

27. Geomagnetic Studies of Volcano Mihara. The 8th Paper.

(Continuous Observation of Changes in Geomagnetic
Declination during the Period 1955~56)

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A continuous recording of geomagnetic declination has been carried out at the western coast of Ooshima Island in order to study the relation between the changes in the geomagnetic field and the activities of Volcano Mihara on this island. The results obtained by the observation during the period from 1951 to 1954 have already been reported in this Bulletin¹⁾. Towards the end of 1955, a new station where a continuous recording of declination is also carried out in the same manner as station No. 37 Nomashi, was set up in the vicinity of station No. 14 Zoo on the east side of the island. The purpose of this new station No. 43 Zoo is, as mentioned in the previous paper¹⁾, to verify that the changes at both stations on the west and east sides of the island should be in the opposite direction in relation to the activities of Volcano Mihara provided the changes are caused

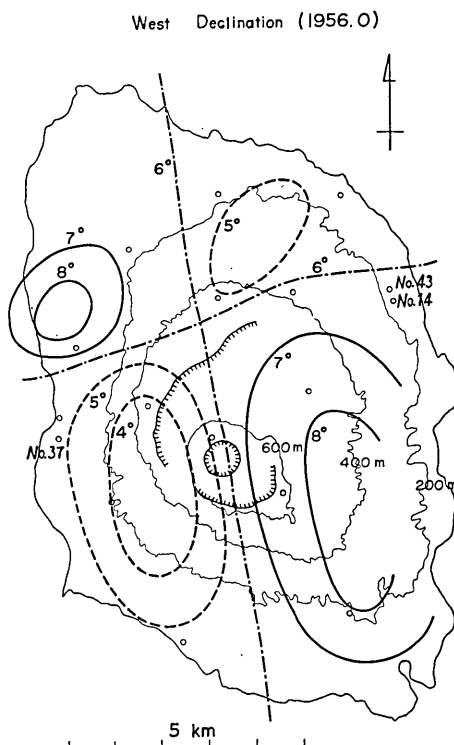


Fig. 1. The distribution of the westerly declination in Ooshima Island for 1956. 0.

1) I. YOKOYAMA, *Bull. Earthq. Res. Inst.*, **33** (1955), 251.

by the increase or decrease in magnetization of the volcano probably due to the temperature changes in its interior.

In order to examine the gradual changes associated with the volcanic activities, the hourly values are read off from the weekly records and the daily means and finally the semi-monthly means are obtained exactly in the same procedure described in the previous paper. The mean values

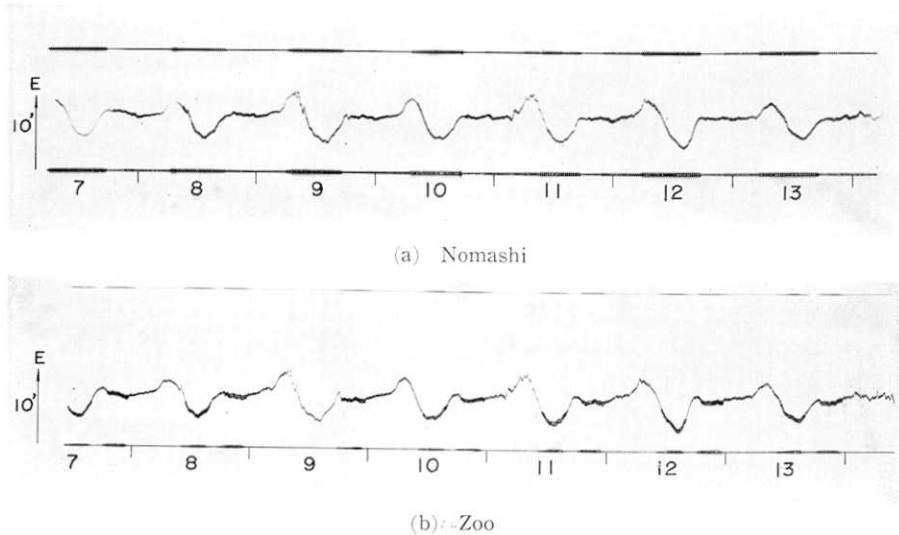


Fig. 2. Examples of the magnetogram obtained at both stations in Ooshima Island.
(From July 7 to July 14, 1956 J.S.T.)

observed at station No. 37 Nomashi are compared with that of Kakioka Magnetic Observatory to eliminate the effect of transient magnetic disturbances due to the origin outside of the earth. The semi-monthly means of westerly declination at each station during the period 1955~56 and the differences between them are tabulated in Table I and shown in Fig. 3. continued from the results since 1951. For the purpose of avoiding the drift of the base-line on the magnetogram, the absolute measurements were carried out by a G.S.I. type magnetometer²⁾ at both stations in Ooshima Island at several epochs which are shown by the points surrounded with big hollow circles in the figure. These absolute measurements are very convincing as to the reliability of the results shown in the Fig. 3 but not sufficient by themselves to trace the mode of the changes in detail. The surface activities of the volcano are shown in an arbitrary scale at the bottom of the figure while their quantitative expression by energy of volcanic tremors or earthquakes till 1954 are

Table I. The semi-monthly means of the westerly declination at Ooshima and Kakioka.

Period	Ooshima		Kakioka	Difference Nomashi-Kakioka
	West (Nomashi)	East (Zoo)		
1955				
Jan.	6° 10.3		6° 22.3	-12.0
	10.6		22.5	12.0
Feb.	10.8		22.6	11.8
	10.5		22.3	11.8
Mar.	10.2		22.3	12.1
	10.0		22.3	12.4
Apr.	9.9		22.6	12.7
	9.6		22.6	13.0
May	9.3		22.7	13.4
	9.4		22.5	13.1
June	9.6		22.5	13.0
	9.5		22.6	13.2
July	9.3		22.6	13.3
	9.5		22.4	13.0
Aug.	10.6		22.7	12.0
	10.7		22.3	11.6
Sept.	10.8		22.7	11.9
	10.4		22.5	12.1
Oct.	10.5		22.6	12.0
	10.5		22.5	12.1
Nov.	10.1	8° 48.8	22.5	12.4
	10.4	48.2	23.0	12.5
Dec.	10.1	48.4	22.6	12.5
	10.0	48.1	22.3	12.3
1956				
Jan.	10.2	48.0	22.7	12.5
	10.4	48.0	22.9	12.4
Feb.	10.2	47.7	22.6	12.4
	10.4	48.1	23.0	12.6
Mar.	10.7	48.2	23.2	12.6
	10.6	48.7	23.5	12.9
Apr.	9.5	47.8	22.7	13.2
	10.6	49.4	24.0	13.4
May	9.5	48.2	23.0	13.5
	10.1	49.4	24.3	14.2
June	8.9	48.4	23.1	14.2
	9.1	48.6	23.1	14.0
July	9.2	48.5	23.1	13.9
	9.7	48.6	23.2	13.5
Aug.	9.5	48.5	22.8	13.3
	*	48.4	23.3	—
Sept.	—	48.7	23.7	—
	—	48.1	23.3	—
Oct.	—	47.7	23.0	—
	—	48.3	23.4	—
Nov.	—	48.2	23.7	—
	—	48.2	23.6	—
Dec.	9.8	47.6	22.8	13.0
	9.6	47.2	22.7	13.2

* The cave in which the variometer had been operated collapsed by a strong typhoon in August and was reconstructed in November.

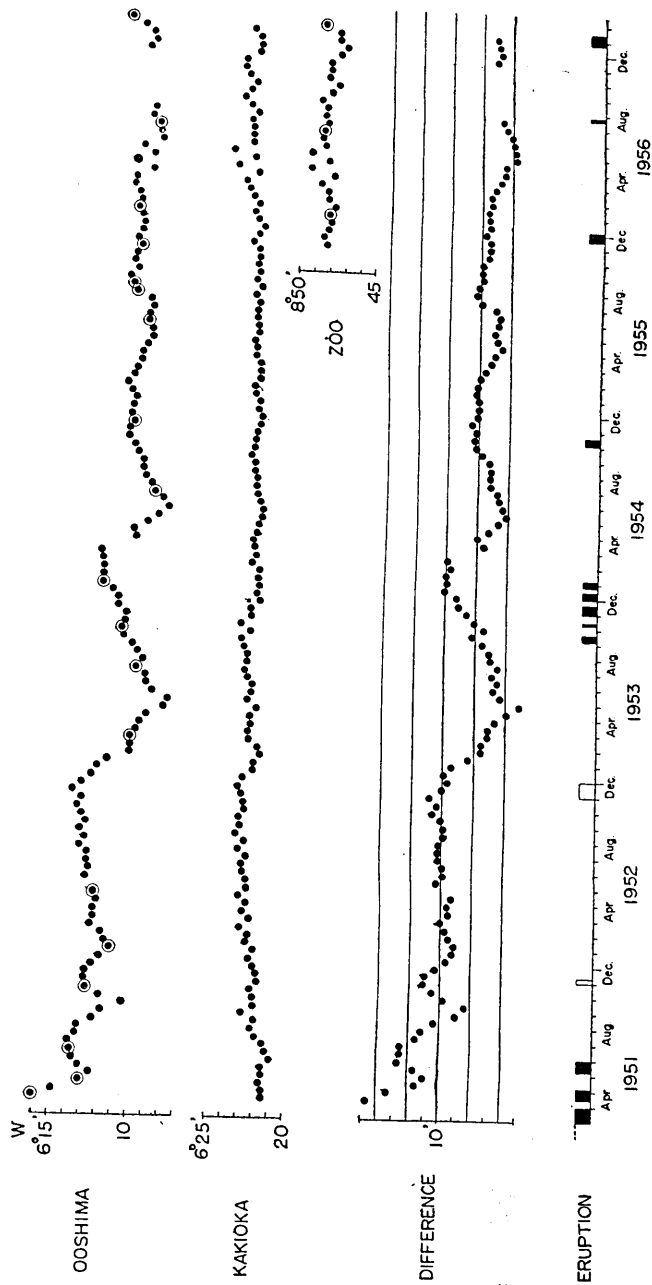


Fig. 3. The semi-monthly means of the westerly declination and activities of Volcano Mihara.

found in the writer's other papers³⁾. During the period 1955~56, the minor eruptions were observed in Dec. 1955 and Aug. 1956 but no new lava was ejected in either case.

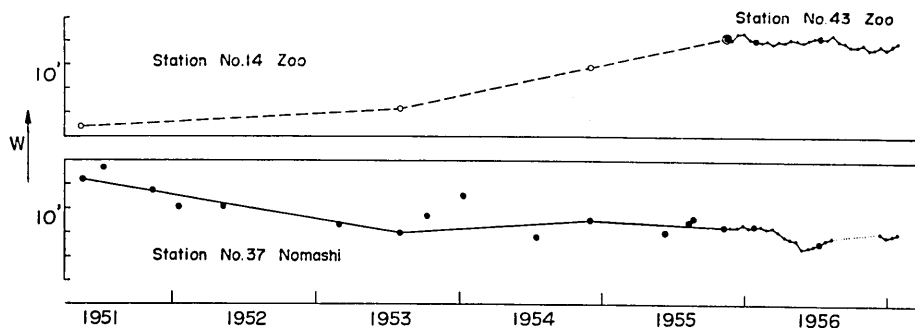


Fig. 4. The changes of the westerly declination at two stations in Ooshima Island. The hollow circles show the instant values and the black the semi-monthly means.

The result shown in Fig. 3 confirms the conclusion obtained in the previous paper that the declination at Nomashi Station tends towards the west whenever the volcano becomes active and returns eastward after the subsidence of activity. Furthermore, it is noticeable that the amplitude of undate change accompanied by the volcanic activities has decreased gradually year by year after the 1950-51 eruption and the same may be said of the activity itself. Here, the writer must refer to the annual variation seen in the figure, as a matter of fact: Unless the volcano shows the activities annually by its own mechanism, it is hard to find a valid cause for the apparently annual variation seen in the figure as far as our present knowledge in geomagnetism goes.

The contrast of modes in changes between the west and east sides of

Table II. Simultaneous observations at the stations Nos. 14 and 43 Zoo.

Time	No. 14 (Absolute Measur.)	No. 43 (Magnetogram)	Kakioka
Nov. 11, 1955			
18 h 33 m	6° 30' .5	8° 47' .9	6° 22' .6
46	30.9	48.2	22.8
19 06	30.4	47.8	22.3
21	30.8	48.1	22.8
Mean	6° 30' .6	8° 48' .0	6° 22' .6

2) I. YOKOYAMA, *Bull. Earthq. Res. Inst.*, **31** (1953), 211.

3) I. YOKOYAMA, *Bull. Earthq. Res. Inst.*, **34** (1956), 185; **35** (1957), 75.

the island is shown in Fig. 4 where the changes at the two stations are compared with that of Kakioka. The semi-monthly means observed at the station No. 43 Zoo are connected to the instant values of the station No. 14 Zoo by the simultaneous observations on November 11, 1955 as shown in Table II. If the proposed theory holds good, the declinations on both sides of the island should change conversely with each other associated with the volcanic activities of Volcano Mihara. However, it is unavoidable to confine ourselves to the qualitative discussion of the subject because the station on the east side is not situated at the position due east of the volcano owing to the surrounding circumstances. Roughly speaking, the declination has been drifting conversely at both stations as shown in Fig. 4 in harmony with the proposed theory. The writer cannot yet conscientiously say that the above tendency is shown in each activity of the volcano comparing the results of continuous recording at both stations because no moderate activity occurred these years.

Summarizing the results altogether from 1951 to 1956, we can positively say that local anomalous changes of a particular type in the geomagnetic field have taken place on Ooshima Island and may safely say that these changes are associated with the volcanic activities of Volcano Mihara in the proposed physical theory and have decayed in their amplitude with the decline of the volcanic activity after the great 1950-51 eruption.

27. 三原山の地球磁気学的研究 第8報 (1955~56年間の偏角変化の連続観測)

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1950-51年の三原山大噴火に際して、1951年から同地において地磁気偏角の連続観測を行つてゐるが、第6報に引続いて1955-56年間の観測結果を報告する。三原山の東西両側においては、火山活動に伴う偏角変化が相互に反対向きであろうことが予想されるので、55年末から新たに東側の動物園内に連続観測所を設けた。

51年以來の成果を概観するに、大島において地磁気の異常変化が観測されたことは確實であり、これが火山活動に関係するものであり、理論から予想されるような推移を示したと認めてよいであろう。なお、火山活動も次第に衰微を示しているが、これに伴う地磁気の異常変化の振幅も次第に減衰して、ある状態に落着くかの如くである。
