原 著 論 文

On the Regularity of the Activities of Fuji Volcanic Zone

By

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(Read 27th Sep. 1952, Received 9th. Oct.)

In Fuji volcanic zone, there are five volcanoes, active and dormant, ranging southward from Mt. Fuji, being apart each other about 100 km. From the north, they are Mt. Fuji, Ô-shima (Mt. Mihara), Miyake-shima, Hachijô-shima and Aoga-shima. All of them are strato-volcanoes consisting of basalt or andesite, and had erupted many times during the historical age. (See Fig. 1.)

Sometimes a large quantities of lavas were flowed out and in other times just exploded without flowing out any lavas, or only swarm earthquakes occurred. The eruption histories of these volcanoes are shown schematically in Fig. 2. The abscissa shows the historical age. Each volcano is represented by the horizontal line, the apart of which corresponds to the ratio of the actual distance between these volcanoes. Their eruptions are shown by verticals on the horizontal lines.

No historical record of Hachijô-shima and Aoga-shima, is found before A. D. 1200 and 1600, respectively. In the Figure, Mt. Hakone, Atami-city, Itô-city and Kôzu-shima are added. Swarm earthquakes have been recorded in these areas, namely at the foot of the central corn of Mt. Hakone, vicinity of Atami-city, and the northern neighbour of Itô-city, and the dacite pumice flow eruptions have occurred in Kôzu-shima.

The magnitudes of the eruptions are represented by the height of the verticals and the shortest verticals show the swarm earthquakes.

In Fig. 2, only several small eruptions are recorded from A. D. 1000 to 1400. This period has been revealed to be the repose period of volcanic activities and earthquakes in Japan level. On the other hand,

Fig. 1.

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Jour. Geol. Soc. Japan, Vol. 59, No. 690, March, 1953.

Fig. 2.

before A. D. 1000 and after A. D. 1400 many great eruptions occurred.

The distinct spreading tendency of the activities is shown in the Figure. Especially in northern three volcanoes, Mt. Fuji, Ô-shima and Miyake-shima, the correspondence of their eruptions are clearly visible. That is to say the activities succeed in turn from south to north. They can be analysed in two spreading tendencies, the slow and the fast one, of uniform velocities which is shown by the broken lines in Fig. 2. This fact may be explained by considering something moves northward in the velocities of 2.1 km per year and 6.5 km. per year, accompanying the eruptions. The great earthquakes of no volcanic origin, occurred inner or vicinities of Fuji volcanic zone, may also have a close relation to these spreading tendencies. We shall not contact, however, on this matter in the present paper.

The forecasting of coming eruptions of these volcanoes may be able by using the Fig. 2.

Great eruptions broke out on Aoga-shima, in 1780-1785, and then it was followed by Miyake-shima in 1874,¹⁾ there an eruption occurred with considerable amount of lava flow. This trend happened at Ô-shima in 1910-1914,²⁾ when some tens of million tons of lava flowed out from the pit. Then the trend of spreading moved to northward across the northern vicinity of Itô-city, where probably a submarine volcano lies, happened a swarm earthquake in 1930.³⁾ This trend, a slow spreading, will meet at Mt. Fuji in 1952-1955 and eruption would occur in this duration.

There is another trend of spreading coming from the south, which shown by the eruption of Miyake-shima in 1940⁴⁾ and that of Ô-shima in 1950-1951,⁵⁾ beingt he greatest eruptions in the histories of these volcanoes. This is a fast spreading, and the trend will pass the vicinity of Itô-city, Mt. Hakone and Mt. Fuji in 1954, 1956, 1963, respectively. There would occur eruptions or swarm earthquakes.

At the western side of Fuji volcanic zone, there are three Quaternary dacite volcanoes, one in Izu peninsula on the northern slope of Mt. Amagi, and Nii-shima and Kôzu-shima (See Fig. 1.). It seems that the dacite pumice eruptions of Kôzu-shima in 832, 838 and 852 are also controlled by the tendencies, and this fact together with the fact of uniformity of spreading velocities regardless of the geological structure, indicate the spreading tendency would be the result of deep subcrustal cause.

An interpretation of this cause is as follows. Subcrustal basaltic layer or sialma, consisting of glassy substance, behaves as elastic solid to the earthquake waves, however, it likely flowing slowly in circulation, laterally as well as vertically, with the velocity of a few meters per year. In the layer, certain waves having very slow velocity and long wave length, are conveyed through, which would constrict the magma chambers, and the magma is pushed out through the vent, just as the dental cream is pushed out from the lead tube.

Acknowledgments: The writer wishes to express his thanks to Professor Katsumi MOCHIZUKI of the Shizuoka University for the kind advice. He is also indebted to Mr. A. SUGIMURA and Mr. S. ÔISHI for their kind informations and helps.

References

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富士火山帯噴火の規則的傳播

(摘要)

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富士山・大島・三宅島・八丈島及び青ヶ島の五火山について噴火史を圖表化した (Fig. 2). 横軸に西紀年數をとり、各火山をそれぞれ實際の距離の比に置いた横線で示してある。噴火はこの横線上の縦棒であらわれ、縦棒の高さは噴火の規模の大小を示す。最も短いのは群發地震又は鳴動の記録である。

西紀 1000 年より 1400 年の間は僅の小さい噴火の記録が見られる丈であるが、この時期は日本中の火山活動及地震活動の休止期と認められる。

各火山の噴火には明瞭な対応が認められ、南の火山から北の火山へと噴火が傳播することが明かである。更にこの傳播傾向は2つの異なつた速度のものに分けられる。年速 2.1 km 及び年速 6.5 km のものがそれであつて、南から北へ噴火を惹起しながら進んで来るように見える。この傳播は地質構造に關せず、又火山の噴出する熔岩の性質に關せず、等速度で北上しつつ噴火を惹起せしめる。

このような傳播の機構は地殻下の Sialma 帶を傳わる或る種の波を考えることによつて説明され得よう。

抄

録

C. A. ARNOLD: Classification of Gymnosperms from the Viewpoint of Paleobotany

(Bot. Gaz. 110, (1), pp. 1~12, 1948),

植物化石の分類は甚しく混亂している。これは現生植物の知識を使つておこなうからである。すなわち一般に生殖器官に重きをおくことからの混亂であつて筆者は主として營養器官の解剖的見地に立ちかつ地史的な立場をとつていこうとしている。營養器官を用いたのはすでに 1843 年に BRONGNIART がおこないかけたことがある。筆者は特に従来裸子植物と稱せられたものを以上の見地から全く改廢して次のようにまとめている。これは 1920 年に SHANI が種子が葉につくものを *Phyllosperms* として *Pteridosperm-Cycadophyte group* を入れ、種子が莖につくものを *Stachysperms* として *Cordaite-Ginkgo-Conifer group* を入れたのと考え方は一致している。

I. Cycadophyta: fern から分れたもので

Pteridosperms, *Cycads*, *Cycadeoids* (*Bennettitales*) が入る。

	Dev.	L. Carb. U. Carb. Perm.	Mesoz. Cenoz.	Rec.
Cycadophyta		Ferns		
		Pteridosperms		
			Cycas	
			Cycadeoids	
		Cordaiteae		
			Ginkgoales	
Coniferophyta			Coniferales	
		Pityeae		

II. Coniferophyta: *Pityeae* を最古のものとし *Cordaite*, *Ginkgos*, *Conifer* が入る。 *Pityeae* や *Cordaite* の解剖的性質は *Araucaria* に近いことを重要視した。 *Ginkgos* が *Cordaite* に近いことはいふまでもない。

これらの系統樹は左の如くである。

更に植物化石を基礎としての全植物界の新しい分類を次の如く與えた。

- Division I *Psilopsida*
- D. II *Lycopsida*
- D. III *Sphenopsida*
- D. IV *Pteropsida*
- Class 1 *Pteridophyta*
- C. 2 *Cycadophyta*
 - Order *Pteridospermae*
 - O. *Cycadales*
 - O. *Cycadeoidales*
 - Class 3 *Coniferophyta*
 - Order *Cordaiteales*
 - O. *Ginkgoales*
 - O. *Taxales*
 - O. *Coniferales*
 - Class 4 *Chlamydospermophyta*
 - Order *Ephedrales*
 - O. *Gnetales*
 - Class 5 (?) "*Angiospermophyta*"

(高橋英太郎)