Journal of Volcanology and Geothermal Research, 8 (1980) 3—6
Elsevier Scientific Publishing Company, Amsterdam — Printed in Belgium

Letter to the Editor

It was a pleasant surprise to read the Editorial in the August, 1978, issue of this Journal, calling attention to my warning to volcanologists (Nature, Vol. 269, pp. 96—97, 1977) following the controversy associated with the eruption of the Soufrière of Guadeloupe. The Journal subsequently published responses to the Editorial, and being implicated in these letters, I wish to answer them in turn.

In response to Richard Fiske, I wish to point out that my plea for a deontological code is not motivated solely by the conflicts at Soufrière. Although there were great differences between the volcanologists involved with the eruption (they differed widely in their experience, emotional stability, and the ability to observe and interpret volcanic phenomena), my views were not based on these discrepancies, for such variety is the salt of scientific research.

My aim is to guard against *self-appointed* volcanologists. These are of two types: scientists who have specialized in another field that has little or no bearing on eruptive phenomena, and would-be scientists with no qualification in any scientific field whatever.

The Soufrière affair was triggered by persons who had until then never seen or studied a volcanic eruption, and who acted as if they were experts.

I can cite an instance, in 1970, when a volcanologist attempted to help a fraudulent real-estate scheme to provoke an evacuation of the inhabitants of Puzzuoli, a city close to Naples, by predicting an imminent submarine eruption in the adjacent bay. The prediction was based on information that was entirely false.

Cases such as these convinced me of the need for a code to prevent, or at least to reduce, the harm done by amateurs, both to people living around volcanoes, and to volcanology as a science. In the same way, physicians were long ago compelled to set down such a code to shield their profession against unethical practices.

To Gudmundur Sigvaldason, I answer merely that it is obvious that he has never read the official report I submitted after the outbreak of the Soufrière eruption. In this report I described the situation and showed why nuées ardentes did not present an immediate danger. The following is an excerpt from my "Report of the Volcanological Mission to La Soufrière Volcano" (13—24 July, 1976):

> "...Our investigations, mainly chemical, together with information obtained through the seismographic network and phenomenological observations, have enabled us to state that the probability of any (dangerous) eruption before several days was close to nil...
> "The reasons for my conclusion are as follows:

0377-0273/80/0000—0000 $02.25

(1) *Historical*

1.1. No violent eruption of la Soufrière has occurred during the historic period.
1.2. Volcano-seismic crises, though sometimes frightening, have not culminated in eruptions in the Caribbean region.

(2) *Geological*

Less than 25% of nuées ardentes or pumiceous material occurs in the volcanic pile of la Soufrière.

(3) *Seismo-volcanic*

3.1. The seismic crisis which began in 1975 and continued for more than one year, with periods of strong activity (up to 600 shocks a month) and periods of calm, has not been affected by the short eruptive event of 8 July. If this seismic activity can be a cause for alarm, the fact that the eruption did not affect it seems heartening.
3.3. The focal depth, calculated by the I.P.G., Paris, was between 6 and 2 km... If these hypocenters are considered as corresponding with the top of a rising magma, a lapse of several months at least (more probably several years) is to be expected before this highly viscous magma reaches the surface.

(4) *Eruptive mechanism*

4.1. ...
4.2. ...
4.3. The explosion (of July 8th), which has liberated an "ash" plume and has fragmented an appreciable volume of rock, seems to have been generated by vaporization of an underground water table... more probably due to fault movement, than to the sudden expansion of eruptive gases of magmatic origin. This eruption, consequently, may be considered a phreatic one.
4.4. Observations... clearly show that the temperature of the eruptive gases did not exceed that of boiling water...
4.5. The ejected "ash" consisted exclusively of old material, with no fresh lava...
4.6. ...
4.7. ...
4.8. ...

"To conclude, I am of the opinion that there is no danger for the near future... the most feared risk in the Caribbean, that of Mt. Pelee-type nuées ardentes, is very low. An interval of several days at least is to be expected between the outbreak of a (magmatic) eruption and a possible climax, a period quite long enough to avoid any panic provided the population is properly educated and informed."

Although my name did not appear in Dr. Tomblin's letter, I am unmistakably the target of his statements. I wish to discuss them briefly, one by one.

His point (1):

(i) "...abnormal earthquakes, fumarolic, phreatic or magmatic activity *greatly increase the probability* of a destructive eruption in the early future."

Actually, fewer than one out of every hundred eruptions reaches a destructive climax. In the 1976 Soufrière event, I wonder how destructive nuées ardentes could be expected when (a) no magmatic activity had occurred; (b) no fresh lava was present in the erupted ejecta (notwithstanding the claims of Prof. Brousse, Prof. Allègre and Dr. Tomblin during August, September and October, 1976); (c) the temperature of the erupted gases was less than 200° C; and (d) the molten magma, as deduced from seismic evidence, was at

least 6 km deep and, because of its high viscosity, would require years to reach the surface.

(ii) Dr. Tomblin's statements that "it is unscientific to have claimed that there would be no catastrophe, etc." and that his "own estimate was that there was a probability of about 1 in 6 that the eruption would eventually emit nuées ardentes", are unrealistic.

Although we met several times in Guadeloupe during the eruption, and later in Paris, Dr. Tomblin never discussed with me the evidence on which I had based my conclusion that nuées ardentes could not occur, and never, although we had quite cordial relations, did he express disagreement with my conclusions about the Soufrière.

(iii) Dr. Tomblin says that I "had stated in a widely circulated letter that an absolute minimum of 2 hours would separate the beginning of threatening activity from any catastrophic outburst". This letter showed 2′ hours for 24 hours, the ′ being a typist's error for the numeral 4 (caused by accidentally not pressing the capital key). The explanation of this error was circulated as widely as the letter itself and Dr. Tomblin knew of it. Secondly, because Dr. Tomblin also knew well that these 24 hours were actually a margin of "safety minimum" that I had used, the period was far less than what I considered the most probable interval between outbreak of an eruption and its possible climax. I told Dr. Tomblin several times (in March, July, and August, 1976) that my personal opinion was that several weeks rather than days would probably elapse between the beginning of any magmatic phase and a possible climax involving nuées ardentes.

(iv) Dr. Tomblin refers to accounts he has found in the literature to attempt to convince his readers that the "build-up" from mild activity to potentially destructive nuées can sometimes take less than 2 hours. As examples, he cites five eruptions. For the first four, it should be noted that no one actually observed their outbreak. Consequently, no one knows the length of time between the outbreak and the climaxes. With regard to the fifth, Bezymianni, 1955-56, the late Dr. Gorshkov, who studied this eruption from beginning to end, described it at length to Prof. Marinelli and myself during the three months in 1964 we spent together in the field in Indonesia: he stated that the initial phase of this eventually cataclysmic eruption lasted several months.

(2) *No gambling.* "There may be a temptation for a volcanologist to seek to enhance his own reputation by disregarding the low probability of a catastrophe... and playing a kind of Russian roulette with somewhat better personal odds of survival... but involving the lives of whole populations, not simply his own."

Not only, according to Dr. Tomblin, were my claims unscientific, but I am so deprived of common sense (not to mention a sense of responsibility) as to say that eruptions involve no risk whatever. Only a fool could take such a gamble. I am rather inclined to think that the real gamble was taken by

those who risked making themselves ridiculous (as actually happened) by recommending drastic precautionary measures without adequate justification.

(3) *The need to remain on the spot.* Inasmuch as I was convinced that there was no danger, I wonder why I was expected to remain on the spot? I had left three of my collaborators there to quieten the situation. These three were competent scientists who never lost their presence of mind. This is in contrast to Dr. Tomblin who was so terrified that he told me the volcano-seismic crisis could end in nothing but a catastrophe (because, he said, of the exponential increase of energy released by the seismic activity...). During the whole Soufrière eruption, my team carried on temperature measurements as well as water and gas analyses, which plainly showed that alarming assertions of this kind were totally groundless.

(5) *The need to limit opinion to one's field of professional competence.*

"A final responsibility is that the volcanologist should remember, and if necessary remind the civil authorities, that the decision to evacuate involves not simply the numerical assessment of the hazard probability, but also the offsetting of this against the economic and social consequences of evacuation."

Dr. Tomblin, together with Prof. Brousse and Prof. Allègre, urged the Guadeloupe authorities to evacuate the entire population. Accordingly, 73,400 persons were hastily displaced. In November, 1978 a high official of the French Ministère de l'Interieur told me that the figure of one billion francs (over U.S. $200 millions) had been reached as the price paid for this evacuation and that the ultimate cost would be much larger. There is no way of estimating the effects on the thousands of families that were displaced and subjected to the hardships of this needless evacuation.

How can anyone speak of responsibility after being responsible for what he himself defines as the "economic and social consequences of evacuation"?

H. TAZIEFF
Groupe de Volcanologie, Centre des Faibles Radioactivités, Gif-sur-Yvette

Editorial note: As far as this Journal is concerned, this matter must now be considered as closed.