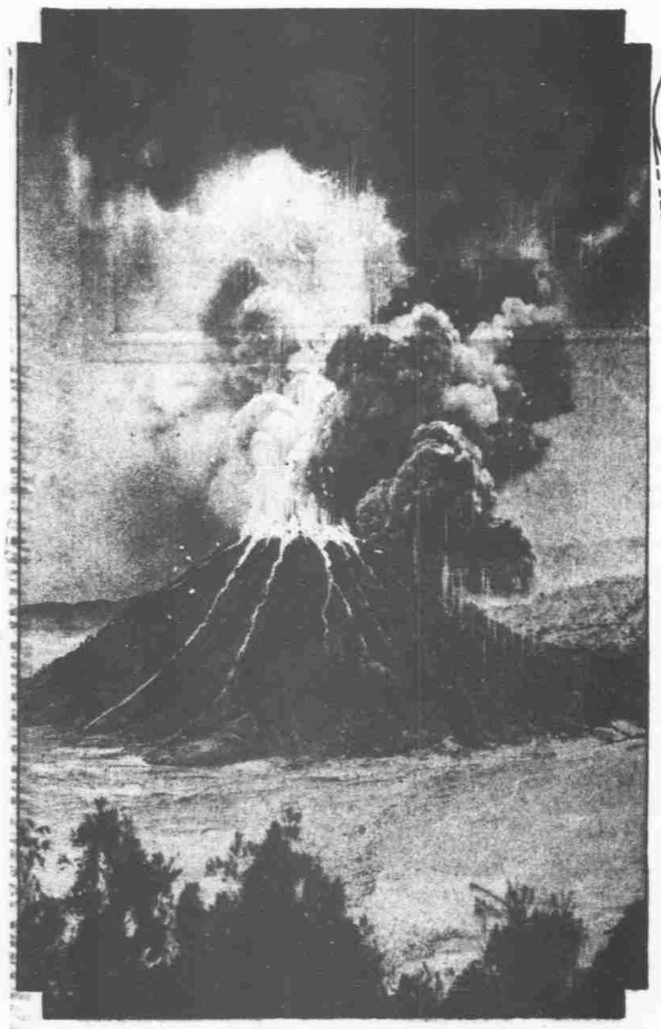


The Javan Volcano Kalut, the Recent Eruption of Which Cost the Lives of 50,000 on the Island. The Outburst Will Undoubtedly Affect This Summer's Weather.

How Volcanoes Affect Our Weather

The Countless Tons of Dust Which Shot Up from Erupting Craters Travel Around the World and Act as a Huge Sunshade for Two or Three Years to Keep Off the Heat-Bearing Rays

By Rene Bache.

THE statement that the United States Weather Bureau has taken over on what amounts to a long term lease the famous volcano Kilauea in Hawaii has undoubtedly caused the great number of those who noticed it to wonder what connection there can possibly be between volcanoes and the weather.

The answer is that among the many factors which produce the combinations of heat and cold, wetness and dryness, air currents and air calmnesses which we group under the general title of weather, volcanoes have been found to be a very important element, indeed; so important that if an observatory could be placed on every one of these chimney stacks of our earth the forecasts, science says, could be improved by at least fifty per cent. The taking over of Kilauea and a substantial grant of money to the Weather Bureau for the extension of observations on other volcanoes is a forward step in this direction.

At first thought it would appear that the only effect volcanoes could possibly have upon climatic conditions would be to release into the atmosphere vast quantities of heat units, raising the temperature within a limited distance—somewhat in the fashion of opening a furnace door—and so affecting the balance of the forces that determine our weather. But this is entirely wrong. Volcanoes produce not hot weather, but cold. The fires which they give forth do nothing whatever, but the dust and ashes that they throw out do a great deal.

A tremendous eruption of Mount Erebus, near the South Pole, could, and at least once has, given us an approximation of the glacial age in a cold-killing Winter and a cold Summer in which little vegetation could develop and ripen.

How could this come about?

The temperature of the earth is determined wholly by the amount of radiant energy it receives from the sun. This energy, in the form of light rays, passes through the space between us and our luminary without any effects of heat. But our earth is surrounded by a gaseous envelope which we call the atmosphere. When the rays of the sun pass through the atmosphere and fall upon the earth's surface their energy is released in the form of heat. Almost all the heat in our atmosphere comes from the radiation of sun rays from earth's surface.

The sun delivers then every day a certain quantity of heat rays through the atmospheric envelope of our earth. If the skies be clear about half of this heat—speaking very roughly—reaches the surface of the world. The other rays have been turned back by minute particles of dust and by particles of watery vapor. If there are clouds, why then these masses interrupt the passage of more rays.

Now we know that we can shield ourselves from the sun's heat by parasols, or umbrellas, or wide-brimmed hats, or awnings, and so on. We know that these shields keep us cooler than we would be without them. What we do with the parasols, umbrellas and so on is to turn back the sun's rays from directly striking us.

What the volcanoes do is exactly the same thing!

By throwing up countless tons of fine dust high in the atmosphere they interpose between the sun and us a cosmic umbrella. The sun rays are deflected by the countless particles back into space, and every one so turned back means one unit of heat lost to us. The dust thrown up by the tremendous eruptions is known to have risen as high as fifty miles. The grains are so minute that gravitation has very little effect upon them and they may, and often do, require years to fall back to earth's surface. In the meantime they are taken by the winds and strewn throughout the whole upper atmosphere until no part of it remains unaffected.

In 1912 there occurred on the Alaskan Peninsula one of the greatest volcanic outbursts on record. Mount Katmai, a peak 7,500 feet high, exploded. The noise it made was heard in Juneau, 750 miles away, and across the mountains at Dawson, 650 miles distant. Intense darkness, black as midnight in the daytime, prevailed over a vast area, lasting for sixty hours at Kodiak, 100 miles away. Sulphurous fumes were distinguishedable in Puget Sound, 1,500 miles from the burning mountain. Dust fell at Juneau and in the Yukon Valley, fifteen miles from Katmai its deposits were four and a half feet deep. All vegetation was annihilated, and bears, rabbits, caribou and other animals went blind.

If the Weather Bureau had known then what it knows now, it could have predicted a year at least of exceptionally cold weather to follow. The eruption occurred June 6, and, as a matter of fact, more than a year of unusually cold weather did follow—not only in the United States but in Europe also.

Following the great volcanic outburst of Krakatoa, in 1883, there were two years of red sunsets all over the world, due to a dust-cloud that enveloped the entire earth.

The dust originated from one spot, Krakatoa, but soon it was distributed by the winds everywhere throughout the upper atmospheric levels. And that is what happens more or less whenever there is a volcanic outburst anywhere in the world. Krakatoa was a mountainous island in the Straits of Sunda, between Java and Sumatra, but the dust it threw up on the occasion mentioned gave the United States three cool Summers and three very cold Winters. All over the earth the temperature was below normal for that length of time.

Krakatoa literally blew itself to pieces. It killed 10,000 natives dwelling along the shores of the Straits, in the middle of which, in a single night, it built up a brand-new mountain twenty-five miles in circumference and two miles high. The explosions were so tremendous as to be mistaken at a distance of 2,000 miles for cannonading.

Pelee, on the island of Martinique, blew its head off in 1902. It was a disaster far greater than that which overwhelmed Pompeii and Herculaneum, because the loss of human lives was much greater. It was a much more tremendous outburst than that of Vesuvius in 79 A. D., and the dust it kicked up kept us cold for a year thereafter.

Eighteen fifty-one was the famous "year without a Summer," which some very old citizens of this country are still able to remember. It followed the great eruption of Mount Tomboro, at the east end of Java, which destroyed 56,000 lives. For three days darkness prevailed over all that region to a distance of 300 miles. It was estimated that enough dust was thrown out to cover the whole State of Texas to a depth of two feet.

During the year that followed the United States had snow in every month! For some reason the heaviest part of the dust cloud hovered over America.

The greatest volcanic catastrophe in history occurred in 1783, when Asamayama, on the main island of Japan, blew up. The mountain threw great volumes of dust to a height of fifty miles, and for years the atmosphere all over the earth was foggy with it.

Benjamin Franklin wrote: "There was a fog all over Europe. It was of a permanent nature and dry. Rays of the sun passing through it were so faint that, when collected in the focus of a burning-glass, they would scarcely kindle paper."

Franklin's statement illustrates the idea perfectly. The sun's rays could not get through the dust-fog to the earth, or at all events suffered so much interference that the heat supply furnished by the orb was largely shut off. No wonder that the following Winter—1783-4—was severe. The next two years also were very cold.

A volcano in Japan, on the other side of the world, may, if it so chooses, make us Americans chilly and run up the coal bills!

Few of us in the United States, being happily free from danger of destruction by volcanoes, realize how plentiful and how widely distributed are such burning mountains in many other parts of the world. But we do not have to go far away to find them in numbers.

In Alaska sixty-one volcanoes form a path of fire extending from the peninsula that is its southwestern tip in the direction of Kamschatka, and all but connecting the eastern with the western hemisphere.

It is a short trip to the Caribbean region, where, scattered over many islands, is a tremendous battery of volcanoes. Pelee is one of its big guns.

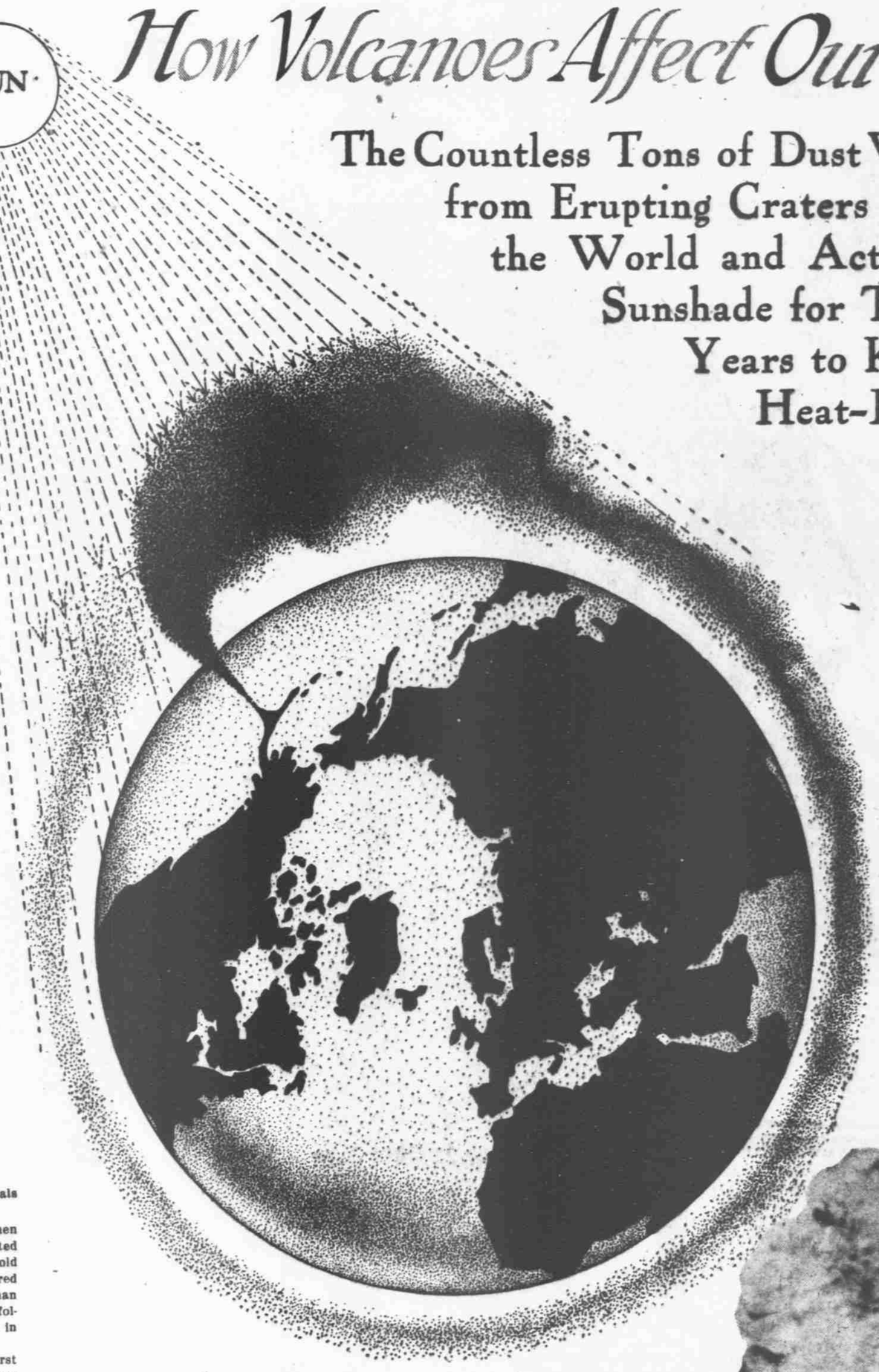
Most volcanoes are arranged in batteries and are liable to "go off" in a bunch. There has always been a marked and obvious sympathy between Vesuvius, near Naples, and Etna, on the island of Sicily, and when one is active the other at least threatens eruption. The whole island of Martinique is a volcanic ash-pile, marking the place where ages ago a vent opened in the sea-bottom, two miles beneath. There were a number of such vents in that neighborhood, each of them marked to-day by a volcano rising out of the ocean. Together these volcanoes form a battery, their chimneys communicating with the same interior furnace.

The only "burning mountain" in the United States is Lassen Peak, in California. It is a real volcano and fully active, though emitting streams of lava not oftener than once in a while. Its most important eruption within recent times occurred in 1914. Though relatively mild, as volcanoes go, Lassen Peak has enough fire inside of it to run continuously all the factories in this country.

There was a time not very long ago, geologically speaking, when all of our far West was literally a land of fire, the mountains now so majestically reposeful throwing out rivers of molten rock from the bowels of the earth. The stuff they threw out is still to be seen, as cooled lava, covering thousands of square miles of territory to a depth of hundreds of feet.

The Weather Bureau, in the light of its recently acquired knowledge, says that any long-continued series of volcanic outbursts—no matter in what part of the world they occurred—might radically alter our climate for an indefinite period. In fact, if great enough, they might bring another Age of Ice, causing all of the United States to be covered with an ice sheet thick enough to bury our cities.

And this calamity would be brought about by no other agency than dense clouds of volcanic dust suspended high in the atmosphere and shutting off the heat of the sun!



Incalculable Quantities of Dust Thrown High in Air During a Volcanic Eruption Are Caught by the Winds of the Upper Atmosphere and Drift for Years Around Our Earth, Cutting Off, Like a Parasol, the Heat Rays of the Sun, as Shown in This Diagram. The Volcano Pictured Is Katmai, in Alasha, Whose Crater Is Ten Miles in Circumference, and This Measurement Gives Us Some Faint Idea of the Incredible Masses of Matter Such Earth Chimneys Can Eject

An Eruption of the Great Mexican Volcano Colima in Its Initial Stages. Here Is Seen an Enormous Pillar of Smoke, Dust and Ashes Rising Miles Into the Sky to Be Carried by the Winds Throughout the Whole Upper Atmosphere.