|-------|
| East Germany (2); Hungary; England; Czechoslovakia/West Germany; Washington, Washington/Oregon (2), Oregon (2), Aleutian Is., Maine, USA; New Zealand | 29-32 |
|---|-------|

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(Data are preliminary and subject to change; contact the original source or SEAN before using)



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